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The Canadian Field-Naturalist

VOL. XL OTTAWA, ONTARIO, JANUARY, 1926 No. 1

FISHES COLLECTED IN NEWFOUNDLAND DURING THE AUTUMN OF 1922

By FRITS JOHANSEN

INTRODUCTION

BEYOND the fishes of economic importance (cod, salmon, trout, etc.), little is known, and still less has been published, about the fishes inhabiting the freshwater bodies and shore-waters of Newfoundland. Much has been written about the famous cod-fishing banks off the S.E. coast of Newfoundland (The Grand Banks); and the numerous rivers and lakes of the interior of the island are well known to the enthusiastic angler or tourist as a paradise for salmon and trout, as duly recorded in various articles and books.

When, however, one takes up the question of the Newfoundland fauna, from a more scientific point of view, and asks what animals inhabit the freshwater bodies and shore waters of the island, the information we have so far is very meagre. This is partly owing to the fact that the Newfoundlanders themselves up to very recently have been content with economic investigations, in so far as the natural history of their island is concerned, treating the cod-fishery, the minerals, forests, etc. And as Newfoundland, politically, belongs neither to Canada nor the United States, it has not been included in the regular natural history surveys and field-work carried out by these two countries, though much nearer to the centres of population than Alaska and the Canadian Arctic. As is well known, Newfoundland is the oldest crown-colony in the British Empire and leans, economically and culturally, more upon Great Britain than upon Canada, though geographically it is a part of the latter. The lion's share of the economic and scientific investigations carried on in Newfoundland by outsiders, has therefore, been financed and carried out from the British Isles, and they were, until the island became a Dominion, practically the only ones. Particularly the mammals and birds, and the vegetation (both terrestrial and marine) have in later years come in for some attention by naturalists in the United States, (both museum-studies and field-work), and the deep waters surrounding the island have been investigated by scientific expeditions from France, Scandinavia, United States, etc.

It is, however, altogether proper that Newfoundland's nearest neighbour, Canada, which has resources, wealth and population far surpassing those of the island, should assist it in solving many of the problems connected with the proper utilization of its natural resources, also because these problems are largely our own. Newfoundland forms the east side of the Gulf of St. Lawrence, and deflects the enormous masses of arctic ice moving south from our shores. Its physiography, fauna and flora (both on land and in the sea) are eastern Canadian; its principal industries are the same as at our Atlantic sea-board; its population consists of English and Acadian French, with history and present relations in common with us; and the island forms the gateway to the Dominion of Canada from the sea, and is greeted in gratitude and hope both by the Canadian returning from abroad, and by the immigrant.

As is well known, sea-fishing is by far the most important industry of Newfoundland, both as to the income from it, and as to the resources and number of people engaged in it. The sea "fishing" falls into two main categories, viz.: the pelagic hunting of seals upon the ice in the spring from schooners fitted out for the purpose in St. Johns; and the fishing for cod, etc., from shore in smaller boats or in schooners upon the banks off the island. It has long been realized that a proper utilization and development of the sea-fisheries (as of every other industry) depends largely upon the gathering of scientific information and conducting of experiments; in this case, observations on the food, animals, currents, etc., of importance to the fishes, and on the life history of the latter. What has Canada then done with regard to this, in so far as Newfoundland is concerned? It is not very much, judging from the literature, but it is gratifying to know, that the last years have seen more accomplished by Canada than was done in as many centuries preceding them.

As the title to this article infers, I shall limit myself here to Canadian, scientific observations

FIG. 1—*Entrance to St. Johns, Nfld., showing shacks and platforms for drying cod.*
F. Johansen photo

on the fishes inhabiting the freshwater bodies and shore waters of Newfoundland.

In the National Collections here in Ottawa is a 7 cm. long Stickleback (*Gasterosteus*) apparently collected by the *Diana* Expedition in November, 1897, at St. Johns, Nfld. (Cat. No. 40). I sent it to Prof. P. Cox, in Fredricton, N.B., who states about it: "I cannot distinguish this specimen from the usual type of the marine *G. bispinosus* of our coasts which I believe it to be." This record is now published for the first time.

The next contribution to our subject, by Canada, is apparently the investigations carried out by the Canadian Fisheries Expedition under Dr. J. Hjort, in 1915. A great amount of pelagic (plankton) material was secured by the *Acadia*, *Princess* and *33* off the south and west coasts of Newfoundland, as recorded in the report on this expedition published in Ottawa in 1919 (see *Canadian Field-Naturalist* for October, 1923, pp. 139-40.). The stations near the shores of Newfoundland are *Acadia* Nos. 36, 83, and *Princess* Nos. 18-20, 44-46 (see figs. 4-5 in the report referred to; fig. 4 should be fig. 5, and fig. 5 should be fig. 4). The drifter *33* also secured fish-eggs and larvae at the west coast of Newfoundland. The fish-eggs and larvae secured are treated by A. Dannevig on pp. 1-74, 3 plates, in the report; and the Newfoundland records will be found on pp. 5-7 (*Ctenolabrus adsperus*), 9-11 (*Scomber scombrus*), 12-14 (*Sebastes marinus*), 17 (*Glyptocephalus cynoglossus*), 18-21 (*Drepanopsetta platessoides*), 22-28 (Gadidae), 29 (*Ammodytes tobianus*), 30-32 (*Mallotus villosus*); and a discussion and lists of them on pp. 33-41, 51-73; while Newfoundland specimens are figured on Plates I, fig. 6, and III, figs. 18, 26-27. The drifter *33* also secured by seine and shrimp trawl some shore-fishes on the west coast of Newfoundland in August, 1915; but these have not yet been recorded, apart from the Long Rough Dab (*D. platessoides*; see Huntsman, 1918, frontispiece, and on pp. 7, 17, 20, 22-26), and the Cunner (*Tautogolabrus adspersus*; see Johansen, 1925. p. 427).

In the summer of 1923, the Canadian Biological Board carried on in the *Prince* and the C.G.S. *Arleux*, under Dr. A. G. Huntsman, detailed marine investigations in the strait of Belle Isle and neighboring waters, at the north-end of Newfoundland; but the fishes secured on this expedition have not yet been published, apart from some references to them (from a hydrographic point of view) by Huntsman in *Contrib. Canad. Biol.*, New Ser., Vol. II, Toronto, 1924; and my record of the occurrences of the Cunner at the Newfoundland side of the Strait (1925, p. 465).

MY EXCURSION IN 1922

After a three weeks' stay in Gaspé, during which time I collected a number of marine and freshwater specimens which will be recorded in another article, I reached Charlottetown, on Prince Edward Island, August 22. I remained only a day and a half on this island, but during this time I secured both freshwater amphipods (*Gammarus fasciatus*) in a lake nearby, as also

Sticklebacks (*Gasterosteus gladiunculus*) and plankton in the harbour, and different small invertebrates attached to the sea-weeds covering the piers here. Heavy rains prevented longer excursions.

I then left on SS. *Manoa* for St. Johns, Nfld., direct; and, after a somewhat stormy passage arrived there on August 24th. After getting ashore, I acquainted myself with the town, particularly the interesting, but neglected, Museum, and the immediate surroundings in company with my friend, Mr. Arthur English, who is much interested in natural history, and knows the island so well. The entrance to St. Johns Harbour is magnificent, with its towering, almost bare, granite coast washed by the sea, and a rather narrow channel leading to the spacious harbour, lined on both sides below with shacks and platforms for the curing and drying of cod-fish (see fig. 1). At the highest point on the north side, facing the sea, nestles the signal-station, from where one has a wonderful view of the Capital and its surroundings, and far out to sea. The city itself, covers a wide area around the harbour (basin) and up the hillsides, and the major part of it lies on the north side of the harbour (where the country is lower and more open), and encloses half a dozen ponds, the largest of which is called Quidi Vidi Lake, and has an outlet to the sea two miles north of St. Johns, where an old fishing village surrounds a protected cove, with high cliffs all around. The soil around St. Johns is very stony; but a little farming is carried on in the outskirts, and there are patches and ridges with fair-sized spruce, larch, pine, etc., even close to the city, which also contains an extensive park. The hillsides are green with verdure and a profusion of berries, and in their lower parts shrubbery of willows, alder, etc., while bogs surround the occasional ponds.

The day after my arrival, Mr. English and I spent in an excursion to Quidi Vidi village, one of the oldest settlements on Newfoundland. It contains some picturesque old houses, and the lagoon-like harbour, which communicates with the sea by a very narrow entrance, is littered with refuse from the fishing-shacks and platforms (made of spruce posts and boughs) alongside it. Of fishes only Sticklebacks (probably *Gasterosteus bispinosus*) were observed in the harbour and an adjoining freshwater pond, and I kept three specimens, $2\frac{1}{2}$-4 cm. long. Some marine algae and invertebrates were also collected in the harbour and in a pocket nearby, where the waves from the Atlantic surge to and fro, and wash up *Laminaria*, shells, etc.

In the afternoon, we visited Oxenham and Burton's Pond and the ponds at the sand pits, but no fishes were found, though I secured specimens of the (introduced) Green frog (*Rana clamitans*), and a number of invertebrates, besides insects, land-snails, etc. I also got a good impression of the havoc wrought by insect-pests to the spruce trees here, and had supper on Mr. English's farm.

FIG. 2—*The beach at Kelligrews, Conception Bay, Nfld., looking west towards limestone-point.*
F. Johansen photo

The next day I took the train in the morning for Conception Bay, west of St. Johns, on the north side of Avalon Peninsula. After a ride of an hour and a half through the valley, I reached Kelligrews, where I got off and walked along the beach towards the bottom of the bay, where the dome-shaped Holyrood Mountain is a conspicuous landmark. The bottom of Conception Bay is entirely different from the coast of St. Johns, being a low limestone coast with extensive gravel-flats or boulder-beach. At Kelligrews lagoons and marshes gradually merge into the open country behind, but a little further south along the east coast of the bay the sea washes directly upon the land, and increases the number of boulders protecting it. The railway runs right along the beach bluffs here, and a characteristic feature of these are the tumulus-shaped, wind-swept, small spruce trees growing here and there close to the ground. The bottom of Conception Bay is very beautiful, with the rocky Bell Island (famous for its iron ore) out in the Bay, and on both sides the yellowish limestone cliffs covered with vegetation, the white gravel and green marshes, and the blue waters of the bay held in check by the boulders (see fig. 2). The villages (Topsail, Kelligrews, etc.) are therefore largely made up of summer houses owned by the people in St. Johns, who find here a more congenial climate, and a less turbulent and more accessible sea than at the Atlantic sea board.

Characteristic for the washed-up gravel-bars or flats making up the beach at Kelligrews is the large quantity of calcareous algae (*Lithothamnion*) scattered among the stones and often completely covering these or Mollusc-shells with their ramifications, so that a small pebble or shell attains many times its original size and quite loses its natural shape, though the final result is a more or less rounded growth. In the cavities of these algal encrustations, of which I kept many, were found secreted a number of certain small Molluscs (*Saxicava, Anomia, Chiton*). An empty egg-capsule of a Ray (*Raja* sp.) was also collected here. A creek-outlet (lagoon) nearby was full of small sticklebacks (*G. bispinosus*), some of which I kept and after my return submitted to Prof. P. Cox, of Fredericton, N.B. (All the Sticklebacks and *Fundulus* mentioned in this article have been identified by Prof. Cox. The other fishes I have identified myself.) Prof. Cox says about them: "Specimens of sticklebacks from 15 to 30 mm. "long, immature. In regions where the fully and "partially mailed species occur, it is often hard to "diagnose these immature stages, for the young "stickleback does not assume the armature of the "adult until it reaches a good size. However, "these specimens are neither *G. cuvieri*, nor *G. "gladiunculus*, but may be the young of *G. aculeatus*, if the species occurs in the range of which "I have no evidence, or of *G. bispinosus*. The "latter is the more probable."

A widening (freshwater pond) in a creek further down the coast also contained sticklebacks, of which I kept two 4 cm. long ones (probably *G. atkinsii*). Small brook-trout (*Salvelinus fontinalis*) were also seen jumping in the water here, but I did not succeed in catching any of them.

At this place is a small pier and a couple of fishermen's shacks, and while bathing here, I noticed a Cunner (*Tautogolabrus adspersus*) swimming around in shelter of the pier; but it refused to bite on my hook, though I secured a 13 cm. long sculpin (*Myoxocephalus scorpius groenlandicus*) this way. I did, however, find the result of a boy's more successful endeavour in the form of the head of a cunner on the pier, which I kept as this is the first record of the cunner from the east coast of Newfoundland (see Johansen, 1925, pp. 427-28). I also secured some small invertebrates secreted among the boulders at the beach here, the most interesting of which was a tiny, ball-shaped Ascidian.

Returning to Kelligrews, I paid a visit to the long limestone point forming the south (west) side of the cove at the village, and found here a small pond (cattle-pool) situated in a grassy field, where I secured various aquatic insects and Entomostraca (Ostracoda and Cladocera). A fisherman's basket-trap in the cove contained no fishes; so, after securing samples of marine plankton here, I had supper and returned to St. Johns with the train.

The next day Mr. English and I explored the Signal Hill at St. Johns. A road leads from the city to the top; and half way up lies a pond in shelter of a rock outcrop and surrounded by swamp and shrubbery. A brook carries its overflow down towards Quidi Vidi Lake below, and a bittern flew up as we approached. In this pond I secured various, mostly microscopic, invertebrates and three sticklebacks, 3-6 cm. long (*Gasterosteus cuvieri?*). We then went up to George's Pond, from where the city gets its water supply; it has a stony margin and clear water and is said to be eighteen fathoms deep. I kept samples of the filamentous algae in it, and secured also a stickleback (*G. cuvieri?*) here.

After admiring the view from the signal tower, we returned to the city by walking along the side of the mountain, where are to be seen the ruins of a stone fortification from the time an English garrison was here. Descending the slopes overgrown with shrubbery, we reached Quidi Vidi Lake, where I secured a number of invertebrates in the water and under stones and among vegetation along its margin. This lake lies on an exten-

FIG. 3—*Fishermen landing their catch at Torbay, Nfld. Note the man holding a cod aloft, and the platforms for drying fish on the slope.*

F. Johansen photo

sive plain and is thus easy of approach; the annual regatta (racing of pleasure yachts) takes place here.

The day after, I walked to Torbay, the deepest of the bays north of St. Johns. A good road runs all the way; and one gets a good impression of the inland country near St. Johns, very stony or swampy, but with fair woods and an occasional farm, surrounded by partly cleared fields. In a pond (Mud Pond) near the road at Sugar Loaf Hill, I secured tadpoles of *Rana clamitans* and different invertebrates. (The freshwater Amphipods I collected on this trip to Newfoundland have been recorded in *The Canadian Field-Naturalist*, Vol. 36, p. 178).

Torbay has a pretty location at the bottom of the bay of the same name, where a wide gravel beach forms a landing-place for the many motorboats used by the fishermen here. The village lies scattered up the surrounding hillsides; and where the latter do not fall off too steeply to the sea, are found the several stories high platforms and shacks for the curing of cod-fish, so characteristic and picturesque a feature of the settlements on the east coast of Newfoundland. Apart from its very bottom, the sides of the bay are thus everywhere formed by steep cliffs, rounded above and covered with verdure, which, with the reddish rock, white houses and blue water and sky, forms a lovely picture. I made a short cut through a gully in the cliffs down to the bottom of the bay, as the fishermen were just coming in with their catch of Cod (see fig. 3). The latter are caught by jigging, using the common squid (*Illex illicebrosus*) which is very plentiful here, as bait; and before I left in the evening, I saw all the motorboats run out to the outer part of the bay, where they anchored for "squidding". The fishing is far better here than at St. Johns, and it was interesting to observe the handling of the cod caught, after the boats had come up to the beach. The fish were emptied into small open box-sledges, each one dragged out to the boat by a small horse, and, when filled, ashore and across the gravel-beach up the slope to the shacks for cleaning, splitting and later drying upon the platforms ("flakes") by the women. This was kept up until all the boats were empty, and accompanied by much good-natured "banter" among the sturdy fishermen, all in oilskins. It was a scene I shall not soon forget, and watched with interest also by the tourists staying at the small hotel here. I kept a squid from here; and also one about 30 cm. long, female flounder (*Limanda ferruginea*) just thrown upon the beach. Specimens of the latter were also seen alive on the bottom at a depth of about two fathoms, and here I also caught a full-grown, female *Myoxocephalus groenlandicus* (not kept; bait in stomach), which species is equally common here. Lovely was it to sit in a boat and look down in the clear, blue water where millions of jelly-fish (medusae and ctenophores) of various sizes, drifted with the current and shone in all the colours of the rainbow, with the bright sun over-

head, and dozens of gulls fighting for the fish-refuse thrown overboard and drifting out to sea. I had my plankton-net out and secured, besides worms, crustacea, etc., a couple of 1-1½ mm. large fish-eggs and several tiny fish-larvae (herring?); the latter were unfortunately dissolved by the evening, as I had forgotten to bring formaldehyde with me. By wading around at low tide in the pockets among the cliffs I noticed different invertebrates attached to the large algae (*Laminaria*, etc.) growing in the water. It was too deep for wading, so I had to take off my clothes and suffer a very cold bath, but I was rewarded by getting different molluscs, crustacea and worms, and not less than sixty of the beautiful, sessile Medusae (*Lucernaria*), so difficult to distinguish in colour from the brown sea-weed to which it was attached. I then had a good supper, and enjoyed getting back to St. Johns in no time, by automobile.

Next morning I shipped off the specimens collected so far, to Ottawa, and I left with the train to explore the west side of the island. I was on the train all day and the following night and morning; and the observations, which can be made from it, are of course very limited. It was a bright, sunny day, so it was a peculiar experience when travelling along the narrow neck of land connecting the Avalon Peninsula with the rest of Newfoundland to be suddenly enveloped in a dense fog, which lasted until we got out of reach of Trinity (north side) and Placentia (south side) Bays, which almost meet here. I am told this fog is a permanent feature here, and it would gladden the heart of any Londoner to see it. After passing Bonavista Bay (which is an important fishing and whaling area), one enters the vast moorland of northern Newfoundland (The Great Barrens), practically uninhabited, except at the coast and the lumber camps up the larger rivers and lakes. Bogs, ponds and scattered growth of shrubby spruce all around, except for an occasional landmark in form of a rock outcrop as a rounded, isolated hill, sometimes dignified by being called a mountain. This used to be an eldorado for wild fowl and reindeer, but the good, old days when one could camp on the railroad track and wait for them to pass, have gone forever. After reaching the vicinity of Grand Lake (about long. 57° W.) the country became much more attractive, with good woods, plenty of shrubbery and swift-flowing streams; and from the railway one catches a glimpse of this lovely lake, the largest in Newfoundland.

At noon (on August 30) I reached Deer Lake, a widening of the famous Humber River, and went in motorboat across it to Nichol's place, which Mr. English had recommended me as a good collecting-ground. The shores of this lake are low and with close shrubbery also upon the islands it contains, but its level was at present so high, that I soon discovered I would have little success in getting any freshwater animals beyond plankton. The latter I secured, and left again in the afternoon, catching the train going east and got off at Grand Lake, where I went to Major Whitaker's bungalow hotel. He is an enthusiastic outdoor-man and amateur ornithologist, and has had great success beautifying the grounds around his premises; so it was a genuine pleasure to remain here for a day or two. That same evening I went on a reconnaissance excursion along the lake, and soon discovered it would be a very interesting and profitable place to collect.

Accordingly, Mr. Whitaker and I left the next morning for a day's trip in canoe down the lake. It was a lovely day, and I have rarely seen anything more beautiful than the wide expanse of this lake, surrounded by woods untouched by fire, lumbering and pests, right to the water's edge and up the surrounding slopes. Above them towered in the distance the more naked, rocky hilltops; and the shore was sand, gravel or boulders, and at the north end a flat bedrock floor. I am glad I have seen it, for it is now well on the way to be destroyed by the raising of the level of the lake fifteen to twenty feet in connection with the new lumber industry in the Humber valley. Mr. Whitaker told me he would soon be "drowned" out and have to move.

We crossed the lake in our canoe, and reached a place on the west side of the lake, where a creek (Rocky Brook) comes out on a sandy beach with scattered boulders (see fig. 4). In its outlet here and along the adjoining margin of the lake, I saw a number of sticklebacks and secured a dozen of them, 1¼-7 cm. long (*Gasterosteus atkinsi*). The ones more than 3 cm. long were infested in their abdominal cavity with a large Cestode (*Schistocephalus?*).

We walked up this creek until we reached a now deserted beaver-dam in it, and I secured a number of invertebrates (Molluscs, insects, Crustacea, leeches, sponges, etc.) in its different parts, attached to stones, submerged logs, etc. The lower part of this creek is surrounded by dense woods; but higher up the trees get more scattered and shrubby and the ground a swampy bog.

(*To be concluded in the February issue*)

CHRISTMAS BIRD CENSUSES, 1925

THE WINNIPEG BIRD CENSUS

DECEMBER 20th, cloudy until 3 P.M., with light snow falling all morning. Ground snow about two inches deep. Temperature, 14 degrees in morning, 10 degres in afternoon. Wind, north, light in morning strong in afternoon.

PARTY No. 1, East Kildonan to Bird's Hill, 2 to 5 P.M.: 5 species, 36 birds. A. B. Gresham, W, Kammrath, K. G. McDougal and J. Morton. At feeding station, 3 species, 13 birds. Mrs. K. J. McDougal.

PARTY No. 2, North Winnipeg, Kildonan Park, golf course and West Kildonan, 11 A.M. to 2.30 P.M.: 1 species, 6 birds. H. C. Pearce.

PARTY No. 3, North Winnipeg, at feeding station: 3 species, 5 birds. P. Kuntz.

PARTY No. 4, Weston and South Winnipeg, 9 to 11.30 A.M. and 2 to 4.30 P.M.: 5 species, 112 birds. J. J. Mott and W. H. Kavanagh in afternoon.

PARTY No. 5, Sturgeon Creek district, 1.30 to 4.30 P.M.: 7 species, 101 birds. B. W. Cartwright and A. A. McCoubrey.

PARTY No. 6, St. James, at feeding station, 6 species, 14 birds. Mrs. J. P. Baggott.

PARTY No. 7, South Winnipeg: 3 species, 163 birds. J. A. Mitchell.

PARTY No. 8, South Winnipeg: 3 species, 8 birds. A. D. J. Morgan.

PARTY No. 9, Agricultural College, Fort Garry, South Winnipeg, Tuxedo and Charleswood, 9 A.M. to 4.30 P.M. by auto from feeding ground to feeding ground: 11 species, 222 birds. C. L. Broley and A. G. Lawrence.

OBSERVATION PARTY NOS.:	1	2	3	4	5	6	7	8	9	Total
Sharp-tailed Grouse	13	..	..	4	..	..	..	..	4	21
Hairy Woodpecker	..	..	..	..	1	2	..	..	1	4
Downy Woodpecker	1	..	..	..	..	2	..	..	..	3
Blue Jay	13	..	..	1	2	3	5	4	17	45
Bronzed Grackle	..	..	..	..	..	1	..	..	..	1
Evening Grosbeak	3	..	1	..	..	..	..	..	18	22
Pine Grosbeak	8	..	..	..	20	..	..	2	16	46
Hoary Redpoll	..	..	..	..	..	..	..	..	1	1
Redpoll	..	..	3	..	19	..	..	2	100	124
Snowflake	..	6	..	77	5	..	150	..	30	268
Bohemian Waxwing	..	..	..	21	51	..	..	..	21	93
White-breasted Nuthatch	..	..	..	..	..	3	..	..	6	9
Black-capped Chickadee	11	..	..	9	3	3	8	..	8	42
Robin	..	..	1	..	..	..	..	..	..	1
Total Species	6	1	3	5	7	6	3	3	11	14
Total Birds	49	6	5	112	101	14	163	8	222	680

DOWNY WOODPECKERS SCARCE

The outstanding feature of these counts is the scarcity of the Downy Woodpecker, a species generally found at every outing in previous seasons and one of the common visitors at feeding stations. The three recorded were seen at feeding trays, none being noted afield in spite of diligent search. Have readers noticed a decrease in the number of Downies this winter, or is this merely a local fluctuation?

The second point of interest is the recording of forty-five Blue Jays. Party No. 9 recorded fifteen (there were probably more), at the M.A.C. refuse dump, and Mrs. K. J. McDougal has seven or more regularly visiting her garden.

This is a Bohemian Waxwing winter, ninety-three birds being recorded, with possibly fifty more, as Party No. 4 reports that a second flock of fifty birds were seen which may have been different to the flock recorded. The Bohemian Waxwings are somewhat erratic in their travels, but usually arrive in southern Manitoba in October and leave in April, though they may not remain in one area for this period. The same species visits northern Europe in winter, sometimes in enormous number, but we do not know if the European invasions coincide with the American, or if the birds desert the one continent in favor of the other.

CHRISTMAS BIRD CENSUS FROM LONDON, ONTARIO

Saturday, December 26th, was the day decided upon by the McIlwraith Ornithological Club for the Christmas Bird Census this year. As usual, a number of parties were sent out, three in the morning and three in the afternoon, working

pretty well from daylight until dark. The morning broke clear and cold, the thermometer standing at eight degrees at 7.30 A.M. It rose to eighteen degrees by 1 P.M., dropping back to ten degrees by 7 P.M. and during the night registered two below zero. The ground was covered by six or eight inches of snow which was somewhat added to by a storm which lasted from 9 to 11 A.M. Apart from this interval, when observation was difficult and visibility poor, the day was mostly fine and bright, although a strong and bitter north-west wind made the shelter of the woods preferable to the open country.

Morning Party No. 1, consisting of W. E. Saunders, Mrs. Dale, Will and Ralph Christianson, started in a north-easterly direction from London by auto, the objective being Bryanston, where some two or three years ago on a similar trip a wonderful list of birds had been found, including Red-bellied Woodpeckers, Red-headed Woodpeckers, Chewinks and Meadowlarks. The going was so bad, however, that they had to turn back. They then struck south-west towards Lambeth. This is a paved road and they were able to get to their destination without much difficulty. A very meager list awaited them, some four species, ten individuals being all that were noted.

Morning Party No. 2, consisted of Mr. and Mrs. E. H. McKone. Their home is situated just to the south of the city and a good list may usually be compiled without leaving their own premises. A few winters ago a Mockingbird spent some time at their place, but although no such rarity greeted them on this occasion, they found Flickers, Pheasants, Cardinals as well as the usual run of Chickadees, Downies, etc. Mr. and Mrs. McKone also visited some of the other feeding stations in South London, as well as Mount Pleasant and Oakland Cemeteries and the weedy river banks nearby. They had good success, finding 16 species, 141 individuals.

The territory covered by Morning Party No. 3 has usually proved to be the best all-round for winter work and this year was no exception to the rule. The 7.40 A.M. train was taken to Hyde Park station, some five miles west of London, and then a snowshoe tramp back towards the city winding up at Springbank Park, the rest of the journey being finished on the trolley. This party originally consisted of four members, but two of them slept in and No. 3 only arrived at the station in time to wave the train a fond farewell. He got a lift with an auto, however, and met the writer about half way back to town. This bit of country borders the river Thames and is quite varied in character. There are several heavily-wooded ravines with little streams trickling through them to the river (here a Winter Wren was found in 1923). Swamps, woods, fields, cultivated areas, cedar and hemlock groves add to the river itself in making the place very attractive to birds and the list of 21 species, 746 individuals is the result.

In the afternoon, Party No. 4, Mr. and Mrs. McKone, C. Maddeford and Reg. Werner, went to Springbank Park by auto and then covered the park thoroughly on foot. This is also good hunting ground, being a continuation of the country described in the previous paragraph, the only difference being that is it somewhat closer to the city and is also in a less natural state, having been cleaned up and trimmed up and otherwise "improved" by the Parks Board. They found the hunting very good, however, and listed 11 species, 131 individuals.

In the limited time at his disposal, C. G. Watson covered the district from where Party No. 4 left off to the city. He found things very quiet, however, only 4 species, 7 individuals coming his way.

Party No. 6, W. E. Saunders, Mr. and Mrs. Dale, Will Christianson and J. R. McLeod, went by auto to Delaware which is still farther west along the river than any of the points touched by the other parties. Drifting snow made the going heavy and few birds were seen. A pair of Bald Eagles have nested in this vicinity for several years, but although the nest stood out very prominently against the winter sky, neither of the birds put in its appearance. Only 7 species, 65 individuals were noted, which did not repay for the time and trouble taken.

A composite list of species and approximate numbers follows: Herring Gull, 3; American Merganser, 32; American Golden-eye, 2; Great Blue Heron, 1; Ruffed Grouse, 1; Pheasant, 5; Red-tailed Hawk, 1; Red-shouldered Hawk, 1; Screech Owl, 1; Hairy Woodpecker, 6; Downy Woodpecker, 21; Flicker, 2; Blue Jay, 19; Crow, 572; Starling, 35; Purple Finch, 3; Goldfinch, 3; English Sparrow, 150; Tree Sparrow, 65; Junco, 29; Song Sparrow, 1; Cardinal, 7; Brown Creeper, 8; White-breasted Nuthatch, 19; Red-breasted Nuthatch, 2; Chickadee, 87; Golden-crowned Kinglet, 32.

Total 27 species; 1108 individuals.

In addition to the above, the following have also been seen recently: Snow Bunting, Marsh Hawk, Northern Shrike, Great Horned Owl and Long-eared Owl.

E. M. S. DALE,
Chairman Census Committee.

CHRISTMAS BIRD CENSUS FROM PAKENHAM, ONTARIO

PAKENHAM, ONTARIO, December 23, 10.30 A.M. to 12.45 P.M.; 1.30 P.M. to 4.30 P.M. Fair, bright

sunshine wind north-west; 3 inches snow in fields, deeper in woods, temperature, 22 degrees at start, 14 degrees at return. Twelve miles on foot. Observers separate. Canada Ruffed Grouse, 4; Blue Jay, 3; Pine Grosbeak, 25; Snow Bunting, 27; White-breasted Nuthatch, 6; Black-capped Chickadee, 18. Total, 6 species, 83 individuals. Seen recently: Dec. 7, Crows, 3; Dec. 10, American Three-toed Woodpecker (Yellow crown and barred back distinctly noted. Bird watched for five minutes at distance of six feet); Northern Pileated Woodpecker; Dec. 12, Arctic Three-toed Woodpecker (Female. Observed at nine feet Acted nervously. Feeding at same place as American Three-toed Woodpecker); Canada Jay, 2; Dec. 17, Goldfinch; Dec. 20, Hairy Woodpecker.

EDNA G. ROSS,
ALLAN ROSS.

CHRISTMAS BIRD CENSUS OF THE BRODIE CLUB, AT TORONTO, ONTARIO, 1925

On the morning of December 23rd, 1925, two parties of members of the Brodie Club sallied forth to take a Christmas Bird Census at Toronto. One party worked in and near the eastern part of the city, where it was afield from 8.00 A.M. to 1.00 P.M. and from 2.45 P.M. to 5.00 P.M., observing from Ashbridge's Bay to Eastern Gap and return, and also from Westlake Avenue across Jones Creek and farmland to the Don River, returning down the Don River and up Jones Creek to Westlake Avenue. This party travelled a total distance of ten miles on foot. The second party worked at the western end of the city, where it was afield from 8.00 A.M. to 5.00 P.M., during which time observations were made at High Park, Sunnyside, along the lower Humber River, at Lambton Mills and Islington, and through farm areas and woodlots for three or four miles north from Islington. The second party travelled a total distance of eighteen miles on foot.

The day was generally fair, although mist and clouds obscured the sun at times, and one snow flurry of some magnitude occurred about eleven o'clock. The wind varied from west to north-west. It was rather light in the morning, but in the afternoon attained a velocity of eighteen or twenty miles an hour, which was unpleasant in open country. The temperature was 18° F. at 8.00 A.M., 26° F. at noon. In some areas the snow was half an inch deep, but in other areas the ground was bare.

The result of the census was a list of twenty-five species observed, not including the European House Sparrow. Some of the species particularly worthy of mention are the Black Duck, Arctic Three-toed Woodpecker, Cardinal and Robin.

The Black Duck was not seen at Sunnyside when that place was first visited, about 9.00 A.M., but was found there at the time of a second visit about 4.30 P.M. It kept by itself, flew strongly, and seemed to be in good condition.

The most thrilling find made by the eastern party was a female Arctic Three-toed Woodpecker, which was found in the Don Valley in the afternoon. Its note was heard and recognized, and a rush to the place whence the note came disclosed a very tame bird seeking food in an old stump. There are other reports of this species in the Toronto region this fall and winter, indicating a certain amount of southward migration.

The chief "thriller" of the western party came when a female Cardinal was found among wild grapevines in a small ravine, tributary to the Humber Valley, near Lambton Mills. This bird showed little alarm, and was viewed with ease at close range from various directions.

Another moment of delighted interest came to this party when, rather late in the afternoon, a sturdy-looking Robin was found perched in a small, bare sumac bush near the Humber.

Exceptionally favorable circumstances accompanied the observation of each of the three species of Hawk recorded, for in each case the Hawk was seen at close range for some little time, so that, with the aid of binoculars, its distinctive characters were clearly noted, and the bird was identified with certainty.

While the observations which have been described individually above were particularly noteworthy, moments of interest abounded throughout the day, and all who took part in the census found much pleasure in it.

The absence of the Crow, Snow Bunting, Redpoll, Hairy Woodpecker, Red-breasted Nuthatch, and Golden-crowned Kinglet from the bird population observed is of interest, especially for comparison with other years.

The list of species observed is as follows: Great Black-backed Gull, 5; Herring Gull, 281; Ring-billed Gull, 4; American Merganser, 10; Black Duck, 1; American Golden-eye, 15; Old Squaw, 4; Sharp-shinned Hawk, 1; Rough-legged Hawk, 2; Sparrow Hawk, 1; Great Horned Owl, 1; Downy Woodpecker, 12; Arctic Three-toed Woodpecker, 1; Blue Jay, 2; Starling, 65; Purple Finch, 4; Tree Sparrow, 74; Slate-colored Junco, 16; Song Sparrow, 1; Cardinal, 1; Northern Shrike, 1; Brown Creeper, 1; White-breasted Nuthatch, 10; Chickadee, 59; Robin, 1. Total, 25 species, 573 individuals. J. L. Baillie Jr., Paul Harrington, Harrison F. Lewis, L. L. Snyder, F. A. E. Starr. (Members of Brodie Club.)

CHRISTMAS BIRD CENSUS AT TORONTO, DECEMBER 25, 1925

Only 7° of frost, a light west wind, and a sky which by 9 A.M. had almost totally cleared, afforded Toronto an ideal day for Nature Observation. A light snow had fallen the night before and now lay over all, and bore down the evergreen boughs in a way so typical of the season.

Two parties from the Toronto Field-Naturalists' Club went out; one through High Park and along the lake shore to the south, the other up the Don Valley at the north-east of the city. The total number of observers in both parties was twelve.

Naturally the party visiting the lake front saw not only many more species of birds, but a far greater number of individuals of each species. The condition of the weather for several days previous was such that the lake and quieter waters inside the breakwater remained more or less open, giving a safe harbor for water-fowl. Both parties agreed that bird-life in the woodlands was meagre considering the clear, still weather of Christmas Day.

The combined observations of both parties were as follows: Black-backed Gull, 4; Herring Gull, 38; Ring-billed Gull, 2; American Merganser, 14; Greater Scaup Duck, 15; American Golden-eye, 39; Old Squaw, 49; Hairy Woodpecker, 1; Downy Woodpecker, 4; Blue Jay, 1; Bronzed Grackle, 3; Starling, 10; American Crossbill, 10; Pine Siskin, 3; Snow Bunting, 30; Tree Sparrow, 16; Brown Creeper, 1; White-breasted Nuthatch, 7; Chickadee, 30. Total, 19 species, 277 individuals.

To the above may be added one large hawk seen at distance, species undiscernable.

It is interesting to add that such birds as Rough-legged Hawks and flocks of Bohemian Waxwings have been seen at Toronto recently. This, with the presence of the American Crossbills seems to promise a winter of surprises in way of wandering species.

STUART L. THOMPSON,
JAMES L. BAILLIE.

CHRISTMAS BIRD CENSUS AT HAMILTON, ONTARIO, 1925

December 26, 9 A.M. to 1.45 P.M. Mostly clear, but partly very lightly overcast; 6 inches of snow; very light but penetrating north wind; temperature 5° at start, 8° at return. South-east, south, and west limits of city, among trees and in open, parks, gardens, golf courses, and waste land, and south shore of Dundas Marsh. Fifteen miles on foot. Observers in four parties. Herring Gull 254; Duck (unidentified), 1; Hairy Woodpecker, 3; Downy Woodpecker, 8; Blue Jay, 3; Crow, 4; European Starling, 4; Redpoll, 3; Tree Sparrow, 53 (3 singly and 2 flocks of 5 and 45); Slate-coloured Junco, 7; Song Sparrow, 1; Cedar Waxwing, 1; Brown Creeper, 1; White-breasted Nuthatch, 8; Black-capped Chickadee, 32. Total, 15 species, 383 individuals. The Song Sparrow was in the locality where the species was seen during the census of 1924, and was seen by the same observer, G. O. McM. Also reported recently: Meadowlark, 1; Vesper Sparrow, 1; (G. O. McM.), Dec. 19.—Mrs. F. E. MacLoghlin, Misses Greta Bauer, E. O. Smith, and H. E. Downey, Dr. G. O. McMillan, Messrs. H. C. Nunn, Roger Nunn, D. A. Baxter, Earl Edmunds, Roland Brown (The Hamilton Bird Protection Society Inc.).

CHRISTMAS BIRD CENSUS FROM LAKE COWICHAN, B.C.

Taken on 27th December, 1925, at Lake Cowichan, B.C. Third mild sunny day after a month of mild rainy weather. No snow on 5,000 ft. mountain tops, where there usually would be several feet on a normal year.

Western Grebe, 2; Horned Grebe, 8; Pied-billed Grebe, 10; Loon, 1; Marbled Murrelet, 24; Glaucous-winged Gull, 40; Mallard, 4; Scaup Duck, 25; Ring-necked Duck, 10; Golden-eye, 10; Buffle-head, 25; Surf Scoter, 1; Northwestern Coast Heron, 2; Coot, 35; Oregon Ruffed Grouse, 2; Belted Kingfisher, 3; Steller's Jay, 4; Pine Siskin, 30; Oregon Junco, 6; Rusty Song Sparrow, 4; Oregon Towhee, 2; Chestnut-backed Chickadee, 40; Western Golden-crowned Kinglet, 15; Varied Thrush, 2. 24 species, 305 individuals.

G. BUCHANAN SIMPSON,
Game Warden and
Provincial Constable.

CHRISTMAS BIRD CENSUS FROM EASTEND, SASKATCHEWAN

Gower Ranch, Eastend, S.W. Saskatchewan. December 25th. Temperature 10°-18°, westerly breeze, cloudy; but cleared at noon. Two inches of snow all over, no drifts. 9.30 A.M.-12.30 noon. Walked up Frenchman River valley and climbed 500 feet to the open prairie on south side. Obliged to return home at noon. 2.30 P.M.-4.30 P.M. Walked up wooded ravine on north side. About seven miles altogether.

Sharp-tailed Grouse, 5; Hungarian Partridge, 7; Horned Owl, 2; Horned Lark, 5; Magpie, 20±; Pine Grosbeak 7; Redpoll, 12; Snow Bunting, 10; Bohemian Waxwing, 50±; Chickadee, 2. Species, 10; individuals, 120.

L. B. POTTER.

CHRISTMAS BIRD CENSUS AT OKANAGAN LANDING, B.C., 1925

Okanagan Landing District, British Columbia, December 24th, 1925. 8.00 A.M. to 12.15 P.M.; 2.00 P.M. to 3.30 P.M.

District covered—brushy lake shore and timbered hillside on east side of Okanagan Lake, beach at north end of Okanagan Lake; bottom land along Long Lake Creek. Five miles by automobile, five miles on foot. Weather mild and a heavy fog descending to within 300 feet of the lake level; six inches of wet snow in the hills and snow in patches along the lower levels. Birds inactive and silent.

Horned Grebe, 2; Herring Gull, 2; Canvasback, 10; Scaup Duck, 6; Coot, 1,200; Gray Ruffed Grouse, 2; Mongolian Pheasant, 2; European Gray Partridge, 9; Short-eared Owl, 1; Red-shafted Flicker, 2; Magpie, 9; British Columbia Evening Grosbeak, 27; Rocky Mountain Pine Grosbeak, 30; Redpoll, 120; Rusty Song Sparrow, 1; House Sparrow, 18; Slate-colored Junco, 1; Shufeldt's Junco, 13; Rocky Mountain Creeper, 1; Slender-billed Nuthatch, 7; Long-tailed Chickadee, 5; Mountain Chickadee, 24; Chestnut-backed Chickadee, 1. Total, 24 species, 1,494 individuals.

J. A. MUNRO.

CHRISTMAS BIRD CENSUS FROM HORSESHOE DISTRICT, SULLIVAN LAKE, ALBERTA

It seems to have become a regular habit with certain bird lovers living in Eastern Canada to take a census of birds at Christmas time, and, while the compilation of a list of the birds to be found in any one district at that time may not be of scientific importance, it always makes interesting reading to bird lovers living in other parts of the world.

Although readers of the *C.F.-N.* have been entertained many times by descriptions of census taking in the Eastern Provinces and British Columbia, I do not remember anything of the kind coming from the three Prairie Provinces, so I made up my mind that I would try to remedy the deficiency this year. The district in which my farm is situated is the horse-shoe-shaped area lying between the northern arms of Sullivan Lake, and is, roughly, five miles long and the same in greatest width.

Most of the land is under cultivation, but several quarter-sections are still untouched by the plow. Along the east arm of the lake, bluffs of Aspen, Poplar, Willow, Choke Cherry and Saskatoon Berry are plentiful, but the west side of the district is treeless. In planning my Christmas Day walk, I decided that it would be better to keep to the east side for the greater part of the trip, as it was in the bluffs of trees that I expected to find most of the feathered inhabitants of the district. Consequently, of the twelve miles covered between eleven o'clock and three-thirty P.M., only four miles was over open prairie.

The weather was mild and fine, but during the latter part of the trip it became quite foggy, making it impossible to see birds that were more than fifty yards distant.

The going was fairly heavy, about six inches of snow having recently fallen.

Of the birds seen, the two Crows are especially interesting. One of them is obviously a hand-reared bird, the tips of both wings being clipped. I first saw it on November 12th, and it kept near the farm buildings most of the time. On November 28th, it was joined by another Crow and this bird shows no sign of having been a captive. Both birds are still here (December 29th).

The Great Horned Owl has also been here for several weeks, but a Goshawk, which has been on the place for some time, failed to show up on census-day, although I saw it on the 26th. Snow Buntings, which had simply swarmed in the district during the three days preceding the 25th, had moved elsewhere for their Christmas dinner. The same applies to Pine Grosbeaks, not one being seen during the walk.

Had this census been taken on any previous Christmas Day, several Ruffed Grouse would have gained a place on the list, but, alas; the "Ruffies" are no more. Three broods were hatched on my farm last spring and were always in evidence until the beginning of September. At that time Goshawks began to appear in numbers and their advent coincided with the complete disappearance of the Ruffed Grouse. I saw one male bird on September 16th, but since that date I have failed to find a trace of them. During the day, three large flocks of Redpolls were seen. Many of these were very pale in colour, and, while the majority of the birds were undoubtedly *A. linaria linaria*, I think there was a great many *A. l. exilipes* among them.

Of the game birds seen, two species, the Prairie Hen (*Tympanuchus a. americanus*) and the European Grey Partridge (*Perdix perdix*) are noteworthy as being comparatively new to the district. The former seems to have reached this locality about 1919, and has thriven and multiplied wonderfully well. The first Partridges also appeared in 1919, and are increasing at such a rate that in another two years they will easily outnumber our native game birds. In the twelve mile walk, I saw eleven coveys, averaging six birds to the covey. Altogether, the trip was successful and interesting and

I do not know of a more delightful way of spending Christmas Day for the lover of birds. The following is a complete list of birds seen during the walk.

Pinnated Grouse, 38 (one flock of eighteen); Sharp-tailed Grouse, 63; European Grey Partridge, 67 (in eleven coveys); Eagle (sp.?), 1; Snowy Owl, 5; Hawk Owl, 1; Great Horned Owl, 1; Short-eared Owl, 8 (five of these birds were together); Downy Woodpecker, 2; Crow, 2; Magpie, 9; Redpoll, 500 (number estimated. Three large flocks seen); Snow Bunting, 12; Horned Lark, 5; Northern Shrike, 4; Black-capped Chickadee, 14; English Sparrow, 16; Bohemian Waxwing, 9. Total species, 18. Total number of birds seen (excluding Redpolls): 257.

T. E. RANDALL.

CHRISTMAS BIRD CENSUS AT OTTAWA, ONTARIO-HULL, QUEBEC

The Annual Christmas Bird Census of the Ottawa Field-Naturalists' Club was taken by 14 people on December 27, 1925. Seven different routes were occupied. These have been fairly definitely established, although a few minor changes were necessary to meet circumstances this year, and following the precedent established by Dr. R. E. DeLury in *The Canadian Field-Naturalist*, XXXIX, page 24, January, 1925, the records for each route are given in a table. Where an established route was unoccupied, its number has been left blank, and routes which were not given a number because unoccupied in the 1925 census have been given new numbers.

FIRST PARTY: C. L. Patch, R. S. Finnie, W. H. Lancely, east along the south bank of the Ottawa River; 10 miles; 11 A.M. to 4.25 P.M. SECOND PARTY: C. E. Johnson, S.S.E. from Billing's Bridge along the Metcalfe Road; 12 miles; 9 A.M. to 2 P.M. THIRD PARTY: D. B. DeLury, R. E. DeLury and A. H. Brown (D. B. DeLury was the only one to cover the entire route); south through the Experimental Farm along the Rideau Canal and River to Black Rapids; 16 miles; 8.45 A.M. to 2.45 P.M. FOURTH PARTY: C. B. Hutchings, south-west along the south bank of the Ottawa River to Britannia; 6 miles; 9.30 A.M. to 12 noon. FIFTH PARTY: B. A. Fauvel and Hoyes Lloyd, Aylmer, P.Q., Lake Deschenes, Rivermead Golf Club; 9 miles; 8.40 A.M. to 3.45 P.M. SIXTH PARTY: A. G. Kingston, R. D. Lockwood and Harlow Wright, Fairy Lake vicinity; 4 miles; 8.30 A.M. to 11.45 A.M. Route 7 vacant. SEVENTH PARTY took Route No. 8, unoccupied last year, D. Blakely, easterly along the north bank of the Ottawa River from Gatineau Point, P.Q.; 15 miles; 8.30 A.M. to 3.00 P.M. The day was very cold, the thermometer reading 18°F. below zero at 8 A.M., and 5° below at 3 P.M. Cloudiness varied from ten per cent to complete at noon; it was snowing at 3 P.M.; the wind was moderately strong and cold, westerly and north-westerly; ground snow-covered about ten inches, and snow drifting as well. The "moderately strong" term used in connection with this wind is an official description and most of the people who took part in the census will question it, for there seemed to be nothing moderate in the biting breeze that drove both birds and census takers to any shelter there might be. No effects more serious than minor frost bites were reported by the observers.

SPECIES	ROUTE NUMBER							
	1	2	3	4	5	6	8	Totals
American Golden-eye	..	...	...	..	11	..	..	11
Merganser (sp.?)	..	...	6	..	..	..	..	6
Ruffed Grouse	..	2	1	..	..	..	..	3
Hairy Woodpecker	2	...	...	..	..	..	1	3
Downy Woodpecker	..	1	...	..	..	..	..	1
Crow	..	386	147	..	1	..	..	534
Starling	..	18	...	..	1	..	..	19
Pine Grosbeak	..	2	10	..	3	..	..	15
Redpoll	..	...	...	..	33	..	..	33
Snow Bunting	36	...	...	..	..	..	20	56
Northern Shrike	1	...	1	..	..	..	..	2
White-breasted Nuthatch	..	2	3	..	..	..	1	6
Black-capped Chickadee	14	12	9	..	5	9	3	52
Total Birds	53	423	177	0	54	9	25	741
Total Species	4	7	7	0	6	1	4	13

One starling was seen at Aylmer, P.Q., the rest at the Bronson Avenue garbage dump. Pine Siskins were entirely absent, and if this one species had been present in last year's numbers, our census

would have approximated last year's in total number of birds seen. As it is we are low in both number of species seen and total of birds seen. An occasional Robin has been reported up till a few days before Christmas, but none were found on our census day.

HOYES LLOYD.

CHRISTMAS BIRD CENSUS AT CAMROSE, ALBERTA

Camrose, Alberta, Canada (to Battle River Bridge and back), December 20th, 10.30 A.M. to 4.30 P.M. Cloudy, heavy coating of hoar frost on trees. One inch of snow. Wind north-west, light. Temperature at start 20 above, at return, 24 above. Twenty miles by auto, ten miles on foot. Observers together. Sharp-tailed Grouse, 10; American Goshawk, 3; American Rough-legged Hawk, 3; Northern Hairy Woodpecker, 1; Nelson Downy Woodpecker, 2; American Magpie, 2; Blue Jay, 1; Pine Grosbeak, 40; Redpoll, 50; Snowflake, 1; Long-tailed Chickadee, 40. Total, 11 species, about 153 individuals. Found dead Pine Grosbeak at entrance to weasel hole, all flesh eaten, skin and feathers in good shape. Believe weasels killed many of these birds while feeding close to ground. On 17th instant, saw Snowy Owl, Richardson's Merlin and Northern Shrike.

FRANK FARLEY,
ARTHUR TWOMEY.

(*In a letter, Mr. Farley gives the following additional information.* —ED.)

The Rough-legged Hawks are the first real winter records for the vicinity. They are spending the winter along with a number of Goshawks, in the large hay meadows and in the clumps of spruce along the river. The Goshawks cover the surrounding country and farmers claim that they are very destructive to poultry. They are also very hard on Ruffed and Sharp-tailed Grouse. The Rough-legged Hawks are usually found about the hay stacks and no doubt live upon mice. In the spruce at the river we have found this winter four new birds for this part of the country: Brown Creeper, Hudsonian Chickadee, Arctic Three-toed Woodpecker and American Three-toed Woodpecker. This is interesting because the entire vicinity is devoted to agriculture and we are at least sixty miles from any large areas of coniferous forest.

CHRISTMAS BIRD CENSUS OF WELLINGTON FIELD-NATURALISTS' CLUB, GUELPH, ONTARIO, 1925

Guelph, Ontario (along south-easterly bank of River Speed into Puslinch Township below Hanlon's Creek and return), December 27th; 8.35 A.M. to 12.35 P.M. Brilliant sunshine. 5 to 7 inches of snow; west wind, light; temperature 18° below zero at start, and 3° above zero on return. About 8 miles on foot. Observers together most of time. American Merganser 19; American Golden-eye, 1; Belted Kingfisher, 1 (seen twice and characteristic rattle heard several times); Hairy Woodpecker, 1; Northern Downy Woodpecker, 6; Pine Siskin, 50+ (seen repeatedly in one flock at close range); Snowflakes, 25+; Winter Wren, 1 (seen several times within 30 feet with 8X glasses and note heard); Brown Creeper, 1; White-breasted Nuthatch, 3; Red-breasted Nuthatch, 1; Black-capped Chickadee, 75+; Golden-crowned Kinglet, 2. Total, 13 species, 186+ individuals.

R. E. BARBER,
I. MULLER,
H. HOWITT.

Guelph, Ontario, December 25th, 1925. Day bright and sunny; light wind, west to north-west; temperature at starting 30° above zero; temperature at end of trip, 20° above zero. The same ground covered as in enclosed official census of Wellington Field-Naturalists' Club, except that I returned along the west bank of Speed River. About 8 miles on foot. 12 A.M. to 4.25 P.M.

American Merganser, 16; Great Blue Heron, 2; Ruffed Grouse, 1; Downy Woodpecker, 1; Crow, 1; Goldfinch, 4; Pine Siskin, 4; Slate-colored Junco, 1; Brown Creeper, 1; White-breasted Nuthatch, 1; Black-capped Chickadee, 11. Total, 11 species, 43 individuals.

ROBT. E. BARBER.

CHRISTMAS BIRD CENSUS AT COMOX, VANCOUVER ISLAND

Comox, Vancouver Island, B.C., December 20, 1925. Temperature 45°. Weather cloudy, inclined to rain. Wind light, south (following few days of stormy weather). Distance covered: 22 miles along shore-line, Courtenay to Kye Bay. Observers in two parties: Theed Pearse, R. M. Stewart, H. M. Laing and Allan Brooks.

Western Grebe, 70; Holboell's Grebe, 40; Horned Grebe, 150; Loon, 13; Pacific Loon, 11; Red-throated Loon, 7; Marbled Murrelet, 4; Pigeon Guillemot, 3; California Murre, 1; Glaucous-winged Gull, 1,500; Western Gull, 1; Herring Gull, 2; Short-billed Gull, 50; Violet-green Cormorant, 10; American Merganser, 9; Red-breasted Merganser, 50; Hooded Merganser, 8; Mallard, 800; Widgeon, 300; Scaup Duck, 1,700; Lesser Scaup Duck, 50; American Golden-eye, 1,000; Barrow's Golden-eye, 7; Buffle-head, 500;

Long-tailed Duck, 4; Harlequin Duck, 39; American Scoter, 78; White-winged Scoter, 2,000; Surf Scoter, 2,000; Black Brant, 1; Northwestern Coast Heron, 6; Coot, 13; Red-backed Sandpiper, 1; Pheasant, 2; Oregon Ruffed Grouse, 3; Bald Eagle, 5; Gray Gyrfalcon, 1; Belted Kingfisher, 2; Hairy Woodpecker (Harris's), 4; Downy Woodpecker (Gairdner's), 2; Pileated Woodpecker, 1; Northwestern Flicker, 30; Steller's Jay, 1; Raven, 1; Northwestern Crow, 700; Western Meadowlark, 22; Brewer's Blackbird, 35; California Purple Finch, 5; Pine Siskin, 150; Oregon Junco, 50; Rusty Song Sparrow, 37; Oregon Towhee, 21; Cedar Waxwing, 4; Seattle Wren, 13; Winter Wren, 20; California Creeper, 2; Red-breasted Nuthatch, 7; Chestnut-backed Chickadee, 18; Western Golden-crowned Kinglet, 9; Varied Thrush, 12. Total, 60 species, 11,585 individuals.

REPORT OF THE COUNCIL OF THE OTTAWA FIELD-NATURALISTS' CLUB FOR 1925

Read at 47th Annual Meeting

THE business of the Ottawa Field-Naturalists' Club and the publication of *The Canadian Field-Naturalist* are transacted by a Council, elected at each Annual Meeting, and, at present, consisting of thirty members residing in Ottawa, together with the Presidents of affiliated societies who are ex-officio members. During the past year seven meetings of this Council were held, and a number of special committees of its members were appointed to carry on the special activities of the Club. The Radio Committee, headed by Mr. Hoyes Lloyd, reports a successful year and that lectures were given under the auspices of the Club each week over CNRO from December to April, with two lectures in April and one in May. The subjects of these lectures were various phases of geology, entomology, ornithology, and botany. Also, over CKCO, a number of talks by members of the Club were broadcasted on "Birds of the Week", and other natural history topics. The chairman of the Radio Committee reports that programme of talks for the coming winter have already been submitted to the radio authorities.

The Editor and Publications Committee are to be congratulated upon the high quality and interesting character of the articles published in Volume XXXIX of *The Canadian Field-Naturalist*. These articles are representative of all branches of natural history and discuss topics from various parts of Canada. During the year a special Publications Fund was established, and Council wishes to express its appreciation to the contributors to this fund. These contributions have made possible the publication of the many illustrations accompanying Volume XXXIX.

Council regrets to report that the annual grant of the Ontario Government has not yet been renewed. This grant had been paid annually by the Ontario Government for twenty-six years and its sudden cancellation put the Club in a rather serious financial condition, with the result that Council has been forced to recommend the raising of the membership fee from $1.50 to $2.00 per year. The financial difficulty, due to the cancellation of the government grant, was temporarily overcome through the energy of the past-President Mr. Hoyes Lloyd, in selling back sets of the *Naturalist* and by donations. However, it is felt that it is unwise to depend upon this as a means of future financing the publication of *The Canadian Field-Naturalist*.

The various excursions of the Club held last fall and spring proved very successful and interesting. Each excursion was well attended and much interest was aroused in Nature Study in the vicinity of Ottawa.

We are pleased to announce that the American Ornithologists' Union has accepted the invitation of the Ottawa Field-Naturalists' Club to hold its Annual Meeting in Ottawa during October, 1926. This is the first time that this Association has held its annual meeting outside of the United States, and a large attendance and an interesting meeting are anticipated.

On the whole, 1925 has been a successful year in the history of the Ottawa Field-Naturalists' Club, and Council wishes to express its appreciation for the support and co-operation of the members and affiliated societies, which has added so much to the success of all Council's undertakings.

J. F. WRIGHT,
Secretary.

ANNUAL MEETING OF THE OTTAWA FIELD-NATURALISTS' CLUB

THE 47th Annual Meeting of the Ottawa Field-Naturalists' Club was held in the auditorium of the Victoria Memorial Museum on Tuesday evening, December 1st, 1925. After the brief business session, Mr. C. M. Sternberg delivered an interesting address on "Dinosaurs and the Bad Lands of the Red Deer Valley of Alberta".

The following officers and additional members of Council were elected for the year 1926.

President.....MR. NORMAN CRIDDLE
1st Vice-President.....MR. C. L. PATCH
2nd Vice-President.....DR. E. M. KINDLE
Secretary.....DR. J. F. WRIGHT
Treasurer.....MR. B. A. FAUVEL
Additional Members of Council: MISS M. E. COWAN, MISS FAITH FYLES, MR. W. T. MACOUN, MR. G. A. MILLER, DR. H. M. AMI, DR. R. E. DELURY, DR. R. M. ANDERSON, PROFESSOR E. E. PRINCE, MR. P. A. TAVERNER, DR. M. O. MALTE, MR. H. GROH, MR. D. JENNESS, MR. H. F. LEWIS, MR. HOYES LLOYD, REV. G. A. MACDONALD, DR. MARK G. MCELHINNEY, MR. C. M. STERNBERG, MR. G. B. HUTCHINGS, MR. ARTHUR GIBSON, MR. H. I. SMITH, MR. W. J. WINTEMBERG, MR. ANDREW HALKETT, MR. C. E. JOHNSON, MR. S. W. WHITE, MR. E. G. WHITE, MR. A. G. KINGSTON, MR. NORMAN LEACH, and MR. FRITS JOHANSEN.

Auditors: A. E. BATEMAN and C. W. TWINN.

J. F. WRIGHT,
Secretary.

STATEMENT OF THE FINANCIAL STANDING OF THE OTTAWA FIELD-NATURALISTS' CLUB AT THE CLOSE OF THE YEAR 1924-25

LIABILITIES

The Graphic Publishers (Printers)	$ 138.32
Editors' Honoraria, 1925	50.00
Deficit	49.35
	$ 238.67

ASSETS

Cash on Hand and in Bank	$ 38.58
Unpaid Membership Dues, 1924	7.50
Unpaid Membership Dues, 1925	105.00
Bills Receivable	87.59
	$ 238.67

RECEIPTS

1 January, 1925

By Balance on hand	$ 9.98
MEMBERSHIP DUES—	
Current	765.59
Arrears	40.75
Advances	20.00
Affiliated Societies	83.15
Advertisements in Magazine	91.67
Back Numbers & Volumes Sold	391.06
Reprints and Illustrations	394.33
Donations	140.17
Sundries (Radio & Lecture)	21.75
Interest on Bond	27.50
	$ 1,985.95

DISBURSEMENTS

To The Graphic Publishers (Printers)	$ 1,501.11
(do) Reprints and Illustrations	366.88
(do) Job Printing and Stationery	32.94
Postage	25.87
Exchange	20.57
Balance in Bank	31.93
Balance on Hand	6.65
	$ 1,985.95

Audited and found correct.
(Sgd.) A. E. BATEMAN,
November 25th, 1925.

OTTAWA FIELD-NATURALISTS' CLUB,
BERTRAM A. FAUVEL,
Hon. Treasurer.

STATEMENT OF TRUST FUND COMMITTEE, 1925

Receipts

Cash on hand, Jan. 1st, 1925	$ 70.32
Received from R. B. Whyte Estate	100.00
Interest from Bank	4.09
Interest on $500.00 Bond	27.50
	$ 201.91

Disbursements

Interest Payment to General Club Fund, 1924-25	$ 27.50
Cash Balance	174.41
	$ 201.91
Total Assets in this Fund	$ 174.41
Victory Bond, 1934	520.00

Audited and found correct.
(Sgd.) A. E. BATEMAN, *Auditor.*
DATED 19th January, 1926.

(Sgd.) W. T. MACOUN, *Chairman*

OCCURRENCES OF FROGS ON ANTICOSTI ISLAND AND NEWFOUNDLAND

By FRITS JOHANSEN

IF ONE searches the literature for information about the occurrence of Reptiles and Batrachia upon the islands in the Gulf of St. Lawrence, apart from Prince Edward Island, one finds very little information. So much is known, however, that Reptiles are entirely absent, and that no Batrachia are native to the islands in question; but that frogs have been introduced both to Newfoundland and Anticosti Island within fairly recent times. Which species of frogs have thus been introduced and how well they have established themselves in their new home had, however, never been definitely known until I visited Newfoundland in the autumn of 1922, and Anticosti Island in the summer of 1923, and secured specimens, both of the adults and tadpoles from these two islands. These are now found in the Victoria Memorial Museum, Ottawa, where they have been identified by Mr. C. L. Patch as the Leopard Frog (*Rana pipiens*) from Anticosti Island, and the Green Frog (*Rana clamitans*) from Newfoundland. It is therefore the proper time now to bring together our present information about this matter.

The first record of the occurrence of frogs on Anticosti Island is contained in J. Schmitt's *Monographie de l'Ile Anticosti*, Paris, 1904, p. 288, where he says (translated):—

> "With the object of diminishing the number of flies (mosquitoes) at the settled parts (of the island) we introduced, in 1899, several hundreds of the common *frogs*, which, in the following year, laid their eggs in the neighbouring pools. Though young frogs thus became rather numerous, the species is now decreasing in numbers, so that one may foresee its extermination soon. The great numbers of Black Ducks (*Anas obscura* Gmel.), which arrive to breed upon the island are said to be responsible for this."

When I visited Anticosti Island in 1923, I learned from Mr. Martin-Zédé, the present Governor of the island, that these frogs had been introduced from the vicinity of Quebec City, and I soon found that Schmitt's prediction about their speedy extermination has *not* come true. I found the tadpoles numerous in the vicinity of Port Menier at Ellis Bay, in the west end of the island, particularly Lake St. George and its outlets and tributaries, as mentioned by me in *The Canadian Field-Naturalist* for November, 1924, p. 163, and several adults were seen, one of which was kept. From what I learned during my stay upon Anticosti Island the frogs (*Rana pipiens*) have apparently not spread out over the island beyond the place (the vicinity of Ellis Bay), where they were "planted" in 1899; but they have certainly increased considerably in numbers during the last twenty-five years.

Turning now to Newfoundland, we find the first record of the occurrence of frogs there, in the form of a note by E. Maret, contained in Vol. I, Part 3 of *Proc. Nova Scotia Inst. Scien.*, Halifax, 1867, p. 6, which reads:—

> "Contrary to my former experience, I find that *frogs* do exist in Newfoundland, and several colonies of them inhabit the ponds and lakes about St. Johns, though whether introduced or indigenuous, or whether the same as those of Nova Scotia, I cannot say; at all events, they are not numerous."

When I visited Newfoundland in 1922, I found frogs fairly common in the freshwater bodies around St. Johns, and secured specimens both of adults and tadpoles, as mentioned in *The Canadian Field-Naturalist* for January, 1926, pp. 3, 5. The species is, as said above, *Rana clamitans*, so common in the Maritime Provinces.

Mr. Arthur English, of St. Johns, who has a good knowledge of the natural history of Newfoundland, tells me in a letter that all the information he can give me about the subject is that these frogs occurring around St. Johns are supposed to have been introduced (with hay?) from Nova Scotia less than a century ago; that they are *not* found outside the Avalon Peninsula, and that they were first generally observed in a swampy meadow on the edge of St. Johns about thirty years ago.

We thus see an interesting parallel between the distribution (since introduction) of *R. pipiens* on Anticosti, and of *R. clamitans* on Newfoundland, namely that they have not spread much beyond the area where they were originally placed, but that both species are well established in their new home, and in years to come probably (if left undisturbed) will increase in numbers and populate a larger area, both on Anticosti and Newfoundland.

It is interesting that Batrachians are entirely absent on the Magdalen Islands, though some of the larger ones of these islands contain suitable lakes and ponds, as ascertained during my visit there in 1917. An introduction of frogs to Alright, Amherst, Grindstone and Grosse Islands, from Prince Edward Island (which has regular steamship conection with the Magdalens during the summer) would probably show as good results as has been the case on Anticosti Island and Newfoundland.

NOTES AND OBSERVATIONS

THE MEETING OF THE AMERICAN ORNITHOLOGISTS' UNION.—The Forty-third Annual Meeting of the American Ornithologists' Union was held in New York, November 9th to 12th. The first day was, as usual, devoted to routine business, the three succeeding to the reading of scientific papers through the day and various receptions, etc., in the evenings, after which visits were made to the Bronx Zoological Park and other places of interest. The Annual Dinner was held at the Manhattan Square Hotel the evening of the 11th after which the Union and its ladies were the guests of the Explorers' Club where they were entertained by a talk on the Arcturus Expedition to the Sargasso Sea and Galapagos Islands by Mr. C. Wm. Beebe and some humorous remarks on polar exploration and polar scientists by the veteran navigator, Capt. "Bob" Bartlett. Refreshments were served. Incidentally it may be remarked that this was the first time that ladies have been admitted to the sacred precincts of these historic club rooms stored with souvenirs of exploration over all the world.

The great feature of these annual meetings is of course the renewal of friendships among colleagues and the opportunity of discussing ornithological problems personally with acknowledged authorities in the science. In this the meeting was its usual great success. Canada was well represented among those present and Canada had one of her well-known ornithologists, Mr. Hoyes Lloyd, raised to the class of Members.

The next meeting of the Union will be held at Ottawa, Ontario, the middle of next October. This will be the first time it has ever held its session outside of the United States. It is hoped that Canadians will turn out well to welcome their brothers in science to these, the northern parts of their sphere of activities. We urge that as many ornithologists as possible, especially Canadians, plan well in advance to attend this meeting here in the National Capital.—P. A. T.

UNUSUAL NESTING OF THE YELLOW PALM WARBLER.—During the past two decades it has been the writer's privilege to examine not less than fifty-three nests of the Yellow Palm Warbler (*Dendroica palmarum hypochrysea*). Most of these were discovered in Annapolis County in the interior of Nova Scotia where this bird is a fairly common breeder in suitable localities. Considerable variation in the character of the nesting sites has been noted, ranging from deep depressions in the sides of damp mounds of sphagnum (or peat moss) in wet swales, to a fairly exposed position on the dry hillsides. Occasionally low spruce bushes are chosen, the nest being placed close to the trunk, often as high as one and a half feet, but in other cases only a few inches from the ground. The usual site, however, is on a dry, exposed barren contiguous to a damp or wet swale where green trees still flourish, having withstood the ravages of the forest fires which have effectually cleared the higher dry areas. These trees provide singing perches for the male, whose monotonous little trill may be heard intermittently for long periods throughout the entire day. They also attract the insect fare for both birds and provide shelter from their winged enemies.

The nests are usually concealed beneath bunches of dry brakes which have become broken and entangled by the weight of the winter's snow. The materials used are fern stalks, coarse grasses, etc., neatly lined with fine vegetable fibre, hair (usually of the deer) and feathers. The latter are very frequently those of the Spruce Grouse, which abound in the spruce swales above mentioned and numbers of which fall prey each winter to their numerous furred and feathered enemies, thus providing the little "Palms" with the coveted lining material which appears so conspicuously in their nests.

On May 25th, 1924, while traversing the barrens near the shore of a lake a Yellow Palm fluttered out under my feet, with tail spread and wings quivering in characteristic fashion. On bending down and parting the protecting brake clusters, I was surprised to find that the nest contained not only four eggs of the Yellow Palm but two of the Hermit Thrush as well, whose bright blue provided a vivid contrast to the pale, delicate eggs of the warbler. My brother, Dr. Harold F. Tufts, of Boston, was near at hand and, calling him over, we proceeded to examine the nest. It proved to be a typical one of the Hermit, being considerably larger and less cup-shaped than the Warbler's and, as is usual with this Thrush, was wholly lined with pine needles, no trace of hairs or feathers being in evidence. After carefully collecting the six eggs, we removed the nest and it was at this juncture we noticed another egg of the Yellow Palm embeded in the lining almost completely out of sight

It would seem probable that the Warbler had laid the first egg before the Thrush had completed the lining. On discovery of this, the latter had hastily added more lining in an apparent attempt to rid her home of this unsolicited and unexpected contribution. Possibly the completed nest of the Yellow Palm had been stepped upon or otherwise destroyed just at this crucial period and the

mother bird turned in her biological necessity, to the first suitable quarters available.

It seems reasonable to assume that in the struggle which inevitably ensued between the Thrush and her smaller adversary, the Warbler was victorious, as we found her apparently in undisputed possession.—R. W. TUFTS.

THE FOLLOWING FROM MY NOTEBOOK may be of interest to readers of *The Field-Naturalist.*

May 19, 1924.—I saw a female Redpoll (*Acanthis linaria*) feeding three young near our garden to-day.

The female had black chin patch—red cap very dull—whole plumage darker than in winter.

Young have no chin patch, but a sort of necklace of dark spots—underparts dull yellowish brown, spotted with darker—rump very similar.

They were all busy picking up weed seeds on the ground.

The female fed them all by regurgitation.

Call notes same as in winter.

May 24th.—Saw the young Redpolls again to-day.

Redpolls were particularly plentiful in our district all the winter of 1923-24.

I have note of a small party of females (no red breasts) on April 27th, 1924.—C. H. SNELL, Red Deer, Alta.

Phenacomys Ungava.—This year I have had the great luck to take two specimens of Phenacomys, which are probably *Ungava*, and the exceeding rarity of this genus in the East, would seem to make the specimen worth recording.

On October 5, 1925, I stopped at Franz, the junction point of the Algoma Central and the C.P. Ry., for the purpose of going down the A.C. Ry., to see the noted scenery on its course. As I had the time available, I set a line of mouse traps, and was startled and delighted to find a Phenacomys in my traps in the morning. I had intended going all the way down to the Sault and taking a train from there to Toronto, but when I found this specimen, I immediately decided to travel only part way to the Sault and come back again, that I might give the traps another opportunity, and, on the morning of the 7th, I was again delighted to find another specimen. These little mammals are of a lighter color than *Microtus* with an orange suffusion around the nose and they measure respectively: length 123 and 127 mm., tail 27 and 34; hindfoot 17 and 19.

One of these was submitted to Mr. A. B. Howell, of the National Museum, Washington, and he reports that it is a subadult and therefore its characters are possibly not fixed. Mr. Howell says: "At present the only thing to say is that there are no grounds for recognizing *celatus* and *latimanus* as distinct from *ungava.* and as we can't be sure of just what the characters of the latter are until at least several near-topotypes have been taken, we can but call everything north of the St. Lawrence and the lakes (except Labrador skins) "ungava".

The total number of specimens of Phenacomys in north-eastern America seems to be eight, so that the species is well worthy of a diligent hunt, on the part of students of mammals.—W. E. SAUNDERS.

OCCURRENCE OF THE BITTERN AND CUCKOO IN SOUTH-WESTERN SASKATCHEWAN.—There are two birds, the American Bittern (*Botaurus lentiginosus*) and the Black-billed Cuckoo (*Coccyzus erythrophthalmus*), that at one time were uncommon in this locality, then for a short period became common, and now have disappeared once more. The Bittern, when I first came to this district twenty-four years ago, might be met with occasionally along the streams or in the sloughs. At that time the beaver were starting to "come back" as a result of closer protection, after having been almost exterminated in several places.

By about the year 1908, they were fully re-established, every watercourse having its succession of dams which backed the water out, flooding the willow bush and the lower meadow land. These conditions apparently suited the Bittern, which increased in numbers proportionately, and not only was the well known "pumping" note frequently heard, but the bird itself also became a familiar figure, standing in the water or walking along its edge. In the spring of 1918, the close time for beaver was suspended and once more wholesale destruction took place. Since then the Bittern has disappeared also, and the writer has not seen or heard one for three years. But the indomitable beaver will be plentiful within the next three or four years, at the present rate, and it will be interesting to note whether or not the bittern will follow suit.

The writer saw his first Cuckoo in 1912. As is well known, the Cuckoo is one of the few enemies of the tent caterpillar, a pest which multiplied exceedingly in this district, and, I believe, in many other parts, reaching its "peak" about 1923. That year Black-billed Cuckoos were almost abundant and there was evidence of several pairs nesting here.

Last summer, on the other hand, we had practically no caterpillars nor have there been, to my knowledge, any Cuckoos in the country.—L. B. POTTER, Eastend, Saskatchewan.

REMEDY FOR POISON IVY.—Some months ago there was quite an elaborate paper in *The Naturalist* regarding the treatment of Poison Ivy, and as I

have been a sufferer from this plant for many years and have, for years, had the trouble under absolute control, I venture to trespass on your space with these notes.

The fact that every naturalist is an out-door man and therefore exposed to poisoning from *Rhus toxicodendron* and *R. venenatus*, may be sufficient reason for devoting a little space in *The Naturalist* to this subject. The writer is one of the regular sufferers from these plants, and in early life, under severe stress, discovered that hot water is practically the only treatment necessary. Not only this, but the hot water method leaves the patient in absolute comfort at all times during the attack.

Nature, aided perhaps by a gentle laxative, effects a cure for Ivy poisoning in one or more weeks, but the irritation connected with the attack is at times almost unbearable. Medical opinion seems pretty unanimous that the irritating medium is a volatile oil and therefore it is probably well to bathe the parts with alcohol or spirits of chloroform before commencing the following treatment.

As soon as the first symptoms of rash appear with the attendant itching, one equips himself with a dish of suitable size and a kettle full of boiling water. Some of this is cooled down to a bearable temperature and the affected parts are soaked in it. In half a minute one can bear it hotter and a small portion of the boiling water is then added. This procedure is repeated until no higher temperature can be endured. The parts are then left in the water for a few minutes and, when taken out, it will be found that the irritation has entirely vanished and the patient is in perfect comfort. It will be necessary to repeat this treatment in one, five or ten hours and perhaps five or ten times, but during the intervsal, comfort reigns and eventually the attack passes away, the suffering has been nil, and the inconveniences trifling.—W. E. SAUNDERS.

NOTES ON THE WHITE-WINGED CROSSBILL.—I have, during the summers of 1909, '10, '12, '13, '21, '22, '23, '24, and '25, kept fairly close check on the birds in the immediate vicinity of the Biological Station, St. Andrews, N.B., but until 1924 I had never seen any White-winged Crossbills there, though I had seen flocks of them on some of the outer islands on several occasions. On June 22nd, 1924, I came across a flock feeding on the buds of *Picea canadensis* not far from the Station, and from July 29th until September 9th, five, and possibly more, males resided in the woods behind the Station. These birds were in full song from July 29th until August 19th. The song is rich and varied, with three quite distinct parts, two of which suggest a very mellow-voiced canary. The song is delivered from the top of a spruce, and also on the wing, the bird flying, as it sings, with a somewhat hovering flight. When singing from a tree-top, the bird turns from side to side. The song has considerable carrying-power, as it can be heard at a distance of about seven hundred yards. After August 19th, the birds did not sing so much. During this period, no females or young of this species were seen.

In 1925 White-winged Crossbills were first seen in the woods behind the Station on June 29th. They may have been there previously, as I did not reach the Station until June 22nd. From that time until August 16th, only males were observed, but on that date I saw families consisting of a male, female, and four or five young. On August 30th I watched a pair, with four young, practically all day. The parents fed the young by regurgitation and apparently on comminuted seeds. The young were able to make only comparatively short flights, which suggests that they must have been reared in the vicinity. Three of the young went down beside the laboratory, sat down under the salt-water drip from the experimental jars on the laboratory roof, drank some of the salt water, and then went to sleep. I went down and caught two of them in my hands. They were in the juvenal plumage and their mandibles had not yet started to cross. I saw this family in the vicinity for three days, after which they disappeared, and no more White-winged Crossbills were seen up to the time of my departure on September 12th.—A. BROOKER KLUGH.

COAST JOINTWEED (*Polygonella articulata* (L.) Meisn.) IN THE OTTAWA DISTRICT.—That the Ottawa district is not yet utterly worked out, even for the old-time Phanerogamic botanist, was again exemplified, when on September 7, 1925, the handsome little Coast Jointweed—*Polygonella articulata* (L.) Meisn.—turned up at Constance Bay, twenty-five miles up the river from Ottawa. The writer was making his way with difficulty on a bicycle, over the "sand hills" near the summer camp on the Bay, when one of his unpremeditated stops landed him fairly in the midst of several specimens of this interesting plant in the height of flowering. Hurry to overtake his party, and failure at the moment, to realize the significance of the discovery, caused postponement of the reconnaissance of the locality which is still needed to asceratin the extent of its presence there.

This *Polygonella* is a plant of the sea-coast ranging from Maine to Florida, which has also a very local extension of range inland along the Great Lakes system. There are records for the north shore of Lake Superior (Agassiz) and the south end of Lake Huron (Dodge); and there are other more general statements of occurrence by

early explorers. There are specimens in the National Herbarium, Ottawa, from Point aux Pins, near Sault Ste. Marie, Ontario. The only records to my knowledge, from the Ottawa river, are represented by specimens in the Central Experimental Farm Herbarium from two localities besides the one now recorded. The earlier one dated September 18, 1908, was collected by A. G. Boak, at Petawawa Camp, and specimens were sent from there again this year by Mrs. (Major) H. F. Geary. In September, 1913, W. F. Grylls, Westmeath, Ontario, sent specimens collected in sandy soil near the river. The Constance Bay station would appear to be the only one found within the thirty-mile radius from the city that is taken as the Ottawa district. It would be also the closest link with the plant's coastal and northern New Hampshire distribution as given in Gray's *New Manual of Botany*.

The restricted sandy shore habitat of Coast Jointweed doubtless explains sufficiently its localized occurrence in the interior. That it should occur at all is probably a matter involved in the past geological history of the continent.—HERBERT GROH.

A NEW TROUT FROM ONTARIO.—A new trout has recently been described from Ontario (Description of the Aurora Trout (*Salvelinus timagamiensis*) a new species from Ontario. Arthur W. Henn and Wm. H. Rinkenbach. *Annals of the Carnegie Museum*, Vol. 16, pp. 131-141. 1925). The new species belongs to the *Salvelinus alpinus* group to which also belongs the Red Trout of Quebec, *S. marstoni*. The new species was secured in a small lake in Gamble Township, Timagami Forest Reserve, north of Lake Timagami, but it is known to occur in quite a number of small lakes in the same region. It is described as having "the dorsal surface uniformly iridescent dark olive-green which has a golden glint in the sunlight. The sides become paler, below the lateral line becoming silvery and gradually shading into the pure white abdomen." The spots found on the sides of most species of trout are lacking in all the specimens secured except one in which there were two spots on the left side. The species is said to reach a size of eighteen inches or even more in length.—J. R. DYMOND.

"AIMS AND METHODS IN THE STUDY OF VEGETATION."—In a communication, dated November 30th, 1925, the British Empire Vegetation Committee, appointed by the Imperial Botanical Conference, London, 1924, announces that in, an endeavour to encourage and promote the survey and study of the natural vegetation of the Empire, the Committee "is preparing to put into the hands of workers on vegetation in all parts of the Empire a book that will be useful to them, and which will also give those who may become workers some idea of the aims, opportunities and methods of work that lie before them". It is expected to be published before the middle of 1926.

The book, entitled *Aims and Methods in the Study of Vegetation*, will deal with a great variety of subjects, e.g., Plant Communities and their Structure and Development, the Methods of Investigating Vegetation, the Factors of the Habitat, Climate, Topographical Features, Soils, Influence of Man (Clearing Forest, Burning, Grazing, etc.), Fungi and Lichens, Forest Investigation in Canada and many others.

The price of the book, which will correspond as nearly as possible with the actual cost of production, will not exceed twelve shillings and sixpence.

Subscriptions should be sent at an early date, and not later than the middle of February, to the undersigned, who has undertaken to act as distributing agent.—M. O. MALTE, *Chief Botanist*, National Herbarium, Victoria Memorial Museum, Ottawa, Ont.

CANADIAN FIELD-NATURALIST PUBLICATION FUND

Statement of Receipts

Previously acknowledged	$360.00
Mr. Harrison F. Lewis	22.20
	$382.20

BOOK REVIEWS

CONTRIBUTIONS FROM THE MUSEUM OF GEOLOGY, UNIVERSITY OF MICHIGAN

Volume I.

THE STRATIGRAPHY AND FAUNA OF THE HACKBERRY STAGE OF THE UPPER DEVONIAN. *By Carroll Lane Fenton and Mildred Adams Fenton. The Macmillan Company, New York, 1924, pp. 204, pls. 45.*

The remains of the luxuriant marine life which flourished in the late stages of Devonian times are preserved in exquisite perfection in the fossils of the Devonian shales of North Central Iowa. The location of this fauna in the central part of the continent and the occurrence of some of its elements in the Upper Devonian rocks of regions as far apart as New York State, the Rocky Mountain States and the Mackenzie valley gives it a peculiar interest from the viewpoint of correlation and

palaeogeography. Everyone interested in the late Devonian rocks and faunas should therefore welcome the detailed and careful study of this fauna illustrated with several hundred photographs and drawings which Mr. and Mrs. Fenton have prepared under the above title. Not all of the 200 or more species in this fauna are taken up in this work. The stromatoporoids is one of the large groups which space limits have excluded.

The nomenclature used throughout the work differs in some respects materially from that of most geological surveys. The terms stage and substage are about equivalent to formation and member of the United States Geological Survey. The reviewer prefers formation to stage, partly because of the widely accepted usage which has been accorded the former; but the authors are responsible for continuing and not for initiating this feature of the nomenclature of the Iowa section.

The definition of zone as here used appears rather individualistic. While it may be for the particular field covered by this paper, possible to draw identical stratigraphic and faunal limits for what the authors call zones, it appears best to keep for the term zone, a strictly biological significance, which will let it either coincide with, or overstep lithologic limitations. Both *zone* and *hemera*, which is not used in this work, are most useful terms if the biological significance is retained for them. It is pleasing to see the term faunule used as freely as it is in this paper. Some palaeontologists appear to forget that such a useful term is available.

Iowa stratigraphy has furnished its full share of discussions concerned with the revision of its geological nomenclature, as the various workers in that field have disclosed new information or reacted to new interpretations of old information. The first part of the present paper is largely concerned with the question of the proper name for the beds holding the fauna described. A table of nomenclature compiled by the authors shows that the name "Lime Creek beds", first used by H. S. Williams in 1883, has priority over the "Hackberry group" of Webster by four years. The latter name, if used at all, would therefore have to be amended as was done in '97 by Calvin to include only a part of the Lime Creek beds or shales as he called them. J. M. Clarke followed Williams in 1885 in using the name Lime Creek and in 1893 Keys, accepting this term, speaks of Lime Creek shales as the name then generally used in Iowa (*Iowa Geol. Surv.*, Vol. 1, p. 57). The authors, however, have used Hackberry in the original broad sense of Webster instead of the restricted sense proposed by Calvin, on the ground apparently that "Lime Creek beds" were not given a formal definition by Williams. If all the formation names introduced in the eighties and earlier were discarded for this reason, a large crop of new formation names would be required without any evident compensating advantage.

The important and valuable contribution made by the authors to the nomenclature of the Iowa Upper Devonian section, is its division into six faunal zones.

The new genera and many new species described in this volume will make it indispensable to workers in Devonian palaeontology. One new genus of corals, *Tabulophyllum*, is accompanied by a dozen new species, while the familiar genus *Aulopora* is credited with a half dozen new species. It is rather surprising to find the ubiquitous *Atrypa riticularis* missing from the assemblage of nine protean species of Atrypa reported from this fauna. The proposal to substitute Webster's *A. devonica* for *A. reticularis* on the ground that the original definition of Linne was unsatisfactory, may be defensible on a strict interpretation of the rules of nomenclature, but the proposal to eliminate so venerable a name from the Science is not likely to evoke much enthusiasm from the majority of palaeontologists. In applying rules of nomenclature, some special consideration might well be shown for at least a few of the most venerable names in Palaeontology as well as for the man a few years out of college who can recall only half a dozen of the fossil names, including *Atrypa reticularis*, which he acquired there.

Certain of the new species and varieties, like *Schizophoria iowensis magna* may represent gerontic forms of well known species or individual reactions to some special or seasonal change of environment like salinity. However this may be, the careful description and illustration of these nonconforming types represents a valuable contribution to Devonian palaeontology. The definition of the new genera *Platyrachella* with ancestral relations to *Pseudosyrinx*, and *Cranaenella* with its curious "false syrinx" are among the valuable contributions to Palaeontology which the volume contains.

As might be expected from the imprint, the typography leaves little to be desired.—E. M. K.

RECOLLECTIONS OF MY FIFTY YEARS HUNTING AND FISHING, *by Wm. B. Mershon. The Stratford Company, Boston, Massachusetts.*

This book will prove attractive to both sportsmen and naturalists, chiefly because it portrays conditions in the wild life of the parts of the continent treated which have gone forever. Michigan is a state bordering Canada, and the changes which have occurred there have been paralleled in many parts of Canada. This is the

state with which our author is most concerned, but he treats as well of shooting expeditions to the Dakotas, to Saskatchewan, and elsewhere.

In acclimatization, he records some valuable facts of the kind that other writers have urged be recorded before they are lost. In many parts of America his remark, "the plow has taken the place of the paddle and the punt pole", is all too true, and hence the book has a very general appeal to those interested in wild life. Changes in cover, changes in the sportsmen's means of transport, changes in the numbers of hunters, drainage, lumbering, farming, have all affected the wild creatures, and, though the old-time bags seem huge, there was not one hunter then for a hundred to-day.

There is a splendid description of the dance of the Sandhill Crane, and in treating of hunting Wild Turkeys, Passenger Pigeons and other birds, as well as in describing fishing and deer hunting trips, the author presents a great deal of valuable information in an attractive and readable form. Would that all other hunters would see as well, and record so faithfully what they have seen as does Mr. Mershon.—H. L.

SAND DUNES AND SALT MARSHES, *by Charles Wendell Townsend, new edition, April, 1925. L. C. Page & Company, Boston, with an introduction by Ralph Hoffmann.*

A real field-naturalists' book, for Dr. Townsend here tells charmingly of a multitude of interesting things that a naturalist found in the intensive study of one locality for twenty years and more. As he states in his preface, "the formation of sand dunes and salt marshes is much the same the world over . . . ", and consequently our naturalist beach combers of Canada can well pay attention to his studies in a locality which must resemble many parts of our country. Mayhap, consideration of his methods may result in further valuable results from observers who consider the natural history near home savours of the commonplace, and consequently do not devote to it the attention it deserves. The book contains something for the geologist, the botanist, the mammalogist, the ornithologist, the entomologist, the herpetologist.

One striking feature is the historical and other evidence respecting the subsidence of the coast of which he treats, and the rate at which this is occurring. Whether it be bird or flower or strange sea-life, our author seems equally at home. The book will please all out door naturalists, and should prove especially interesting to those living inland whose knowledge of the sea is fragmentary because they lack direct contact with its strange and abundant life.—H. L.

(*First edition reviewed by H. F. L., C.F.-N., XXXVIII, 1924, p. 60.*)

THE FAUNAS OF THE CAMBRIAN PARIDOXIDES BEDS AT MANUELS, NEWFOUNDLAND, *by B. F. Howell. Bull. of Am. Pal. Vol. II, No. 43, pp. 1-140, Figs. 1-3, Pl's. I-II, Tables 1-7, 1925.*

This is the second example of a much needed kind of work on Cambrian faunas to appear. Both are confined to the Atlantic Province, each covering separate fields. Several years ago the treatise by Dr. A. H. Westergaard on the *Olenus* series was published and gave us for the first time a standard by which to measure contemporaneous beds in detail. Several other fairly detailed Scandinavian works are available, particularly Gronwall's studies in Bornholm, but none are equal Westergaard's and Howell's papers.

It is quite fitting that Manuels Brook should become the standard Paradoxides section for the Western portion of the Atlantic sea by such work as this since it was here, in 1888, that the true relationship of the commonly used Lower and Middle Cambrian periods was first ascertained. It is almost certain that Prof. Howell's zonal subdivision and the specific determination of the fossils will not always stand without change, but nevertheless the faunal succession as given on pp. 35-56 is bound to influence all subsequent work in the Atlantic Province.

Some question may be raised with respect to the validity of Prof. Howell's correlation of the major zones with those in Europe since no account is taken of the two distinct basins of Scandinavia with their distinct successions. But this work would lose considerable of its value if the author had not attempted these tentative correlations.

That the Manuels section is so complete is exceedingly fortunate in view of the relatively small area of the Cambrian preserved in Newfoundland. It is to be hoped that a detailed treatise following this plan will soon appear for the beds succeeding the Paradoxides series. Too many well authenticated and exact detailed studies cannot be made in any field, but more particularly in the largely unworked Cambrian. The author is to be most highly commended for his well completed task.—C. E. R.

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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.

THE OTTAWA FIELD-NATURALISTS' CLUB

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The official publications of THE OTTAWA FIELD-NATURALISTS' CLUB have been issued since 1879. The first was *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.

The Canadian Field-Naturalist

VOL. XL OTTAWA, ONTARIO, FEBRUARY, 1926 No. 2

A STRIKING EXAMPLE OF NEGATIVE HELIOTROPISM

By GUILFORD B. REED,

Queen's University, Kingston, Ontario

NOTWITHSTANDING the abundance of field observation on the heliotropism of plants, the following case appears sufficiently striking to warrant consideration.

In the spring of 1923, Boston ivy was planted about the new concrete fence enclosing the George Richardson Memorial Stadium, the Queen's Football field. The stadium is an area 620 by 320 feet, with parallel sides and rounded ends, the long axis being approximately north and south. The enclosing fence is of solid concrete ten feet high except for part of the west side where the back wall of the grandstand rises to a height of 30 feet. The fence consists of posts 15 feet apart which project a few inches beyond the intervening solid panels, Fig. 1. A Boston ivy was planted on the outside of the fence at the base of the middle of each of these 15-foot panels. All have made excellent growth with the exception of those planted at the South end, most of which died soon after planting.

The striking feature is the growth habit assumed by the ivy plants. At the extreme north end and west side of the fence, the plants have spread out on their respective panels in a symmetrical fan-like structure, Fig. 2. Those growing on the north-east sector of the round end of the fence have spread out like a portion of a fan with all the branches on one side of a perpendicular from the root and pointing toward the north or north-west, Fig. 3. The plants growing on the north-west sector of the round end show a similar symmetrical habit but the branches point in the opposite direction.

It seemed probable that this condition was related to the direction of incident sunlight. It is

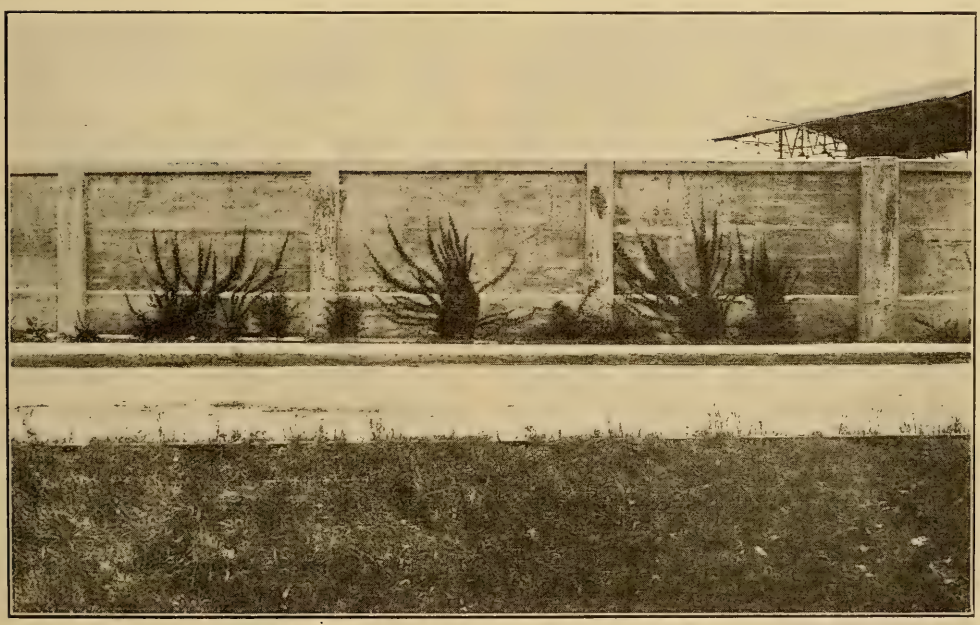

FIG. 2—*Photograph of three panels at the north end of the fence showing the symmetrical habit of the ivy plants*

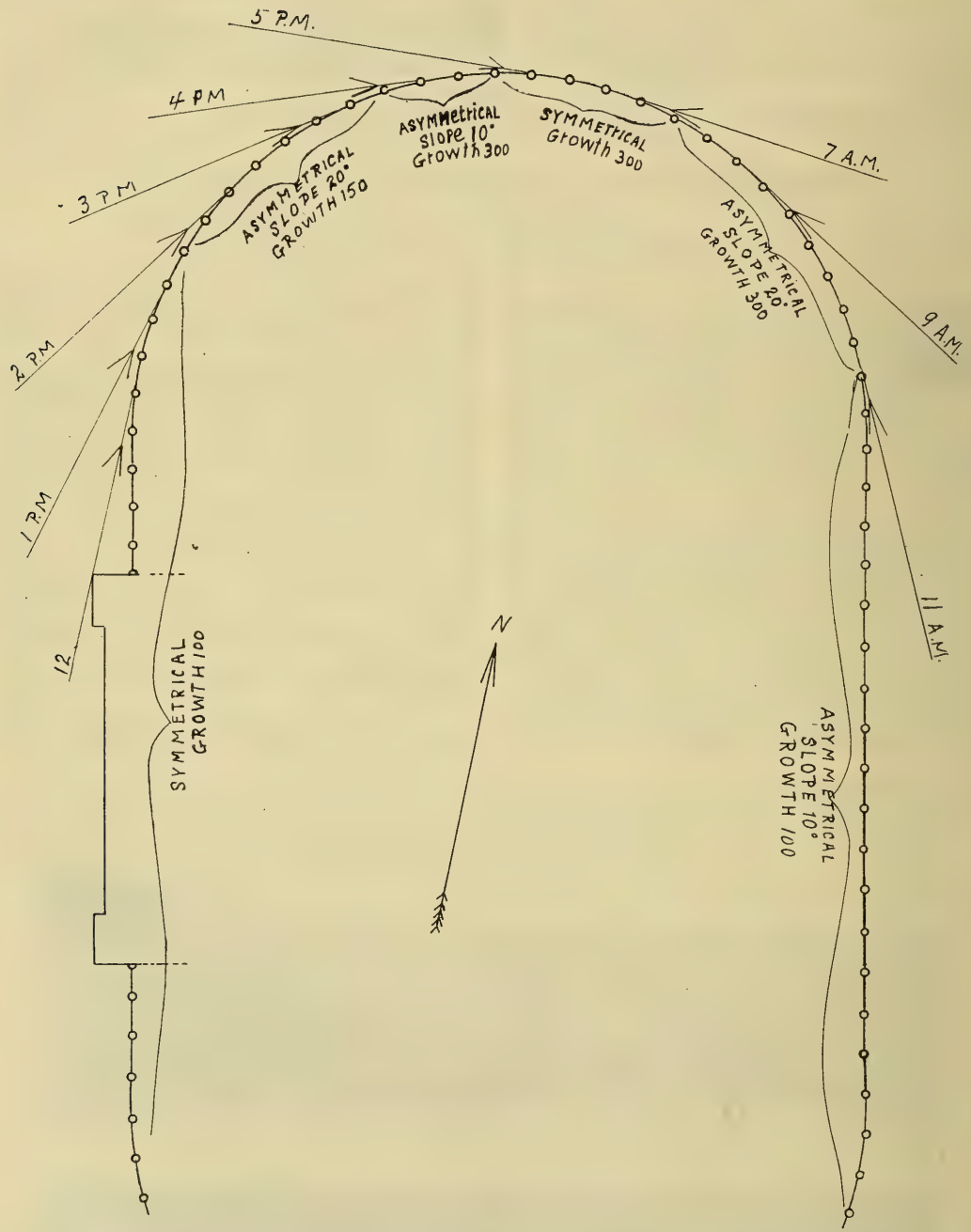

FIG. 1—*Diagram of the east, north and west sides of the George Richardson Memorial Stadium fence. The small circles represent the posts and connecting lines the intervening panels. An ivy plant is now growing on each of these panels. The arrows shown on the outside of the fence indicate the direction of incident sunlight at various times during the day. The printed notes on the inside of the fence indicate the symmetry of the plants, the slope in terms of the average angle between the branches and a perpendicular from the root and the growth in terms of the total length of main branches per plant on the panels in the brackets shown.*

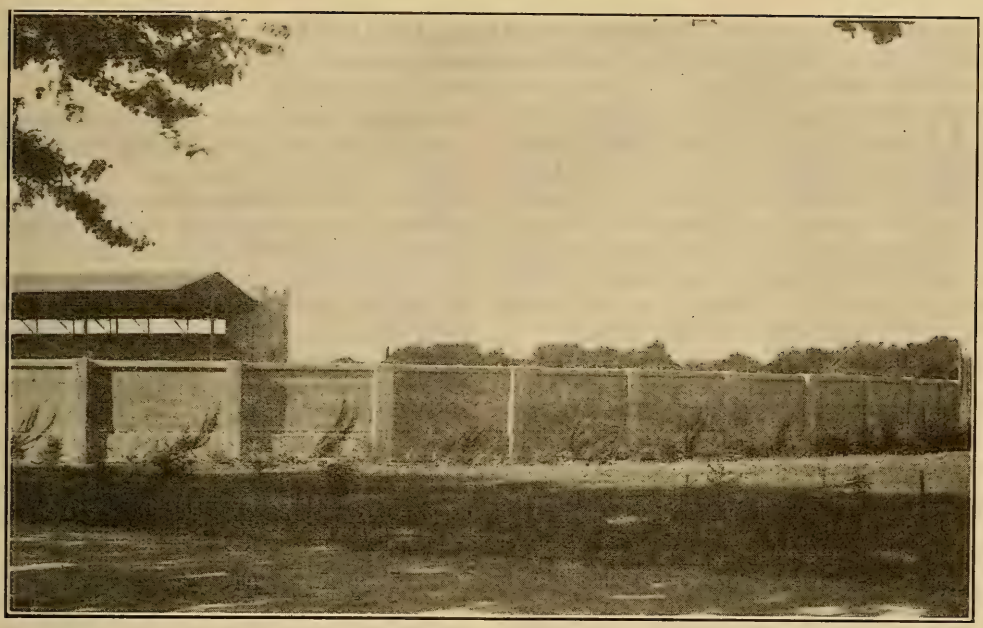

FIG. 3—*Photograph of the north-east section of the fence showing the asymmetrical habit of the ivy plants. It may be noted that the plants shown at the right of the picture, north, are symmetrical whereas those at the left are very definitely asymmetrical and sloping toward the north.*

apparent from the position of the structure, with its round ends at the north and the south, Fig. 1. that the early morning sunlight will strike the east side fence at approximately a right angle and that the incident beam will be tangent to the panels on the north-east sector of the round end of the fence. (Large trees at the east shade the fence until about 7 A.M.) As the sun moves from east to west, the north-east sector will gradually be left in shadow, the east side after a morning of more or less right angle illumination will gradually become obliquely illuminated and pass into shadow, the west side will first be momentarily illuminated obliquely and for the greater part of the afternoon subjected to approximately right angle illumination while during the latter half of the afternoon the respective panels of the north-west sector of the round end will receive the sunlight at a tangent. This is shown diagrametically in Fig. 1, where the direction of incident sunlight for various times of the day on August 15th is indicated by long arrows.

At the extreme north end, where the best growth has occurred, and where the vines have produced the most uniform fan-like habit, Fig. 2, the only sunlight reaching the plants is in the late afternoon; after 5 P.M. in August. The other plants showing symmetrical fan-like habits grow on the west side where the oblique illumination is very short compared with the total time in direct sunlight. In sharp contrast, at the rounded ends of the fence, where the total illumination by direct sunlight is at a tangent or mostly falling at a tangent, the vines have spread out on their respective panels in an asymmetrical manner, the several branches growing at angles from 10° to 30° from the perpendicular from the root and in a direction away from the incident light. Those on the north-east end appear pushed away from the morning light, Fig. 3, and those on the north-west appear pushed in the opposite direction away from the afternoon light. In Fig. 1, the sections of the fence showing symmetrical and asymmetrical plants are indicated together with the extent of the slope of the asymmetrical plants.

The total amount of growth has at the same time been influenced. The plants on the north of the fence where they receive little or no direct sunlight and those on the north-east and north-west where they receive only early morning or late afternoon sunlight have made much the most growth, the plants average approximately 300 feet of main branches. On the east side, where they are illuminated during the morning hours they show an average length of main branches of approximately 100 feet. On the north-west, where the afternoon illumination lasts for two to three hours, the growth amounts to about 150 feet and on the west, where the plants are in the sunlight all the afternoon, the average growth is approximately 70 feet. These growth differences on the several parts of the fence are indicated in Fig. 1.

NATURE LOVERS AT JASPER

BY FRANK MORRIS

IT WAS gross presumption, no doubt, to think of exploring Jasper Park without either guides or horses; but that was our plan, and by greenhorn's luck, it worked like a charm. The fact is, we knew so little and had heard so much about pack-ponies and their peculiar ways that we vowed no quadruped so cater-cousin to Kipling's "commissariat camuel" should share our bivouac—by invitation at least. A glance at the map made it equally plain that our Peterborough canoe, trusty comrade in so many summer jaunts, must be left at home. We had no notion of imitating the couple at Jasper Lodge who paddled merrily down the Athabasca half a day, only to find they must wade back with the canoe in tow or cache it in the cottonwoods and hike home.

It was our first trip west and chock full of surprises. The biggest of these hit us right between the eyes at 6 A.M. the day after leaving Edmonton. For forty miles we had been running along an easy grade of some sixteen feet to the mile, eagerly awaiting the moment when the foothills around us should be replaced by mountains and the real climbing begin. And then we drew up at the little station of Obed to find ourselves within ninety feet of the railway's height of land! Instead of hanging on by our eyelids to beetling crags and tottering dizzily over roaring cataracts, we glided down grade to the smooth, level floor of the spacious Athabasca valley. Between us and the Great Divide lay nothing but a gentle incline of ten or twelve feet to the mile that would lift us imperceptibly first to the river plateau of Jasper village and then up the Miette Valley to the threshold of the famous Yellowhead Pass. We had actually done far more climbing and steeper in crossing the Prairie—near Melville, for instance, and again between Saskatoon and Biggar. The fact is, the only real mountain grade between Lake Ontario and the Pacific was up the Don Valley to Richmond Hill on the outskirts of Toronto.

Our next surprise, and a most welcome one, was the village of Jasper itself. Visions of North Bay in its infancy had come like a nightmare to disturb our day-dreams, an unlovely shacktown of crudeness and squalor. Picture our delight to find a pretty little hamlet of Swiss chalets in perfect harmony with their setting, a wide-spread valley of pine-woods and lakes girdled with dove-grey mountains—an Arcady of sunshine and fragrance. At first glance it was hard to realise that those soft gray turrets and spires, even where they cut the sky in jagged saw-tooth lines—"sierras" in Spanish phrase—were really mountain masses three times the height and thrice three times the bulk of the Scottish Grampians; yet so they were. Nor is the illusion due, as you might suppose, to the valleys you survey them from being highland plateaus, 3,000-4,000 feet above sea-level. It is rather the clarity of the air, which so heightens the already bold relief of the mountains against their background of sky that you get field-glass views of everything you look at.

So great was this foreshortening on the slopes of Pyramid that the point we had planned to lunch at was still the same "mile and a bittock" away at 3 P.M. The botanist's ten-minute scramble to the top of the screes behind our camp at Edith Cavell lasted over an hour. Next day, when we climbed above the timber-line on the slopes that face the glacier, it looked the easiest thing in the world to fling a stone clear into the heart of the corrie at whose lip hung the Ghost with arms outspread—probably two miles away as the crow flies; and when we looked down at the ice-field below, it was hard to realise that the specks of ants creeping about its surface were half a hundred American "Elks", tourists from Jasper Lodge. To the very last, the Rockies kept tripping us up with our own measuring rods. On the eve of our departure, as we drove towards the Maligne Canyon, the chauffeur, pointing to the strange effigy of Old Man Mountain—"our grandsire cut in alabaster"—asked us how big we thought it was. Not to be caught napping, "A hundred yards or so," we made bold to reply. "They tell me," he said thoughtfully, "from the tip of his nose to the point of his chin is three-quarters of a mile." What looked like stubble on an ill-shaved cheek, as though the Old Man needed a new blade in his Gillette, was probably several acres of dwarf spruce.

No sooner had we "found ourselves" at Jasper than we laid in supplies and packed our dunnage bags for a three-day trip to Pyramid Lake. All morning warm rain fell in scattered showers and the valley was filled with steam. Late in the afternoon, the last wisp of flying scud disappeared, and Jasper's battlements of mountain stood out in the sunshine, newly draped with snow.

The fine evening tempted us out to explore, and at the base of Whistler Mountain, by a unique stroke of luck, we discovered the very flower we were hurrying off to Pyramid to hunt for—the White Lady Slipper, first found by Franklin and his men on the shores of James Bay. And so favored is Jasper by the northern twilight—give ear, you campers—it was actually nine o'clock in

the evening and broad daylight when we spied these fairy Moccasins on the mountain slope. That settled it; Pyramid must wait now till we had explored Whistler from base to peak, and back we hiked the very next day for our first ascent of the Rockies.

It was all we had ever expected and far more. The pony trail rose from a cottonwood swamp a mile southwest of Jasper, right at the entrance to the Miette Valley. Its lower slopes were clothed with pine and at several points we left the path to view the village and the valley spread out below us; at every stage of our climb, coil after coil, the river unwound like a great serpent writhing along the flat floor of its course. Above the pine we zig-zagged up through a mile or more of spring-fed alder woods.

Here we met the only traces of surface moisture on this whole slope—at one point a running stream, and three several times a trickle of spring water that tried hard to cross the trail. The vegetation took on a richer tone. Pretty drooping bells of blue Lungwort appeared beside the path, and mountain Columbine with blooms of lemon yellow and white. Even orchids met our eager questing looks: more of the White Lady Slipper; Blunt-leaved and Northern Rein-orchids; a colony of stout, budding Ladies' Tresses (*Spiranthes Romanzoffiana*); some plants of a broad-lipped Twayblade, probably the western form of our *Listera convallarioides*; and, best of all, a big patch of Calypso with sturdy scapes and swelling capsules of purple, in striking contrast to the delicately-drooping flower-stalks of May.

Just beyond the alders, the path crossed a tumbled avalanche of talus. Once more we turned aside to clamber over a hundred yards or so of boulders—their dead gray livened into green here and there with tufts of rock-loving ferns—and were treated to a fine bird's-eye view of Athabasca's tortuous course. Then came half an hour's steady climbing, occasionally of switch-back steepness, as we rounded the great flank upthrust between the north face, our point of approach, and the western slope, our final scaling-ladder for the peak.

Over the last 2,000 feet we ran the whole gamut of alpine scenery—the wonder of mountaineering shorn of its terror. Far beyond the cataract of talus, away above the timber-line of spruce, we entered a well-watered, flowery valley, gay with golden Arnica, soft mauve daisies and scarlet Paint-brush, scaled its main stream to the last point of vegetation, clambered up its roof of grey screes and—"clinging perilously to its gables, gazed dizzily out and down through 6,000 feet of space" —— . There! that's how the journalese thrill-stuff would read, and at first it really seemed like it. You felt distinctly more comfortable if you leaned well back against the mountain before looking out, or, better still, crawled behind one of those mis-named gables—a block of granite as big as a billiard-table, perhaps. Your line of vision ran steeply down some fifty yards and then fell over into sheer space leaving you with a queer "wiggly" feeling inside. But if you followed your eyes with your feet, every stride brought a bigger and a wider prospect of solid ground in front of you.

As a matter of fact, you could have played a ball-game at any one of a dozen points on Whistler's peaks; and if a "homer" had rolled over the edge, an active out-field could have followed it up and overtaken it on the screes. Few things are more exciting, safer, or easier, than running down a quarter-mile of screes full tilt in a series of flying leaps, the heel sinking well down into loose, slaty rubble, soft as a well-packed snow drift. And as a rule you are glad enough to hurry down from the mountain peaks. Truth to tell, when once you've won to the very top, you feel as though you hadn't a prospect left in life; the whole world is topsy-turvy; you've reached the Land's End in a vertical plane with your head in the clouds. Bird's-eye views were never meant for human optics, and but for a passing thrill of strangeness, they fail to attract—as well clap the wrong end of a telescope to your face.

While plunging down Whistler's steep-pitched roof of gray slate, we were suddenly halted in mid-career, right at the dribbling lower end of a July snow-drift, by the sight of some strangely beautiful flowers, pale yellow, soft-petalled, with drooping heads and dark green foliage, our very first find of the Arctic Poppy.

Below the biggest corrie at the edge of the talus we boiled a pot of tea as a stirrup-cup for the main descent; and while we were at our busiest, up skipped a gopher on to our granite sideboard and made off with half a sandwich very neatly plucked from the heart of the pile. They were very abundant above the timber line, and—along frequented trails—as tame as chipmunks, with a most captivating trick of begging bolt upright in front of you, forepaws drooped.

About half way down, on rounding a corner sharply, our feet shod in "sneakers", we ran plump into two mountain goats, a big bearded nanny and her kid; the youngster was disposed to be friendly and peered curiously at us as it trotted along in the parental wake, but the mother—in deference, probably, to her own beard rather than through fear of us—hustled it unceremoniously off into the thickets of alder.

Next day we were transported to our first camp —dunnage, duffle, and sundries all loaded up on a

bucking, balking Rosinante of a motor truck. It was quite an exciting trip, and if you didn't keep wide awake, it was the hardest thing in the world to remember that you were really in the Rockies and not, as a week before, cruising about among the Fishing Islands of Lake Huron in quest of the Alaska Orchid, pitching and churning in the teeth of a spanking breeze, aboard an old sail-boat equipped with a motor.

Our engine heated so on the steep grades that skipper "Slats" withdrew the radiator cap and let us puff along under our own steam; we seemed to ship a good deal of water on the voyage and came to port at Pyramid Lake in a cloud of steam and deluged with spray, but otherwise safe and sound.

Our dream of the Huron Shore was strangely renewed on the margin of the lake, for we found growing there most of the rare plants that had so delighted us at Red Bay: the delicate little cousin of the Alpine Club Moss—*Selaginella selaginoides*, the violet Butterwort, the Mealy Primrose, the Lily sprays of Zygadenus and Tofieldia, and, right beside the tent, in the heart of an alder bush commandeered for our larder, a colony of Twayblades (*Listera caurina*).

It would be hard to overpraise the beauty of Jasper's mountain lakes. Their virginal waters born of snowdrift and glacier lie crystal-clear, the surface like a magic mirror filled with reflections from sky and earth of sapphire and emerald, turquoise, amethyst and opal. The beauty of a jewel is its setting, and surely no artist's eye or poet's dream ever pictured fairer scene than these forest-girdled meres that sleep among the hills. Each has a beauty all its own, and everyone in turn seemed queen of all the rest—Patricia, Pyramid, Edith, and Beauvert.

Our three-day stay at Pyramid was one long revel of beauty and delight. The sight of that great mountain mass across the lake in all its varying lights from grey dawn to dusk, filled one with a restful sense of peace and permanence. Never had we seen a more symmetrical piece of carving than the face of this mountain nor richer coloring than its groined ramparts, the usual slate-gray being livened into warm reds and browns. Imagine a lump of pure jasper in a matrix of gray granite, a crystal with a thousand prisms, magnify its inches into miles and there you have Pyramid. Other heights in the Rockies—Majestic, say—showed as rich a coloring and the same grand symmetry, but nowhere did we find a more impressive view of mountain scenery than from the door of our little tent looking across the lake to the wooded slopes and snow-flecked peaks of Pyramid.

We were peculiarly fortunate in our choice of a camping site. Back of us stood a steep wooded slope of mountain from whose bold rock bluffs and shadowy groves of Douglas fir we could watch the sun go down behind those walls of jasper. So loth was the daylight to leave the valley that when we turned in at 10 P.M., a robin was still loud at its evensong. To the laughter of loons and a lone owl-hoot—familiar sounds of the night that wafted us dreamily back to Algonquin, tent and all—was added a new music, the hollow rolling notes and organ tones of the wind sweeping over the granite crags and chasms of the mountain—an Aeolian harp surely the most stupendous in all Nature.

A day of roaming the woods and shores among new flowers and ferns and trees; a day's paddling about the lake to visit the island and the stands of tall spruce that darkened the farther shore; and a day of tramping up the great northeast shoulder of Pyramid till we could look over into the adjoining valleys; and then we must tear ourselves away to make ready for the trip to Mount Edith Cavell; it was all too short, but we made the most of it.

Nowhere on all the lake-margin did we find a more interesting strip of bog-flora than lay alongside our little tent; and screened from the motor-road as it was by a belt of evergreen, it soon became our favorite "pleasance" for odd moments in camp. Further down the lake we found more of our White Lady Slipper, in scattered colonies right at the water's edge; and though the blooms had faded, like most of those on Whistler, they yet enabled us to settle a point of some interest.

Specimens taken at James Bay we had seen described and figured as having the big lower sepal ending in a pair of tips that were distant and without an emarginate interval between them. In all that we examined, two or three score from half a dozen stations, the lower sepal was as in the Yellow Lady Slipper: the tips adjoining, separated only by a slit or at most a narrow cleft, and the space between distinctly notched. The interesting thing about them was the *variability* of the double tip, its two points being sometimes contiguous and sometimes divaricate, and the slit or notch between them either shallow or deep. Actually, in the colonies on Whistler, we found several blooms whose lower sepal was separated into two perfectly formed elliptic halves, distinct from tip to base and standing laterally like the lower sepals of the Ram's Head; clearly, reversions rather than "sports", with all the value of a missing link.

Beyond question, however, the botanist earned his triumph the day he was threatened with a strait waistcoat. For without his dogged persistence we should never have reached the heart of the big spruce stand that loomed up dark with mystery across the lake from our camp. There

was something quite uncanny about that black patch of conifer; it really seemed, like the "dark tower" of Childe Roland's quest, to be hedged about with witchcraft; it drew like a lodestone from the distance, only to drop you groping helpless on approach; no matter from what quarter you advanced, it would always, at a certain point, suddenly disappear, whether sunk into the ground among the cottonwoods or crouching behind a screen of pine, who could say? A detour on foot round the lower end of the lake was thus made to end in dismal failure; our canoe-hiring some half-mile up the lake shore was resolutely opposed by a large bear, which refused to be "shoo"-ed from the side entrance of the boatman's shack; and the canoe leaked so when we headed it across the lake that it had to be dumped twice on the island in mid-course and then paddled furiously over to a sand bar on the north shore, where we beached it just before it swamped. Even then we should have failed but for careful compass work at the tent-door, for the "Dark Tower" had played its old trick and utterly vanished. However, after being twice landed in impenetrable forest tangle through following our compass bearings too closely, at last, by a lucky slew to the left, we stumbled on an open strip of heath—and immediately every obstacle disappeared.

The relief to foot, eye, and spirit was beyond description. We had apparently hit on an old clearing that slanted up the slope right to the edge of the spruce woods. Its lower half was partly obscured with thickets of willow and dogwood; these were gradually succeeded by scattered poplars which in turn gave place to a stretch of open, flowery heath; a profusion of orange lilies and creamy sprays of Zygadenus greeted our looks among the shrubberies of Labrador Tea; and so, entranced on every side, we stepped into the very centre of the magic ring beneath the spruces. For if ever a piece of fairyland came within mortal ken, it was that half-acre of forest floor that we found ourselves standing in, a great hummocky space of sphagnum and heath, shaggy with giant horse-tails and pitted with moss-wells. Here, in full flower, appeared clusters of "Spotted Fly" Orchid (*Orchis rotundifolia*)—a score or more of colonies mostly in the moist pockets; and, at one spot, a billowy cushion of moss supporting, amid trails of fragrant Twin-flower, several spikes of a western Twayblade (*Listera nephrophylla*) and *eight perfect blooms* of Franklin's Lady Slipper, the floor of their creamy white cups thickly patined with dots of rich purple!

Our stay at Pyramid fully confirmed the impression borne in on us at Whistler, that mountain scenery is at its best as you climb the gullies or traverse the flanks and shoulders below the peaks. The eye travels upward in happy swallow-skimming flight to the ridges and crests, or settles restfully in level gaze on slopes across the valley. Again and again we had occasion to note the beauty of these half-way views and the pleasant sense of repletion they brought: on the open fells above the timber-line at Edith Cavell; in the upper gorge of Portal Creek, through the Maccarib Pass, and—most wonderful of all—over the whole length and breadth of the great Tonquin Valley.

As we stood folding our tent into the dunnage bag on the lake-margin of Pyramid, a large-eared doe and her fawn came down the slope behind us to stare at the strange intruders. And on our way home a big bear-cub foraging at the edge of the road sized us up in a long and doubtful stare, and then lumbered away into the woods.

Bears, we found, were abundant, and perfectly harmless if left to themselves. When quite wild and unused to human ways they sheer off to avoid close contact. But when once familiar with their queer-clothed cousins, they often prove awkward customers and are hard to get rid of. One big cinnamon fellow habitually fed by sportsmen trout-fishing in a secluded glen, made off with the entire food supply—duffle-bag and all—of an unfortunate trio camping over a week-end on the river bank. Another strolled into the village church in the middle of the Sunday sermon and spoiled the pastor's best period by stampeding his flock. We counted fifteen of these big plantigrades one evening, shambling about the dump-heap on the outskirts of the village, most of them tame enough to come up and lay a paw on your shoulder by way of begging for food. When we returned from a last camping trip through the famous Tonquin Valley, we found the whole village a hubbub of tongues talking bear. The local scavenger, a veteran of His Majesty's forces, had been honored the day before by a personal interview with the Governor-General. Feeling that he must take heroic measures to mark the occasion, our veteran drew longer and stronger draughts at the canteen that day. And soon his duty rose clear before him. Down through the village he marched with a long noose of rope in his hands and, making his way to the dump heap, lassoed the biggest bear in sight, being minded to present it to His Excellency next morning as a small token of his esteem. At first the bear took its necklace in good part, but presently, getting tired of the joke and finding the man at the other end was serious, if not exactly in sober earnest, the burly fellow squared up to its captor and in a brief sparring encounter, ripped his clothes completely off and drove him from the field of battle in a badly mangled shirt. Our last sight in Jasper, as we steamed out of the station bound for the

coast, was the veteran telling a knot of bystanders the story of how near the Earl came to getting a pet bear.

"Let's camp at the Edith Cavell Lake!" was the exclamation one of us had made a month earlier as we sat poring over a brand-new map of Central Jasper just mailed us from Ottawa. The picture in our minds at the time had been very far from the truth, owing to one trifling omission—we had forgotten the forests, and fancied the Edith Cavell Lake as a mountain tarn in the midst of bare moors, a second Loch Turrit at the foot of Ben Chonzie. And behold, it lay buried in the heart of a magnificent forest of conifers, incense-breathing spires of evergreen coated with grey lichen and bedded in a floor of billowy moss and heather.

The approach was quite in keeping with the scene: nearly twenty miles of good motor road that, after travelling two level leagues along the valley bottom of the Athabasca, suddenly rose a thousand feet or more in a series of sharp switchback loops and, leaping Portal Creek, swung into the big Astoria Valley; another big wriggle up the hill-side on our left and we entered the fragrant forest that covers the slopes of the Edith Cavell glen. For a mile or more beyond the motor terminus, we toted our packs through the heart of the forest, swerved into a cross-path leading down to the keel-way of the valley, sidled cautiously over two log-straddled creeks to the central "inch" of the delta, and there, between glacier and lake, on the level floor of a grove of big spruces, our lodge for the nonce, we dropped the bags with a thud.

Two days to explore the glen! After visiting the glacier and scrambling up the screes to the base of the precipice, we made a tour of the lake and then climbed far up the opposite slope of the valley through those wonderful forests of fir. For the man-of-grass, both days were filled to the brim with excitement. The coloring of the flowers was a perfect miracle, no less than their lavish profusion. The wet gravel beds of the delta were aflame with mountain Fireweed, a broad-leaved species of Willow-herb with big richly-veined blossoms of purple. Almost on the edge of the glacier, in the midst of icy streams, lay a little island entirely covered with plants of Western Castilleia—the Indian Paint-brush—in a dozen different shades from white and pale cream, through pink, scarlet and crimson, to madder and brown. The delta itself was rich in Anemones, Grass of Parnassus, Alpine Speedwell and half a hundred little treasures that the untrained eye would never notice. On the steep rock slide below the precipice, we found thickets of beautiful white-flowered Mountain Rhododendron, aromatic shrubs of False Azalea, and big drooping sprays of violet Beard Tongue. Other finds just as interesting, if not so obvious—Alpine Club Moss, for instance; Oregon and "Crag" Woodsias, the "Holly" Fern and the "Parsley"—served to make of this rocky staircase on the mountain-side a veritable Jacob's Ladder from earth to heaven for the botanist to run up and down.

The two last finds, made while clambering over some big boulders on the way down, had sent his thoughts harking back over the years to a certain memorable summer in the Perthshire Grampians; and an hour later, as we stepped through the spruce woods at the head of Lake Cavell, it seemed only fitting that he should find, bedded in soft moss at his feet, a colony of the dainty little Mountain Bladderfern, rarest and prettiest of all its race, the one treasure he had scoured the far-off slopes of Ben Lui in vain for.

On our farewell trip, we had planned winning up to some point of vantage above the timber-line from which to survey Mount Edith Cavell, at arm's length, as it were, across the valley. A precipitous gorge half choked with boulders and the debris of spring-time freshets proving impregnable, we held on up the valley, keeping to the base of its left slope. It was steep climbing alongside the great rampart of talus that has been swept across the valley and slowly piled up by pressure from the glacier; but presently we won to the threshold of the pass, and the whole character of the valley suddenly changed. It was a great surprise and all the more delightful that it supplied the one feature we had looked and longed for in vain ever since our first day in the Rockies: soft spring-fed tracts of open heath—"mosses", in Scottish parlance.

The floor of the valley widened out on the north side into a big bay; and, after crossing a piece of muskeg dotted with tufts of cotton grass and tall stems of dark-purple Lousewort—well-named "Little Elephant" from its quaintly shaped blossoms—we found ourselves on the edge of a lovely alpine meadow gay with golden Arnica, mauve Fleabane, scarlet Painted Cup, and a profusion of soft grey-green silky heads, plumed seed-stalks of the Western Anemone. The meadow ran partly up the slope on our left to meet the fringe of spruce, and there, down the mountain side, making a green cleft through the forest, the mother of all this verdure came dancing to meet us and the music of her dancing filled our ears: a sparkling stream whose waters leapt and ran in delightful disorder down the terraced slope, now scattered abroad in a dozen little cascades, now gathered in a rocky pool or plunging sheer in a gray mare's tail. Wherever she went, flowers sprang in her path. Giant stems of Indian Hellebore with rich lily-like foliage adorned the plateaus, and all the

way up, between forest and stream, the slopes of the gully were cushioned with bell-heather purple and white.

What could we do but obey the call? Hanging our pack in a clump of fir, we clambered up the magic staircase with its dripping grottoes and dells of moss, all rich with starry sprays and clusters of White Saxifrage, Bishop's Cap, Fringed Grass of Parnassus, Snowy King Cups and Globe Flowers. Up and up, till we stood on a level with the great Ghost Glacier across the valley. Then we rounded a corner to the right and, still guided by the stream, ascended a long, gently sloping glade that led us right to the top of the timber-line.

Here we were reminded even more of the muirs and moist heaths of our native Highlands. Mountain marsh marigold with snow-white blossoms bordered the stream; the little Alpine spiræa trailed about the ground with its rosettes of filigreed leaves and creamy cones of clustered flowers; here and there in the carpet of purple and white heather appeared bright rose-red blooms of American Laurel dwarfed at this altitude to pigmy form. Peaty muskegs and patches of white appeared just beyond. Some of the patches really were melting snow, but others proved to be solid masses of Spring Beauty flowering in soil still soaked from vanished drifts. By this time we had reached the open fells—a stretch of rolling prairie or undulating downs perhaps a mile wide and three or four times as long.

Beyond the fells, we climbed a succession of steep slopes to a wide saddleback ridge. Even here, at an elevation of some 8,000 feet, plant life still flourished; full-blown hare bells swung barely clear of the ground on inch-long stems; bright patches of Moss Campion and golden Whitlow Grass broke the grey monotone of screes; most beautiful of all was the white-flowered Dryad with its crinkly scalloped leaves, bright green above and silver-backed. It surely had been better named the Oread, for its favorite haunt was on the mountain-side above the forest.

It was now four in the afternoon, and facing about on our mountain slope, we sat and surveyed the scene. It was no bird's-eye view that met us now, sheer down to a flat land of atomies and pismires, nor did we any longer look up at great masses frowning above us; we were on equal terms with the giants at last; they could browbeat us no more. It was a strange sensation. This way and that we looked out with level glance over a wilderness of mountain-tops, boundless as the sky. On all sides and of all shapes, they rose around us in endless confusion; peaks, ridges and rollers, like waves of an angry sea; and there, borne up on the shoulder of a giant billow, right under its combing crest, we rode serenely through the welter of wild waters. Beyond Cavell appeared Throne Mountain and Old Horn with the Ramparts looming up behind. To the north-west were Chak, Franchere, Aquila, and the Lectern with the Trident Range beyond. To the north-east, the Maligne Mountains with their heights of Antler and Curator, the Watchtower, Excelsior and Tekarra. Due north for miles we looked over a wide vista of moor; at its far end, like guardian pillars, rose two minor peaks; between them, in the valley twenty miles beyond, was spread the village of Jasper, with the great masses of Pyramid and the Cairngorms against the sky behind it.

The sun was lowering in the west; and presently, as we sat rapt with the distant scene, a mountain ram passed slowly across the fells in front of us and disappeared behind some crags; a golden eagle sailed into view above a neighbouring peak—sailed, soared, and stooped behind the walls of granite. We were alone among the everlasting hills. This was what we had come 3,000 miles to see—Jasper, the beauty and the grandeur of the Rockies.

FISHES COLLECTED IN NEWFOUNDLAND DURING THE AUTUMN OF 1922

By FRITS JOHANSEN

(*Concluded from page 6*)

After a delightful luncheon prepared by an open drift-wood fire at the shore, we paddled further down the lake, and tried a less accessible pool in the woods also on the west side, but I only secured a haul with my plankton net here. We then struck across the lake for the east side, near the north end of the large Glover's Island which almost fills the whole width of the lake here. It is high, rocky and wooded, and I imagine it will not be ong before it will be adorned with a beacon or ighthouse, when the commercial sailings upon the lake begin. But I thought more upon the Beothucks, the extinct aborigines of Newfoundland, who must have camped upon this island many times, when they crossed the large lake in their frail canoes. Instead of them, however, we met a motorboat with the survey party engaged upon the preparations for the commercial utilization of Grand Lake. It did not take us long to cross in the canoe, as the wind was coming up, and I had neither the instruments nor the inclination to find out how deep the lake is. It is said to be very deep (the bottom has not yet been found in its

FIG. 4—*Outlet of Rocky Brook on west side of Grand Lake, Nfld. Major Whitaker standing.*
F. Johansen photo

middle), and the following year Mr. Whitaker kindly took in it some vertical plankton-hauls up to a depth of more than one hundred feet, and sent me the material.

We landed on the east side of the lake, where a brook (very properly called Alderly Brook) comes out among shrubbery and gravel with a big growth of *Epilobium latifolium* in full bloom. Here we rested for a while (it was too dark to collect anything) before tackling the long trip back to the bungalow. It became quite windy, but luckily the moon was out, so we crept quite bravely up along the east side of the lake in the canoe and, after much paddling and getting soaked good and plenty, and a rest at the outlet from Hinds Pond, we passed the only other house at the lake beside Mr. Whitaker's, and reached our comfortable home. We shall both long remember that outing.

The next morning I left with the train for St. George Bay and enjoyed every minute of the ride; along the east side of Deer Lake, and down the beautiful Humber valley, said to be the most wonderful scenery in Newfoundland. First a river surrounded on both sides by high, wooded cliffs and hills, then the wide expanse of the Humber mouth with its brackish water, distant hill-ranges and the coastal steamer from Labrador at the pier. This is quite a lively tourist place in summer, and soon one will be able to sail from the Bay of Islands in the Gulf of St. Lawrence up the Humber River to the south end of Grand Lake. Crossing the divide, I then rode south along the west side of the swift running Harry's Brook (a famous salmon-stream), and I reached Stephenville Crossing, at the bottom of Bay St. George. Here I got off, as I intended to explore Port au Port Bay, and the mail coach took me out to the village of the same name later in the afternoon. The road runs through woods in rocky areas, or through lower land with a farming community largely composed of French Acadians, with St. George's Bay in view most of the time. Most picturesque is perhaps the gypsum-cliff at Romaines, showing up in its white splendour and grotesque, natural carvings against the much foliage above and around, and washed at its foot by the Romaines River, which now contained only little water. There is a fishing village where the river merges into the bay. I secured a room in Port au Port village, which lies on high ground facing the two bays, and the bluffs fall off steeply both to the boulder beach of Bay St. George, and to the sandspit connecting them with the Cape St. George Peninsula, which forms Port au Port Bay.

The next day I walked across this sandspit which contains a large lagoon-lake and some fishermen's shacks, etc., and along the road to Aquatuna Quarry, owned by the Dominion Steel and Iron Company, which gets its limestone here for ore-smelting. In a pool alongside the road which runs through the woods, I secured a number of Ostracoda, etc. I was most kindly received by the Manager of the quarry, Mr. House, who during my five days' stay in this vicinity, took much interest in the purpose of my visit, and most

hospitably treated me, a perfect stranger. The company's small steamer, the *Rattler*, was to leave that afternoon for their saw-mill in West Bay (the western part of Port au Port Bay). I went with her, and, by towing my plankton-net behind the boat, I secured in the surface half a dozen fish-eggs, ½ mm. in diameter; two young, four-bearded rocklings ("Mackerel-midges", *Enchelyopus cimbrius*), 28 and 38 mm. long, and a 5½ cm. long stickleback (*Gasterosteus bispinosus* subsp. *Johanseni*). The last-mentioned fish has been described by Prof. P. Cox in *The Canadian Field-Naturalist* for November, 1923, pp. 147-48. The two young rocklings were beautiful little fishes, with their silvery colour and large eyes.

Arriving at the sawmill in West Bay, I got ashore, secured a room, and walked northward a piece along the beach. The latter consists here of a soft, carboniferous shale with often large crystals of iron-pyrites; except where cleared, this low land is all covered with dense woods. In the mouth of the first creek north of the mill I noticed a number of small brook-trout (*Salvelinus fontinalis*) jumping for mosquitoes in the calm evening. Long Point is the name for this northern extremity of the Cape St. George Peninsula.

Next morning I tried fishing for the numerous brook-trout (*S. fontinalis*), which were seen jumping in the dam across the mouth of the river at the sawmill, but without success. Later, I walked southward along the beach, on the east side of Long Point, as it was now low tide, and a good opportunity to study the shore-fauna here. The beach is sandy or gravelly, continued out in the bay; but here and there the shore bottom is formed of flat bedrock (limestone) outcrops, with an occasional boulder of the same material. These boulders have a rich vegetation of algae (*Fucus*, *Ascophyllum*, etc.), and various invertebrates (*Balanus*, Molluscs, Asterids, Chaetopods, Crabs, and Amphipods), of which I secured samples, are attached to, or sheltered by them. Darting over the bottom at approach were also numerous shrimps (*Crangon*), while schools of transparent Schizopods (*Mysis*) and an occasional jelly-fish (*Aurelia*), drifted with the currents. Of fishes, I observed one about 8 cm. long sand-launce (*Ammodytes americanus*), which, however, escaped me; but I secured with my bag-net twenty flounders (*Pseudopleuronectes americanus*), which were of a length between 3 and 13½ cm. This flounder was observed to be very numerous here, darting wildly off at approach and hiding themselves in the sandy bottom of the bights or pools left by the tide alongshore. Samples were also secured of the different Mollusc shells washed up on the beach.

About halfway down the coast to "Piccadilly" (see below) a creek (called "Big Brook") comes out to the sea in the form of lagoons, marshes and a winding canal and I waded up it. The tide was just setting in strongly, and carried with it great schools of *Mysis* and many fishes (flounders and

FIG. 5—*Low tide at "Picadilly", Port au Port Bay, Nfld., looking west. Note the sea-weed growing on the rocks exposed.*

F. Johansen photo

sand-launces). One of the latter, a full-grown *Ammodytes*, jumped in its excitement clear out of the water upon the shore, but fell back into the water before I could get hold of it. In the brackish water of the lagoons and channel higher up the creek were great schools of Killifish (*Fundulus heteroclitus*). (This is apparently the farthest north record of *Fundulus* on the Atlantic side of North America, but it is probably also found in the Bay of Islands.) By chasing them up in blind alleys, I secured thirty-eight of them, measuring from 2½ to 12 cm. long. Here I also got a 5 cm. long *Pygosteus pungitius* and nineteen *Gasterosteus gladiunculus*, between 2½ and 3¼ cm. long. The bottom of the lagoon and creek-bights here is composed of deep, soft mud and great masses of rotting sea-weed (*Zostera*, *Fucus*, etc.). Here is a shack or two, occupied by a farmer fisherman who now was hay-making, and after a simple, but hearty supper of bread, beans and jelly, served on scallop-shells, I walked along the road through the woods back to the sawmill, reaching it at midnight.

Next forenoon I spent in preparing my notes and specimens from yesterday, and at 1 P.M. we left for the quarry in the *Rattler*, towing behind a big raft of lumber, made by the men the day before. During the sailing, I had my plankton-net out in the surface, and secured a far greater amount of material than two days before (see above), viz. three fish-eggs, ½ mm. in diameter, many Copepods, etc.

At my request, I was landed at the end of Middle Point, the narrow peninsula dividing Port au Port Bay in two parts, West and East Bays. The base of it is heavily wooded, but its northern half is made up of almost impassable bog and swamps growing over oily, black muck, which, particularly along the east side of the peninsula, forms steep bluffs and is eroded by the sea. At the end of the point, and along its west side, is a beach made up of gravel and limestone boulders and floor; but I found little of interest here apart from the usual sea-weeds, with Hydroids, Bryozoa, small Molluscs, etc., on, samples of which I kept. The peninsula here falls off more gradually to the beach, and has a couple of fishermen's shacks with lobster-traps, remains from clam-digging, etc., on a grassy spot. Here the higher "tundra" forming the major part of the peninsula, is marked by a declivity with shrubby spruce from the lower swamp and bog further out the point; and under stones and boards here I secured different land-snails, (*Helix*, *Succinea*, *Agriolimax*). I also took some hauls with my plankton-net in the ponds on the lower land here, and collected a sample of the slimy, green, filamentous algae found in the seepage from the coastal bluffs. The tide was now rising fast, and I just managed to get past the bluffs on the east side of the peninsula, which further in is composed of shale, in time. After a long walk, I reached the house of an employee of the quarry, where I spent the night. There are said to be large quantities of oil in this soil, and that it seeps or gushes out at many places in the tundra-muck or shale-cliffs.

Next morning I started off, through the woods, for "Piccadilly" (a corruption of a local French name), the bottom of West Bay. The path is poor, and runs occasionally through swamps. I passed several creeks or brooks, in one of which I noticed a number of small brook-trout (*Salvelinus fontinalis*), ten of which I secured (3½-7½ cm. long). The *Cornus*-shrubbery here was badly defoliated by sawfly-larvae, samples of which I kept alive. Finally I reached "Piccadilly", and spent a couple of hours wading around at low and rising tide in the shallow beach-water. The coast here is formed by rocky points or eroded bluffs of shale, and the beach is made up of scattered boulders with a rich vegetation of *Fucus*, *Ascophylum*, etc., and sand, the latter bare nearest the beach, but further out in deeper water with a dense growth of *Zostera* (see fig. 5).

I first went out as far as I could by wading; but the fauna out here did not seem to be different from, and less varied, than in shallower water. The large Scallop (*Pecten magellanicus*) is said to be common out here in the bay, but I did not see any; they are said to be less plentiful now, than formerly. The digging for the large clams (*Mya arenaria*) and snails (*Lunatia heros*) takes place at the very bottom of the bay, where there are a couple of fishermen's shacks. I was a little up the east side of the bay, but later when I reached its bottom, I selected samples of them for keeping.

A very characteristic and common invertebrate in the shallow beach water, was a Schizopod (*Mysis* sp.), "standing" in large schools over the depressions in the sandy bottom, only their dark eyes and purple swimming legs showing up plainly. Equally typical for the shore water one to two feet deep, was a snail (*Natica* sp.) ploughing through the sandy bottom with its light-coloured (dark banded) shell, and the white, soft body spread out; also the common shrimp (*Crangon* sp.) occurred here in great numbers. Attached to the underside of a stump lying on the bottom (beyond lowest tide) were a number of small, sand-covered Ascidiacea. I also kept samples of the worms, small molluscs, and Asterids, attached to *Fucus*, etc.

Of fishes I secured sixteen young flounders (*Pseudopleuronectes americanus*), 3¾ to 7½ cm. long, which fish was as common and behaved in the same manner here as further north in West

FIG. 6—*Cod (left), Haddock and small Herring (right) caught in St. George Bay, Nfld. (Abraham's Cove)*
F. Johansen photo

Bay. Typical for the *Zostera*-covered bottom further out was the Grubby (*Myoxocephalus aeneus*), of which I secured eight specimens 8-17 cm. long. When approached, it took refuge under the *Fucus*-covered boulders.

At 8 P.M. the tide was rising rapidly; so I walked along the beach to the very bottom of "Piccadilly", and succeeded in getting across the mouth of the big creek here just in time. Inside the creek-mouth I noticed both sticklebacks and *Fundulus* in the water, but was not able to secure any of them. I then continued on along the road through the woods to Abraham's Cove, at Bay St. George, where I got a room for the night.

Next morning I went down to the beach, which here is composed of gravel, and more accessible owing to a creek outlet, while otherwise the coast on both sides consists of high limestone cliffs. The fishermen were just coming in with their motor boats from the bay, having secured a number of Cods (*Gadus callarias*, one very large) and some haddock (*Melanogrammus aeglefinus*) (see fig. 6). I also got from them a Rough Dab (*Drepanopsetta platessoides*) about two feet long. The fishes had been caught by squid-bait, and had in their stomachs crabs (*Hyas, Chionoecetes*) and large black Mussels (the black bank clam ?). Schools of smaller herring (*Clupea harengus*) were at present frequenting the shore-water and I kept five of them (15-17 cm. long) caught by the fishermen. Upon the beach were washed up large *Asterias rubens* and *Strongylocentrotus droebachiensis* (samples kept); and from some boys I got three *Buccinum* caught on codlines, and a stone with snail-eggs, Bryozoa, etc., on, secured here in about five fathoms of water some time ago. Later in the day I drove in a rig along the Bay St. George to Aquatuna Quarry; walked out to Middle Point, where I secured a 4 cm. long stickleback (*Pygosteus pungitius*) in a creek-outlet, and returned along the beach.

Next day I walked down to the gravelly beach at Bay St. George, and secured a number of invertebrates attached to the washed-up sea-weeds (*Laminaria, Delesseria, Lithothamnion*, etc.) here. Some barnacles (*Lepas anatifera*) attached to a piece of driftwood, and the empty egg-capsule of a ray (*Raja* sp.) were also found. The large lagoon-lake upon the sandspit here had a vegetation of algae (Ulvaceæ), and young sticklebacks (*Gasterosteus cuvieri?*) occurred in thousands in it, fifty of which I secured (2-3½ cm. long). No other fishes have ever been noticed in this lake.

Next morning (September 8) I packed and sent off to Ottawa the specimens I had collected on the west side of Newfoundland, and left in a rig for Stephenville, catching the train for Port au Basques at 4 P.M. The coast on the east side of the head of Bay St. George, after crossing the railway bridge, presents a character in Newfoundland unique, being made up of sand-dunes, which gradually merge into the lagoons and marshes at the mouth of St. George River and into the higher ground behind. At 10 P.M. I reached Port au Basques, the S.W. extremity of Newfoundland where the steamer was waiting to take us across

to Sydney. Thus ended a very pleasant and profitable two weeks' stay on Newfoundland.

CONCLUSION

It will be seen from the above, that besides fishes I collected a number of marine and fresh-water invertebrates, also some insects and aquatic plants, all of which (apart from certain duplicates) will remain in the National Collections in Ottawa, where so few specimens in these lines from Newfoundland were found before.

There will therefore be further notes or articles when these specimens (now all sorted out or in the hands of specialists) have been identified in the course of time; but I have found it best, in this article dealing with the fishes from the trip to give a general (and I trust not too detailed) account of my observations and collecting for each day during my stay on the island. In the future, it will be necessary merely to record the invertebrates I secured, and refer for a general account of the trip and the natural surroundings of each place, to this article.

It is my hope also that, besides naturalists, the average Canadian, who knows altogether too little about Newfoundland, may read with some interest this narrative of explorations by an enthusiastic, marine biologist. Life on Newfoundland is simple and its people poor, compared to Canada, and it is well that we, who come to their shores, should enter into the same spirit with which they greet us.

This article must, of course, not be understood as an account of the fishes hitherto recorded from Newfoundland. It deals solely with Canadian, scientific explorations of the island, as to its fishes, etc., and the other subject would fill a whole book, and is a laborious undertaking, scattered as the records are in the literature of a dozen different countries. It is to be hoped that the Newfoundlanders themselves will sometime soon give to the scientific world a complete account of the fishes frequenting their shores and inland waters.

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THE CANADIAN NATIONAL COLLECTION OF INSECTS

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IN 1904, the late Dr. James Fletcher, then Dominion Entomologist, having described a few new species and races of Canadian Diurnal Lepidoptera, deposited his types in the United States National Museum at Washington in order to secure a safe depository for them. It is evident, therefore, that, even at this quite recent date, the Canadian National Collection of Insects, as an entity, was non-existant. This collection has been formed by the union of two separate entomological collections, viz: that of the Biological Division of the Geological Survey, Department of Mines, and that of the Entomological Branch, Department of Agriculture, and the purpose of the present paper is to trace the steps leading up to the amalgamation of these two units into a single definite National Collection.

The material derived from the first mentioned source consisted (1) of specimens collected at odd times by members of the Geological Survey when in the field, (2) of the insects collected by the members of the Canadian Arctic Expedition of 1913-18 and treated of in Volume III of the *Report*, and (3) of collections of insects purchased in or prior to 1914 by the Canadian Government; of these collections the three outstanding ones were those made by Capt. Gamble Geddes, of Toronto, Mr. J. D. Evans, of Trenton, Ont., and Mr. C. H. Young, of Ottawa.

The Geddes collection consisted chiefly of Diurnal Lepidoptera and contained a number of showy exotic species; the Canadian material was largely the result of a collecting trip made in 1883 by Capt. Geddes, from Edmonton, Alta., to the Crow's Nest Pass and the species obtained were at the time considered great rarities; now-a-days most of them excite little interest and the inaccurate system of labelling used by Geddes has still further reduced their value to the scientist—Sic transit gloria collectionis!

The Evans Collection acquired in 1914 was a general one, made chiefly in the vicinity of Sud-

bury and of Trenton and contained much material of interest and value. A large portion of it had been named by specialists in the United States to whom Mr. Evans sent his specimens. Unfortunately, the best and rarest specimens were usually retained and in consequence a certain proportion of the material has been lost to the National Collection.

The Young collection, purchased in 1913, was the result of twenty years of collecting Lepidoptera in the vicinity of Ottawa. It was especially rich in Microlepidoptera and most valuable on account of the perfect condition of the specimens. W. D. Kearfott, of Montclair, N.J., described a considerable number of new species in the Pyralidae and Tortricidae from Young's material and in most cases returned paratypes so that at least a certain portion of the type material is retained in Canada.

No attempt was made by the members of the Biological Division of the Geological Survey to work over or arrange the above mentioned collections other than had been done by the owners and it was not until 1917, as we shall see later, that they were made readily available for scientific study.

The second, and by far the greater, source of supply for the National Collection of Insects has been, as stated in the opening paragraph, the collections of the Entomological Branch. These collections date back to 1887, when Dr. Fletcher was appointed Dominion Entomologist and Botanist, his own personal collection forming the nucleus around which the collections of the then Division of Entomology were built. Dr. Fletcher was fully recognisant of the value of such a collection and states in his first Report that "reference collections of preserved entomological and botanical specimens will, of course, be necessary for the advantageous prosecution of entomological and botanical work. Temporary cases have already been provided for the former and no effort will be wanting on my part to build up, with all expedition, a collection".

In his 1893 Report, referring to a collection of twenty cases of insects, exhibited at the World's Fair in Chicago, Dr. Fletcher states that "the collection, when returned, will form the nucleus of a reference collection. Such a collection of reference has been much needed in the past. I hope, during the coming winter, to much increase this collection from the large amount of material which had accumulated previous to the appointment of my assistant, Mr. Guignard, and which could not be arranged, owing to pressure of other work".

In 1899, with the appointment of Mr. Arthur Gibson as Assistant to Dr. Fletcher, a fresh impetus was given to the building up of the collection; Mr. Gibson not only presented his own valuable personal collection to the Division, but proved most ardent and assiduous in the collecting and breeding of specimens; under his care, fresh material was rapidly added and a serviceable working collection gradually evolved.

Dr. Fletcher's Reports from 1900-1909 mention with almost monotonous regularity a great yearly increase in specimens collected and received; a growing interest in Nature Study, which became apparent all through the Dominion about this time, was responsible for many donations to the Division's collection and throughout the Reports we constantly meet with acknowledgments to such well-known collectors and entomologists as W. H. Harrington, Ottawa; C. H. Young, Ottawa; N. Criddle, Aweme, Man.; J. B. Wallis, Winnipeg, Man.; T. N. Willing, Regina, Sask.; F. H. Wolley-Dod, Calgary, Alta.; J. W. Cockle, Kaslo, N.S.; G. W. Taylor, Wellington, B.C.; A. W. Hanham, Duncan, B.C.; and many others in all parts of the country. From the 1905 Report I quote the following: "The collections of insects and plants in the Division have been largely increased during the past year. Mr. Gibson, who has charge of the insect cabinets, has mounted and placed a large number of specimens, the collection of lepidoptera is now in excellent working order. Efforts will be made to build up the reference collections of the other classes of insects as quickly as possible, as information is being constantly sought for from the Division by the large number of students in all parts of the Dominion who are giving so much attention to Nature Study".

At this time the collections had increased to such an extent that they occupied between 150-200 large drawers, besides a great deal of unworked material in store boxes.

In 1910, Dr. C. Gordon Hewitt, in his first report as Dominion Entomologist, stated that "in the absence of a national collection of Canadian insects, every endeavour is being made to render our systematic collection as complete and representative as possible". Again in his 1912 Report he writes: "It is our aim that this collection shall ultimately become a national collection of the insects of Canada, for such it is virtually at present. During the last year the arrangement of several of the orders has been started. The Lepidoptera are now almost in order". In 1913, he reports that Mr. Germain Beaulieu, appointed to the Division in 1912, had "assiduously devoted himself to the arrangement of our now rapidly increasing collection. The Hemiptera have been arranged and special attention has been devoted to several orders of the Coleoptera". He also reports that the late Mr. F. W. L. Sladen had been placed in charge of the Aculeate Hymenoptera.

In the 1914 Report, he states that: "The Collection of Insects, which now constitutes the National Collection, has increased materially during the past year owing to the increase in the staff of the division and the greater opportunities which are now afforded to secure insects of all orders by the presence of field officers in the various provinces".

With the raising of the Division of Entomology to the status of a Branch in 1914, and its subsequent separation from the Experimental Farms to occupy its present quarters on the sixth floor of the Birks' Building, more room was afforded for the collections; Dr. Hewitt was also in the same year appointed Honorary Curator of Entomology in the National Museum. To quote from his Report of 1915: "Arrangements were completed at the beginning of the year (i.e. 1914) for the co-ordination of the work of this Branch and that of the National Museum (the Victoria Memorial Museum of the Geological Survey) in the matter of entomological collections, to prevent duplication. The collections of this Branch and of the Geological Survey now constitute the national collection of insects".

From Dr. Hewitt's report as Honorary Curator of Entomology for 1916, I quote the following:—

"The congestion and restriction of available space in the Museum caused by the temporary use of the building by Parliament rendered it impossible to continue our plans for arranging the national collection of insects in the steel cabinets that have been provided for its accommodation.

"In the absence of the working room required for consultation and of a qualified man in charge of the collection in the Museum, it was considered advisable to postpone further efforts to transfer to the cabinets in the Museum the main and working portion of the insect collection that is now housed in the offices of the Entomological Branch of the Department of Agriculture until the Museum is vacated by Parliament, when normal conditions will again prevail and the necessary space will be available. Our work in the Museum, therefore, has been confined to the task of transferring to the cabinets for safe storage the insects belonging to various collections that had been purchased by or donated to the Museum in the past and which were contained in a miscellaneous collection of storage boxes and cabinets.

"The main collection of insects is still in the office of the Entomological Branch and not only have considerable additions been made to it through the field work of the officers of the Branch and gifts of other collaborators, but very satisfactory progress in the identification and arrangement of the large accumulation of unclassified material can be recorded".

The steel cabinets mentioned—twelve in number, with six hundred drawers—were transferred in 1917 to the offices of the Entomological Branch owing to the congestion in the Museum building. Thus was effected the complete unification of the various Government insect collections into one definite national collection of insects.

The succeeding years saw a large increase in the specimens received from various sources, chiefly from field officers connected with the various Branch laboratories: the valuable collection of the late W. H. Harrington, of Ottawa, especially rich in Hymenoptera and including many types of new Canadian species, was also acquired by purchase in 1918.

In his 1919 Report, Dr. Hewitt states that "owing to the increasing magnitude of the collections and the growing demands for assistance in the determination of small collections of insects submitted by individuals and institutions, it has been necessary to arrange for the appointment of a specially qualified officer to take charge of the national collection and to devote his attention to systematic studies".

This led to my own appointment as Chief of the Division of Systematic Entomology in April, 1919, with special charge of the National Collection. At the time of my appointment the status of the National Collection was, roughly speaking, as follows:—

(1) 12 steel cabinets with 600 drawers containing the entire collection of North American Lepidoptera which had been brought together and rearranged according to the Barnes & McDunnough "Check List" of 1917 by Mr. Gibson and me in the summer of 1918, whilst I was on a visit to Ottawa for this purpose. This arrangement did not include the Microlepidoptera which were largely unidentified and unclassified. The cabinets also contained the balance of the Geddes, Evans and Young collections as originally transferred by the Museum staff, as well as a number of empty drawers, destined for the collections of other orders of insects.

(2) The Harrington Collection, which remained as originally purchased in four large wooden cabinets with glass-topped drawers.

(3) The classified collections of the Entomological Branch, exclusive of Lepidoptera, contained in wooden Schmitt boxes in so-called Skinner cabinets, comprising approximately 200 boxes of Coleoptera, 100 of Diptera and 60 of Hemiptera. The Neuropteroid insects and the Orthoptera were in wooden cabinets with large glass-topped drawers and had suffered so severely from the ravages of *Anthrenus* as to render them practically worthless. The Aculeate Hymenoptera were still in charge of the Dominion Apiarist, Mr. Sladen, at the Central Experimental Farm.

Besides the above, there was a very large accumulation of miscellaneous insects, entirely unclassified and unsorted, contained in all manner of drawers and store-boxes. The named collections, exclusive of the Lepidoptera and a portion of the Coleoptera in charge of Dr. Swaine, were found on examination to be arranged according to more or less antiquated systems of classification and the series of specimens under a single specific name were often much mixed; it was evident that a revision of the entire collection would have to be made in order to place it on a sound nomenclatorial basis. To accomplish satisfactorily such a piece of work a good library of taxonomic works was the first essential and it was soon evident that the library of the Entomological Branch was totally inadequate for the needs of a systematist.

From the very first, therefore, it was clear that the development of the National Collection of Insects must proceed along the following three lines:—

(1) The gradual sortation of the unclassified material into families and genera in order to make it available for systematic study.

(2) The transference of the collection into permanent steel cabinets, accompanied by a critical revision of the species and an arrangement according to the latest taxonomic views.

(3) The building up of a taxonomic library capable of sustaining the demands placed upon it by the systematist.

It is along these lines that we have been working for the past six years and I am proud to say that to-day we have a National Collection of Insects which ranks among the leading collections of the North American Continent and a taxonomic library which is not only one of the finest specialized libraries in the Government Service, but also probably the best of its kind in Canada.

At first the work progressed but slowly, as I had only the services of one laboratory assistant at my disposal; in September, 1922, however, we were extremely fortunate in securing the appointment of Mr. C. H. Curran to the Division and he was at once put in charge of the Diptera; in July, 1923, Mr. H. L. Viereck, the well-known Hymenopterist, was temporarily, and a year later permanently, appointed to take charge of the Hymenoptera and at last this large and much neglected family is receiving the attention it merits on account of the economic importance of so many of its members. The number of laboratory assistants has been increased to three and a clerk-stenographer is of invaluable assistance in the preparation of manuscript and in general library work.

Apart from the divisional staff, several other members of the Branch force have assisted materially in revising the collections. Mr. Norman Criddle, Field Officer in Manitoba, has charge during the winter months of the Coleoptera, and Dr. Swaine and Mr. Hopping of the Division of Forest Insects have been most active in working over the wood and bark-boring groups of beetles. Mr. R. Buckell, now Field Officer in British Columbia, spent several winters working over the Orthoptera and has rearranged our entire collection.

As occasion required, further steel cabinets and drawers have been purchased and the main National Collection has now been, with the exception of a small section of the Hymenoptera, entirely transferred to these permanent receptacles, and to a very large extent revised from the standpoint of nomenclature, either by one of our own staff or by some specialist in the United States.

The number of specimens added yearly to the collections has been very large; in 1920 the collection of Lepidoptera of the late Mr. F. H. Wolley-Dod, of Midnapore, Alta., was bequeathed to the Entomological Branch; this collection was especially rich in Western Noctuidae and represented the result of many years' collecting in the Rocky Mountain foothills. In 1921, on the death of Mr. Sladen, the Aculeate Hymenoptera were transferred from the Central Experimental Farm to the main National Collection and, in addition, his collection of British Hymenoptera was purchased; in 1923 a large portion of the collection of J. W. Cockle, of Kaslo, B.C., was purchased, including all the type material; in 1924 the Treherne collection of Thysanoptera, a most valuable lot of slide material, including a number of types, was acquired from his estate; the Curran collection of Diptera was also added.

The Faunal Surveys carried on by my Division during the summer months have resulted in much additional material and have also furnished considerable new data regarding the distribution of species; these surveys are made by members of the staff assisted by several seasonal investigators; the region between the Ottawa river and Georgian Bay in Ontario has been given especial attention and we are also investigating the insect fauna of the north shore of Lake Erie which contains many southern elements. Two more extended trips were made by me to the eastern slopes of the Rocky Mountains, to Nordegg, Alta., in 1921 and to Waterton Lakes National Park in 1923; the resulting material, combined with the large collections made at Banff, Alta., in 1922 by a seasonal assistant and with the specimens contained in the Wolley-Dod collection, has given us a very fair idea of the fauna of this interesting region.

From the Field Officers in charge of the various Branch laboratories, especially in the west, we have received large consignments of valuable material

each year and great credit is due these officers for the continued zeal shown by them in the building up of the National Collection. Members of the Geological Survey, the Topographical Survey and other Departments of the Government, whose work often takes them into unexplored and inaccessible regions, have shown much interest in obtaining collections of insects for us; their material has frequently contained species of great rarity. From donations by private individuals and from exchanges of specimens, considerable additions have also been secured.

The possibilities of satisfactorily determining specimens have naturally increased from year to year as the various groups have been revised; in consequence not only our own field officers, but provincial museums, universities and colleges, school-teachers and private collectors have availed themselves to an ever-increasing extent of our services in the matter of indentifications. As these services are given on the understanding that we may retain material of value to the National Collection, we have profited considerably from this branch of our work.

The net results of the work of the past six years may be briefly summarized in a few paragraphs.

The National Collection of Insects is now contained in 31 steel cabinets of 1,550 drawers apportioned as follows: Lepidoptera, 625 drawers; Coleoptera, 250 drawers; Diptera, 225 drawers; Hymenoptera, 200 drawers; Hemiptera, 50 drawers; Orthoptera, 50 drawers; Odonata, 75 drawers; Ephemeridae, 50 drawers; Neuropteroid insects (partially unclassified), 25 drawers. There are besides two cabinets of alcohol material, including collections of Arachnida, Odonata and Ephemerida, and several slide-cabinets containing our material in plant-lice, fleas, thrips, etc.

The divisional staff has published about 120 taxonomic papers, which include descriptions of 736 new species; of these, I am responsible for 200, Mr. C. H. Curran for 250, and Mr. H. L. Viereck for 286. The types of these new species are nearly all deposited in the Canadian National Collection and the paratype material has been used very advantageously as a medium of exchange for paratype material contained in other institutions. As a result, type material of approximately 2,000 species is now contained in the collection and this number is being constantly added to. It is gratifying to note that workers in entomology in Canada outside of our Branch Staff, are beginning to deposit the types of their new species with us and it is to be hoped that such a practice will increase as the Canadian National Collection is the most logical and the safest depository for the types of Canadian insects.

I cannot conclude without calling particular attention to the debt of gratitude which we owe to Dr. J. H. Grisdale, Deputy Minister of Agriculture, and to Mr. Arthur Gibson, Dominion Entomologist, for their constant interest in the plans for the building-up of the National Collection and their willingness to further the same. Without their co-operation it would have been impossible to have secured the necessary authorization for the purchase of insect cabinets and books, nor could we have increased the divisional staff to its present size.

NOTES AND OBSERVATIONS

THE UBIQUITOUS HOUSE SPARROW.—Stretching eastward from the "Eastern Gap" of Toronto Bay lies a long beach washed by the waters of Lake Ontario. Strong winds have swept the clean sand inland, where it has piled into long smooth dunes, on which the various species of Willow and Poplar have found root and are flourishing. The smooth, more level, spots have brought forth a crop of many sand-loving plants such as Sea Rocket, Beach Pea, Wormwood, and the well-known Sweet Clover. Remote from the city and all dwellings, as it is, this is the last place where one would expect to find the common House Sparrow. Yet on several occasions I had noticed small flocks of this bird whose life-history is so linked up with haunts of man. At first I accepted their presence in such a spot as an evidence of the birds' wandering, but soon found it meant much more than mere wandering. Once, as I suddenly appeared at the top of a low sand dune, I came upon a small flock of six or eight sparrows, feeding at the roots of the Sweet Clover on a smooth, level sand. Naturally, I thought of seeds as being the attraction, but, after I had flushed three or four such flocks, always from similar locations, and reflected that the end of June was hardly the time for seeds, I determined to learn the true state of affairs. On flushing the next flock, I turned aside and examined the ground. There was apparently nothing to be found but smooth, clean sand surrounding the weed-stalks, in which lay crisp Willow leaves, half buried. Then I raked my fingers through the sand—at once the secret came to light. I disclosed a large, whitish grub—fat and juicy. Half a dozen of such would have been a full meal for any Sparrow. With very little trouble I located and exposed several others, all within a few square feet of sand.

Then I began to wonder, how did the House Sparrow stumble on such a treasure? A little

scratching and he was amply rewarded. If such resourcefulness and enterprise be his as to seek out food so far from his usual haunts, in an obscure nook like this, then, by all the laws of Nature he deserves to win. No wonder his tribe has increased and multiplied. As for us, it would be interesting to learn how he came upon the idea in the first place.

The grubs, however, did not take kindly to the sunlight at all. No sooner did I unearth a few than they, one and all, scrambled about until they got their heads into the loose sand and, next minute, dragged their tails in after them. Yet they left no trail whatever. The question then became more difficult than before to answer. How did the Sparrow find such prey without even the clue of a trail?

There was a little touch of irony in the situation. Here were Plovers and Sandpipers running up and down the beach; Gulls and Terns flying overhead; Marsh Black-birds, Song Sparrows, Horned Larks and many other such birds constantly about. Yet none were to be seen searching amid the sandy weedy spots, of which there were acres on the lonely beach. Not more than a quarter of a mile away were several men fishing from the pier. No doubt each had brought his can of bait from home. But far off from his accustomed haunts, the House Sparrow had come and was finding food in plenty. —STUART THOMPSON.

NOTES ON FLICKERS IN ALBERTA.—In this district, we have no old hollow trees for the flickers and birds of that kind to nest in. So I make a practice of putting up rotten posts and boxes, etc., for them. I have the best luck with the flickers to put up a rotten post or log and let them make their own hole for a nest. In 1923, a pair of Flickers had their nest in a post near our house. I banded them. They raised their family and left in the fall as usual. I watched with a great deal of interest for their return in 1924 and, on April 15th, the male bird arrived here along with about a dozen other flickers. The last year's female was not with them. I watched with field glasses several times a day and it was quite comical to see the last year male coax some of the females to have a look at the last year's nest. First one, then another, would have a look in. There was lots of *talking* and *bobbing* of *heads*, as flickers do, as much as to say that was a dandy good house last year and should make a good place this year, etc. I think it was on the third day after the first arrivals, I was watching them. The last year's male bird was on top of the post and one of the females was sitting with her head inside the hole, evidently inspecting the place. I suppose to see if the bathroom was big enough, etc., when there was a streak through the air and something like a cyclone hit that female on the back and knocked her off the post and—well, the last year's female had arrived. She paid no attention to her last year's mate sitting on the post about a foot from the hole, but went right in and commenced to clean house. Dirt and chips commenced to come out at once. She stayed with the house cleaning for about a day and then mixed up with the rest of the flickers and for about a week it was impossible to tell if there were any favorites on either side of the house. They would sometimes be with one and again with another. But the female never let any other female go into the last year's nest. Perhaps the divorce papers didn't get around in time, or maybe it was all a big bluff; anyway, the same two birds went to keeping house and raised their family as usual. It was just three days short of two months from the time the *first* egg was laid until the young birds were flying from the nest, practically full grown. I will, of course, try to be watching for their return in 1925.—DAN PATTON, Midnapore, Alta.

NOTES ON BLUEBIRDS IN ALBERTA.—This year, 1924, we had a family of Bluebirds nesting in one of our porch posts. (I had made a hole for them.) I banded the old birds, also the seven young ones, that they raised. I suppose it is generally known that Bluebirds nearly always raise two families each year. Sometimes the second nest is a mile or more from the first one. The nest is built and eggs laid in the second nest while they are feeding the young birds in the first nest. They evidently try to have things timed so that the incubating in nest No. 2 commences at the time the young birds are leaving the first nest. This year, I never found where the second nest was, but it must have been quite a distance from the first one. I noticed nothing unusual among them until several days after the young birds were out of the first nest (in the porch post). They stayed around in the garden and trees near the house. The old male bird was often with them, and, at night at least, part of the young birds went back to sleep in the old nest. One evening, after they had been out about ten days, I heard quite a disturbance among them and went out to see what the trouble was, and the old male bird was guarding the nest and would not let a young bird come near. First one, then another, would try to get in the nest to roost, but nothing doing; the old bird was there first and kept them out until after dark, and the young birds went to roost, some under the eaves of the house and others on the roof by the chimney, where they were out of the wind. Next night, it was the same thing over again, and was kept up regularly for three weeks or more. Sometimes it

was the old female that was on guard, but most of the time it was the male; never both at the same time. One of the old birds evidently had to stay looking after nest No. 2.

Finally the young birds quit trying to get back in the nest and, in due time, they all left. Can any one give a reason why those old birds should go to so much bother to keep those young ones out of that nest? Was it just a dirty, unhealthy place and the old birds realized it?.—DAN PATTON, Midnapore, Alta.

UNUSUAL BEHAVIOUR OF A LEWIS'S WOODPECKER, *Asyndesmus lewisi* Riley.—When in the neighbourhood of Mount Tolmie, Victoria, B.C., on February 16, 1925, I observed a bird ahead of me circling around above the tops of some tall oak trees. The wings were held outstretched and apparently rigid. The attitude and general behaviour of the bird was distinctly hawk-like, and as the bird was first seen from a considerable distance, it was presumed to be a small hawk. Though the performance still had a distinctly accipiterine appearance on a closer view being obtained, yet the nearer I approached, the less hawk-like did the bird itself appear. I was completely at a loss to know what the bird was until, as it turned in its circling, the sun shone on its underparts, showing them to be a deep crimson and I concluded it must be a Lewis's Woodpecker which I was watching. After a while, it flew down to the lower branches of a tree close to me and I was able to check my indentification.

This performance took place in the close vicinity of the tree which recent evidence leads me to believe to be its nesting site.

I had proceeded some fifty yards on my way when, happening to look up, I perceived the bird repeating its performance, sailing, diving, swooping and circling in an apparently effortless manner. On this occasion, a passing Crow took exception to the proceedings and gave chase, eventually driving the Woodpecker to seek safety by clinging to the trunk of an oak tree. (I have frequently observed that a Crow will never let slip an opportunity of bullying a Woodpecker of this species.)

It is unfortunate that, when the above performances took place, I was in a hurry and unable to loiter, as I should have liked to have been able to take a good look round and to have discovered if the female (I assume the performer to have been a male) was in the vicinity.

That the behaviour of the Lewis's Woodpecker here recorded was in the nature of a "nuptial display" seems to be a reasonable theory, though the above evidence is admittedly inconclusive and quite inadequate considered as proof of such a theory.—W. H. A. PREECE.

FOX SPARROW SPENDING THE WINTER IN HAMILTON.—I would like to report that we have a Fox Sparrow spending the Winter here.

I first noticed him about the end of October with a flock of Tree Sparrows; then, as the cold weather set in, he joined a flock of English Sparrows, and has been almost a daily visitor at my veranda all Winter.

To-day, being very stormy, I noticed him five different times on the veranda picking up anything the Chickadees, etc., dropped from their swinging feeding place.

I always see him at close range and can positively identify him with the bluish slate about his head and the foxy red tail and sides heavily marked with reddish brown and black.

I may add I am a member of the Hamilton Bird Protection Society.—ISABEL D. TURNER.

TREASURER'S CORRECTION.—I am pleased to report that the amount of $49.35 shown on page 15, Canadian Field Naturalist, Volume 40, No. 1, as deficit, is in reality as a surplus.—BERTRAM A. FAUVEL, Hon. Treasurer, The Ottawa Field-Naturalists' Club.

BOOK REVIEW

INDEX TO PALAEONTOLOGY (GEOLOGICAL PUBLICATIONS 1847-1916); *compiled by Frank Nicolas. Pp. 1-383, 1925, Geological Survey, Canada Publication No. 2034; Price 50 cents.*

Captain Nicolas' index to the fossils recorded in the reports of the Geological Survey of Canada has furnished a long-needed key to the wealth of knowledge concerning ancient life which is widely scattered through these reports. A work of reference in many volumes without an index is about as useful as a twenty storey building without an elevator. Palaeontologists will probably be sufficiently thankful for this great aid and ally which Captain Nicolas' persevering industry has placed in their hands to overlook any technical defects which they may discover in it.

Those who use this work will find in the supplementary list of specific names, which occupies 65 pages, a valuable adjunct to the index. In it the several generic names which have been associated with each specific name follow it, and the accepted generic names appear in small capitals, while synonyms are in italics. A list of fossils whose specific and generic names have both been changed

terminates the volume. This work should be welcomed by everyone interested in geology and we believe by a great number of biologists as well. Every biologist has some interest in palaeontology —the hinterland or the historical back-ground of his subject—and will have much occasion to use this index. The botanist will be able to find out with its help all that has been recorded concerning the Tertiary and Cretaceous ancestors of modern trees in the 180 volumes covered by the index. The recorded information in this series of volumes concerning the geographical distribution of living shells during the Pleistocene becomes easily usable for the first time with the aid of the index.

The writer hopes that the author of this index will follow it with another which will cover scientific reports other than those of the Geological Survey of Canada, in which descriptions and references to Canadian fossils occur. In such a work the scope and plan of the present one should be improved upon by indicating the geological horizon of every species cited.

By way of illustrating the important role which fossils play in economic geology, it may be noted here that when the preliminary survey of New York State was completed about 80 years ago, the geologists announced that coal would never be found within the areas they had covered. This conclusion was based on the determination of the age of the New York rocks by means of fossils which indicated that the Coal Measure rocks were absent from the State. Coal is still unknown in New York State and one of the results of the geological surveys made there has been the prevention of the waste of large sums previously squandered annually in searching for coal at horizons below the Carboniferous.

Names of fossils, before they can become entirely efficient allies of the structural or economic geologist and an important part of the permanent fabric of science, require interpretation in terms of time and space. The index is a most important step in this direction. The data which, through many years, have been accumulated by the labor of many men and have appeared under hundreds of titles, become truly significant only when the range in time and the geographical distribution of each species can be shown. An index such as this is a very large contribution to such an objective.

In 1623, the Frenchman, Gabriel Sagard-Theodat, commonly called Sagard, of the Recollet order, in company with two other followers of the great nature lover, St. Francis Assisi, ascended the Ottawa river and observed, in passing the Chaudiere falls opposite the present city of Ottawa, that the rocks were covered with what seemed to be small stone snails (*petits limas en pierre*). Sagard records concerning these: "I am unable to account for this, unless it is owing to the nature of the stone itself, or that the result has been produced by mist from the falling waters" (*Grand Voyage du Pays des Hurons, 1632*). It is a far cry from this first published reference to Canadian fossils three centuries ago to the recently published 383-page check list of the fossils of Canada.

When the history of the development of a systematic knowledge of the ancient life of Canada is written a century or two hence, the mist-made fossils of the keen-eyed Frenchman will be the recognized starting point, and Captain Nicolas' index one of the conspicuous milestones on the great highway of Canadian Palaeontology.—E. M. K.

A Square Deal for the Antelope

The antelope is the most unique big game animal on the American Continent.

It is in greater danger of extermination than is the buffalo.

Whereas many years ago this fleet-footed animal ranged the prairies in countless thousands, to-day it is estimated there are less than five hundred antelope in the province.

Drastic measures are necessary to save this most beautiful of our big game from the fate of the passenger pigeon and the buffalo.

Its present range is in the ranching country in the South-west portion of the province, south of the South Saskatchewan River.

Many ranchers are now doing splendid work in protecting the antelope, one rancher having as many as fifty running with his stock.

To such public-spirited citizens, the antelope now depends principally for its protection, but when the alarming situation is once brought to the attention of the public, we feel confident they will respond to this urgent appeal for their co-operation in saving the antelope.

We owe it not only to ourselves, but to those who come after us that we exert every effort to save the antelope.

UNFORTUNATELY THERE ARE THOSE IN OUR MIDST WHO HAVE NO REGARD FOR THE LIVES OF THESE BEAUTIFUL CREATURES. THESE GAME LAW VIOLATORS WOULD SLAUGHTER THE LAST LIVING ANIMAL FOR THE LUST OF KILLING. WE TERM THEM "GAME HOGS" FOR WANT OF A MORE APPROPRIATE NAME.

EVERY SPORTSMAN WORTHY THE NAME SHOULD MAKE A DEAD SET AGAINST SUCH "GAME BUTCHERS". THEY SHOULD BE BANISHED FROM THE SOCIETY OF DECENT SPORTSMEN AND HELD RESPONSIBLE FOR THEIR COWARDLY CONDUCT.

At this stage of the game, one live antelope is worth 100 dead ones.

The time for passing lightly on antelope violations is past. Further leniency would result in the disappearance of this graceful animal.

The penalty for hunting or killing antelope is $200 and costs and in default of payment, six months' imprisonment.

Game guardians and the provincial police are paying special attention to patrolling the antelope range. Any persons who have knowledge of any violations should report full particulars at once to the Game Commissioner, Regina.

It is no pleasure for a game guardian to prosecute any person. He would much rather find in the performance of his duties that everyone is playing the game in accordance with the rules as outlined in The Game Act. He is under instructions to deal fairly and justly with all persons with whom he comes in contact. He is the sportsman's best friend. But the antelope situation is serious, and the most stringent measures are necessary to cope with the situation, and no leniency can be extended to violators in this respect, nor should any be expected. It is well known throughout the antelope territory that these animals have been on the protected list for many years now.

HELP TO PROTECT THE ANTELOPE

"All should guard what all may share,
A general good should be a general care."

F. BRADSHAW,
Game Commissioner,
Dept. of Agriculture,
Regina, Sask.

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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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THE CANADIAN FIELD-NATURALIST

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THE OTTAWA FIELD-NATURALISTS' CLUB

CONTENTS.

The official publications of THE OTTAWA FIELD-NATURALISTS' CLUB have been issued since 1879. The first was *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 Membership Committee of The Ottawa Field-Naturalists' Club is making a special effort to increase the subscription list of *The Canadian Field-Naturalist* and we are asking every reader to assist in making the campaign the success it should be.

We would particularly urge the Secretary of each Affiliated Society to bring this matter up at EVERY meeting and secure as many subscribers as they possibly can to a Canadian Publication devoted to the study of Natural History in all its phases.

Use the blank below and forward it to the Treasurer.

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The Canadian Field-Naturalist

VOL. XL OTTAWA, ONTARIO, MARCH, 1926 No. 3

A NEW LYMNÆA

By F. R. LATCHFORD

IT MAY be little less than a zoological crime to regard as new a mollusc of the widely disseminated tribe of *Lymnæa* (*Galba*) *palustris* Linn., the synonomy of which covers pages of Professor Baker's Monograph on the *Lymnæidae*. As might be expected in the case of a species ranging deeply from the boreal pole in three continents, under widely differing ecological conditions, *palustris* varies greatly. In the vicinity of Ottawa, it is common everywhere on the Ontario side of the river. The large and usually malleated form which is regarded as typical, occurs in Cave Creek, west of Holland Avenue, and elsewhere in ditches and ponds, while a smoother, smaller shell is found in the river itself. On the north shore, *palustris* seems restricted to the Ottawa and to pools and sluggish streams on the terraces below the Laurentian Hills. If it occurs among the hills themselves, I can only say that in more than forty years collecting, I have not there found a single specimen. It may yet be found in the Peche, in the long reach above the dam at Ste. Cecile, though it was not in that stream at one time. In other streams of swiftly flowing water and in the many clear, cold lakes in the valley of the Gatineau with which I am familiar, *palustris* does find a congenial habitat. *G. obrussa* in Gauvreau Lake is the only *galba* I have noticed other than one which I cannot but think is specifically distinct from *palustris* and proper to be regarded as undescribed.

The shell was first collected in Chilcott Lake on the memorable day in 1892 when the now famous orchid swamp near-by was discovered by four members of the Field-Naturalists' Club, the late Dr. James Fletcher and W. H. Harrington, and S. E. O'Brien and the writer. On several subsequent visits, the wonderful botanical attractions of the place were so absorbing that the molluscan fauna of the lake was wholly neglected. Later, however, owing mainly to the difficulty of attributing the *lymnæa* to any described species, the lake was frequently visited in late summer and autumn and large series of the shell collected in various stages of growth. It was found especially abundant on a submerged, mossy plant in shallow water, over a rocky point in rear of Samuel Chilcott's hospitable home, about three hundred yards north-west of his boat-house. The lake seems not more than half a mile in length. It occupies a small basin, set deep in the old Laurentian rocks, at an elevation of about 600 or 700 feet. Its principal, if not only, visible inlet is the little stream in the swamp. It is doubtless fed chiefly from springs, as its waters are cold and very clear. The *galba* found in it is not, in my opinion, *palustris*. No known form of that species resembles it in anything except size. None of the many described species and varieties is like it with the possible exception of *G. leaii*, which is a West Coast species. But as the shell differs materially from *leaii* as well as from *palustris*, and is really beautiful in its way, I venture to regard it as undescribed and quite worthy of being named after the ancient and beautiful hills among which it is found.

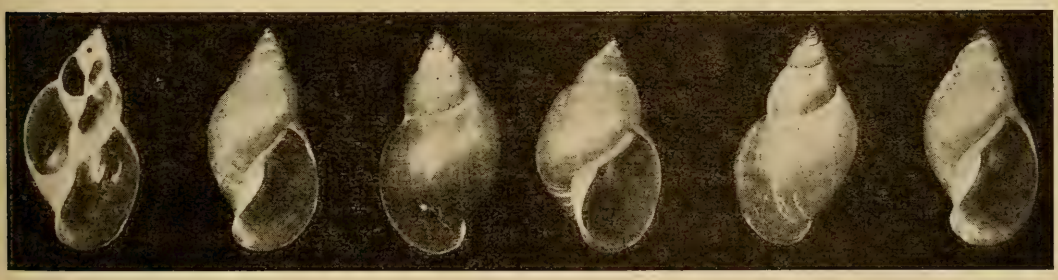


FIGURE 1.—*Lymnæa* (*Galba*) *laurentiana*, new species.

FIGURE II.

Shell large, ovate to elongate-ovate, thin; periostracum pale yellowish horn; striae of growth very narrow and fine, crossed spirally by narrower and finer slightly elevated lines, producing iridescent effects in reflected light; whorls six, rather flatly rounded, increasing rapidly in diameter, the last whorl very large; suture distinct but not deep; aperture usually elongate-ovate, rarely ovate; always longer than the spire; peristome thin or, in very old specimens, but slightly thickened, often expanded at basal margin, never malleated or bordered by a color-band; inner lip also thin; columella broadly expanded and with a long sweeping twist at umbilicus, which, in some cases it covers; callus very thin and closely appressed to body whorl. Animal pale slate colored, not spotted. Habitat Chilcott Lake, Masham, Ottawa County, Quebec. Types author's collection, No. 3902. Topotypes Victoria Memorial Museum, Ottawa, No. 3145, Mollusks; U.S. National Museum, Washington, No. 361,739.

The measurements in millimeters of ten examples are as follows:—

Length	*Breadth*	*Length Aperture*	*Breadth Aperture*
32.5	14.5	19	9.5
30.5	15.5	19	9.5
30.5	14.5	18.5	9
29	13	17	8
28	13.5	17	8
28	13.5	17.5	7.5
27	13.5	17	7
27	13	15	7.5
26.5	12.5	15.5	7.5
24.5	13	15.5	7.5
Av. 28.3	13.6	16.9	8.1

Taking the average length of the ten shells as 100, the proportionate dimensions are, breadth, 47.6; length of aperture, 59.1; breadth of aperture, 8.1. No *palustris* described or depicted by Baker, and none of the many that I have collected, has similar proportions. The length of the aperture is notably different and the much stouter general aspect of the shell quite distinct. This more clearly appears in Figure II, an enlargement to nearly twice the natural size of three of the shells shown in Figure 1.

How a shell so unique should occur in this small body of water and not elsewhere, so far as known, is one of the mysteries which so often puzzle the alert field-naturalist. Of course, it may yet be found in some of the thousands of similar lakes that adorn the Laurentides, but nothing like it has been observed in any of those which I have visited from Lac Tremblant west to Lac du Moine.

In Chilcott Lake, associated with *G. laurentiana*, I have found *Lymnæa stagnalis*, *Planorbis trivolvis*, *Plan. campanulatus*, a physa like the so-called *P. lordi* of Meach and the adjacent lakes, but smaller; *Campeloma decisum*, *Unio complanatus*, *Anodonta cataraecta*, an *amnicola*, probably *porata*, and an extremely delicate musculium as yet undetermined. *Alismidonta costata* Raf. and *Sphaerium simile* Say occur in the creek where it enters the orchid swamp.

BIRDS OF OUR GARDEN

By LOUISE MURPHY

"In the Market Place there is money,
But under the cherry tree there is rest and peace."
—JAPANESE PROVERB.

LOOKING over scattered notes jotted down during a period of twenty-five years, I find with surprise that our city garden records some sixty bird visitors in that time. Doubtless an earlier riser and a keener eye would have a longer story to tell, but all bird-lovers know that the true bird-story never comes to an end, for, with all the sweet memories and joyous thrills of the past, one must ever press on, only to discover more sylvan secrets stored away in the inexhaustible treasure-house of Mother Earth.

It is apparently always fair weather in the City of Montreal for our two permanent all-the-year bird neighbors—*Passer domesticus* and the Downy Woodpecker, who at least are willing to front the north wind and be dramatis personae in that grand old poem called "Winter". For the House Sparrow begins his courtship days as early as St. Valentine's Day, when the bright February sunshine melts little pools of water in the ice and snow. There it is you see the sparrows plunging at high noon into an icy bath and having rid themselves of some chimney soot, appear a few shades lighter on the glistening snow. They chirrup to each other, and their calls take on an upward lilt which continues until nesting time.

The Screech Owl lulls us to sleep with his soft-throated tremulo nine months of the year; Chickadee and Nuthatch fill many a day with their merry-hearted capers, and the Cedar Waxwing, a very gallant gentleman indeed, may pay us a visit on any calendar date. Once, when a company of Cedar Waxwings visited the crab-apple tree in January, a bit of a frozen crab-apple was passed from one beak to another, and, after it had been offered to each one in turn, it was finally enjoyed by the original finder of the tit-bit. These Waxwings live in community harmony, every member a perfect lady-bird or a gallant gentleman!

While some forty species comprise the annual average list of birds noted in the garden and vicinity, migration in all its variableness makes up a new programme each season when sky and unexpected visitants drop in for a bit o' cheer. So it was in July, 1924, when the Black-billed Cuckoo's rain call rang out every afternoon of that showery month:

"Cow-Cow—Cow Cow—Cow-Cow-Cow,"

came the monotone from the trembling leaves of the Normandy poplars, that rise in formal beauty at the north end of the garden. Was this a song of a mighty hunter despoiling, perhaps, the nests of the twenty-four varieties of birds then housekeeping in our neighbourhood? Happily, in July, 1925, never once came the monotone over the garden wall. So seasons come and seasons go and ever with infinite variety and charm.

LIST OF 24 BIRDS NESTING ANNUALLY.

1. House Sparrow.
2. Crow.
3. Bronzed Grackle, (since 1919)
4. American Robin.
5. Song Sparrow.
6. Catbird.
7. Chipping Sparrow.
8. Red-eyed Vireo.
9. Warbling Vireo.
10. Yellow Warbler.
11. Hummingbird.
12. House Wren.
13. Goldfinch.
14. Baltimore Oriole.
15. White-breasted Nuthatch.
16. Cedar Waxwing.
17. Flicker.
18. Downy Woodpecker.
19. Nighthawk.
20. Phoebe.
21. Wood Pewee.
22. Chimney Swift.
23. American Redstart.
24. Northern Yellow-throat.

LIST OF SIX OCCASIONAL NESTERS

1. Screech Owl.
2. Hairy Woodpecker.
3. Black-billed Cuckoo (1924).
4. Least Flycatcher.
5. Purple Finch.
6. Black and White Warbler (1925)?

But all the while, the old, true friends never fail to be neighbourly. Why, it wouldn't be Spring without "Melodia", the Song Sparrow!

"Sweetest of musicians,
Most cheerful of songsters.
Whose roundelays, tinkling from twig and bush,
Make Canada a land of song."

Or the Catbird, who peeps out at the world from tangles of bitter sweet, grape vine and hedgerow; or Robin Redbreast, with his Spring serenade setting the world astir: "When summer is 'a cumen in'."

As our garden nestles on Mount Royal's slope, no water fowl has ever deigned to visit us, for our water supply is limited to a garden hose and a bird-bath; nor have I, in all the years, ever seen a Bluebird, although apple-trees abound in and around Summerhill Avenue. Our garden neighbourhood has reached the venerable age of at least one hundred and thirty years, for, in 1793, it was the site of the residence of the intrepid

traveller, Sir Alexander McKenzie (the first white man to cross the Rockies) and although apartment houses are now creeping nearer, the trees and lawns are still holding out a welcome to the wild birds as they pass over.

ANNUAL LIST OF SIXTEEN MIGRANTS

1. Golden-crowned Kinglet
2. Ruby-crowned Kinglet
3. Wilson's Thrush
4. Hermit Thrush
5. Nashville Warbler
6. Junco
7. White-throated Sparrow
8. Indigo Bunting.
9. Myrtle Warbler
10. Canada Warbler
11. Blackburnian Warbler
12. Bay-breasted Warbler
13. Magnolia Warbler
14. Black-throated Blue Warbler.
15. Chestnut-sided Warbler
16. Chickadee (no record of nest)

FOURTEEN OCCASIONAL VISITANTS

1. Cape May Warbler (May 23, 1912);
2. White-crowned Sparrow;
3. Redpolls;
4. Crossbills;
5. Evening Grosbeak, 1916—March, 1917.
6. American Pine Grosbeak;
7. Bohemian Waxwing (February 21, 1920);
8. Great Horned Owl;
9. Wood Thrush—1901—Last Record;
10. Red-breasted Nuthatch;
11. Cowbird;
12. Yellow-bellied Sapsucker;
13. Blue Jay;
14. Brown Creeper.

A RARE BIRD

In June, 1901, a Wood Thrush, solitary and alone, spent a month here. Tangles of grape vine, bitter sweet, elder and wild cherry, offered a retreat for the Wood Thrush. At Dawn and Dusk, his golden voice penetrated through the windows. What a song! Double toned—slow—solemn and passing sweet.

Nuttall says the Wood Thrush sometimes ventures to visit city gardens, and Ernest Wintle calls it an accidental visitant to Montreal. However, it happened, this solitary artist honored us but once—while the Veery and the Hermit Thrush give us a passing nod occasionally, Spring and Fall.

On October 8, 1920, the Hermit Thrush was preparing for a morning dip when by flew "Sweet Canada", the White-throated Sparrow, who at once indicated his intention of taking a bath (Nature and Human Nature often resemble each other) with the result that the Master-singer withdrew quietly to wait, offering no temperamental resistance whatever.

John Burroughs writes of shooting a Hermit Thrush (circa 1863?). Of this, he says: "I open his beak and find the inside yellow-gold—I was prepared to find it inlaid with pearls and diamonds, or to see an angel issue from it." Without doubt, our Hermit makes the most sublime bird-music in all the world. While the literature of the Old World has hallowed and made classic the songs of Skylark and Nightingale, this thrush is the golden voice in the New World symphony.

TWO USEFUL BIRDS

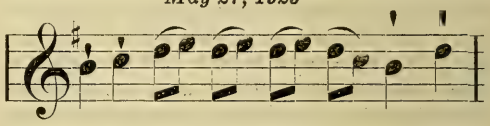
In July, 1923, the ugly black (tent) worms were swarming in a thick, white web on the wild cherry tree, when the Goldfinch and the Red-eyed Vireo deliberately pecked through the web and ate the wriggly black worms to their fill—without any opposition from the other birds. These pests evidently did not appeal to the appetite of that mischief-maker, the Bronzed Grackle, even. So when our darling Goldfinches swing and sway on the beet tops all through the summer days and pick holes in the leaves for a salad course, we remember our indebtedness, and echo what they express so sweetly in their canary-voice tone:

"Swee-eat—Swee-eat—Swee-eat—Swee-eat".

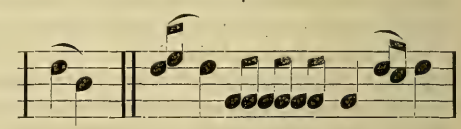
"There are tuneful bits o' music
On the May morning air."

But more than that, May is the month of the multi-coloured warblers that flash past us on their Northern migration. It is also the time of apple-blossoms, and the arrival of that gifted musician, "Lord Baltimore", the Oriole—whose concert season is all too short!

May 27, 1925—



Slur *1914*



On a sunny mid-day in June, 1917, a new song fell on our ears,

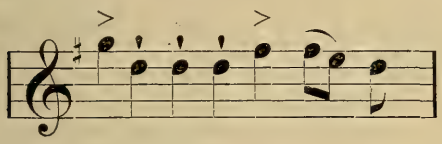
"Whip-poor-will"

repeated with all the joy of effort. It was a good performance and, looking up into the apple tree, we located the performer—a fine specimen of the American Robin! So perfect the mocking and so calm the mocker, one learned that dear old Robin Redbreast is more than the harbinger of Spring-time—he is a man of parts.

A TRIO OF LATE NESTERS

On June 30, 1924, Jennie Wren and her husband arrived, bubbling over with high spirits, as usual. We had despaired of them coming at all (it was so late), but the Goldfinches were picking vigorously that day at the clothes line, and a pair of Waxwings were busy, we noted, gathering string from the archway the week previous, when already chippy Sparrow had his family parading all out on the lawn, and the Robins did nothing but call every two seconds to their small sons, *"Hugh—Hugh—Hugh"*.

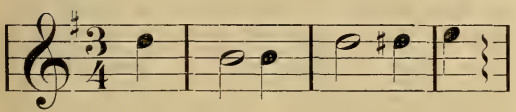
In the Spring of 1917, "Sweet Canada" came to see us on schedule time—April 24, and brought in company a flock of White-crowned Sparrows. They remained almost a week, hopping on the lawn with the Juncos, tinkling away like silver bells as they ate cornflakes mixed with snowflakes. To my knowledge, no White-crowns have ever visited us since, although it was that season that I had the joy of watching a White-crown nestle down to sleep!



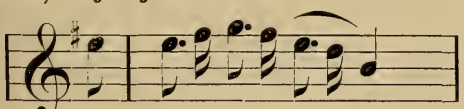
"Now I lay me down to sleep", he sang on one foot on a branch, but, not finding this the right roosting place, flew a little nearer. Here he repeated his evensong. Nor was this the right resting spot either. So again he perched still nearer to me, and once again rang out the song phrase, and up went the little foot, and under the wing reposed that crowned and kingly head. He was fast asleep.

Until 1919, two of our neighbours kept chickens. This enabled the two neighbouring factions to answer each other over the fences—some of the Roosters were makers of fair melody—one was a Waltz King, and he always crowed *"on with the dance"*.

WALTZ

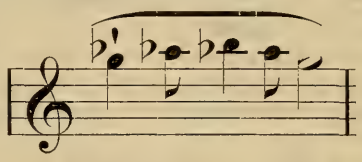


Another sang snatches from the old Scotch Ballad, *"My Boy Tammie"*—



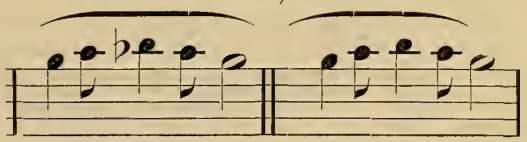
Cock-a-doodle-doo-oo-oo

and a more modern spirit echoed Harry Lauder, but the finest tenor was John MacCormack, a Black Minorca Bird, whose musical career was cut short one August morning, but whose clear voice still rings in my memory—



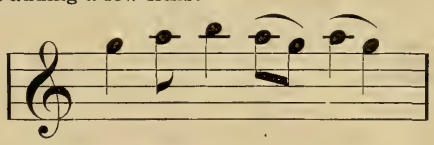
Cock-a-doodle-doo

March, 1915



April, 1915 May, 1915

swinging into the Major Key for July and August and adding a few frills!—

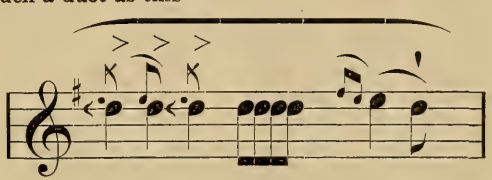


Cock-a-doodle-doo

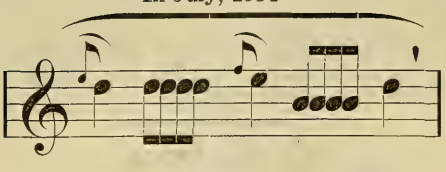
Early in August, the Southern migration starts. Chickadee and Nuthatch hop near the kitchen door and announce all too plainly that Autumn is coming, as if one needed to be reminded, when everywhere the goldenrod and asters are telling the secret, and here and there a birch tree is "donning a dress of gold".

VOICES IN THE NIGHT

When "Bubo", the Great Horned Owl, passed through the city in September, he sounded as if he were employing the "Loud Speaker", and when the chorus was strengthened by a family of Screech Owls, one felt somehow that this sort of thing did not fit in with our orderly city life. 'Tis a far, far cry from the silent wing-flight of a bird to the pomp and pride of a traffic cop, but what could be sweeter than to hear the Song Sparrows calling to each other in mid-summer-nights'-dream songs, such a duet as this—



In July, 1914—



or to hear the White-throat give a few notes of clear fluting in the middle of the night—

Sweet, Sweet Canada!

THE ECLIPSE OF THE SUN—A TRUE STORY

The House Sparrow was sleepy, although it was only 8.56 A.M., January 24, 1925. A shadow was gradually creeping over the city, growing darker and darker each moment. It was very still and silent, and human folk were looking at the sun through old photograph films to save their eyesight. The snow, instead of glistening, now had become pale, lifeless and dead white, and across the roadway the trees cast their outlines in long, ghostly silhouettes, and all in the fading light of day. The little cock-sparrow flew into the lilac tree, fluffed himself up on one foot, back to the sun, and wisely went to sleep.

THE CAMBRIAN-ORDOVICIAN STRATIGRAPHIC COLUMN OF SOUTHEASTERN NEWFOUNDLAND

By BEN. F. HOWELL

INTRODUCTION

THE sedimentary rocks, ranging in age from Lower Cambrian to late Lower or early Middle Ordovician, which have been found in southeastern Newfoundland, are of more than ordinary interest to stratigraphers and palaeontologists because of the abundance, variety, and excellent preservation of their fossils, and of the remarkable way in which these fossils resemble those found in beds of corresponding age in northwestern Europe. Much work will have to be done on many of the Newfoundland beds and fossils before we shall be in a position to give a detailed account of their exact sedimentary and faunal succession, detailed geographic distribution, and local development; but a brief summary of our present knowledge may perhaps be appropriately presented now.

Much of the information on which this paper is based was gathered by members of the three geological expeditions from Princeton University which worked in southeastern Newfoundland in 1912, 1913 and 1914; and the late Professor Gilbert van Ingen, who organized and led these field parties, would have been far more competent than the writer to describe the early Paleozoic rocks of that region. In acceding to the request of the editors to undertake this task, the writer has been actuated by a desire to make available to the scientific world some of the many facts which Professor van Ingen had gathered together, but which he was unable to publish because of ill health and the pressure of other duties. The writer would also express his indebtedness to the late Messrs. Alexander Murray and James P. Howley, of the Newfoundland Geological Survey, who gave us the first detailed account of the sedimentary rocks of southeastern Newfoundland; to the late Dr. G. F. Matthew and to Dr. Charles D. Walcott, who added much to our knowledge of the stratigraphy and palaeontology of the beds; to Dr. Albert O. Hayes who, with Professor van Ingen, first worked out the detailed stratigraphy of the Ordovician section in the Conception Bay district; and to Professor Nelson C. Dale, who described the Cambrian manganese beds about Conception Bay and studied the Cambrian rocks along the shores of Fortune Bay. The Cambrian fossils referred to have been identified by the writer. The identifications of the Ordovician ones are by Professor van Ingen.

THE SECTION

The Lower Paleozoic sediments of southeastern Newfoundland are shales and sandstones, with a few limestones, limy shales and limy nodules in the Lower Cambrian and the overlying Paradoxides beds, and with limy concretions in the Upper Cambrian, and a sandy limestone in the succeeding Tremadocian. Their character, faunas, and order of superposition are indicated in Table 1. Their total thickness has been estimated by Professor van Ingen at about 10,000 feet in the Conception Bay region. As far as we can judge, with our present knowledge, they appear to be naturally separable on lithological and palaeontological characters into five main divisions—the red and green shales and limestones with the *Callavia*, *Protolenus* and *Catadoxides* faunas, at the bottom of the column; the gray and black shales and thin gray limestones holding the *Paradoxides* faunas (the lower beds of this division are some-

times red); the gray and black shales and gray sandstones of the Upper Cambrian, containing the *Olenus* fauna; the gray and brown shales and single sandy limestone of the Tremadocian, with *Bryograptus, Shumardia, Parabolina, Princetonia,* and *Niobe;* and the sandstones, shales, and hematite beds of the Arenigian (and possibly Llandeilan) containing *Sphaerobolus, Didymograptus, Synhomalonotus, Schizocrania* and *Westonia.*

These beds occur as widely separated erosion remnants of what was probably, during and following the time of deposition of the later beds at least, a more or less continuous sheet of sediments. Because they have been longest subjected to erosion, the more recent of these beds have been more nearly completely removed, while the most ancient ones have been more extensively preserved.

The Lower Cambrian beds are known to outcrop at Topsail, Manuels, Long Pond Brook, Duff's, and intermediate points on the southeastern side of Conception Bay; at Chapel's Cove, Bacon Cove, Collier's Bay, and Brigus Bay on the western side of Conception Bay; on the western and northern shores of Random Island, and for a considerable distance on the northern shore of Smith Sound, Trinity Bay; and near Little Danzic Cove, which lies southwest of Fortune, on the southern shore of Fortune Bay.

The shales and thin limestones of the Newfoundland series, the Paradoxides Beds, have their best exposure in the gorge of Manuel's Brook, on the southeastern side of Conception Bay, some fifteen miles west of St. John's. This is a locality famous in the annals of North American stratigraphy, and of Cambrian geology in general, as the place where Dr. Walcott, in 1888, found *Paradoxides* beds and *"Olenellus"* beds in the same section—the first time that they had been recognized in America in a single section, and the first time that they had been found anywhere in the world so well developed and richly fossiliferous, and with their stratigraphic positions so clearly shown that their relative ages could be determined beyond question—and was able to demonstrate to everyone's satisfaction that the *Paradoxides* faunas were *younger* than the *Olenellus* faunas, and not *older*, as had been commonly believed up to that time. The Newfoundland beds are also well exposed at Topsail, Chamberlin's Brook, Long Pond, and Kelligrew Brook on the southeastern side of Conception Bay; at Chapel's Cove and on the south side of Brigus Head on the west side of Conception Bay; at Chapple Arm and Island Cove, near the head of Trinity Bay; on the west and north shores of Random Island and the north shore of Smith Sound, Trinity Bay (where the lower beds of the series are red shales and limestones); at Branch, St. Mary's Bay; near Fortune on the south side of Fortune Bay, near Boxey Point on the western shore of the same bay; and on Little Miquelon Island, which is not a part of Newfoundland, but which belongs geologically with that island, as it lies near it geographically.

The Upper Cambrian, "Olenian", Elliott Cove series, forms the part of Random Island which lies southeast of the island's northwestern corner. It is supposed to underlie the mainland on the other side of Smith Sound, to the northeast, though the island along that shore of the Sound is covered with glacial deposits for a considerable distance, and the beds are not known to be well exposed there. The series is also present on the southeastern side of Conception Bay, where it is well exposed in the gorge of Manuels Brook, and on the shore of the bay at Topsail Head. It will probably be found to outcrop also in the valleys of Kelligrew Brook and Seal Cove Brook, southwest of Manuels.

The beds of the Clarenville series, which are of Tremadocian age and older, although they presumably underlie the southeastern part of Conception Bay, are not known to outcrop as a whole above sea-level there, and have been found exposed only about Trinity Bay, where they form the northwestern part of Random Island and a part of the mainland at the western end of Smith Sound, the highest bed of the series, the Riders Brook limestone, occurring only in the latter locality.

The shales and sandstones of the upper division —the Bell Island and Wabana beds, of Arenigian, Lower Ordovician (and perhaps Llandeilan) age— are known only in the Conception Bay basin, and are exposed above sea level only on the three islands, Kelly, Little Bell, and Big Bell Islands, which lie out in that bay, though they must underlie much of the bay, the hematite beds of the Wabana series having been mined for several miles out beneath the sea-bottom northwest of Great Bell Island. The beds which are considered to be possibly of Llandeilan age are exposed on the northwestern side of that island.

In all this great stratigraphic section, from the base of the Cambrian to the uppermost Ordovician beds found, there is no known angular unconformity. Indications that deposition or upward movements of the sea-bottom brought the bottom almost or quite to sea-level have been found at one or more horizons in each of the five stratigraphic divisions described above; but in no case has there been noticed clear evidence of any considerable deformation or subaerial erosion of strata indicating an undoubted stratigraphic break of any importance, though periods of almost complete cessation of deposition seem to have occurred a number of times, and may prove on further

examination to have continued, in some instances, for considerable lengths of time. Concealment of some of the later beds beneath the waters of Conception Bay, between the mainland and Kelly, Little Bell, and Great Bell Islands, and folding of others of the upper beds in Random Island, together with our lack of detailed knowledge of many of the sections on the southern coast-line of southeastern Newfoundland, make it impossible for us to speak more definitely at present about the number or importance of the breaks in this stratigraphic column.

Fossils are common, in some beds at least, in each of the five groups of strata described above. They have not been found in the oldest beds of the Lower Cambrian; they occur in the greatest abundance and variety in the Paradoxidian Newfoundland shales and thin limestones; they are very abundant in some beds of the Upper Cambrian, the Tremadocian, and the Arenigian, but appear to be absent from others. They are sufficiently abundant and well enough distributed in all five divisions to enable us to determine the ages not only of the divisions as a whole, but of most, or all, of the principal parts of each division. They are, too, in many cases so similar to forms occurring in New Brunswick and Cape Breton, on the one side, and Great Britain and Scandinavia, on the other, that we can make close correlations of many of the zones with the corresponding horizons in those regions.

CORRELATION

The correlations of the strata of southeastern Newfoundland with those of the Canadian Maritime Provinces and northwestern Europe are shown in Table 2. An examination of this table will reveal the fact that the zones of the Lower and Middle Cambrian series of southeastern Newfoundland can, in most cases, be accurately identified with zones in southeastern Canada and northwestern Europe, but that the later zones of Newfoundland, while comparable in a general way with those of New Brunswick, Cape Breton, Great Britain and Scandinavia, cannot be correlated so closely. The main reason for our inability to make closer comparisons between these later beds is undoubtedly our lack of a more detailed knowledge of the Newfoundland faunas—a handicap which will be largely removed when the study of Professor van Ingen's collections, which are at Princeton, has been completed. Further studies of collections already made will probably disclose the age of the shales lying between the *Paradoxides davidis* beds and the *Agnostus pisiformis* beds in Newfoundland, some of which shales may prove to belong in the *Paradoxides forchhammeri* zone. The exact relations of the *Catadoixdes* Zone to the *Protolenus* Zone in southeastern Newfoundland is also not well understood. The *Catadoxides* Zone contains an undescribed fauna, which may prove similar to the fauna of the beds lying between the known *Protolenus* beds and the lowest known *Paradoxides* beds of Shropshire, England.

As far as they have yet been studied, the Cambrian-Ordovician faunas of southeastern Newfoundland have proved to be most remarkably similar to the faunas found in strata of the same age in Europe. Further study will undoubtedly add much to our knowledge of the Newfoundland faunas, and will probably enable us not only to recognize a larger number of faunal zones and make further detailed correlations with European and continental North American zones, but will surely disclose the presence of many more species, some of which will resemble closely, or be identical with, European forms, while others will be new or will be forms already known in North America. On the whole, there is good reason to believe that an increased knowledge of the Newfoundland fossils will make this interesting correspondence between the ancient life of the two sides of the Atlantic even more striking that it is now known to be.

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TABLE I.

CAMBRIAN-ORDOVICIAN STRATIGRAPHIC COLUMN OF SOUTHEASTERN NEWFOUNDLAND

SYSTEM	SERIES	ZONE	NATURE OF BEDS	CHARACTERISTIC FOSSILS
	Llandeilan?	*Lingula fraseri* Zone	Black shale, sometimes phosphatic.	*Lingula fraseri* *Schizocrania striata*
	Middle and Upper Arenigian, Wabana Series	Beds with *Didymograptus* and *Synhomalonotus*	Black and gray shales, sometimes phosphatic and pyritiferous, gray sandstones, and red oolitic hematite.	*Synhomalonotus chambersi* *Hemigyraspis cantleyi* *Lingula leseuri* *Schizocrania hayesi* *Didymograptus nitidus*
ORDOVICIAN	Lower Arenigian, Bell Island Series	Beds with *Obolus Linguloboluis*, and *Sphaerobolus*.	Brown and gray sandstones and shales, white sandstone, and, at the top, red oolitic hematite.	*Obolus burrowsi* *Sphaerobolus fimbriatus* *Lingulobolus affinis* *Lingula hawkei* *Lingula murrayi* *Lingula howleyi* *Lingulella billingsi* *Lingulella bella*
	Tremadocian and older Clarenville Series	Beds with *Bryograptus*, *Shumardia*, *Parabolina*, *Princetonia*, and *Niobe*.	Gray and brown shales, with a sandy limestone near the top in at least one locality.	*Shumardia* *Princetonia terranovica* *Parabolina harrieta* *Niobe howelli* *Bellerophon randomi* *Bryograptus*
?	?	*Orusia lenticularis* Zone	Black and brown shales, and thin sandstones.	*Orusia lenticularis*
CAMBRIAN	Upper Cambrian Elliott Cove Series	Zone of *Agnostus pisiformis obesus* and *Olenus*.	Black shales and thin gray sandstones.	*Agnostus pisiformis* *obesus* *Olenus*
		Agnostus pisiformis Zone	Dark shales.	*Agnostus pisiformis*
	?	Age unknown.	Dark sandy shales.	No fossils yet identified.
	Middle Cambrian Newfoundland Series	*Paradoxides davidis* Zone.	Black, brown, and gray shales sometimes with limestone nodules.	*Paradoxides davidis* *Paradoxides rugulosus* *Corynexochus minor* *Agnostus punctuosus* *Agnostus granulatus*
		Paradoxides hicksi Zone	Black, brown, and olive shales.	*Paradoxides hicksi* *Agraulos socialis* *Agnostus fissus* *Agnostus barrandei* *Agnostus rex* *Eodiscus punctatus*
		Paradoxides bennetti Zone	Green, and sometimes red, shales with limestone nodules and thin beds of limestone.	*Paradoxides bennetti* *Paradoxides eleminicus* *Hartiella matthewi* *Conocoryphe elegans* *Agnostus* cf. *rex*
	Lower Cambrian	*Catadoxides* Zone.	Green shales, sometimes with manganiferous shale and limestone in upper part.	*Catadoxides magnificus*
		Protolenus Zone.	Green and red shales, with some manganiferous limestones and phosphatic beds.	*Protolenus*
		Callavia Zone, and possibly a pre-*Callavia* Zone.	Red and green shales, sometimes holding nodules of limestones; red limestones.	*Callavia broggeri* *Strenuella strenua* *Solenopleura bombifrons* *Microdiscus bellimarginatus* *Obolella atlantica* *Coleoloides typicalis*

TABLE II.

CORRELATION OF THE CAMBRIAN-ORDOVICIAN SEDIMENTARY ROCKS OF SOUTHEASTERN NEWFOUNDLAND WITH THOSE OF SOUTHEASTERN CANADA AND NORTHWESTERN EUROPE

System	Southeastern Newfoundland		Southeastern Canada (N.B. and Cape Breton)	Northwestern Europe (Gt. Britain & Scandinavia)
	Series	Zone		
Ordovician	Llandeilan?	*Lungila fraseri* Zone	Not known to be present	Llandeilo of Gt. Britain?
	Middle and Upper Arenigian, Wabana Series	Beds with *Didymograptus* and *Synhomalonotus*	Division 3d of Dr. G. F. Matthew's classification—beds with *Didymograptus* and *Tetragraptus*	Middle and Upper Arenig of Great Britain
	Lower Arenigian, Bell Island Series	Beds with *Obolus*, *Lingulobolus* and *Sphaerobolus*		Lower Arenig of Great Britain
	Tremadocian and older, Clarenville Series	Beds with *Bryograptus*, *Shumardia*, *Parabolina*, *Princetonia* and *Niobe*	Divisions 3a-c of Dr. G. F. Matthew's classification—beds with *Ctenopyge*, *Sphaerophthalmus*, *Peltura*, and *Bryograptus*	Beds with *Shumardia*, *Parabolina*, *Peltura*, *Niobe*, and *Orusia lenticularis*
?	?	*Orusia lenticularis* Zone	?	
Cambrian	Upper Cambrian, Elliott Cove Series	Zone of *Agnostus pisiformis obesus*, and *Olenus*. *Agnostus pisiformis* Zone	Division 2 of Dr. G. F. Matthew's classification—beds with varieties of *Agnostus pisiformis*	Zone of *Agnostus pisiformis obesus* and *Olenus*. *Agnostus pisiformis* Zone (Scandinavia only?)
	?	Unidenitfied Zone	*Paradoxides forchhammeri* Zone?	*Paradoxides forchhammeri* Zone (Scandinavia only?)
	Middle Cambrian, Newfoundland Series	*Paradoxides davidis* Zone	?	*Paradoxides davidis* Zone
		Paradoxides hicksi Zone	*Paradoxides abenacus* Zone	*Paradoxides hicksi* Zone
		Paradoxides bennetti Zone	*Paradoxides lamellatus* and *Paradoxides eteminicus* Zones	*Paradoxides groomi* Zone
	Lower Cambrian	*Cata loxides* Zone	?	?
		Protolenus Zone	*Protolenus* Zone	*Protolenus* Zone
		Callavia Zone, and possibly Pre-Callavia Zone	Etcheminian	*Callavia* and possibly other Pre-Ptotolenus Zones

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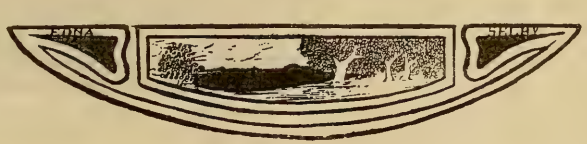

ARCHÆOLOGICAL EVIDENCE OF THE PRESENCE OF THE WAPITI IN SOUTHWESTERN ONTARIO*

By W. J. WINTEMBERG
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WE HAVE historical and other evidence that the Wapiti formerly existed in the Ottawa valley* and in the St. Lawrence valley, east of Montreal†, but there does not seem to be any historical evidence of its presence in the peninsula of southwestern Ontario.‡ I recently discovered archæological evidence of the presence of this animal in two widely separated localities in the peninsula. Many bones, comprising humeri, scapulæ, metapodials, phalanges, and vertebræ, were found at a pre-European Neutral site, known as the Lawson Village Site, near London, Middlesex County. I also found a few bones at Tobacco Nation Sites in Simcoe County.

Judging from the small number of bones, as compared with those of the deer, discovered at the Lawson Village Site, Wapiti were probably not very numerous. The bones, however, were found about as often as those of the bear. As most of the bones were unworked, it is probable that the animals were killed near the site.

The animal seems to have been in Simcoe County during the French mission period (1640-1649), for some of the bones were found at a post-European site.

The extinction of the Wapiti, if caused by man, may have been due either to Iroquois Indian hunters, who came into the country from what is now New York State, after the dispersion of the Hurons, Tobacco Nation Indians, and Neutrals (1649-1651), or to the Missisauga, who succeeded the Iroquois in the occupation of the country. These later comers probably hunted with guns instead of the bows and arrows of the earlier Indians, and this may have led to the speedy extinction of the animal; at any rate, it appears to have disappeared from the country before the beginning of British settlement, late in the eighteenth century.

*A skeleton of the Wapiti was found while digging the Rideau Canal, near Ottawa, in 1832. In 1854, what was probably the remains of the same species was discovered in Lanark County— J. M. LeMoine, *L'Album du Touriste*, Quebec, 1872, p. 199. See also my article, Archæology as an Aid to Zoology, *The Canadian Field-Naturalist*, Vol. XXXIII, 1919, p. 67.

†See Lalement's *Relation* of 1646, Burrow's edition of the Jesuit *Relations*, Vol. XXIX, p. 221; also Seton's *Life Histories of Northern Animals*, Vol. I, 1909, pp. 41-44.

‡"It seems certain that at one time the Wapiti was found in western Ontario, but it has become extinct."—C. W. Nash, *Manual of the Vertebrates of Ontario*, Department of Education, Ontario, Toronto, 1908, p. 92.

WILSON'S WARBLER (*Wilsonia pusilla pusilla*)

By W. J. BROWN

THIS perky little Warbler is a fairly abundant summer resident on the south shore of the Gulf of St. Lawrence. The first migrants were noted on June 2nd, 1925, and on this date they were in full song. This species nests on the ground in alder thickets and sometimes in the moss amongst Labrador Tea. On June 9th they were clearly nesting, this assumption being based on the general activities of the birds. On June 16th, in a growth of seedling spruce, alders and birches, at the edge of coniferous woods, a beautiful and neatly constructed nest of fine grasses was discovered, well embedded in green moss, in a mound, which was covered by Bunch-berry—a very unusual location for the Wilson's Warbler. The female lacked the black cap, but the characteristic mannerisms and the harsh call-notes peculiar to this warbler soon revealed proprietorship. A few minutes later, the male, which was warbling a short distance away and whose song reminded one of certain variations of the Yellow Warbler, appeared, the glossy black crown-patch showing strongly in contrast with the otherwise yellow-green plumage. Unlike other warblers, the Wilson's is not shy and has some faith in man. The camera was operated only two feet away and on several occasions the female entered the nest for a moment and then darted out again into the bushes near by. It was proposed to take a photograph of the bird at home, but the movements of an enraged bull in the neighborhood for days forced camp elsewhere.

On June 17th, 1925, an elaborately built nest of grasses was found in a pocket at the base of a warped alder tree in low, wet ground. The nest was altogether too large to contain snugly the diminutive frame of this bird, but birds exhibit common sense and wisdom at times and build wisely. Pools of water were within two or three feet of the nest and any heavy rains would flood it and the immediate surroundings. To prevent such an occurrence, the bird had constructed a thick wall of coarse grasses on all sides of nest, and on the west, where the pools were, blades of

rank grasses in profusion were spread cunningly. The female in this case had the distinguishing black cap on crown.

Nest of Wilson's Warbler in Mound. Unusual location.

Wilson's Warbler's Nest at base of alder bush in swamp.

THE PRAIRIE POCKET GOPHER IN MANITOBA

By H. H. PITTMAN

COMPETITION in Nature has eliminated many creatures whose development progressed along unsatisfactory lines and has produced many variations from what we consider original types. This, in other words the survival of the fittest, is still going on all around us, although man often takes a hand in the matter and hastens or retards according to his needs and inclinations.

Different forms of life evolved in many ways and directions, but those which for any reason were unadaptable to changing conditions gradually were replaced by more plastic forms able to contend with altered circumstances. Of the various Canadian mammals whose structure seems modified to correspond with their modes of life, one of the most remarkable is the northern pocket gopher of the western prairie.

This rodent, like other members of the family, spends most of its time underground, where it makes long burrows or tunnels from which heaps of earth are thrown up exactly resembling molehills. Indeed, English newcomers, judging by these mounds and unfamiliar with the animals, almost invariably refer to them as moles.

The northern pocket gopher is about the size of a rat and has short, powerful fore-limbs armed with long claws for digging. As might be expected, the eyes are comparatively small, although the animal can see well, but the chief points of interest in the head are the relatively enormous cheek-pouches with external openings. These pouches are fur-lined and so elastic that a finger placed in one and a thumb in the other seem to be able to reach back almost round the base of the skull. When distended, they give the head of the gopher a most remarkable appearance.

The ground-squirrels have cheek-pouches also, but opening into the mouth and which, it seems probable, are filled by means of the tongue, but the pocket gopher must fill his with his paws. He empties them by pressing his paws at the back of the pouches and gradually forcing the contents forward, as some of the pocket-mice do. The food consists largely of bulbs and roots and, as may be imagined, there are places where considerable damage is done. They enjoy the cultivated soil of gardens and are partial to carrots and often follow rows of these vegetables underground, eating or cutting them off as they go along. Most of their burrowing is done in search of food, like that of the mole.

Although this rodent spends most of its life underground, it pays occasional visits to the surface in the daytime if there is shelter to be found. My dog has sometimes caught them wandering among the vegetables in the garden in bright sunshine. At night, however, its excursions must be longer, judging by the way it appears in fresh places, and it is then that its natural enemies take the heaviest toll. Coyotes and weasels prey upon it, but its worst foes, I believe, are the Western Horned Owls, and I have frequently taken burrowing gophers from nests of these birds.

The disposition of the pocket gophers can only be described as surly and irritable, as some of my photographs suggest. This seems to be a characteristic of all the various species or sub-species and, although I have never witnessed an encounter, I am told that they will fight viciously among themselves without provocation. Advantage of this is taken by the Indians in some places by tying a string to a captured animal and introducing it into the tunnel of another. The resident immediately attacks the intruder and, by drawing the captive one out, the other can be pulled out also, and made a prisoner. The diet of some of the Indians includes sundry items seldom mentioned in our cookery books, I may say.

The skull of the northern pocket gopher does not possess the peculiarities that the great cheek-pouches might suggest, although it is sturdily built and has rather wide and strong zygomatic arches. The most prominent features are the powerful incisors, which are also conspicuous in life. The head is rather rounded and blunt and the ears and eyes are small, as might be expected in a mammal spending so much of its time burrowing. The eyes, however, are much larger than those of the moles, and in a captive specimen, follow an observer closely.

The muscles on the fore-part of the body are very strong and well developed, and the short, stout fore-limbs make the hind legs look weak by comparison. The claws on the front feet are large and very long and, I believe, when not in use are folded under the soles of the feet, but I have not had an opportunity to verify this.

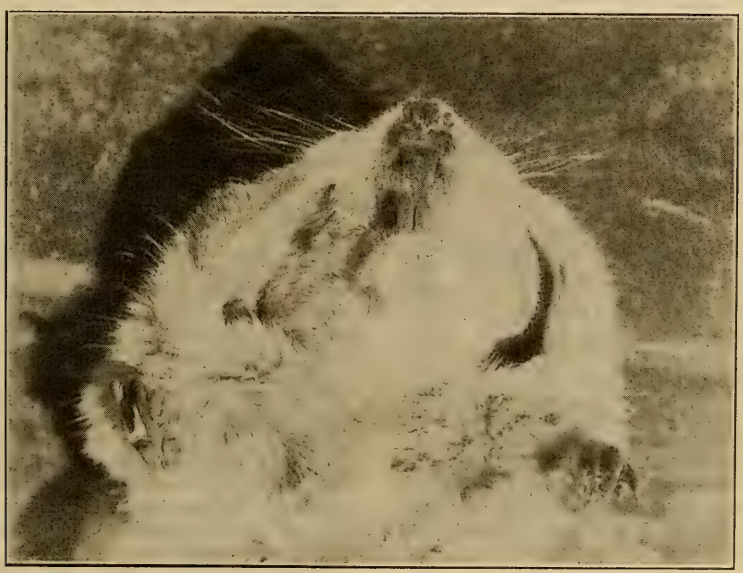
Pocket gophers are found practically all over the North American continent, but in south-western Manitoba, where these notes were made, the "northern" pocket gopher (*Thomomys talpoides*) is the common species, although I have a record (Hartney, Man.) of the larger form (*Geomys*) which had previously not been found farther north than North Dakota.

From the farmer's point of view, pocket gophers are an unmitigated nuisance, not only for what

Prairie Pocket Gopher—Burrowing Interrupted

they destroy, but also on account of the mounds of earth they eject from their burrows, which only too frequently are in the hayfields. When mowing, these hillocks are constantly in the way of the machinery, and the cause of damage and loss of time, for there are sometimes scores of mounds in a quite small area.

Whether it may be considered a matter of intelligence or not, I have never found a pocket gopher's tunnel in a position where it could be flooded either by the river or snow-water, but, of course, this may happen. They seem to prefer slightly moist soil; however, perhaps this is mainly a matter of food supply. I believe they travel more upon the surface during hot, dry periods, not so much on account of the soil becoming hard and dry, but to reach fresh or lower-lying areas quickly, where food would be more



The head, with pouches filled, from below

plentiful. As their diet would suggest, most of their tunnels are near the surface and are sometimes very long and erratic. The living quarters are generally deeper, for I have never seen them reached by a plough. It is possible that the northern pocket gophers make storage chambers and secrete supplies of food, as some related species do, and, indeed, the capacious pouches make this seem probable. Also, as they do not apparently completely hibernate, it is difficult to see how they could otherwise remain active during the long prairie winters without large stores of food to fall back upon when the ground is impenetrable and unyielding, even to sharp claws and long teeth.

The race for existence is not to the swift, but to the most adaptable and out of the numerous examples to be found everywhere, the pocket gopher provides one of the most interesting of a changed manner of procuring a living, in the course of time, bringing in its train an alteration of structure.

*Mr. Vernon Bailey, in his *Revision of the Pocket Gophers of the Genus Thomomys*, North American Fauna No. 39, Washington, 1915, p. 99, places the large, dark-coloured gopher occupying the greater part of North Dakota, eastern South Dakota and southwestern Manitoba, as *Thomomys talpoides rufescens* Wied., Prairie Pocket Gopher, or Dakota Pocket Gopher. The form found on plains of Saskatchewan and Alberta, south in Montana to Great Falls and the Big Snowy Mountains, is given as *Thomomystalpoides talpoides* (Richardson), Saskatchewan Pocket Gopher. The latter form, the *Geomys borealis* of Richardson (1837), is not recorded much east of Indian Head, Sask., but ranges north of Edmonton nearly to Athabaska, and is more entitled to the name of "Northern" Pocket Gopher, than the other subspecies.—R.M.A

*OFFICIAL CANADIAN RECORD OF BIRD-BANDING RETURNS**

ADDITIONAL RETURNS FROM BIRDS BANDED IN 1924

GREAT BLACK-BACKED GULL, No. 309,409, juvenile, banded by Harrison F. Lewis on the island called "The Black Land", Wolf Bay, Saguenay County, Quebec, on July 20, 1924, was killed on the shores of Shippigan Island, Gloucester County, New Brunswick, on or abour September 20, 1924.

GREAT BLACK-BACKED GULL, No. 309,411, juvenile, banded by Harrison F. Lewis on the island called "The Black Land", Wolf Bay, Saguenay County, Quebec, on July 20, 1924, was shot at Wolf Bay, five miles west of Cape Whittle, during the month of September, 1924.

HERRING GULL, No. 321,148, banded by F. C. Lincoln, at St. James, Michigan, on July 20, 1924, was found dead on the shore of the St. Lawrence River, at Montmorency Village, Quebec, on September 15, 1924.

HERRING GULL, No. 313,763, juvenile, banded by Wm. M. Duval, on Bonaventur, Island, Quebec, on July 25, 1924, was found dead at Economy, Nova Scotia, on September 14, 1924.

HERRING GULL, No. 309,437, juvenile, banded by Harrison F. Lewis, on Fog Island, Saguenay County, Quebec, on August 10, 1924, was shot at Fogo, Newfoundland, on September 20, 1924.

HERRING GULL, No. 309,475, juvenile, banded by Harrison F. Lewis, at Coacoacho, Saguenay County, Quebec, on August 11, 1924, was captured for food at Petty Harbor, Labrador, about three miles north of Cape St. Lewis, on September 21, 1924.

RING-BILLED GULL, No. 226,421, juvenile, banded by Harrison F. Lewis, on Fog Island, Saguenay County, Quebec, on August 10, 1924, 1924, was found dead, probably killed by an adult Gull, on the same island, on August 24, 1924.

RING-BILLED GULL, No. 226,422, juvenile, banded by Harrison F. Lewis, on Fog Island, Saguenay County, Quebec, on August 10, 1924, was found dead, probably killed by an adult Gull, on the same island, on August 24, 1924.

RING-BILLED GULL, No. 226,432, juvenile banded by Harrison F. Lewis, on Fog Island, Saguenay County, Quebec, on August 10, 1924, was found dead, probably killed by an adult Gull, on the same island, on August 24, 1924.

RING-BILLED GULL, No. 226,523, juvenile, banded by Harrison F. Lewis, on Fog Island, Saguenay County, Quebec, on August 10, 1924, was found dead on the same island, during the month of July, 1925. It appeared from the desiccated remains that the young bird had died during the summer of 1924.

RING-BILLED GULL, No. 226,526, juvenile, banded by Harrison F. Lewis, on Fog Island, Saguenay County, Quebec, on August 10, 1924, was found dead, probably killed by an adult Gull, on the same island, on August 24, 1924.

RING-BILLED GULL, No. 226,541, juvenile, banded by Harrison F. Lewis, on Fog Island, Saguenay County, Quebec, on August 10, 1924, was found dead, probably killed by an adult Gull on the same island, on August 24. 1924.

RING-BILLED GULL, No. 226,556, juvenile, banded by Harrison F. Lewis, on Fog Island, Saguenay County, Quebec, on August 10, 1924, was found dead, probably killed by an adult Gull, on the same island, on August 24, 1924.

RING-BILLED GULL, No. 226,563, juvenile, banded by Harrison F. Lewis, on Fog Island, Saguenay County, Quebec, on August 10, 1924, was found dead on the same island, on June 1, 1925. The bird died while it was young, evidently some time during the latter part of the summer of 1924, at which season its body was concealed in the dense herbage.

RING-BILLED GULL, No. 226,570, juvenile, banded by Harrison F. Lewis, on Fog Island, Saguenay County, Quebec, on August 10, 1924, was found dead on the same island, on June 1, 1925. The bird died while it was young, evidently some time during the latter part of the summer of 1924, at which season its body was concealed in the dense herbage.

RING-BILLED GULL, No. 226,579, juvenile, banded by Harrison F. Lewis, on Fog Island, Saguenay County, Quebec, on August 10, 1924,

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was found dead, probably killed by an adult Gull, on the same island, on August 24, 1924.

RING-BILLED GULL, No. 226,581, juvenile, banded by Harrison F. Lewis, on Fog Island, Saguenay County, Quebec, on August 10, 1924, was killed near Aurigny, Amherst Island, Magdalen Islands, Quebec—no date given, but reported on November 14, 1924.

RING-BILLED GULL, No. 226,585, juvenile, banded by Harrison F. Lewis, on Fog Island, Saguenay County, Quebec, on August 10, 1924, was found dead, probably killed by an adult Gull, on the same island, on August 24, 1924.

RING-BILLED GULL, No. 226,590, juvenile, banded by Harrison F. Lewis, on Fog Island, Saguenay County, Quebec, on August 10, 1924, was found dead, probably killed by an adult Gull, on the same island, on August 24, 1924.

RING-BILLED GULL, No. 226,591, juvenile, banded by Harrison F. Lewis, on Fog Island, Saguenay County, Quebec, on August 10, 1924, was found dead, probably killed by an adult Gull, on the same island, on August 24, 1924.

RING-BILLED GULL, No. 226,592, juvenile, banded by Harrison F. Lewis, on Fog Island, Saguenay County, Quebec, on August 10, 1924, was found dead, probably killed by an adult Gull, on the same island, on August 24, 1924.

RING-BILLED GULL, No. 226,464, juvenile, banded by Harrison F. Lewis, at Pointe au Maurier, Saguenay County, Quebec, on August 12, 1924, was killed at Manikuagan, Saguenay County, Quebec, on September 12, 1924.

CASPIAN TERN, No. 226,599, juvenile, banded by Harrison F. Lewis, on Fog Island, Saguenay County, Quebec, on August 10, 1924, was picked up in a wounded condition on Lower Currituck Sound, North Carolina, on November 5, 1924.

CASPIAN TERN No. 226,600, juvenile, banded by Harrison F. Lewis, on Fog Island, Saguenay County, Quebec, on August 10, 1924, was found dead, probably killed by an adult Tern, on the same island, on August 24, 1924.

MALLARD, No. 232,059, banded by Reuben Lloyd, at Davidson, Saskatchewan, on July 30, 1924, was killed at Bayou La Branche, about nineteen miles north of New Orleans, Louisiana, on January 10, 1925.

MALLARD, No. 232,060, banded by Reuben Lloyd, at Davidson, Saskatchewan, on July 30, 1924, was killed at a place two miles above Beaumont, Jefferson County, Texas, on December 13, 1924.

MALLARD, No. 313,122, flapper, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on July 31, 1924, was killed at Carthage, Panola County, Texas, on November 8, 1924.

MALLARD, No. 313,123, flapper, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on July 31, 1924, was killed near Greeley, Colorado, on November 30, 1924.

MALLARD, No. 309,716, banded by Reuben Lloyd, at Davidson, Saskatchewan, on August 1, 1924, was killed in Carter County, Oklahoma, about January 29, 1925.

MALLARD, No. 309,733, banded by Reuben Lloyd, at Davidson, Saskatchewan, on August 1, 1924, was killed at the Fin and Feather Club, near Dallas, Texas, on November 27, 1924.

MALLARD, No. 309,737, banded by Reuben Lloyd, at Davidson, Saskatchewan, on August 1, 1924, was shot at Hawley, Minnesota, on November 11, 1924.

MALLARD, No. 313,124, flapper, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on August 1, 1924, was shot at La Salle, Colorado, on November 7, 1924.

MALLARD, No. 321,319, raised in captivity, and banded by N. W. Kerr, at Brandon, Manitoba, on September 13, 1924, was shot at West Newton, twenty miles north of Winona, Minnesota, on November 21, 1924.

MALLARD X ENGLISH CALL DUCK, No. 232,051, dark brown and white, banded by Reuben Lloyd, at Davidson, Saskatchewan, on July 26, 1924, was shot near Kansas City, Missouri, on December 7, 1924.

MALLARD X WHITE ENGLISH CALL DUCK, No. 232,056, pure white, banded by Reuben Lloyd, at Davidson, Saskatchewan, on July 26, 1924, was killed at Last Mountain Lake, Saskatchewan on October 23, 1924.

MALLARD X ENGLISH CALL DUCK, No. 232,068, pure white, banded by Reuben Lloyd, at Davidson, Saskatchewan, on July 26, 1924, was killed at Last Mountain Lake, Saskatchewan, on October 23, 1924.

MALLARD X ENGLISH CALL DUCK, No. 232,146, white, banded by Reuben Lloyd, at Davidson, Saskatchewan, on July 30, 1924, was shot in Burke County, North Dakota, on November 15, 1924.

MALLARD X ENGLISH CALL DUCK, No. 232,118, white, banded by Reuben Lloyd, at Davidson, Saskatchewan, on July 31, 1924, was shot at Cantril, Iowa, on November 3, 1924.

MALLARD X ENGLISH CALL DUCK, No. 232,126, white, banded by Reuben Lloyd, at Davidson, Saskatchewan, on July 31, 1924, was shot near Worthington, Minnesota, on November 14, 1924.

MALLARD X ENGLISH CALL DUCK, No. 232,128, white, banded by Reuben Lloyd, at Davidson, Saskatchewan, on July 31, 1924, was shot near Napoleon, Logan County, North Dakota, on November 9, 1924.

MALLARD X ENGLISH CALL DUCK, No. 232,136, white, banded by Reuben Lloyd, at Davidson, Saskatchewan, on July 31, 1924, was killed at a place six miles east of Davidson, on November 3, 1924.

MALLARD X ENGLISH CALL DUCK, No. 232,139, white, banded by Reuben Lloyd, at Davidson, Saskatchewan, on August 1, 1924, was shot at Chillicothe, Illinois, on December 13, 1924.

MALLARD X ENGLISH CALL DUCK, No. 232.150, white, banded by Reuben Lloyd, at Davidson, Saskatchewan on July 31 1924 was killed in Clay County Nebraska eight miles from Sutton on the Blue River on November 6, 1924.

MALLARD X ENGLISH CALL DUCK, No. 309,706, dark, banded by Reuben Lloyd, at Davidson, Saskatchewan, on August 1, 1924, was killed on the Cache River, Creaghead and Poinset County line, one and one-half miles west of Chilson, Arkansas, on December 15, 1924.

MALLARD X ENGLISH CALL DUCK, No. 309,711, dark, banded by Reuben Lloyd, at Davidson, Saskatchewan, on August 1, 1924, was killed at Iowa Park, Wichita County, Texas, on November 15, 1924.

MALLARD X ENGLISH CALL DUCK, No. 309,713, dark, banded by Reuben Lloyd, at David-

son, Saskatchewan, on August 1, 1924, was shot at Perham, Minnesota, on November 12, 1924.

MALLARD X ENGLISH CALL DUCK, No. 309,714, dark, banded by Reuben Lloyd, at Davidson, Saskatchewan, on August 1, 1924, was killed at Moro, Lee County, Arkansas, on November 13, 1924.

MALLARD X ENGLISH CALL DUCK, No. 309,717, dark, banded by Reuben Lloyd, at Davidson, Saskatchewan, on August 1, 1924, was killed at Steele, North Dakota, on November 18, 1924.

MALLARD X ENGLISH CALL DUCK, No. 309,718, dark, banded by Reuben Lloyd, at Davidson, Saskatchewan, on August 1, 1924, was killed at a place about nine miles north-west of Mystic, Iowa, on the Sherdearn River, on December 6, 1924.

MALLARD X ENGLISH CALL DUCK, No. 309,723, dark, banded by Reuben Lloyd, at Davidson, Saskatchewan, on August 1, 1924, was killed at Madison Lake. about twenty-five miles east of Tulsa, Oklahoma, on November 10, 1924.

MALLARD X BLACK DUCK, No. 297,824, banded by H. S. Osler, at Lake Scugog, Ontario, on September 13, 1924, was killed in the same locality, on October 4, 1924.

BLACK DUCK, No. 300,515, banded by T. E. Musselman, at Scobey Lake, Missouri, on March 21, 1924, was killed at York Factory, Hudson Bay, Manitoba, on September 24, 1925.

BLACK DUCK, No. 297,779, banded by H. S. Osler, at Lake Scugog, Ontario, on August 29, 1924, was caught in a muskrat trap at Huron, Ohio, on December 15, 1924.

BLACK DUCK, No. 297,808, banded by H. S. Osler, at Lake Scugog, Ontario, on September 5, 1924, was shot in Fighting Island Marsh, Lasalle, Ontario, on October 31, 1924.

BLACK DUCK, No. 297,812, banded by H. S. Osler, at Lkae Scugog, Ontario, on September 5, 1924, was shot on the west branch of the Cooper River, twenty-five miles north of Charleston, South Carolina, on December 30, 1924.

BLACK DUCK, No. 297,813, banded by H. S. Osler, at Lake Scugog, Ontario, on September 5, 1924, was killed at Beaumont, Texas, on November 23, 1924.

BLACK DUCK, No. 297,817, banded by H. S. Osler, at Lake Scugog, Ontario, on September 8, 1924, was shot on the Sassafras River, Kent County, Maryland, on December 5, 1924.

BLACK DUCK, No. 297,818, banded by H. S. Osler, at Lake Scugog, Ontario, on September 8, 1924, was killed at Broome's Island, Maryland, on December 1, 1924.

BLACK DUCK, No. 297,834, banded by H. S. Osler, at Lake Scugog, Ontario. on September 13, 1924, was shot at Oshawa, Ontario, on September 15, 1924.

BALDPATE, No. 210,504, banded by Reuben Lloyd, at Davidson, Saskatchewan, on August 1, 1924, was killed at Cuero, Texas, on November 11, 1924.

BALDPATE, No. 210,512, banded by Reuben Lloyd, at Davidson, Saskatchewan, on September 1, 1924, was caught in a muskrat trap at a place between Lewiston and Havana, Illinois, on November 11, 1924.

WILLET, No. 281,655, banded by Reuben Lloyd, at Last Mountain Lake, Saskatchewan, on July 26, 1924, died from sickness in the same locality, on August 17, 1924.

MOURNING DOVE, No. 264,724, fledgeling, banded by George Lang, at Indian Head, Saskatchewan, on August 25, 1924, was killed by a hawk in the same vicinity, on September 9, 1924.

MARSH HAWK, No. 204,458, young, banded by W. E. Saunders, at London, Ontario, on August 14, 1924, was shot at Palmetto, Florida, on November 21, 1924.

SONG SPARROW, No. 136,654, banded by Ralph E. DeLury, at Ottawa, Ontario, on July 29, 1924, was found dead in the same locality, on August 1, 1924. The bird had no surface injuries, but had a pinkish shade under its skin on the right shoulder.

NOTES AND OBSERVATIONS

SQUID PURSUING HERRING.—In the late afternoon on August 29, 1925, a rather unusual scene was witnessed by a number of workers, including the writer, at the Atlantic Biological Station, St. Andrews, N.B. This Station is situated on the estuary of the St. Croix River. A number of squid (*Ommastrephes illecebrosus*) were darting about among a much larger shoal of young herring, such as are caught in the weirs for the sardine factories around Passamaquoddy Bay. The afternoon was dull and the herring were swimming at the surface alongside the wharf at the Biological Station. The squid were moving rapidly backwards in the usual cephalopod manner. They appeared to be capturing herring as a flash of silver was frequently seen in the tentacles of the squid.

Squid are very abundant in the bay, and are regularly caught as bait for cod and haddock by means of the squid jig. a piece of lead painted red with a number of hooks sticking out from the lower part of it. But they are rarely so abundant as far up as the Biological Station, as they were during the latter part of the summer of 1925. The sight of them turning the tables on the herring has not previously been entered in the station records.

They were also observed to attack the haddock that had been caught on the line trawl in individual instances, and this can be literally described as turning the tables upon their hereditary foe. A photograph was secured showing the wound inflicted on a haddock by a squid.

Besides the arresting incident of an exciting chase, such a spectacle had the added interest of a high invertebrate type preying upon a vertebrate type, both standing at approximately the same grade of organization in their respective phyla,

without being in any way related. It is an ecological association of a novelkind.—A. H. LEIM.

NOTES ON THE OCCURRENCE OF SOME RARE BIRDS IN CENTRAL ALBERTA. During the last few years, several species of birds of unusual occurrence in this part of Central Alberta have been recorded. The wrtier has been an observer of birds in this region since 1892, and failed to detect any of the birds enumerated in this article until quite recently. With the exception of one species, the Brown Thrasher (*Toxostoma rufum*) the records have been obtained from the vicinity of Camrose, which is in lat. 53, and just east of Meridian 113. In other words, Camrose is in the same latitude as the southern extremity of Labrador, and on the same meridian as Butte, Montana, and Phoenix City, Arizona.

Within a few miles of Camrose, three life zones are represented by well known birds, during the breeding season. The Hudsonian by the Fox Sparrow and Hudsonian Chickadee; the Canadian by the Red-breasted Nuthatch, Canada Jay, Olive-backed Thrush and White-throated Sparrow, and the Transition by the Catbird, Bobolink and Black-billed Cuckoo. This merging of species of different zones, might reasonably be expected in the proximity of high mountains, but this locality is nearly two hundred miles east of the Rockies and embraces the rich agricultural park-like areas of Alberta.

FORSTER TERN (*Sterna forsteri*)

On the 13th of July, 1925, Arthur Twomey, of Camrose, shot a male of this species in a marsh at the upper end of Dried Meat Lake, seven miles south of Camrose. On the 20th of the same month, the writer found the nest with two young, and secured the female. These were given to Prof. Rowan, of the University of Alberta, Edmonton, who identified them. The nest was placed on the top of an old muskrat house, which was in open water surrounded by tall reeds, and was about ten inches above the water level.

In the same marsh, large numbers of Black Terns, Yellow-headed Blackbirds, Red-winged Blackbirds, Coots, Grebes and several varieties of ducks were nesting. The nearest colony of Common Terns was in the Miquelon Lakes, about twenty miles due north of Dried Meat Lake. This is probably the first record of Forster Tern being taken in Alberta.

BLACK-BILLED CUCKOO (*Coccyzus erythrophthalmus*)

On the 23rd of June, 1924, a dead Black-billed Cuckoo was picked up in the village of Duhamel, twelve miles south-west of Camrose, which had evidently been killed the night before by flying against a close-meshed wire fence. The writer made an examination of the vicinity the following day and, although unable to find the dead bird's mate, located a partially completed nest of the year, and one which, no doubt, had been used the previous year. Both nests were placed in crotches of large willows about one foot above the ground. The bird was sent to Prof. Rowan, in whose collection it now is. On the 21st of June, 1925, the writer observed a pair of cuckoos for half an hour in a thick patch of brush and poplars at the Camrose Golf Course. A few days later their notes were heard from another brushy area, a half mile distant from where they were first seen. These birds are rare summer residents in the country seventy-five miles south of Camrose, around Sullivan Lake, and their appearance as recorded above seems to be their northern limit at the present time.

BOBOLINK (*Dolichonyx oryzivorus*)

On the 7th of June, 1919, the writer observed, and enjoyed the song of a bobolink for over an hour, in a meadow close to Battle River, seven miles south of Camrose. The female was not seen, but from the actions of the male, she was undoubtedly nesting in the immediate vicinity. In the hope that a colony of these southern birds might establish themselves in this territory, the writer visited the meadow the following years, but was unsuccessful in his search for them.

The Bobolink has been reported from the country south and east of Camrose, but the observation recorded above is the first and only time the writer has seen the bird in Alberta.

TOWNSEND WARBLER (*Dendroica townsendi*)

Mr. Arthur Twomey collected a young male of this species at Miquelon Lake, about fourteen miles north of Camrose, on August 21st, 1925. It was with a large number of other migrating warblers, and apparently the only one of the kind. Mr. P. A. Taverner identified it as *townsendi*.

BROWN THRASHER (*Toxostoma rufum*)

The writer observed a Brown Thrasher for a considerable time, about two hundred yards south of the grain elevator at Rossyth (six miles east of Hardisty) on the 19th of June, 1925. Being very familiar with this bird in Ontario when a boy, there could be no doubt as to the identification. Rossyth is about eighty-five miles east, and somewhat south of Camrose, and the location seemed to be admirably suited to the bird. It is possible that this species will be found to be a regular summer resident of the sandy, rolling country in that section through which the Battle River flows. The Brown Thrasher has been reported from the lower Red Deer River, near Steevesville, more than one hundred and fifty miles south of Rossyth.

TOWNSEND SOLITAIRE (*Myadestes townsendi*)

Possibly the only record of this mountain-loving bird in Central Alberta, is one which the writer procured at Lake de May, eight miles north east of Camrose, on October 7th, 1921. The skin was sent to Mr. P. A. Taverner, Victoria Museum, Ottawa.—FRANK L. FARLEY, Camrose, Alta.

A BIRD SANCTUARY AT VICTORIA, B.C.—The harbour of Victoria, B.C., extends for several miles inland. It first passes through a narrow, rocky and picturesque channel known as The Gorge, and then expands into a lake of considerable size. At one place, this lake is over half a mile wide. Its shores on the western side are heavily wooded and there are two promontories projecting into it, both covered with primeval forest. All this water is part of a Bird Sanctuary proclaimed under the Migratory Birds' Convention Act, passed by the Federal Government at Ottawa on the 27th day of October, 1923.

On one of these wooded points, Mr. H. E. Newton has commenced the establishment of a colony of wild fowl. He obtained, last spring, a flock of twenty wild ducks, consisting of eight drakes and twelve ducks, and all the members of this flock have become very tame. They occasionally take to wing and go away some distance from their home, but they always return at feeding time, and on one or two occasions, they have brought some of their wild cousins with them.

They are so tame that they will readily take food from the hands of human beings, and it is a pretty sight to see little children holding out handfuls of grain to the birds, who eagerly gobble it up

Though the waters of this estuary are included in the game sanctuary, unfortunately the shore above high water mark is not, and as the shores are steep, there is nothing to prevent so-called sportsmen from wandering along them, gun in hand. The spectacle of a flock of wild duck lazily floating only a few yards away and quite unaffrighted by the presence of man is a temptation that can hardly be resisted. So far, however, no casualties have occurred, but if this flock of wild birds becomes, as it is hoped it will be, the nucleus of a colony of wild fowl of all sorts, including swans, geese, and other species, it is almost too much to hope that none of them will fall victims to shore poppers.

A little further inland are several lakes, most of which are surrounded with bush and have swampy margins, eminently suitable as homes and breeding places for wild fowl. The largest of these lakes, known as Elk Lake, is already declared a Bird Sanctuary, but if a line was drawn across the southern end of Vancouver Island, just north of these lakes, and all the territory between it and the sea declared to be a game preserve, much greater security for feathered visitors would be obtained, and this part of Vancouver Island might become a recognized resting place for the millions of wild fowl that pass over it in their two annual migrations.—CHARLES ST. BARBE.

"FAITHFUL UNTO DEATH—AND BEYOND!"—Mott Lake, Buffalo Park, froze over on the night of October 26th, 1925. While patrolling this area on October 27th, I noticed a live Canada Goose about four hundred yards out on the lake, and on coming closer to it, I observed that there was another one, apparently dead, and frozen in the ice, with the live mate standing guard over it.

It was still there on the 28th, but was missing on the 29th. I had my boy skate over to the spot, where he reports finding feathers, and also coyote tracks, which seems to show that the mate stood by until driven off, or probably captured, by the coyote.—D. W. DAVISON.

OCCURRENCE OF *Epigæa repens* L. IN THE LABRADOR PENINSULA.—In the last week of May, 1925, I found several plants of *Epigæa repens* L., the Trailing Arbutus or "Mayflower", in bloom near the village of Seven Islands, Saguenay County, Quebec. They were in sandy soil, about one-half mile north of the northern end of the village. I identified the plants without difficulty, as I have been familiar with this species from childhood. Unfortunately, I did not preserve any specimens, as I supposed at the time that the species must have been recorded previously from a place which, like Seven Islands, had been visited by a number of naturalists.

While I saw only a few plants of the Trailing Arbutus near Seven Islands, there must have been a good many more close at hand, in some neighboring area unvisited by me, as the villagers of Seven Islands knew these flowers well and were accustomed to gather them in small quantities for the decoration of their homes. As all of these plants were on the eastern side of the large Bay of Seven Islands, they were undoubtedly growing in the Labrador Peninsula, even if the base-line of the peninsula is considered as meeting the southern coast at the head of the Bay of Seven Islands.

As Dr. M. O. Malte informs me that the National Herbarium contains no specimen of this species from the Labrador Peninsula, and as Mr. Harold St. John has not recorded it here as a result of his botanical explorations in this region in 1915 (which extended even as far as Pentecost River, south-west of the Bay of Seven Islands), it has seemed desirable to make this record.—HARRISON F. LEWIS.

YELLOW-BELLIED SAPSUCKER INFESTED WITH TAPE WORMS.—While I was carrying on natural history instruction at the Camp of the Montreal Boy Scouts, Tamaracouta, Argenteuil County, Quebec, during the early summer of 1925, a specimen of the Yellow-bellied Sapsucker, *Sphyrapicus varius varius*, ♀, was taken for scientific purposes (July 6, 1925). Upon dissection, the abdominal cavity was found to contain a number of tape worms. The carcass was preserved and handed over to Dr. A. B. Wickware, Acting Chief Pathologist of the Health of Animals Branch, Department of Agriculture, Ottawa. He reported that, owing to the method of preservation—it had been kept in some methylated spirits begged from the camp doctor—it had been found impossible to make preparations showing sufficient details to permit an accurate determination. Consequently, the specimens were transferred by him to the late Dr. B. H. Ransom, Chief, Zoological Division, Bureau of Animal Industry, Washington, D.C., who it was thought could identify these parasites with the aid of type species in his possession. Under date of August 11th, he replied to Dr Wickware as follows:—

DR. A. B. WICKWARE,
Biological Laboratory,
41 Cliff St.,
Ottawa, Canada.

The specimens of tapeworms from a yellow-bellied sapsucker, referred to in your letter of August 4, have been examined and determined as a species very close to *Davainea comitata*, possibly the same species, although all of the suckers belonging to three heads examined presented a character not seen in *D. comitata*, namely, the presence of spines only on the posterior half of the sucker, whereas in *D. comitata* the spines occur throughout the entire circumference of the sucker. It is, of course, possible that the missing spines were lost, but if this should be so, it is rather odd that they should have been lost from the same region of the suckers in the three specimens examined. *Davainea comitata* was described in the following paper, of which there is undoubtedly a copy in one of the libraries in Ottawa.

As to the life history, nothing is known and one can only surmise that the intermediate stage occurs in some small invertebrate, probably an insect.—B. H. RANSOM, *Chief, Zoological Division.*

The taenioid cestodes of North American birds. Bull. 69, U.S. Nat. Mus., Wash., Dec. 31, pp. 1-141, figs. 1-42 (B. H. Ransom).

Owing to the death of Dr. Ransom on September 17th, the story ends there, and I am indebted to his successor, Dr. Maurice C. Hall, for permission to utilize in this way the data given by Dr. Ransom. There is obviously a difficult but interesting field awaiting some of our workers in the study of the life histories of parasites affecting wild life, although this little-developed region is being explored of late, particularly by the scientists investigating the parasitic fauna of the Ruffed Grouse.—HOYES LLOYD.

BRUNNICH'S MURRE (*Uria lomvia lomvia*) AT TORONTO.—A female of this species was taken from a flock of five on Lake Ontario, near the Exhibition Grounds, Toronto, on December 12, 1925. The flock was flying west, over the water, and one pitched into the duck-decoys of a hunter and was shot. The bird was brought to the Museum in the flesh for identification and, upon examination of the stomach, it was found to be empty. The bird seemed healthy and was not emaciated. Although the present note was withheld several weeks for further reports, no other records have been heard of. News items reported the species invading the Quebec City vicinity during November, 1925, but the present record is the first to be published for the Toronto region since 1908. The captured specimen is now in the possession of Mr. Alfred Meade, of Toronto.—JAS. L. BAILLIE, JR., Royal Ontario Museum of Zoology, Toronto, Ontario.

TOWHEE AT PAKENHAM, ONT.—When looking over the November, 1924, issue of *The Canadian Field-Naturalist*, I noticed that Hoyes Lloyd recorded having observed the Towhee at Christie's Lake, in the south-western corner of Lanark County. It reminded me that we, in the north-eastern corner of the same County, saw the Towhee last summer on three different occasions, near the front of Lot 16, Concession 10 of Pakenham Township. This lot, which comprises part of our farm, is two miles north-west of Pakenham village, four miles south of the border of McNab Township, Renfrew County, and two and a quarter miles west of the border of Fitzroy Township, Carleton County. The lot, which lies within the "Mountain" district of this township, consists of ridges of hills which produce little else than a bountiful crop of blueberries. The lower slopes and valleys are well wooded.

On the morning of May 26, 1925, while crossing a beaver meadow, my brother found a singing male Towhee in a swamp alder. About 3 P.M. on July 29, when picking blueberries near the top of the burned-over hillside above the beaver meadow, my sister came upon a male Towhee singing from the lowest limb of a small black oak. Two hours later, when attracted by a strange song, I followed the sound and found a male Towhee, presumably the same bird, in the same little tree. This time we both came so close that we had no difficulty in identifying the bird. When we attempted to come nearer, he dropped to the ground. The nest may have been close by and this was probably

the bird that was seen in May. This has been our first observation of the Towhee here.—EDNA G. ROSS.

ADDITIONAL NOTES FROM THE CASTOR DISTRICT, ALBERTA —I suppose it is only to be expected that the abnormally mild weather which has prevailed throughout Western Canada since the end of November would produce a large crop of unusual bird records, and I trust that all bird-lovers in the Prairie Provinces will share their records with other readers of *The Canadian Field-Naturalist*.

Two Crows have elected to make their winter home here, and on December 29th, 1925, I saw a Duck Hawk sitting on a telephone pole about half a mile from the town of Castor. I got within twenty-five yards before it took to flight.

On January 8th, a Gray-crowned Leucosticte was feeding in the farm-yard with some English Sparrows. My only previous record was a bird seen in the same place on November 17th, 1924.

I got the big surprise of the winter season on January 15th, when I found a Meadow Lark feeding around a straw pile. The bird was very lively and quite wild. I would judge it to be a young bird, as the yellow of the breast was very dull and the black horseshoe mark indistinct. I again saw it at the same place yesterday, January 16th, and I think it will manage to come through the winter now.—T. E. RANDALL.

CAROLINA WREN AT HAMILTON, ONT.—On November 6th, 1925, I saw a Carolina Wren hopping in and out of a yellow birch tree on the east end Mountain Brow. It was in this same place that I saw one three years ago, so I think it probable that it had nested there. I am going to make a point of watching for it next Spring.—ANNA E. MACLOGHLIN.

BOOK REVIEW

THE FOREST TREES OF ONTARIO AND THE MORE COMMONLY PLANTED FOREIGN TREES, *by J. H. White, Ph.D., B.Sc.F., Department of Lands and Forests, Ontario. Toronto, 1925, pp. 80, with 260 illustrations.*

This guide to the identification of the trees of Ontario is an excellent little volume which cannot be too warmly recommended. After some brief chapters on the importance of the forests and the forest industries of Ontario, the distribution of the forest trees within the Province, various characteristics associated with the leaves, flowers, fruits, winter twigs, and bark, and helpful to the identification of the trees, the author gives a very comprehensive account of the trees of Ontario. A total of 131 species are dealt with, 82 of which are native. The species are arranged in accordance with Gray's Manual of Botany with which also the nomenclature is in accord.

The descriptions are attractively simple in non-technical language and brief. As the author says: "There has been no attempt at complete descriptions; rather the aim has been to present the main recognition marks for leaf, fruit, or twig, as the case may be." In the latter, the author has been eminently successful. In the case of two or more trees being closely related, they are discussed together and the salient characters separating them explained with a simplicity that bespeaks an intimate, scientific as well as practical, knowledge of the subject. Along with the descriptions are included the chief facts about the properties and uses of the leading species.

As pointed out, the descriptions are given in plain language, although, of course, the use of a few technical terms has been unavoidable. The exact meaning of the technical terms employed is explained in a brief glossary.

To guide the student in his identification of tree material, three keys, with explanation how to use them, are given—one for the evergreens, and two for the broad-leaved trees to cover both the summer and winter conditions. Guided by these keys, and with the assistance of the descriptions and the excellent illustrations, it should be an easy matter for any one to identify accurately all the native trees found in Ontario.

Although the author modestly intimates that the bulletin is not written for the technical man nor for the specialist, it is our opinion that both would be well advised to secure a copy for their library. However, the main object of the bulletin is to interest the younger generation in trees from the descriptic and systematic side which, it is hoped, will in turn help to pave the way for a better appreciation of the enormous value of the forest resources.

We share the author's hope to get the bulletin universally introduced into the secondary schools and into the hands of all teachers, but cannot refrain from the remark that, with this in view, and taking into consideration the wear and tear resulting from the frequent use which any one interested in the subject will, we venture to predict, make of it, it would no doubt have been advisable to have had it bound more substantially than it is.

The bulletin is available from the office of King's Printer, Parliament Buildings, Toronto, Ont., at a price of 25 cents a copy.—M. O. M.

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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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The Canadian Field-Naturalist

VOL. XL OTTAWA, ONTARIO, APRIL, 1926 No. 4

NEW LIGHT ON FORGOTTEN TRAILS IN THE FAR NORTHWEST

By G. H. BLANCHET

THE great stretches of Northern Canada are gradually being made known with the advance of Survey and Exploration. Accuracy of position and completeness of detail take the place of the rude earlier mapping. However, it is well to remember that the features of the early maps, its lakes and rivers, marked the courses of adventurous journeys across the country in the days before attention was directed towards the North by the westward and northward march of civilization. In some cases, the courses of the early explorers may be easily traced by lakes and rivers which they noted. In others, the route followed was not accurately defined and with the passage of time it has become almost a tradition.

The present narrative concerns a journey that was planned nearly a century ago, but which was not accomplished until during the past season, when in the course of an exploration into the country southeast of Great Slave Lake, the unknown portions of two large rivers were traced and the forgotten Indian portage connecting them was rediscovered.

Dr. Richard King, who had been Medical Officer on Sir George Back's expedition to the Arctic in 1834, obtained a map from an Indian which showed a route to the Arctic by rivers which avoided the large lakes and offered an apparently easy passage across the height of land. He advocated this route strongly, as the lack of success on the 1834 expedition had been largely due to delays caused by the late ice in the large lakes and the difficult ascent from Great Slave Lake. King's attempts to organize an expedition for further Arctic exploration, using this route, were unsuccessful. Some ten years later, when anxiety for the overdue Franklin Expedition was beginning to be felt, he again came forward, volunteering his services to bring relief to the missing expedition by this route, but again he failed to convince those directing relief operations as to the soundness and feasibility of his plans.

It later transpired that King was correct, both in his suggestions as to Arctic geography and of the movements and location of the Franklin Expedition and there is little doubt that had his plans been followed, help could have been rendered to the ill-fated Expedition. King's proposed route was never investigated. His map was forgotten, and in the course of time the Inbians discontinued travelling far into the interior and even they lost their knowledge of these waterways.

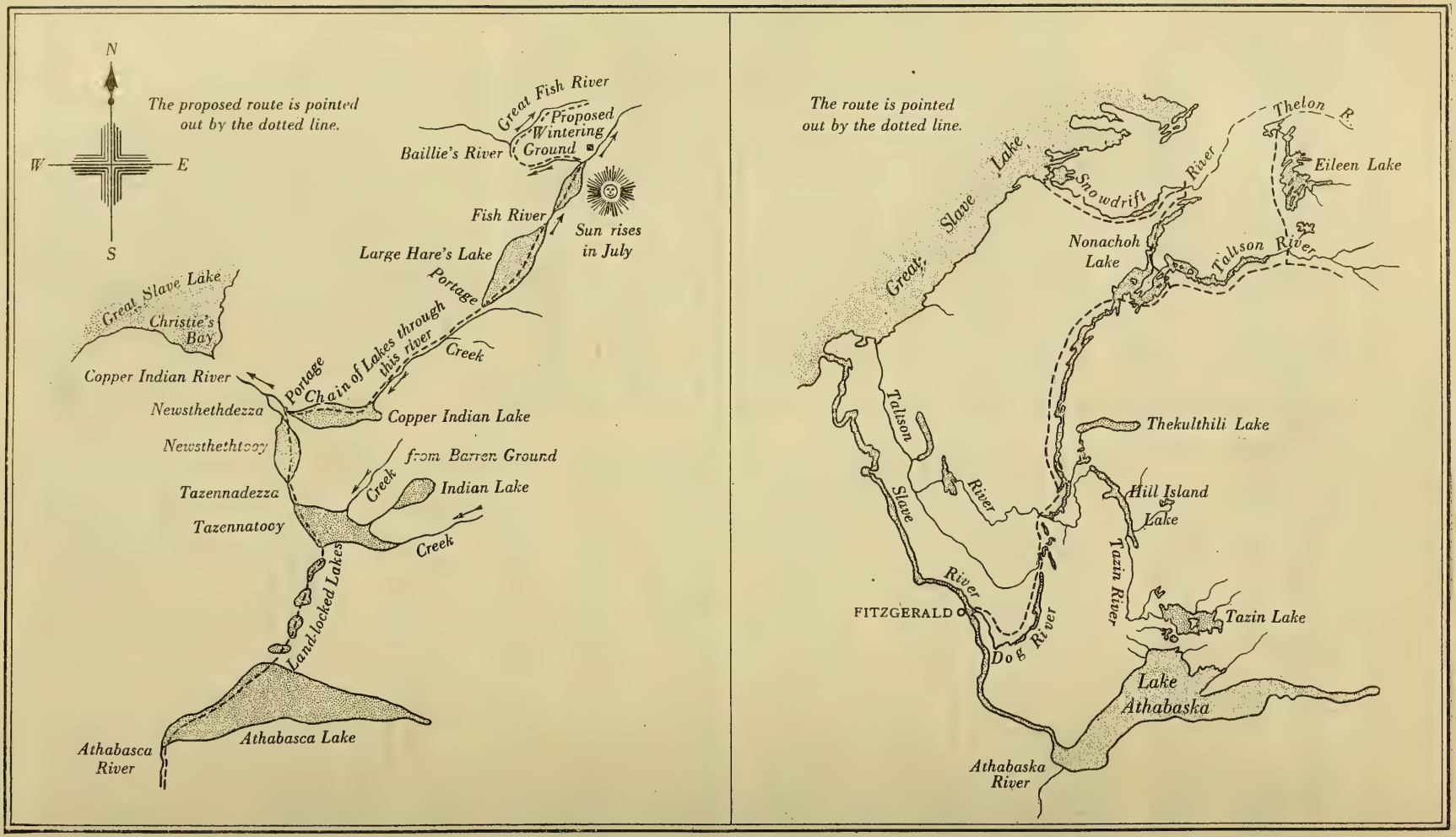
In 1900, when J. W. Tyrrell was travelling eastward along the north coast of Lake Athabaska, the Indians reported that from a deep bay, a canoe route reached a river flowing to Great Slave Lake and that from one of its branches, another river which flowed northward beyond their knowledge could be reached. Sixteen years later, a party from the Geological Survey under Charles Camsell travelled from Lake Athabaska to Great Slave Lake. On this journey, Tazin Lake and River were discovered and a portion of King's Indian route was established thereby.

There still remained a vast region, eastward of this route, lying between the two great lakes, Athabaska and Great Slave, to which a vague form had been given by Samuel Hearne's track across it in 1772 and by Indian tradition, but the country was practically unknown. In fact, it might be said to be the largest blank space on the map of Canada, reasonably accessible to travelled waters.

A brief description of the character of the country may help to explain its isolation and the lack of penetration into it.

The great plains of Western Canada extend from the mountains to a north westerly line which marks the limit of sedimentary formations and from the plains the pre-Cambrian plateau rises through a rough hilly country to a broad summit. Here deep accumulations of glacial drift have largely obliterated its rock structure and have given it an undulating topography of low relief. The easterly portions of Athabaska and Great Slave lakes occupy trenches which cut deeply into the plateau.

The deep penetration of the east end of Great Slave Lake into the plateau makes it appear that the easiest and shortest route to the interior would be found at its easterly extremity. To a certain extent, this is true. Although the abrupt drops of the rivers make them practically unnavigable,



COMPARATIVE MAP.—This shows the sketch supplied Dr. King by the Indians in 1834 and the map of the same country as determined by the exploration of 1925.

portage routes which take advantage of a number of small lakes, notably Pike's Portage, give reasonably simple access to the interior plateau, but one is still confronted by the problem of late ice both on Great Slave Lake and on the large interior lakes. Although this route gives access to the plateau with its far-reaching waterways, it is not a suitable highway to the Arctic Coast. By it, one arrives too late in the season. King's contention was that by using the rivers of the plateau instead of the large lakes, difficulties from late ice would be minimized and, as it was reported that the woods followed the river far into the open plains with their greater variety of game, a much more favourable wintering place could be found there than at Fort Reliance at the east end of Great Slave Lake.

With a view to ascertaining the nature and resources of the great stretch of unknown country lying southeast of Great Slave Lake, the Topographical Survey of Canada undertook its investigation last summer and the writer was given charge of this work. We proposed to leave the Tazin-Taltson route at their junction and, following the latter upstream, to attempt to find a route from its headwaters to those of Thelon River. As the journey would bring us into the country of the Indians known as Caribou Eaters, we endeavoured to obtain some information about it from them. They said that if we proceeded up Taltson River we should reach a very big lake, at least two hundred miles long, which reached out to the barren lands. They did not know where its waters discharged and had no knowledge of Thelon River, although they said in winter they followed the caribou far to the east. Their fear of the Eskimos made them stop at a certain point to avoid a possible trespass of the country of their enemies. They had also other fears—monsters, part fish and part man, that inhabited the waters of the interior lakes, great falls and many portages and of "starving times" which sometimes overtook their parties when the fisheries failed and the caribou did not arrive. As to the trip which I proposed, they said that it could not be made—certainly none of them would accompany us and that the way was so far that winter was sure to overtake us. There is a remarkable similarity to be noted in the various recorded reports made by the Indians when they have been asked about the unknown parts of the country. It is perhaps explained by the fact that they themselves always choose the path of least resistance and they have the idea that any place to which they do not travel must be inaccessible to a white man. For, fundamentally, they have a certain amount of contempt for him. They do not value the things he knows and they think he is rather helpless when thrown on his own resources.

However, the information concerning the big lake was very promising and two Indians were induced to come with us as far as the start of it.

We had one nineteen-foot Peterborough canoe and a very small, folding canvas boat (the hero, later, of our journey across the height of land). Four men made up the party, with the addition of the two Indians and their canoe, for the first part of the trip. It may be easily understood that after stowing the essential equipment for four men, instruments, etc,. very little room was left for supplies.

The Indians had assured us that we should meet the caribou in July and that the lakes abounded in fish and there is a general principle when travelling in the North that the less the baggage you have, the farther you may go. Moreover, if you know the country and where and how to hunt and fish, there is not much danger of shortage in summer, when living off the country. The list of supplies to be taken was a slim one, but even this was cut and recut before we finally adjusted our loads. The final trimming of the cargo, in clearing the paddling places, generally resulted in the sacrifice of a sack of flour or bacon. One article on which I was pinning faith was buffalo pemmican. We had eighty pounds put up in ten-pound skin containers. Later, when fishing was poor and on the overland

A TROUT THAT WEIGHED NEARLY AS MUCH AS OUR CANOE.
—The fisheries of the upper lakes are an important factor of life there and make these waters a fisherman's paradise.

journeys, the pemmican amply justified my faith, but on the early portages, it received nothing but abuse. The hard, slippery packages simply would not ride comfortably in a load. We replaced sugar by saccharine, and used compressed teas. Rolled oats, macaroni and dried apples are all good and occupy little space. Lard is an essential —one needs the grease—and a small stock of jam, milk and butter was a reluctant concession to 20th century ideas. I have somewhat enlarged on details of equipment, but they are important. If one wishes to go far, he must go light. We had an illustration of it on this trip. Four prospectors were headed for the interior carrying (as the one old-timer among them told me) everything. We passed them, three weeks out, on our fourth day, and in the season they got nowhere.

We left Fitzgerald on Slave River on June 11th and, after crossing at the head of the rapids, we entered the almost concealed mouth of Dog River, the beginning of an old Indian route to the interior which led through lakes and small streams. Starting up this stream, we at once encountered that great scourge of the North—the mosquito. When travelling through the country, it is impossible to protect oneself from them. One must develop the philosophy that accepts them. Till this is achieved, they destroy all enjoyment of the trip.

We had not gone far before the portaging began. The climb towards the interior had commenced and for the next ten days we mounted steadily by many short portages through the moderate slopes by which the plateau rises from the sedimentary plains. The moderate relief of the lower slopes became accentuated and the country more rugged and picturesque as we proceeded.

Dog River dwindled to a small brook before we left it. We crossed, by some small, muddy lakes, to Tethul River and proceeded up it. In the spring of 1772, Hearne, with his Indian companions, had followed this stream for some distance on his return journey to Hudson Bay. Tethul River had become so small that the big canoe could scarcely navigate the turns before we left it and crossed to waters flowing directly to Taltson River.

We found the Taltson to be a large river flowing through a deep rocky valley which, in places, becomes almost a gorge and then widens to long, sinuous, narrow lakes.

When we had reached a lake larger than usual my guide said that we were now on the "Big Lake" and he would be glad if I let him go home. Not being satisfied with the appearance of the lake or with our elevation, I insisted on another half day's travel. A few miles brought us to a wild series of cataracts which involved a mile portage over a "mountain". This was followed by some ten miles of bad water and difficult portaging. The guide explained this by saying "the people call this all one lake but", he added, "now I will go with you as far as the winter camps of the Caribou Eaters, where you can get people who know the country better." Many portages the next day dampened his ardor and, in the afternoon, when another big lake opened out, he went through a formula that, by many repititions, had become monotonous. He was not sure where the people were or even if there were any in the country. His wife had no one to cut wood and his dogs assuredly would be starving.

We were already beyond his knowledge of the country and near where we were the man-headed fish had been seen. The lake looked promising and the two extra men were making inroads on our supplies. Consequently, I decided we could do very well alone, so gave the Indians permission to return. Their spirits at once revived and, starting back, the little canoe fairly danced along and, until they were almost out of sight, the sounds of a wild, not unmusical Indian song were blown back to us.

Nevertheless, their departure deepened the sense of isolation that our penetration of the country had produced. We had been travelling ten long days without a break. Portaging had been heavy and the mosquito pest harassing. So we took a day here to rest, overhaul outfit, determine our position and form plans.

I shall continue my narrative of the outbound journey with a series of extracts from my log.

JUNE 23RD.—We are now away on our own. The only information from the Indians was that we should keep to the left when the lake forked. The lake and the country it lies in becomes more interesting as we proceed. It is rather like a river, seldom more than two miles wide and narrowing to one-quarter of a mile.

JUNE 24TH.—We got embayed twice yesterday by keeping to the left, so shall disregard this information. Navigation was broken at one point by a short cascade at a narrows, though the valley of the lake holds through. Cairns and meat stages are frequently seen. The lake maintains its sinuous character. It always seems to be ending, when a turn unexpectedly opens up a new long view. Excellent trout are abundant. We catch them with a troll while travelling. The water is a clear blue and vegetation is varied and abundant. Our course is too much north to suit me. We must meet the caribou next month or fall back on fresh supplies somewhere, as August fisheries are not usually good.

JUNE 25TH.—After nearly two weeks travel, with our view closed by a bend not far away, we just opened up a water horizon stretching off to

the northeast, giving us more of the desired easting. High, rocky, timbered hills border the lake. Its width is uncertain on account of islands, but from a cliff I saw water six miles west. I saw a golden eagle, which is very rare here. *Evening.*—We passed two big last winter camps with many lodge poles and stages and caribou debris. The people cannot have left very long. Then the lake pinched out to three straggling arms with a most unpromising view from the hills.

SNOWDRIFT RIVER LEAVING THE HILLS BY GLORY FALLS

SATURDAY NIGHT, JUNE 27TH.—Two days of rather involved travel have put another forty miles behind us and include another cascade. We have emerged from the narrow, regular valley and have entered a great, sprawling lake with long views to faint blue hills in several directions. (We later ascertained that its Indian name was Nonachoh or Big Point Lake.) The topography is more that of the summit of the plateau, lacking continuity and high relief. It reminds me somewhat of the north coast of Lac de Gras, but, of course, here we have timber. We are camped in a really beautiful spot. A low sand ridge rises gradually from the lake in a long, wide crescent beach with clean groves of well developed spruce and jackpine behind. The big lake gives long views to the north and probably nearly surrounds us. Fish are unusually abundant and caribou trails and feeding places mark the mossy slopes. One feels that the land of the Caribou Eaters is truly a pleasant place.

The next day a warm south wind brought up a heavy pall of smoke and this was succeeded by a violent storm. Finally, we were able to continue and adopted the plan of "sweeping" the south shore, that is, investigating its every bay. This was rather slow, tedious work but, in such a situation, it is the only safe method. One is then sure that he does not unexpectedly pass the outlet. On one very small, rugged island, we saw a colony of myrtle warblers which were the only ones noted. The travel of the next few days was not pleasant. Frequently embayed, always faced by unpromising hills from the summits of which our view was restricted to a succession of similar ones; we described a curve southeast, east then northeast. Finally, on a high, sandy island, we came on the trail of the people again—many graves of different periods, and the lake broke through to the east again.

JULY 2ND.—We are still going well. I had a view from the cliff last night which directed us to a long straight stretch, with hills coming in from both sides to a narrow gap. Here, to our satisfaction, we saw swift water. The discharge was considerable, but not nearly so great as at the previous rapids. Either the lake is much more extensive than it appeared to be, or it has a considerable feeder from the northeast. We are travelling on hand to mouth knowledge, as it is impossible to read much from the configuration of the country. From a vantage point, I pick out a course, usually with the hills offering a choice of several. To-day we passed several very big, old, Indian winter camps with signs of ancient canoe building. I am reading from these that this may be the last locality for timber and, possibly, that not far ahead navigation for big canoes may end and that the people have therefore been building light portaging canoes for the barren land. It would be some such locality as this that Hearne described as Thelew aza yeth.

The discharge of the river still indicated lots of water ahead, with my log reading 250 miles. This trip sometimes lacks reality, day after day slipping along these lakes through the heart of an unknown country. Hills show up in the distance, faint blue, blue, then green as they slip past us to become blue and finally a faint cloud glimpsed between other hills that have followed them. There is just enough variety to hold your interest and, though we make many turns in our travels, we always come to a bend with expectation that something interesting will be discovered.

JULY 3RD.—Away all morning down the swinging reaches of the lake of the sand points. It is most picturesque in its contrasts of high, rocky ranges and low sand points, which resemble parks with their clean moss and open groves of spruce.

We have the roar of falls ahead tonight, and the country is displaying more irregular topography. There are two high, isolated buttes, one on either side of the lake. I am sure they must have been landmarks in the old days of travel here.

JULY 4TH.—We are camped on a little step on a cliff with a strong wind from a clear sky and the sight of a new rapid ahead. My log of to-day is a story of falls and rapids and portages. The trail of the people becomes fainter and fainter, hardly to be distinguished from those of the caribou, but at one portage their trail was made very human by finding a small toy boat.

The long blue ridges are gone. The country is flatter with isolated hills and, here, the trail forks south and east. Was this the fork of which the Indians spoke? At any rate, we shall go contrary to it and hold to the main water south.

The life of the interior is fairly abundant. Moose, wolf and fox tracks are frequently seen and those of bear occasionally. Birds are rather grouped in colonies. A favourable situation will support large numbers and many varieties while, elsewhere, they are scarce and restricted to certain species. The notes of the white-throated and Harris sparrows are the predominating ones, day and night—or what passes for night, a mingling of twilight and dawn.

Water birds are less numerous than one would suppose. Loons and duck are rare, but shore birds are more abundant. Of them, the semi-palmated plover is the most striking. I did not observe any of their nests, but a number of times was interested by their frantic efforts to lead me away by affecting a broken wing. It is rather strange to see an odd robin beach-combing with the snipe and plovers. Gulls are numerous and the characteristic water bird of the country. The herring gull is most common. Others noted include the Glaucous and Bonaparte. Both the common and Arctic tern are frequently seen on the upper waters.

JULY 6TH.—The day started with a stiff portage, then a stretch of winding river with swampy margins alive with lesser yellowlegs, black birds and waxwings. This led to an expanse bordered by sand hills. Sand eskers have become a feature of the country. Leaving this lake we entered country of a different character. The river, with a uniform width and moderate current, meandered through a plain of pure sand, well timbered and in part swampy. At my first opportunity to climb a hill, I could see that it represented an old lake bed. The former shores are well marked.

JULY 7TH.—The day started with a glorious summer morning, a bright sun, little white clouds sailing across the sky and the river like a strip of silver through a park. The scene was animated with the song of the birds——

This was too auspicious a start for the day. The next entry is JUNE 8TH.—After a few miles yesterday, the river became almost continuous rapids, by which it spills from little lakes over boulder moraines. We left the big canoe and travelled upstream till it became apparent that one could not get anywhere by this route. The river was unnavigable and the country difficult to traverse. Hills showed up to a distant horizon and all were timbered. The river started to fork into a number of branches. One may take it that the headwaters of a river in this part of the country will either be a large lake on the summit of the plateau or a network of small streams, branching among the hills. The former is favourable for crossing the height of land, but the latter is not.

Moreover, we were now far enough east ot be in the supposed position of the west fork of Thelon River and Taltson drainage continued east at least another thirty miles. I therefore decided to move back to the last lake and explore south towards the location of the Thelon given by Hearne. I have very little faith in this, and think that he confused Upper Taltson with what he called Upper Thelon.

Returning, I shot a beaver, the first seen on the trip, and camped on the Sandy lake. This corresponds in position with Hearne's Tittameg Lake, but, of course, that means nothing, except that we hope for whitefish (Tittameg) as there are no trout here. The mosquitoes, which have been bad throughout the trip, have become almost unendurable.

JULY 8TH.—Explored south to-day, but found the country unpromising, difficult for travel and lacking in waterways. It is a succession of low hills and wide swamps—headwater country, but of the wrong kind. A showery day settled into a violent storm. This is one of the old familiar northeasters with the tang of the Arctic in it—the thrash of the wind and the pound of the waves make our little spot of shelter seem lost in a desolation of wind, water, sand and rock. One must experience one of these northern storms to appreciate them. My mind went back to others experienced out in the open plains, when we had neither trees for shelter nor wood for fires.

By a process of elimination, we discarded the east and south on account of the character of the country. It was decided that our best chances to cross the height of land lay to the north or northeast and a point some twenty-five miles back was selected as being the most northeasterly point reached by the Talston. We moved back to this point and established a base camp and rebuilt an

old Indian stage. Here we saw a black bear and two white wolves.

Leaving the base camp with several days' supply of pemmican, we headed north. From some high hills that enclose Taltson Valley, we observed the country to the north to be flatter, with isolated hills and, in the distance, the summits were bare of trees. Small lakes were to be seen in all directions and a large one of uncertain size lay between us and the distant hills. Detours about the arms of this lake occupied us all day and dusk was settling when we made camp at its northeastern extremity. We found old Indian cairns at several points, such as would be set by people heading across country—possibly Hearne's as we were in the vicinity of his northerly track from Thelew aza yeth towards Clowey Lake. The next day's travel started across an almost open, gently undulating plain with swampy valleys of tundra character and sandy hills—pleasant travelling after the thick woods and swamps of the day before. Then, in the afternoon, we reached another great lake with water showing over twenty miles away. Travel without a canoe was almost impossible; accordingly, a return was made to the base the third day, through a drizzle that made travel difficult and disagreeable.

THE FOLDING BOAT ON THE THELON EXPLORATION
Although space was limited, it proved to be quite sea-worthy in making wide traverses and even running rapids.

The folding canvas boat which had been carried for such an emergency was overhauled. It was found to have sufficient bouyancy for two men and a few essentials, though accommodation was very much cramped.

(*To be concluded in the May issue*)

"GYPSYING THROUGH THE TONQUIN"

By FRANK MORRIS

WE CERTAINLY didn't let the grass grow under our feet in Jasper. Within two days of our return from the Glacier, we got ourselves motored back to Portal Bridge and set down where the pony trail branches out of the Cavell road. It was with a queer sense of being marooned that we watched the big car disappear round the corner on its homeward trip. Why hadn't we asked the man to wait for a couple of hours, or at least to come back in the evening in case we weren't able to make the grade?

The sense of loneliness lasted no longer than we let our looks and thoughts tag dolefully after the receding car. As soon as we faced about to the mountain track, we began to feel better. The very sight of our dunnage bags, squatting on the bank there beneath the sign of "Portal Trail" was as good as a greeting from old chums. Tried and trusty comrades in so many a summer jaunt, there they sat, podgy and stolid, like well-fed papooses, waiting to be given a pick-a-back. It was a positive pleasure to feel their arms about us once more. If friendship's sign-royal is still as it was in the days of King Solomon, here we had it to the very letter; they certainly stuck to us closer than brothers on the trail that day.

So, without more ado, we bent to our task and were soon zig-zagging up Portal Creek Trail headed for Tonquin Valley. This was the real test of our tyros' plan to do without ponies and guides, and the success of it, after all, was mainly due to something we had never thought of—the extraordinarily bracing tone of the air. We had noticed this first on our all-day climb up the north slope of the Cavell Glen and, though we had been far from reading its full import then, it had really spelled the success of our whole venture. Nothing had seemed to tire us. We had left the delta that morning before nine, cached our lunch at the foot of the gully, climbed above the timber line, and tramped the fells till 5 P.M. without a trace of fatigue. Indeed, we seemed to get fresher with every step, filled with a buoyant resilience of spirit no less than body. And now, on our big hike to

the Tonquin Valley, weighed down under our packs, with never a pony but Shanks' mare, we felt always ready for anything. Naturally enough, on the trail, we often turned in dog-tired at night, but we woke in the morning as fresh as daisies and kept going all day. We packed ten miles this very first try and rose three thousand feet by the way.

One by one, as we tramped along, the worries and fears that had beset us at the start, fell away down the mountain side or were left on the trail behind us. We found we could carry our packs up even the steepest grade and, though it set us puffing, a short breathing-space put us in fettle for the next round.

Quite fortunately, as it proved, we were put to the severest test at the very outset of the trip; for, after half a mile of moderate up-grade, the climbing quite abruptly stiffened to its steepest pitch and our pick-a-back packs, with tump line and shoulder strap, tightened their grip into almost the strangle-hold of Sindbad's Old Man of the Sea. It was as much as we could stand—but not more; for, by crowding our breathing spaces, we contrived to keep a small reserve of wind and limb throughout; and then, just as we reached the last gasp, more unexpectedly even than it began, it suddenly ended and the trail shot forward on the level. In little more than a mile, we had risen some fifteen hundred feet.

The slope we were on was wooded, but not too heavily for us to look across the valley and from our view of the other side get some idea of what our own must be like. The north slope rose steeply up to a series of minor peaks culminating further back in Marmot Mountain; in the same way, we must be working round the group of foothills and outlying spurs—gnarled, knubbly mountain roots they were, too—that form part-pedestal to Lectern Peak.

Looking upstream to Circus Valley, we could see Portal Creek itself, rough and torrential, dashing in foam down the steep chute of the gorge, half choked, on bed and bank, with chunks of broken rock and stranded logs. Once or twice, too, at the steepest turns of our zig-zag climb, through the fringe of brush at the outer edge of the path, we caught fleeting glimpses and the distant roar, almost sheer beneath our feet, of churning cataracts. It was then we thanked our stars we had come on foot; for it is precisely at such points, we understand, that the cayuse invariably cranes its neck down over the edge to crop a tempting bunch of leaves or grass. That we should be dashed to the bottom by a slip of the saddle or the girths giving way, was, of course, in the last degree unlikely, but its improbability wasn't a patch on the certainty of our dying a coward's death many times before we reached the top. One of our greatest fears on setting out had been that the first day's packing would fail to bring us within reach of water, for the pony trail soon leaves Portal Creek a thousand feet below it and the slopes of all but the highest peaks are bone dry at this time of year. But before we had even begun to feel thirsty, perhaps three miles up the valley, we struck springs and small runnels on the hillside, a sure proof that we were now circling the base of Lectern Peak. For it is not thunderstorms and rain clouds that flush the river channels in the Rockies, but the sun smiting with full force on the snowfields and glacial reservoirs. One of the hottest days of our whole trip had been while camping in the Cavell delta, and it was followed by a night of strange cracking and growling sounds from the Glacier; in the morning, we found flood pools welling up near the tent door. The sluice gates at the base of the ice-field had been opened and the main stream that intersects the delta was "in spate".

We were too busy toting our packs up the first five miles of the trail to think much of the scenery; just as well, for this lower half of the valley makes no special appeal to the eye by either beauty or grandeur, and has been badly disfigured by fire. The upper half presents a striking contrast, and as soon as we neared the big bend of Portal Creek, below Circus Valley, and swung to the south, we unconsciously quickened our pace, so eager were we to enter in and possess the land of romance that lay before us.

The dry gorge gave place to a spacious valley filled with mossy spruce woods and tracts of open heath rich with seepage from the snow and ice of Portal Peak range on our right, Lectern and Aquila on our left. Oh! the delight of treading those billowy floors of moss and heather through a resinous forest of evergreen.

As soon as we came to the first ford of Portal Creek, we halted for lunch and a well-earned rest beside the stream. Then, shouldering our packs, we wound our way steadily upstream by rock slides, spruce groves and open heath, till we reached a point where the forest fringe drew back from the river banks. Above us, the valley floor fanned out to its biggest spread between Chak and Vertex, and the snow-clad turrets of Maccarib stared down at us from the upper rim of the great amphitheatre. Here we crossed to the west bank and, making our way to a plateau fringed with evergreen, set up our first tent on the Tonquin Trail. After nine hours' packing over ten miles of up-grade with a three thousand foot rise, Shanks' mare had earned a rest.

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It needed no posset of poppy heads to lull us to sleep that night. Hardly had we stretched out on our patent spring mattresses of heather and fir than we entered the Land of Nod and knew no more till dawn. Showers had fallen all afternoon, and in the evening a "Scotch mist" had settled down on the valley; but so snug had we lain in our home-made bags of good Cavan goose-down that we could hardly credit the surprise of our morning's awakening: when we came to open the tent door we found our whole 7" x 7" frozen stiff as cardboard. The heather was white with hoar-frost, the turf crunched under our feet, and a window-pane of ice clinked in the bottom of our kettle.

For an hour or more the air was what the Scotch call "snell", with quite a wintry tang to it, and the sight of snow fields, when we looked towards Maccarib, didn't mend matters much; we began to have an uncanny fear that we had slept the clock round to December. Then suddenly the sun stuck his head over the shoulder of Aquila Peak and beamed into the valley, the rime rose in gray vapour, a murmur of bees came back to the heather, and we were soon basking with butterflies and flowers in July heat. From close by came the music of running water and we presently found a hidden brook bickering through the heath to join the valley river. As we approached an open pool, a trout flashed under the bank and in the twinkling of an eye carried us back over forty years to the "Sma' Glen" where a nameless burn joins the Fiannoch above Glen Almond.

This part of the valley for half a mile or more was very beautiful and to flower lovers a perfect Paradise. The whole floor was carpeted with heather, just at the height of its bloom. Nothing could be a more lovely sight than the spreading ground-shrubs of Moss Heather (*Cassiope Mertensiana*) with its imbricated leafy stems like dwarf cedar and waxy nodding bells of snow white; or the so-called False Heather (*Phyllodoce*), both red and white, their branches like little twigs of hemlock crowned with terminal clusters of bright rosy bells (*Ph. empetriformis*) or greenish-white globes (*Ph. glanduliflorus*). The exquisite purity of the White Cassiope, the rich, warm glow of the red Phyllodoce, and the lavish profusion with which they all bloomed made a riot of beauty in the valley.

Here, too, as on the upper slopes of Whistler and again in a kind of tundra at the head of Amethyst Lake, we found the mountain gentians very abundant. They are all small, one even minute, but they have always made a peculiar appeal to us, perhaps from their symmetry. On the lower slopes, as well as in Jasper Valley, we had found a somewhat larger kind, which we took for *Gentiana acuta*, much branched and with pale mauve flowers very delicately fringed in the throat; higher up we found a smaller mauve kind, smooth-throated, perhaps *G. propinqua*. A peculiar thing about both these gentians is that the flowers dry into a pure, pale blue. The most interesting of all, however, were the little Dwarf Gentian (*G. prostrata*), with corolla tips of rich azure-blue, scarcely bigger than forget-me-nots, and a species we took to be *G. glauca*, three or four inches high, terminated by a cluster of spindle-shaped blossoms almost pure bottle-green in colour.

About half way up this delightful tract, a little mountain stream crossed our path on its way to Portal Creek. Its course seemed curiously to mark a change in the character of the valley floor; below it lay muskegs, and the ground was rough with boulders and scattered clumps of trees. Here we noticed several kinds of mountain anemone, their white blossoms faintly tinged with blue; the Fringed Grass-of-Parnassus was also abundant, and a rarer small-flowered kind. Beyond its upper bank spread a beautiful alpine meadow, rich with flowers. Among Golden Arnicas and big, soft, mauve Fleabanes stood tall stems of deliciously sweet Mountain Heliotrope (*Valeriana septentrionalis*), not at all unlike our own handsome Swamp Valerian. The "Little Elephant" of the boglands was here replaced by Bracted Lousewort (*Pedicularis bracteosa*) with its looser spikes of yellowish and purple flowers.

The lure of a mountain stream in such a setting was too much for us, and we followed its beck across the valley floor to where it came down the steeper pitch of the western slope in a series of waterfalls and cascades. The pebbly pools and grottoes were perfect gardens of saxifrage; never had we seen such a wealth of them, and how pretty they looked about the water-breaks, these children of dripping rock and spray, springing from their moss-cushions on airy shafts and tossing their arms abroad in a shower of snow-white stars. We found no fewer than five kinds of them, and, besides, two mountain cousins of the Mitrewort: the Five-stamened Bishop's Cap (*Mitella pentandra*), with beautiful yellowish petals very delicately feathered like filigree-work, and the handsome Pear Leaf (*Leptarrhena amplexifolia*) with its cluster of thick oval leaves at the base—crenate and shining, one or two stem-bracts above, and a short crowded panicle of blossom resembling the Foam Flower.

Right in the angle of the steeper slope, where an outlying corner of the alpine meadow meets the very pinion tip of the valley's forest wing of spruce, we found a delightful little nook at the foot of a waterfall—a grassy flat, level as a golf green, and just the right size for our tent. At

one side of it, the mountain stream; at the other, plumed heads of Western Anemone, Indian Hellebore in full bloom, and dainty little flower-cones of Alpine Spiræa (*Spiræa pectinata*).

Here it was that we made our last camp the night after leaving the Tonquin. We couldn't have found a more perfect site for our tent. It was entirely free from mosquitoes and commanded a splendid view down the valley and across to Lectern and Aquila. At sundown, we saw deer come out from their forest coverts to feed about the knolls and central plain, and when we turned in at night there was the lullaby of the mountain brook at our very elbow.

We could hardly tear ourselves away from this delightful spot, and whenever we turned for a view down Portal Glen, our looks would brood fondly over that alpine meadow.

On the big, broad saddleback of Maccarib Pass, it was apparently Fair Day for, no sooner did our heads show above the last ridge, than the air was filled with shrill cries of alarm, and dozens of scurrying forms raced for the talus and other cover. Goblin Market had been thronged with its Fell Folk and Little People of the Rocks—Marmots, "Conies" and Gophers. The Hoary Marmot or "Whistler" is an alpine species of our familiar groundhog, much larger, differently colored and wilder, but with the same short-legged scurry and rippling bulk. Curiously enough, its shrill cry of alarm did not startle nearly so much as the common woodchuck's and we came to the conclusion that it was graduated and so lacked the jack-in-the-box explosive effect of its Ontario cousin. The "Cony", Pika or Little Chief Hare, we had heard on our first day's mountaineering, and now saw for the first time. It appeared to be about the size of the Gopher, but stouter, like a large, woolly rat. The most interesting of all these gnomes were the Striped Gophers. They were astonishingly lively, with the same friendly traits as the chipmunk, inquisitive and familiar. Well are they named "gophers", or honey-combers, for their burrows literally riddled the ground. At one spot, there was such a swarm of them on a heathy slope that when they dived for their holes it looked like a shower of frogs plopping from all sides into their swimming-pool; two of them, leaping for adjoining tunnels, actually collided in the air and fell to chattering and tussling on the ground in shrill rage before disappearing.

In the midst of the Pass, by pure luck, we stumbled on the watershed itself, the stagnant, marshy pool to which we had traced our branch of Portal Creek, oozing at the far end in a baby trickle that grew, as it ran, to a full-fledged stream, and in its company we were soon hurrying down by leaps and bounds to the floor of Maccarib, a gently-tilted, shallow trough of open valley, nearly a mile wide, between the slopes of Majestic and Clitheroe, and about three miles long, to where it merges in a T-crossing with the Tonquin.

The lower third of the valley was winged with spruce, but instead of narrowing to a gorge, it widened out into a great terminal basin of forest, the overflow of half a dozen converging valleys. In the centre of this stood the mountain pyramid of Tonquin Hill, and against the western sky beyond, a line of snow-clad mountains.

There, in plain view before us, lay the land of promise. All we had to do was to enter in and take possession. After an easy tramp of two or three miles, we brought up on a plateau by the warden's cabin, right at the entrance to the Tonquin Valley. A little way off to the north curved the great, wooded base of Majestic. West and south of us ran the great line of the Ramparts—a twelve-mile crescent of solid rock that rose 3000-5000 feet above the valley floor.

The long afternoon was still young, and the exhilaration of our alpine theatre, 6500 feet above sea-level, made us eager to explore. First we followed the pony trail through the woods to the shores of Amethyst for a close-up view of those still Titans, the Ramparts; then we travelled north by a well-trodden path into the depths of Majestic's forest of fir, with its dark groves and sunlit glades, its soft-piled floor of moss and heath. Later still, we wandered most delectably about the flowery meadows of the lower Maccarib. These had a peculiar charm for both of us, because we found there so many of the rare and curious plants that had delighted us on the margin of Lake Pyramid, itself a replica of Huron shore. Never was the uncanny power of memory better shown; no traveller's mirage could have been more real than these illusions of the fancy, as flower after flower sent the mind flashing back to distant scenes of time and space. We fairly revelled in it all, and warm waves of sheer enjoyment went surging through us.

In the hush of evening, we sat and faced the great cordon of the Ramparts stretching from west to south in solemn grandeur. And here it was that one of the most delightful things of all our Jasper trip occurred, for in the midst of that impressive scene, as if to give voice to the feelings of our heart, suddenly out of the twilight silence rose the sweetest song imaginable of a mountain bird—the Golden-crowned Sparrow, as we later learned. It came from the top of a spruce tree almost at our elbow and in an instant we knew it for the voice of the mysterious singer we had met in the upper Cavell.

While viewing the Glacier from the fells above the timber line, we had been attracted by a number

of small birds feeding near the base of a knoll covered with dwarf spruce. They were restless as snowbirds, fluttering up from the ground as we approached, warping down the wind, and settling again. They appeared to be some kind of mountain sparrow, rather dusky about the head and neck and showing a glint of white in the tail feathers when they flew. Both in the air and on the ground, they bandied back and forth among them a most captivating little lilt, reminiscent to both of us of the White-throat—a three-note call in sweet whistling tones, very high-pitched on the first, dropping two or three tones on the second, and then rising on the last almost to the level of the first. It was an energetic, joyous call, the notes short and delivered rapidly, clear and sweet like the piping of a tiny flute.

Every day since that first surprise, we had kept eye and ear on the alert for more, but all in vain. The bird apparently haunted the fells above the timber line in that one region only, and unless we returned to the spot, we should never hear it again. Our hopes had faded so completely that at times it seemed as if we might have merely dreamed it. And then, all at once, in the Tonquin here, came the same three notes again poured out in evensong.

Pretty and pleasing as his performance is by day, you must wait till dusk to gauge the powers of this rare little musician. Evening after evening in the Tonquin Valley and again in the Upper Portal, we listened entranced to this highland piper perched on a tree-top by our tent. He used the same three notes of the day-song, but the first drawn out into a long clear flute-note, ineffably sweet and plaintive, enough to melt heart of stone. He seemed to put his whole soul into the note, deliberately modulating it into a tone of tender appeal. Sometimes the two short notes that closed the call were left unsung as though the singer could no more; and nearly always at this close range we could hear a low preliminary "*chck*" with which the bird tuned up to his thin piping call-note. He seemed to court our companionship, and for all his wonderful power of song, showed no atom of disdain, more than once responding gladly with his sweetest utterance to our faltering echo from the tent.

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Next morning we were up and about betimes, having promised ourselves a whole, long day in our alpine meadow and up the slopes of Clitheroe. The day began badly for the botanist. As woodhewer in ordinary to the camp, he caught up his axe for the morning chore, only to drop it in disgust. Instead of the smoothly bevelled handle that had been a luxury to hold, he found one side of it from head to heel gnawed down about an eighth of an inch into a flat, slivery face sharply angled at the edges. So that was what it had all meant! He had been kept awake for an hour or more in the night by the sound of a porcupine chewing, as he thought, at the door sill of the neighbouring cabin, and had fed his spleen at the untimely vigil with pictures of the warden's wrathful return. So all those satisfied grunts and spurts of feverish energy that he had chuckled over, sounds as of some glutton over an extra toothsome morsel of pickleback, had been at his own expense after all. The axe was ruined.

We found the meadow margins of Maccarib such an Elysium of flowers as held us long in dalliance from our climb up Clitheroe. It was not merely the beauty of the flowers, many of them old favorites, but their magic power of whisking us away into the distant past. The graceful little Mealy Primrose, with its crown of mauve blossoms, flourishing here at an elevation of 6500 feet just as well as on the shores of Pyramid or at Red Bay, 2,000 miles off; the tiny Bistort, a curious kinsman of the Buckwheats, with its diminutive wand of spiked flowers—two kinds, apparently, the Alpine and the Heart-leaved; the lily-racemes of Sticky and of Marsh Tofieldia; the creamy sprays of White Camass; several sorts of mountain Anemone and Grass of Parnassus that two short weeks before had been utter strangers and now formed part and parcel of our nodding acquaintance. We could almost fancy they had come all the way from Whistler or Cavell, travelling over Marmot Pass or up the Astoria to keep tryst with their new friends gypsying in the Tonquin. At every step we had to stop and greet these happy little mountaineers; to one and all in turn our hearts went out in friendship, Primrose, Bistort and Lily, Windflower, Grass of Parnassus and, last, but not least, the dainty little Arctic Raspberry, with its bright mulberry blossom of six petals—not a bit according to Hoyle or Gray but who would ever wish to bring these wayward sprites to book?

Some distance upstream, where the channel was shoaly and broken by gravel beaches, we forded Maccarib Creek and approached the fringe of spruce over the hummocky muskegs with their wealth of mountain bog-flora. And here, among so much that was familiar and delightful with its memories, we had an encounter we shall not soon forget. For fifty yards or more on all sides of us, the ground was thickly set with flower spikes of a wild orchid. It stood some eight or ten inches high, the upper half a clustered cone of snow-white blossoms. From its size, we judged it to be Romanzoff's Ladies' Tresses, but no sooner had we come to close quarters than we found it a

dwarfed and alpine form of the fragrant White Rein-orchid (*Habenaria dilatata*). The individual flowers were of almost normal size, with the familiar strap-shaped lips dilated at the base and prolonged behind into a slender spur. The strange thing about them was their scent. Instead of the honey-sweet smell of hyacinth or syringa that this orchid yields in our Eastern bogs, these blossoms were all richly aromatic of cloves, just like the old-fashioned Picotees of our cottage gardens. Strangely enough, the closely-allied European orchid, *Habenaria bifolia*, also a denizen of mountain slopes, distils the same perfume. So does the Yellow Avens of the Rockies. Will some learned entomologist tell us for what dainty insect reveller this orchid clove-scents her chalice of nectar?

We found the climb up Clitheroe's western slope as easy as delightful, and after following the ridge that overlooks Maccarib Valley to a height of some 8000 feet, we swung to our right below the screes and talus and descended further south. Every little while we stopped on ridge or knoll to enjoy the view these slopes commanded on all sides. From a steep terrace overlooking the Maccarib, we got a magnificent view of Mount Majestic, a greater Clitheroe, covering twice the ground and carrying its head a thousand feet higher. The peaks of these adjacent heights stand six miles apart—elbow-room enough even in this land of Brobdingnag.

The floor of the valley, far below us, presented one very remarkable feature. For nearly half a mile an affluent of the river wound along, a vivid rose-pink stream. The guardian Naiad had transformed her water-course into a flower bed for the summer months, and there it wavered over the valley floor—a Mæander of mountain fireweed.

As we neared the snowfields below the talus, we found ourselves able to survey the whole Tonquin Valley with its forests, lakes and streams, its avenues and outlets. It appeared as a huge arena ringed round with an amphitheatre of mountains. But for the intruding pyramid of Tonquin Hill, it spread out in a great plain of bare tundra, lake and forest. Into it from the east flowed the Maccarib stream; out of it to the north, Meadow Creek and Clairvaux, to the west the Tonquin, to the east Astoria.

But the view that sooner or later always drew the eye was that stupendous barrier of Ramparts upreared behind its guardian moat of the Amethysts—a twelve-mile crescent of solid rock, the central part comparatively low, a parapeted wall perhaps half a mile high above the valley floor, but rising at each end to twice that height in a series of impregnable fortresses: to the west, Geikie and his confreres in echelon formation; to the south, the massed bodyguard of Mount Fraser with Simon Peak in their midst. They might have been the fabled storming-party of Olympus, seizing this vantage ground of the Tonquin; the Titans clearing the way while their forest allies came pouring through the valley mouths across the open and swarming up the slopes.

Here, as everywhere in the Rockies, scale and distance were hard to gauge. The Ramparts looked so close that we had again and again to warn ourselves of the optical illusion. Almost the only evidence that things were not as they seemed was the feeling that we stood on a level with the battlements and parapets of these frontier fortresses, instead of 2000-3000 feet below them.

It was on our way down that we got a final object lesson in these "field-glass" views of the Rockies. We had reached just the right line of contour for a perfect "prospect" over the spruce forest across the glacial lake to the snow-scarfed Ramparts, and had chosen for our last long look the side of a knoll bright with moss-campion and whitlow grass. Here, with our backs against a ledge of rock overgrown with White Dryad, we sat and gazed our fill at the western horizon. So close and clear it all seemed, it was almost as though we were looking not at an actual mountain range, but at a panorama reflected on a huge screen. All at once we saw—over our shoulder, as it were—approaching us round the side of the mountain, a solitary fawn. Instinctively we dropped our voices and shrank in close to the friendly shelter of the rock. On it came, straight in our direction and apparently unconscious of our presence. Another moment and we fell to chuckling at our own expense. It was a big cariboo stag fully half a mile away on the far side of the big gully that troughs the reservoirs of snow down the mountain side. On he came, carrying his fine antlered head well up. He was considerably lower than we, and advanced to the edge of a grassy parapet overlooking the gully, where he stood for some time. Our whispers in 'bated breath were all the more absurd that a roaring waterfall plunged between us in the cleft of the gully.

When we got back to our little camp in the evening, with all that store of pictures back of our retina, it was as though we had the eyes of a clairvoyant. The forest screen between us and the Ramparts no longer hid the Twin Lakes of Amethyst; behind the Tonquin Hill, its westward-flowing creek and the basin of Moat Lake were plain in view. The whole valley and its component parts of mountain, plain and forest, lake and stream, seemed now to make a single picture in the mind. A picture compact of many different things—of sights and sounds, of form and color

and fragrance. A whole gallery of pictures, or rather, perhaps, a magic reel of living scenes.

And how often since have all those scenes been re-created in the inner vision of the mind! Once more we take our place among the gods in an upper gallery of that great amphitheatre and, leaning back against a ledge of rock overgrown with Mountain Dryad, look down on the arena. And even as we look, two figures come packing down the Glen. On a wooded knoll between the Maccarib and Meadow Creek, they pitch their tent—a tiny pyramid of white facing the big gray pyramid of Tonquin Hill. They wander through the alpine meadow, hailing its flowers with cries of delight. In the hush of evening they sit down to watch the snow-scarfed Ramparts beyond the black spires of spruce, while the Golden-crowned Sparrow overhead pours out his liquid melody. And with them once more we go gypsying through the Tonquin.

MOSSES IN BRITISH COLUMBIA—THEIR IMPORTANCE UNDER LOCAL CONDITIONS

By FRED PERRY

ON THE TOP of a high mountain, one is invariably struck with the infinite variety of peak and glacier. The wonder and bewilderment that is evoked often destroys one's sense of perspective, and we frequently fail to make a note of the forces that have been, and are, working to produce the wooded slope and the pleasant valley. It is my purpose in this paper to call attention to one of the most important forces, namely, the mosses. Their presence usually produces nothing more than the remark of Wordsworth about the "Primrose by the river's brim, a yellow primrose was to him, and it was nothing more."

To the lover of the hills, the showy flowering of the arctic plants easily take first place in his imagination, and it is only after being satisfied with their charms, that he turns to the comparatively insignificant and lowly neighbors—the mosses—and finds that the problems relating to the existence of the mosses are just as important as the flowering plants. In part, in some cases they are interrelated.

There are many arctic mosses. The absence of any great variety is, however, balanced by the masses that are often found, of some particular species. One of the most conspicuous is, I think, *Oligotrichum Lyallii*, belonging to the family *Polytrichiaceæ* which we find on Beaver mountain (7000 ft.), Warleach (6800 ft.), and an unnamed ridge in the vicinity of Tomihii (6500 ft.). These peaks are on the western slope of the Cascade mountains. We find that Lyall (according to Macoun's list) found this same moss at the same altitude on the eastern slope of the Cascades in 1860. So far, it has not been recorded from the Coast Range. It occurred in large patches in all three cases, below heavy snowbanks where it had the effect of conserving the icy waters, and serving plants such as *Cassiope Stelleriana* and the rare lily, *Lloydia serotina*, with a steady flow of the icy water. Strange to say, we have never found these two rare species in the Coast Range, and only once dis-associated from the *Oligotrichum*.

The plants noted seem to thrive well under the condition which I have outlined, and in all probability they depend for their very existence on the water-retaining features of the *Oligotrichum*. Like the *Polytrichum*, they are always found freely fruiting, so free that a large patch on Beaver Ridge was completely hidden by their undulating capsules. Possibly their gregarious habit would help to protect them from the vigorous nature of their environment. A task for the "Adaptationist" might be suggested here. We have not noticed them below 6500 feet.

The more rare *Myurellas* occur in the same altitude, never in any but small, scattered patches, bluish green, and rarely fruiting, but sometimes mixed with the *Oligotrichum*. The *Myurellas* are said to prefer limestone rocks, but we have found them far away from any suspicion of limestone.

On the stones, one occasionally meets a few withered *Racomitriums*. They are often found on Beaver mountain in the Hope Range, associated with that flowering aristocrat, *Polemonium confertum*, earning one's regard for them none the less for their modesty.

Grimmia alpestris is sometimes found on the alpine slopes and species of *Dicranum* are sometimes present.

On the descending ridges into the high mountain lakes or tarns, which oftimes are the cirques left by the departing glaciers, one frequently comes upon the *Philonotis*, which in many places takes the place of the *Sphagnums*. Under these conditions, 5000 to 6000 feet, they rarely fruit. Their quantity, however, indicates in no uncertain manner that they are not devoid of the means of reproduction. The reasons why the *Sphagnums* are not as successful as the *Philonotis* in these high altitudes, are not hard to seek; for the

Sphagnums can only absorb water by capillary attraction, thus making them more successful in motionless ponds or lakes. The *Philonotis* can, by reason of its dense matted stem, retain water as by a sponge.

Bryum alpinum is another moss, not common, that is sometimes found associated with the *Philonotis*, as also are a few species of the *Meesias*.

In the clefts of shady rocks and precipices in the dense woods, one often comes on the *Bartramias*, or Apple mosses. On the wooded slopes among the White Rhododendrum and the Copper Bush, the *Hypnum curvifolium*—a snake-like moss suggesting little green tails to some—is nearly always found. This moss, being so rarely in fruit, is difficult to classify, giving great trouble and thereby bearing out the old saying that the commonest of mosses are often the most difficult to classify. We have only found it in fruit twice: once on Grouse mountain and once near "Salter's" on the South Valley trail back of Britannia mine. This is a very important moss. Its thick, trailing stems have a tendency to cover small sticks and fallen twigs with its moist blanket. It covers the mountain slopes—especially when not too steep—from 1500 to 3500 feet, rarely lower or higher. It has been confused with *Hypnum reptile*, but is a much more robust plant and grows on the floor of the forest, whereas, *Hypnum reptile*, which is a more slender species, is generally found on fallen logs and commonly found in fruit.

A great variety of mosses appear under varying conditions of the forest floor. If the forest is extremely dense with small conifers, probably none will be found, except prehaps, on the edges of streams. If, however, the rocks protrude, they are generally covered with mosses. The *Dicranums* are nearly always in evidence, being easily distinguished by their long, narrow leaves, usually curved and twisted to one side; sometimes very freely fruiting and capable of withstanding some dryness, not so much, however, as their neighbors, the *Polytrichums*, which in some cases can endure considerable drought.

Hypnum molluscum, which is common, is, however, very tolerant of sunlight, while that glorious moss, *Hypnum crista-castrensis* (Knight's Plume), prefers the edge of the forest or woods, and is more partial to the light. The effect of this can be seen in their slight yellow color, especially when dry.

Hypnum splendens is one of the commonest of mosses and perhaps one most frequently noted. This feathery-like moss is rarely found below 2500 feet; infrequently in fruit, and, like *Hypnum crista-castrensis*, tolerant of extremes of light.

On the open rock slides, one often comes upon the *Grimmias* and the *Racomitriums* which can withstand a whole season's strong sunlight and then freshen up at the first rain. They are easily distinguished by their usually hoary appearance, which is occasioned by silvery hairs that are a continuation of their leaves.

On the steep mountain sides are to be found numerous streams and rivulets, where it would be supposed that such plants could scarce find foot-hold, but numerous mosses seem to delight in such surroundings. Their chief service seems to consist in retadring the numerous particles of soil that are continuously being carried down by the current, some of them even braving the strong streams that are caused by steep declivities over which the water rushes. Perhaps one of the most noticeable of these hardy adventurers belongs to the family of the *Grimmias*, of which I have just spoken. *Grimmia scouleria* is to be found at the entrance to Capilano canyon and on the rocks in the Nicolum river at Hope. *Conomitrium julianum*, whose long slender stems appear to have no leaves, is also found under the same circumstances, while *Fissidens grandifronds* can easily be noticed by its tenaciousness and its beautiful green color.

Another genus not uncommon to these cool streams is the *Fontinalis*, meaning, belonging to water. It attaches itself to stones or wood and is often found, many feet long, floating down streams, and easily distinguished by its large, deeply concave leaves arranged in three rows, which give a three-sided appearance to the stems. *Fontinalis antipyretica* var. *gigantea*, is often met with, but rarely in fruit.

On the sides of the streamlets and pools, the *Philonotis* are common, retaining a considerable amount of water. The *Meesias* and *Mniums* are also common and easily recognized by their opaque leaves and strong fruit.

On the trunks of deciduous trees, particularly the maple, the *Neckeras* are often found, while in the deep woods, *Climacium ruthenicum* may be looked for. *Climacium americanum* and *Climacium dendroides* must be sought for, however, in the open, preferably marshy, meadows. *Polytrichum juniperinum* is commonly found on rocks, especially in the clefts.

In the deep mountain valleys, the work of the beaver can often be traced, sometimes damming swift mountain streams, thus forming lakes that are often of considerable size. Under these conditions, the mosses get a very strong hold, fill the interstices, and cover the dams, thereby completing their mission of utility.

From the foregoing remarks, it can easily be seen that the influence of mosses on water retention in the soil must be very great. Their soil-forming qualities are, however, not so evident, but a glance at the foot of the cliffs, and into the

crevices in the rocks, will convince anyone of their activities in this direction, chiefly perhaps as a pioneer agent. The old handlogging methods, in vogue in British Columbia before 1912, took mainly the merchantable timber and left the immature trees. This resulted in merely changing the species of mosses. The mosses that were more tolerant of light took the place of those that were less tolerant, but the introduction of the vicious high-lead system of logging, completely destroys all but a few of the hardiest. The ruin is completed by fires that sweep through the immense mass of slashing left by the loggers and thereby entirely destroys all vestige of lichen or moss.

*A COMPARISON OF RECENT AND LATE CHAMPLAIN STAGES OF McKAY LAKE AS DIATOM HABITATS**

By E. M. KINDLE

McKAY or Hemlock Lake occupies a depression in the marine terrace a few hundred yards south of the Ottawa River just east of Ottawa. Its present length is about five hundred yards and its maximum width some two hundred and fifteen yards. In late Champlain and early post-Champlain time, the area of McKay Lake was about one third greater than it is now. At this early period of the lake's history, when the surface stood about eighteen feet higher than at present, a deposit of marl formed around the eastern and southern shore of the lake. The operation of the sand pits on the east side of the lake has destroyed a portion of the old marl bed, but it can still be traced through the forest by its fossil shells, both north and west of the pits.

The composition of both the fossil and the living Molluscan life of McKay Lake has become well known through the studies of the late Mr. E. J. Whittaker† and Dr. H. M. Ami‡. Whittaker recognized in the living fauna twenty-three species and eight species in the fossil marl fauna. All of the latter were recognized in the living fauna with one exception. In connection with the further study of the composition of the bottom materials of this lake, the writer has been able, through the kind co-operation of Mr. Chas. S. Boyer, of Philadelphia, to learn something of the diatom content of the bottom ooze of this lake. The fossil marl of the lake has also been examined for diatoms both by Mr. Boyer and the writer. From a sample of the lake bottom ooze which the writer collected in midwinter from a depth of about twenty feet near the northern end of the lake, the sixty-four species of diatoms as listed below were identified.

INTRODUCTION

DIATOMS FROM LAKE BOTTOM*

Amphiprora ornata Bail.
Amphora ovalis (Breb.) Kutz.
Caloneis Silicula (Ehrenb.) Cleve.
Cocconeis flexella (Kutz.) Cleve.
Cymatopleura Solea (Breb.) W. Sm.
Cymbella cuspidata Kutz.
Cymbella cymbiformis (Kutz.) V. H.
Cymbella heteropleura (Ehrenb.) Kutz.
Cymbella lanceolata (Ehrenb.) V. H.
Cymbella microcephala Grun.
Cymbella ventricosa Kutz.
Epithemis Argus Kutz.
Epithemia Sorez Kutz.
Epithemia turgida (Ehrenb.) Kutz.
Eputhemia Zebra (Ehrenb.) Kutz.
Eunotia Arcus Ehrenb.
Eunotia major (W. Sm.) Rab.
Eunotia praerupta bidens Grun.
Fragilaria construens venter Grun.
Gomphonema acuminatum coronatum (Ehrenb.) V. H.
Gomphonema Augur Ehrenb.
Gomphonema intricatum Kutz.
Gomphonema lanceolatum Ehrenb.
Gomphonema sphaerophorum Ehrenb.
Gomphonema subclavatum Grun.
Gyrosigma attenuatum (Kutz.) Cleve.
Gyrosigma Kutzingii (Grun.) Cleve.
Hantzschia amphioxys (Ehrenb.) Grun.
Mastogloia Dansei Thw.
Navicula anglica Ralfs.
Navicula cuspidata Kutz.
Navicula dicephala (Ehrenb.) W. Sm.
Navicula oblonga Kutz.
Navicula peregrina (Ehrenb.) Kutz.
Navicula Pupula Kutz.
Navicula radiosa Kutz.

*Determinations by Chas. S. Boyer, A.M., F.R.M.S.

*Published with the permission of the Director, Geol. Surv. Canada, Ottawa.

†Relationship of the Fossil Marl Fauna of McKay Lake, Ottawa, to the Present Molluscan Fauna of the Lake, *Ottawa Naturalist*, Vol. XXXII, No. 1, pp. 14-18, April, 1918.
Notes on Variation in Planorbis campanulatus Say. from Blue Sea Lake, Quebec, *The Nautilus*, Vol. XXXII, No. 4, p. 130, p . X, April, 1919.
Bottom Deposits of McKay Lake, Ottawa, *Trans. R. S. C.*, Vol. XVI, 3rd Series, Section IV, 1922, pp. 141-156, Pls. I-II.

‡*Ann. Rept. Geol. Surv. of Can.*, Vol. XII, p. 569.

Navicula rhyncocephala Kutz.
Navicula trinodis (Lewis).
Navicula Tuscula (Ehrenb.) Cleve.
Neidium affine (Ehrenb.) Cleve.
Neidium amphirhyncus (Ehrenb.) Cleve.
Neidium Iridis (Ehrenb.) Cleve.
Nitzschia Brebissonii W. Sm.
Nitzschia Denticula Grun.
Pinnularia Brebissonii (Kutz.) Cleve.
Pinnularia major (Kutz.) Cleve.
Pinnularia nodosa (Ehrenb.) Cleve.
Pinnularia stauroptera (Grun.) Cleve.
Rhopalodia gibba (Kutz.) Mull.
Rhopalodia ventricosa (Kutz.) Mull.
Stauroneis acuta W. Sm.
Stauroneis anceps Ehrenb.
Stauroneis Phoenicenteron Ehrenb.
Stauroneis salina W. Sm.
Surirella biseriata (Ehrenb.) Breb.
Surirella guatamalensis Ehrenb.
Surirella linearis W. Sm.
Surirella tenera Greg.
Surirella tenera splendidula A. Schmidt.
Synedra capitata Ehrenb.
Synedra danica Kutz.
Synedra delicatissima W. Sm.
Tabellaria fenestrata (Lyngb.) Kutz.

DISCUSSION

"A notable occurrence in this diatom flora is that of *Mastogloia Dansie* Thw., usually existing in brackish water. Its presence in the deposit may be due to the fact that the lake originally was marine."* The survival of this marine form in McKay Lake is comparable with the persistence in Lake Ontario of the relict species of *Mysis relicta* recorded from Lake Ontario.† It is evidently a survivor from the period when this lake basin and the adjacent Ottawa valley were a part of the Gulf of St. Lawrence.

The McKay Lake bottom ooze was studied by Mr. Boyer in connection with sixty-seven samples of diatom deposits representing various parts of southern Canada from Nova Scotia to British Columbia.* The relative richness of the diatom flora of McKay Lake as compared with the various lake and bog deposits included in these sixty-seven samples is suggested by the fact that only one locality represented in the material studied by Mr. Boyer shows a richer diatom flora than McKay Lake. This is Earltown Lake, in Nova Scotia, which furnished seventy-two species.

In sharp contrast with the rich diatom flora of lake bottom mud, the fossil marl which lies about fifteen feet above the present level of McKay Lake was found to be entirely without diatoms. The eight Molluscan species recorded from this marl together with the great abundance of the shells of certain species in it demonstrates the fitness of the marl forming stage of the lake's history to molluscan life just as the total absence of diatoms in the marl testifies to the unfitness of marl forming conditions to diatom life. The relative abundance of diatoms in the bottom ooze and their absence from the fossil marl indicates that diatoms are affected unfavorably as desmids have been found to be† by hard water.

Marl is not now forming in McKay Lake and it holds less lime than formerly. The three footbed of marl bordering its shelving southeastern shore indicates that it was a hard water lake when its waters stood eighteen or twenty feet higher than at present.‡ This considerable deposit of marl could not otherwise have accumulated in it. During that period of the lake's history in late Champlain or early Post-Champlain time when the upperstratum was alkaline to phenolphthalein, diatoms were absent from the shallow lime charged waters of the south-eastern shore, as shown by their absence from the fossil marl, but they were not necessarily absent from the deeper parts of the lake, though presumably less abundant than at present.

*E. M. Kindle, Bottom Deposits of Lake Ontario, Roy. Soc. Canada, Vol. XIX, pp. 54 and substitute, 61, 1925.

†Letter to the writer from Chas. S. Boyer.

*The other samples were collected by Mr. V. L. Eardley-Wilmot of the Mines Branch. Mr. Boyer's report on these, "A Preliminary List of the Quaternary and Tertiary Diatomaceæ of Southern Canada", will appear in a forthcoming Museum Bulletin.

†G. M. Smith, The Phytoplankton of the Inland Lakes of Wisconsin, *Wis. Geol. & Nat. His. Surv.*, Bull. 57, Pt. I, p. 9.
Birge and Judy, The Inland Lakes of Wisconsin, *Wis. Geol. & Nat. Hist. Surv.*, Sci. Ser. 9 , p. 1-137, 1914.

‡Birge and Judy consider lakes whose average fixed carbon dioxide does not exceed 5 cc. per litre as soft water lakes, while medium waters have 6-22 cc., and hard waters 23-50 cc. Bull. 22, Wis. Geol. & Nat. Hist. Surv. Sci. Ser. 7, p. 1-259, 1911.

INTERNATIONAL CONGRESS OF PLANT SCIENCES

(Fourth International Botanical Congress)

INVESTIGATORS and teachers in the plant sciences, representing all aspects of botany, plant chemistry, plant pathology, and bacteriology, agronomy, horticulture, and forestry are invited to attend the International Congress of Plant Sciences to be held at Ithaca, N.Y., August 16-23, 1926. This invitation is extended to all countries of the world.

This Congress is scheduled to follow the usual academic sessions abroad, also the short summer session of the various universities and colleges in the United States. It is believed to offer the first opportunity ever arranged in the United States for a general conference of all those professionally engaged in plant work. It possesses the additional compelling interest accruing from unrestricted international representation.

In order that a part of the program may be representative of outstanding leadership, the Congress will be divided into about one dozen sections, each section with an invitation program occupying about four morning sessions, or a little more than one-fourth of the available time. These formal programs will be supplemented by another feature that promises also to be of exceptional interest. Ample time will be set apart for round table or informal discussions, which in some cases may be scheduled in advance, and in others may be arranged both as to topics and participation after the Congress actually convenes. This is intended to provide for the widest participation in sectional activities. Supplementary opportunities for individual contact and participation are made possible through the non-commercial exhibits and through the provision for excursions and inspection tours of various types suited to the diverse needs of the different sections.

Although the Congress is not to provide an occasion for *legislation* on regulatory matters of international significance (such as nomenclatorial rules) the organizing committee has expressly provided that "adequate opportunity shall be accorded all sections for the *discussion* of regulatory recommendations of international significance", in order that a better understanding may be reached for definite action at a subsequent international congress.

The sections thus far authorized and the secretaries representing these groups are as follows:—

(1) Concerning round tables and other strictly sectional matters—to the appropriate sectional secretary.

(2) Concerning exhibits and general program matters—L. W. SHARP, Cornell University, Ithaca, N.Y.

(3) Concerning excursions, collecting trips. inspection tours, local arrangements. transportation, etc.—H. H. WHETZEL, Cornell University, Ithaca, N.Y.

(4) Concerning the Congress in general—B. M. DUGGAR, Missouri Botanical Garden, St. Louis, Mo.

Communications regarding the Congress should be addressed as indicated below:—

Agronomy—C. H. MYERS, Cornell University Ithaca, N.Y.
Bacteriology—J. M. SHERMAN, Cornell University, Ithaca, N.Y.
Cytology—L. W. SHARP, Cornell University, Ithaca, N.Y.
Morphology, Histology & Paleobotany—D. S. JOHNSON, Johns Hopkins University, Baltimore, Md.
Ecology—H. L. SHANTZ, Bureau of Plant Industry, Washington, D.C.
Forestry—R. S. HOSMER, Cornell University, Ithaca, N.Y.
Horticulture—A. J. HEINICKE, Cornell University, Ithaca, N.Y.
Physiology—G. F. CURTIS, Cornell University Ithaca, N.Y.
Pathology—DONALD REDDICK, Cornell University, Ithaca, N.Y.
Pharmacognosy & Pharmaceutical Botany—H. W. YOUNGKEN, Massachusetts College of Pharmacy, Boston, Mass.
Taxonomy—K. M. WIEGAND, Cornell University, Ithaca, N.Y.
Mycology—H. M. FITZPATRICK, Cornell University, Ithaca, N.Y.
Genetics—C. E. ALLEN, University of Wisconsin, Madison, Wisconsin.

NOTES AND OBSERVATIONS

ORNITHOLOGY OF NORTHERN NEW BRUNSWICK. —Comprehensive articles on the ornithology of Northern New Brunswick and of the Gaspé peninsula have from time to time appeared. This country is, however, of such remarkable interest to the ornithologist that I have been tempted to give an account of some of the rarer and more interesting birds encountered on a trip to this region taken during the months of June and July, 1925.

Two visits were made to Bonaventure Island, the first from June 8th to June 14th, the second from June 30th to July 4th, the intervening period being for the most part passed at Jacquet River, Restigouche County, N.B. Several days were also spent at Bathurst, N.B., Campbellton, N.B., Percé, P.Q., Matapedia, P.Q. and Gaspé, P.Q.

A decided change in faunal conditions is evident as one leaves the low-lying lands of Gloucester and Eastern Restigouche Counties, N.B., and enters

the spruce-clad hills of Gaspé, where more boreal conditions prevail. One leaves behind such species as the Vesper Sparrow, Parula Warbler and Veery, while Pine Grosbeaks, Blackpoll Warblers and Grey-cheeked Thrushes put in an appearance.

It was interesting to note that during my first visit to Bonaventure Island, song birds were very little in evidence and, with the notable exceptions of Blackpoll Warblers and Savanna Sparrows, comparatively few were in song. During my second visit, however, this beautiful little island seemed alive with song birds, and though it was July, all the nests of passerine birds that I found contained eggs.

Altogether, eighty-eight (88) species were observed. I feel, however, that an annotated list of all the birds seen would have but little value, and would become rather tedious to the reader. The following notes are therefore to be regarded as supplementary in character.

MURRE (*Uria t. troille*).—This species was far more abundant on Bonaventure Island than I had anticipated. Duval, the warden, was of the opinion that there were almost as many Murres and Razor-bills as there were Gannets, and I am inclined to think that he is not far wrong, as the Gannets are much more conspicuous.

KITTIWAKE (*Rissa t. tridactyla*).—It appeared to me that Dr. Townsend had over-estimated the number of Kittiwakes nesting on Bonaventure Island and on Percé Rock. I saw, at the most, thirty pairs. It is quite possible, however, that I overlooked some of these little gulls.

COMMON TERN *Sterna hirundo*).—Mr. George Stuart whom I met on Bonaventure Isand, told me that he had discovered a colony of these terns at Chandler.

LEACH'S PETREL (*Oceanodroma leucorhoa*).—This species can no longer be called common on Bonaventure Island. In spite of diligent search and aided by Duval, I was unable to locate a single occupied burrow. The remains of several petrels were found, and some of the burrows showed evidence of having been tampered with by some animal. As there are no dogs on the island, I feel I shall have to lay the full blame on the foxes, which, I was told, are numerous.

GANNET (*Moris bassana*).—Apparently increasing on Bonaventure Island. A number of nests are accessible without the use of a rope.

COMMON CORMORANT (*Phalocrocorax Carbo*).—I saw several of these birds on Bonaventure Island while in the company of Mr. Stuart. The keen eyes of Duval had detected the difference between this bird and *P. auritus*. He told me that a few appeared every year, but that they did not breed.

HARLEQUIN DUCK (*Histrionicus h. histrionicus*).—Three observed at Chandler by Mr. Stuart.

GOSHAWK (*Astur a. atricapillus*).—Both Mr. Suart and I observed one of these hawks on Bonaventure Island.

GREAT HORNED OWL (*Bubo v. virginianus*).—I saw one of these owls at Jacquet River and one at Percé.

ARCTIC THREE-TOED WOODPECKER (*Picoides arcticus*).—A common species about Jacquet River, where a nest was found on June 21st, containing young ready to leave.

YELLOW-BELLIED SAPSUCKER (*Sphyrapicus v. varius*).—Common summer resident, particularly about Matapedia.

NIGHTHAWK (*Chordeiles v. virginianus*).—Not common. I flushed a female from two eggs in a clearing near Jacquet River on June 25th.

YELLOW-BELLIED FLYCATCHER (*Empidonax flaviventris*).—Very common summer resident throughout, and, in fact, the commonest of the flycatchers. The only other common flycatcher was the Alder, which I observed in all suitable localities.

OLIVE-SIDED FLYCATCHER (*Nuttallornis borealis*).—Not uncommon about Jacquet River.

RAVEN (*Corvus corax principalis*).—I saw several about Percé and on Bonaventure Island, where they appeared to be doing a good deal of damage to sea-birds' eggs. I frequently saw one or two of these birds soaring high above the "Pic d'Aurore" and diving down when occasion permitted, into the herring gulls that breed there. Like the crows, the ravens were very tame and allowed a close approach.

PINE GROSBEAK (*Pinicola enucleator leucora*).—While at Percé in July, I came across one or more of these birds almost every day.

WHITE-WINGED CROSSBILL (*Loxia l. leucoptera*).—A much more abundant species than the Red Crossbill, a fact which also appears to be the case in northern New England. I did not find either of the crossbills on Bonaventure Island.

SAVANNAH SPARROW (*Passerculus sandwichensis savanna*).—One of the most abundant birds of this region. Their song, which may be interpreted "*sick-sick-sicksickerseeeesick*" was one of the most characteristic of bird songs. These sparrows were still building when I left in mid-July.

VESPER SPARROW (*Pœcetes g. gramineus*).—Not uncommon in Northern New Brunswick. I found a nest at Jacquet River on June 18th, 1925.

LINCOLN SPARROW (*Melospiza lincolni*).—A common bird about Matapedia and in Northern New Brunswick, becoming much less common northward, and I failed to find this sparrow about Gaspé.

FOX SPARROW (*Passerella i. iliaca*)—I found several of these sparrows on my second visit to Bonaventure Island.

CLIFF SWALLOW (*Petrochelidon l. lunifrons*).—By far the most abundant of the swallows. A colony was breeding on the cliffs of Bonaventure at the southwest part of the island.

PHILADELPHIA VIREO (*Vireosylva philadelphica*).—A common summer resident and the commonest vireo, though I came across many Red-eyed and some Solitary vireos. Their song appears rather softer and less varied than that of the Red-eye, but I must confess that at times I could not differentiate between the two. The "extra" note which I listened for was not always apparent. Mr. Stuart found a nest at Chandler.

BLACK-AND-WHITE WARBLER (*Miniotilta varia*).—Not common. I watched one of these warblers feeding young out of the nest in early July at Percé.

NASHVILLE WARBLER (*Vermivora r. ruficapilla*).—Not uncommon summer resident throughout.

TENNESSEE WARBLER (*Vermivora peregrina*).—Common to abundant summer resident. Their singing is very variable, but can usually be distinguished from that of the Nashville by having three or even four distinct parts as compared with two of the Nashville. Some of the songs are, however, rather similar. Two songs which I heard more or less frequently resembled:—

(a) *Su-su-se-se-si-tre-tre-di-di-di-di-di;*

(b) *Tre-tre-tre-triri-triri-triri-sic-sic-sic-sic-sic*

—(third parts as if inhaled)—while the Nashville's usual song sounds to me more like:—

"*Kitse-kitse-kitse-a-di-di-di-di-di-di*".

At Percé, these warblers were nesting in mixed deciduous woods and were common on dry hillsides, but about Jacquet River I found them usually about swampy clearings.

PARULA WARBLER (*Compsothylpis americana pusilla*).—A common and characteristic bird about Jacquet River. I failed to find this warbler elsewhere, though conditions seemed suitable in many places. I found a nest containing four fresh eggs on June 17th.

MYRTLE WARBLER (*Dendroica c. coronata*).—Fairly common. I can endorse the statement of Mr. Phillip and Mr. Bowdish (*Birds of New Brunswick—The Auk*, 1917) that in New Brunswick the Myrtle is one of the high-nesting warblers.

BLACK-THROATED BLUE WARBLER (*Dendroica c. cærulescens*).—I ran into a small colony of these warblers in rich deciduous woods near Jacquet River.

BAY-BREASTED WARBLER (*Dendroica castanea*).—A common summer resident throughout, but particularly about Gaspé. In one large stretch of low spruce woods to the west of Jacquet River, these warblers outnumbered all others. Their songs are weaker than any other warblers' songs I've heard, and have a "whispering" quality which is most characteristic. The commonest song resembles a very weak "*Esee-esee-esee-esee*".

I never heard Bay-breasts sing less than eight (8) songs to a minute or Blackpolls more than four.

BLACKPOLL WARBLER (*Dendroica striata*).—Abundant in Gaspé, but obviously absent from the low-lying country of Northern New Brunswick. Two of the nests that I found were in little spruces within a foot of the ground.

BLACKBURNIAN WARBLER (*Dendroica fusca*).—Common about Jacquet River. Their commonest song was an emphatic "*Etsee-etsee-etsee-etsee*".

NORTHERN WATER THRUSH (*Seirus n. noveboracensis*).—This beautiful singer was common along all the rivers and in many of the swamps.

RED-BREASTED NUTHATCH (*Sitta canadensis*).—Common throughout. I found two nests.

ACADIAN CHICKADEE (*Penthestes hudsonicus littoralis*).—Much more numerous than the Black caps. I observed a pair "excavating" in a dead spruce at Jacquet River as late as June 21st.

GOLDEN-CROWNED KINGLET (*Regulus satrapa*).—An abundant summer resident throughout. I found a nest at Gaspé.

RUBY-CROWNED KINGLET (*Regulus calendula*).—Common in Northern New Brunswick and not uncommon in Gaspé. Several pairs were nesting on Bonaventure Island.

OLIVE-BACKED THRUSH (*Hylocichla ustulata swainsoni*).—By far the most abundant of the thrushes. I found many nests.

GREY-CHEEKED THRUSH (*Hylocichla a. aliciæ*).—Not uncommon in Northern Gaspé. The quality of the song of this thrush is exquisite.—JAMES BOND, Philadelphia, Pa., U.S.A.

Celastrus scandens L. SIXTY FEET HIGH.—Climbing Bitter-sweet (*Celastrus scandens* L.) is usually known as a twiner over low trees and shrubs; and in Britton and Brown's Illustrated Flora it is said to grow to a height of twenty-five feet or more. Mr. W. F. Grylls, Westmeath, Ontario, has recently reported a stem which had reached a height of sixty feet, with a diameter of one inch at base and three-quarters of an inch at forty feet from the ground. In a locally published note, he states that "towards the top it received some support from a spruce tree", but evidently it had otherwise the appearance of a separate "tree". A cross section of the "stump" submitted to the Division of Botany, showed sixteen annual rings of growth around a small, pithy core. —HERBERT GROH.

THE SIXTH CONGRESSUS INTERNATIONALIS ORNITHOLOGICUS will be held at Copenhagen, Denmark, May 24th to 29th. Some thirty-five different countries will be represented under the presidency of Dr. Ernst Hartert. There will be five sections: I.—Systematic Ornithology ,Geographical Distribution, Palæontology; II.—Anatomy, Physiology, Heredity and Evolution; III.—Biology, including Ecology and Bird Migration; IV.—Oology, Nidification; V.—Bird Protection and Aviculture. Canada is to be represented by Mr. J. H. Fleming, of Toronto, Ont.

MORE MYSTERY BANDS.—The Canadian National Parks Branch, Department of the Interior, Ottawa, which is keeping the file of official Canadian Bird-Banding Records, has recently received two bands of a kind differing from the official bands being used in Canada and the United States, and an endeavour is being made to trace the origin of these bands.

They are made of aluminium and have the numbers 312 and 314 stamped in respectively on each band. The bands were taken from the legs of a large goose, which was shot by Mr. Harold Herrick, 22 West Twelfth Street, New York, on December 13, 1915, on Currituck Sound, North Carolina.

These bands will be lent to responsible persons, who consider that they may be able to furnish information concerning them.—HOYES LLOYD.

BLUEBIRD ACTIVITIES.—Observations of Mr. Dan. Patton, of Midnapore, Alta., in the February number on bluebird habits prompt me to report some of their activities I have noticed.

A pair of bluebirds* nested in a birch bark house on the south wall of our bungalow at Britannia Bay and brought out a brood in early summer. Their natural timidity soon gave way to almost a friendly confidence in the members of our household. Parents and fledglings played around the garden and bird baths for a few days and then the entire family vanished, as I thought, for the season. A pair of tree swallows promptly took possession of the house and remodelled the interior to suit their fancy. One evening about a week after leaving, the male bluebird returned and attacked the usurpers with berserk fury. About six other tree swallows joined their fellows, and the uneven battle raged for a full hour, but the bluebird, fighting for "home and mother", finally drove the enemy clear off the premises. He was badly ragged, but sat on guard before his re-won home, giving husky little notes and trying to straighten his feathers. Next morning, Mrs. Bluebird arrived and together they threw out all the nice white feathers placed there by the swallows. In due time they brought out their second brood. It was a revelation to see this gentle bird rout a whole band of hard-fighting tree swallows.

As to the parent birds keeping the young away at night from their nest after being a few days fledged, my opinion is that they are simply teaching the young fellows to perch out like other birds and not to depend on a nest for shelter. It may also be that they desire the young birds to go elsewhere to feed, leaving that locality for the support of the next brood. I cannot think it is because the nest is not clean, for I have always found the bluebirds scrupulously clean housekeepers.—W. C. KING.

*This probably refers to the Mountain Bluebird, *Sialia currucoides*, rather than to the Eastern Bluebird, *sialia sialis*. —ORNITH. ED.

RATE OF GROWTH OF NEW TAIL FEATHERS IN CHICKADEE.—On January 6, 1926, I noticed in our garden a Black-capped Chickadee (*Penthestes a. atricapillus*) which had lost all its tail feathers. As it was seen at lumps of suet in our garden daily for some weeks after this, it is probable that it had been a daily visitor previously, and that the accidental loss of its tail had occurred within a day or two of its first tailless appearance. It was as active as its unmutilated companions, and it seemed little inconvenienced by its loss. Though its flight was slightly erratic, it was never observed to have difficulty in reaching any selected perch. Not until January 15 were the new tail feathers visible, and at that date they did not reach the ragged ends of their under coverts. On January 18, the new tail feathers reached nearly to the ends of the folded wings; on January 20, they quite reached the end of the wings; on January 22, they projected about a quarter of an inch beyond the wings, and the middle feathers were decidedly longer than the outer ones; and on January 24, they had grown another quarter of an inch. By January 27, the tail was about half its normal length, and three days later it was about three-fourths its normal length, the middle feathers still being the longest, and the outer feathers now showing ruffled webs. After the end of January, the bird either stopped visiting our garden or had become indistinguishable from its fellows.

I was interested to notice that it was at least nine days after the loss of the old feathers before the new feathers could be seen; but that during the next nine days, the new feathers grew to a length of nearly one inch, and that their growth was equally rapid during the following week.—R. OWEN MERRIMAN.

RED-HEADED WOODPECKER WINTERING NEAR HAMILTON, ONTARIO.—Mr. D. A. Baxter reports

that he and Mr. Earl Edmunds observed a Red-headed Woodpecker (*Melanerpes erythrocephalus*) on February 7, 1926, at a hollow tree on "the Mountain", about half a mile south of the city limits of Hamilton. Mr. Edmunds saw the bird again at the same place on February 13.

McIlwraith, "Birds of Ontario" (Toronto, 1894), says of this species: "They all leave Ontario in October, and during the winter none are observed." Nash, however, mentions finding it occasionally during the winter "in sheltered woods in south-western Ontario," (Birds of Ontario in Relation to Agriculture, 1913, p. 51), and it is sometimes included in the "Christmas Census" of the McIlwraith Ornithological Club at London Ontario.—R. OWEN MERRIMAN.

EARLY OCCURRENCES OF THE EUROPEAN STARLING IN CANADA.—It would appear that the first authentic record of the European Starling in Nova Scotia occurred on December 1st, 1919. Data concerning this noteworthy incident and subsequent occurrences in this Province may be of interest to bird students generally. Since 1915 to the present time (March, 1926), the writer has knowledge of eight individual starlings having been observed here.

December 1st, 1915.—A specimen was picked up dead in Halifax City. It was much emaciated and had apparently died of starvation. The bird was mounted and placed in the Provincial Museum in the Technical College. (Acc. No. 4306.)

December 3rd, 1915.—One shot near the Nova Scotia Hospital at Dartmouth, a few miles from Halifax and later identified by Mr. Harry Piers, Curator of the Provincial Museum.

December 19th, 1919.—A male of the species was found dead at Liverpool, Queen's Co., in a shed occupied by domestic ducks. The weather was very severe at the time. This bird was forwarded to the writer and was subsequently presented to the Provincial Museum at Halifax.

February 8th, 1921.—Two starlings were taken alive at Comeau's Hill, Yarmouth County, by Edward Kinnie, a fisherman of that place. It appears that they flew into his house during excessively cold weather and were placed in a cage. One of them survived for about six weeks. Kinnie made rough skins of these, very ingeniously preserving them with black pepper and same were identified by the writer in June, 1924. He stated that the birds appeared to be starving, being very weak when captured.

July 20th, 1925.—One observed by the writer at Meteghan, Digby County. Efforts to collect the bird were unsuccessful as it was shy and unapproachable and made long flights.

December 17th, 1925.—One seen on the meadow adjacent to the Cornwallis River, below the town of Wolfville. It was feeding on the ground with a flock of several hundred crows and was very wild, eluding pursuit successfully, by flying across the River.

A few days later one was seen feeding on the seeds of the marsh sedges in the same immediate locality, undoubtedly the same individual.

January 12th, 1926.—One seen about the sheep pens of the Agricultural College, near Truro, and reported to me by Mr. W. E. Whitehead, who is officially connected with that institution.

From the foregoing, it will be noted that, with but one exception, all the above are winter records. It would therefore appear that, with the approach of cold weather, the New England starlings, in an endeavor to escape the rigors of that season, undertake long flights which might properly be termed *migratory* flights, but which are utterly devoid of that marvellous guiding sense of direction which enables our native migrants to fly unerringly north and south with the ever-changing seasons.—R. W. TUFTS, Wolfville, N.S.

BIRD NOTES FROM CASTOR, ALBERTA.—Five Tree Sparrows (*Spirella monticola*) were feeding near the hen-house in my yard to-day (March 6, 1926). This is three weeks earlier than any previous spring record of this species.—T. E. RANDALL.

AN OUTDOOR CALENDAR.—For some time past a number of very excellent bird articles by Mr. L. M. Terrill, of St Lambert, Quebec, have been appearing at regular intervals in the *Montreal Star*, under the heading "An Outdoor Calendar".

I should like very much to call the attention of all bird-lovers to these interesting and instructive articles and, at the same time, to take this opportunity to express here my appreciation and pleasure in reading Mr. Terrill's graphically penned bird stories.

Mr. Terrill, I know, is a recognized ornithologist and is certainly a keen observer in the field, but what is so pleasing is his delightful style of writing up his experiences. This gift is not given to all, and is therefore worthy of comment.

I hope Mr. Terrill will continue to let us have, from time to time, many more pages from his Outdoor Calendar.—C. B. HUTCHINGS.

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BIRDS DROWNED IN LAKE HURON.—In the lifetime of every Naturalist, there are occasions that stand out like beacons on the page of memory. Sometimes it is possible at the time of the happening to take full advantage of the circumstances. But usually this is not so.

One such event in my life was the inspection of the bodies of the Birds on the shores of Lake Huron which were drowned owing to the snow storm of October 10, 1906.*

On that occasion, I was able to give only one day to the study of this disaster, when three or four days would have been required to make a complete summary of all that could be learned.

On the night of November 2nd, 1924, another such privilege came to me in the passage of a flight of Swans; to the number of perhaps two or maybe five hundred or even more, which happened to fly near enough to the city of London, Ontario, to become bewildered by the city lights, at least that is the common surmise.

They were first found about 11 o'clock, but at that time I was cooped in the house enjoying other music made by human hands and voices; but about midnight I was outside and heard the birds. They were first taken to be Geese, which are fairly common migrants over Ontario, and after hearing them fly south and then north once or twice, I went around to the house of an interested friend and woke him up.

With his head out of the bedroom window, we listened to the birds and then it dawned on me that their calls were not by any mean s the usual goose call and instantly memory recalled the voices of the Swans at Kingsville last April. And I said to my friend that I had no doubt that those birds were Swans.

I then went home and telephoned some other people, but was soon out on the street again, listening to the migrating throng.

The casual passer-by stopped to talk about them and, while he was there, a company of them flew over and his sharp eyes detected them in the darkness, while I, with my field glass, was able to confirm his sight and make certain that they were large white birds with very long necks.

The first company consisted of about twenty, but, at that time, most of the birds were too far to one side to be seen. A little later others came into view, travelling in another direction and one large company consisted of three groups of 40, 20, and 30—90 in all, following each other through the sky.

They flew in varied order, but the usual arrangement was a rather wide front and a single line. Often this line sloped even as much as 45 degrees from the line of flight and it would also be broken into several sections. For instance a line comprising a total of 40 Swans might consist of 6, 4, 11 and 19.

In the early part of the night, they were exceedingly voluble and one could make a guess at the number of the company by the amount of noise they made. But as the hours wore on they became more quiet, unless when they were turning or there was some other matter to talk about.

The last flock that I saw just before turning in at 2.30 A.M. consisted about 50. The majority of them were in a glorious crescent with 5 or 10 detached birds following in the hollow of the arc. These birds were going east and were very plainly seen, making a wonderfully spectacular appearance. They had not gone a mile before they turned around and came back right over me in exactly the same form as before, so that one could be sure that it was the same company, even though he had not listened to their voices continuously as they retreated into the distance and then turned and approached the second time. They came this time from the south-east and went north-west, but there was very little vocal music from them on the last occasion.

The birds passed over at varying heights—sometimes they could be readily distinguished by the naked eye and at other times they could not be found even by a field glass; but the reflection of the electric lights on their white wings and bodies made them fairly easy to find.

In the first group seen, there were a few smaller and darker birds which apparently were geese, and once or twice I heard notes that I took to be goose calls, but the music of the Swan is so varied in character that a person like myself who has heard it only a few times could never be sure of detecting a few goose calls amid the bedlam of the Swans.

I felt that this was an occasion that really called for an all-night vigil, but the necessity of getting down to work at 8 o'clock next morning eventually prevailed and I quit the job at 2.30 A.M. and, though sleeping with my window open, heard no sounds after my head rested on the pillow. But others, more restless, heard them through the night, the latest being reported at about 5 o'clock. So that it is practically certain that at least 200 Swans flew around over the city of London for six hours. Dawn came about 6.15 A.M., but they appeared to have vanished before that time.—W. E. SAUNDERS.

*_Auk_, XXIV, 1907, p. 108.

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7 "	6.00	6.25	6.50	6.75	7.00
8 "	6.00	6.25	6.50	6.75	7.00
9 "	7.50	8.00	8.75	10.25	11.75
10 "	7.50	8.00	8.75	10.25	11.75
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STUDIES OF THRUSHES

By W. J. BROWN

Northern Water-Thrush
(Seiurus noveboracensis)

THE scenery along the Grand Metis River (County Matane) appeals powerfully to the aesthetic sense. The beautiful wooded hillsides and the rushing waters below also exert a pleasant influence in the mind of the bird student. The luxuriant growth of spruces and the carpet of deep rich moss compel one to halt to admire the landscape and to take an inventory of the bird population. It was early morning and we were just in time to catch the opening chorus. Numerous birds were active, feeding and singing, many of them, of course, being neighbors at home; but it was delightful to listen in a new environment. Nashville, Tennesee and Canadian Warblers were well represented, while Blackburnians were lisping from the tree tops. For several hundred yards, progress was slow on account of the many upturned roots of trees. It was here that four Water-thrushes were singing simultaneously. Later I knew that there were at least six pairs nesting in this neck of land. This was very interesting, as it had never been my experience before to be amongst a small colony of breeding Water-thrushes. It was a most suitable locality for these birds, and they were very partial to the many upturned stumps. One pair selected quarters, three feet from the river bank, in the cavity of an old decayed root, but which is now mostly composed of mud washed up by spring freshets. The bird was flushed off the nest on June 12, and on that date it contained four slightly incubated eggs. The nest was made of moss, fine bark and rootlets and lined withskeleton leaves and other soft substances. The camera was placed three feet from the nest and, while a photograph was being taken, the female perched on the hood of the camera, bobbing her tail and uttering sharp alarm notes. Meanwhile, the male appeared and landed on the mud-bank and actually sang three times while I was only a few yards away. This was rather amazing, since, time and again in days of yore, I had trailed Water-thrushes unsuccessfully through bogs and swamps, just to scrape an acquaintance with an elusive bird in song.

It struck me rather forcibly that this remarkable vocal effort was offered as encouragement to the female. However, she dropped to the ground and walked into the nest immediately on the departure of the male. While camping a short distance from this interesting woodland some hours later, the Water-thrushes were still singing strongly. He is indeed a bird of rare charm and one of high skill as a songster.

NEST OF WATER THRUSH IN MUD BANK
Bird perched on hood of camera while this photograph was being taken. A rare performance for a shy bird.

HERMIT THRUSH ON NEST

HERMIT THRUSH (*Hylocichla guttata pallasi*)

Naturalists not only seize, they make opportunities for getting into the country and for loitering in the deep solitude of the woods. There is an element of mystery and attraction in the spires of the distant spruces and they are always the means of snaring one off the main highway. To me, no matter how arduous the trail, the day's work is not complete until a favorite spruce bog has been explored again or the secrets of an unknown one investigated. It is pleasant and refreshing to linger after sunset on the border of a sphagnum bog with eye and ear alert. Here we have the advantage of privacy and liberty and we listen keenly with hush and awe as the trill of a Lincoln's Sparrow is heard from the centre of the barren; most likely he is amongst the boughs of a tiny spruce and should we be successful, in approaching nearer unobserved, we are astonished to catch a most agreeable termination to this unsparrowlike song—a guttural warble. The bird frequently repeats and then quickly disappears into the thickets for the night.

In the County of Matane, there are many sphagnum bogs, and whilst wandering along the margin of one of them on June 8, 1925, a Hermit Thrush was found at home. The nest, containing four incubated eggs, was built at the base of a small spruce and was made of moss, rootlets and lined with pine needles. Many visits were made to the nest for photographs and the bird proved quite fearless when pictures were being taken at a distance of one foot. She only left the nest when an attempt was made to touch her with the hand. An Olive-backed Thrush, White-throated and Lincoln's Sparrows had nests within ten feet of the site of the Hermit Thrush. In the neighborhood, Ruby-crowned Kinglets, Yellow-bellied Flycatcher, Myrtle, Tennessee, Nashville, Yellow Palm and Wilson's Warblers were also nesting.

OBSERVATIONS ON CANADIAN FRESHWATER-CRUSTACEA MADE IN 1925

By FRITS JOHANSEN

I.—EUPHYLLOPODA

Eubranchipus gelidus. The temperatures at Ottawa for April 1-6, 1925, were between 20° and 54F°., and the weather clear, except rain on April 1st and overcast on April 2nd and 3rd. The maximum temperatures on April 2nd, 3rd and 6th were between 52°F. and 54°F.

On April 5th, I went to Billing's Bridge, in Ottawa South. The Rideau River was now free of ice and contained much water, but its inundations on the fields had already receded considerably so that isolated pools were formed in the depressions here. I could discover no trace of Euphyllopoda, though Copepods were numerous.

April 7th to 10th had clear weather, with temperatures between 26° and 60°F. The maximum temperature on April 7th was 58°F., which caused the hatching of a number of *Eubranchipus gelidus* eggs, though further hatching was delayed by the lower maximum temperature (48°F.) on April 8th. On April 9th and 10th, however, the maximum temperature rose to 56°-60°F., and the remaining eggs of *E. gelidus* hatched around Ottawa. Unfortunately, sickness prevented any excursions on my part on April 7th to 9th. The hatching of the hibernating eggs of *E. gelidus* around Ottawa thus took place in 1925 more than a week earlier than in 1924, and almost two weeks

earlier than in 1923, but only a few days earlier than in 1922. It will thus be seen that the air-temperature necessary for the hatching of eggs of *E. gelidus* around Ottawa can be pretty accurately placed at 55°F. or over.

On April 10th, I went to the rapids of Ottawa River at the Country Club on the Aylmer Line, Quebec, and investigated the pools left among the trees between the railroad-track and the river. The smaller pools did not contain any fairy-shrimps, but in the largest and deepest one were millions of young *E. gelidus*, all congregating in the sunny part of the pool. They had a length of between 2 and 5 mm., and by careful search and using a pipette, I also secured a couple 1½ to 2mm. long. The older (larger) larvae had probably hatched on April 7th; the youngest ones, April 9th or 10th. Air temperature at 4.30 P.M., 53°F.; water in this pool, 54½°F. This is a new locality for *E. gelidus* around Ottawa and samples of the larvae were kept.

I then continued on to the pools near Wrightville, Quebec, and found them all free of ice, but *E. gelidus* not numerous. In the pond on the slope near Fairy Lake, I secured seven 2-4 mm. long, and in the two other ponds nearer Wrightville (after crossing the creek) they were also found being 5-7 mm. long in the larger, deep pool nearest Fairy Lake. They were 4-6 mm. long in the smaller, shallow pool on the fields nearest Wrightville (five specimens kept).

The temperatures for Ottawa on April 11th to 20th were between 24°F. and 56°F. Weather mostly clear except for a heavy snowfall on April 11th; overcast on April 12th, 14th and 19th; rain or hail on April 15th. This cool and windy weather somewhat retarded the growth of the young *E. gelidus*.

On April 13th, I went again to Billing's Bridge, and found a number of young *E. gelidus*, 4-12 mm. long, in the pools here which had already shrunk considerably in extent. Most of the fairy-shrimps (samples kept) had a length of between 5 and 10 mm., and their average size was larger in some of the pools than in others. Air at 5.30 P.M., 49 F.; water in the pools, 59°F.; weather, cloudy-clear.

I then continued on to the pond on Brule's quarry at Hog's Back, but I could find no trace here of the *E. gelidus*, which I liberated here last spring, though pelagic gnath-larvae (*Corethra*) were common. In the pools on the lowland between the trees below the quarry, I secured, however, nine young *E. gelidus* about ¾ cm. long. This is another new locality (around Ottawa) for this fairy-shrimp.

On April 19th, I visited the pools on the fields between Fairy Lake and King's Mountain, Quebec, and found even the smallest of them (almost dried up) teeming with young *E. gelidus*, between ¾ and 1½ cm. long, the greater number having a length of between 1 and 1½ cm. I kept a number of them and observed that the sexual differentiation was already well marked in the largest specimens.

Two days later I went again to Billing's Bridge and secured more *E. gelidus*. They now had a length of between ½ and 1½ cm., the vast majority of them being between 1 and 1½ cm. long, and with the sexual characters (females with unripe eggs) well developed. The same day I also found the first nauplii of *Limnetis gouldii* here (see under this species).

The temperatures around Ottawa on April 21st to 25th were between 32° and 66°F., with clear and warm weather.

On April 25th, I collected at Billing's Bridge more *E. gelidus* of a length between ½ and 1¾ cm. The largest ones were fully developed sexually (females with ripe, loose eggs) in certain pools only.

The next day I went to Graham Bay, on the Ottawa River, where, in a small land-locked pool on the sand beach, were a number of *E. gelidus* of both sexes and fully developed (females with loose, ripe eggs) samples of which I kept. This is a third new locality for *E. gelidus* around Ottawa.

The temperatures around Ottawa on April 26th were 46°-76°F., with weather clear, though rain-showers and a thunder-storm occurred in the afternoon. April 27th to 29th, clear; on April 30th to May 8th, overcast or rainy.

On May 3rd, I again went to Fairy Lake and Wrightville, and collected more *E. gelidus*, which were now all adult and fully developed (females with loose, ripe eggs) in the same pools as on April 10th. May 9th to 15th had temperatures between 36°F. and 70°F.; weather clear and warm, except rain on May 13th.

On May 10th, I again visited the pools at Billing's Bridge and found both sexes of *E. gelidus* fully developed (females with loose, ripe eggs). Apparently a number of them had died off, however, as they were not very numerous.

A week later I visited the pools near Fairy Lake and Wrightville, but only in the one nearest Wrightville were a few *E. gelidus* still to be seen. I secured a male and two females here.

I then went to the pools on the pasture between Fairy Lake and King's Mountain, where *E. gelidus* was so common a month before, but now most of the pools had dried up. One of them had, however, a little water and contained, besides many *L. gouldii*, 1¼ cm. long *E. gelidus* of both sexes, samples of which I kept. Air at 8 P.M., 48°F.; water in pool, 58°F.

Finally, on May 25th, I again visited Billing's Bridge and, though most of the pools here had now dried up, I succeeded in getting a dozen adult *E. gelidus* of both sexes by wading out in the deepest of the pools, where they were swimming briskly around. Temperature of air and water at 7 P.M., about 58°F. This was the last time I found *E. gelidus* around Ottawa in 1925, though I found them two days later in 1923, and four days later in 1924.

The temperatures around Ottawa on May 16th to 25th were between 28° and 78°F.; May 19th and 20th having the highest (70°F. and above) and May 18th, 22nd, 23rd the lowest temperature (32°F. and below). May 16-19th, 21st and 24th-25th were clear-cloudy; rain on May 16th, 20th, 22nd and May 23rd cold and overcast.

May 26th to June 2nd had temperatures between 42° and 76°F. Weather mostly clear or cloudy, with rainshowers on May 29th and May 31st to June 2nd, rainy. On June 2nd, I looked carefully for *E. gelidus* in the pond at Tenaga (see under *L. gouldii*) but there was no sign of the fairy shrimp here now. The end of May was thus the date *E. gelidus* disappeared around Ottawa in 1925.

Limnetis gouldii (*L. brachyurus*). As stated above, under *E. gelidus* I found the first nauplii of *L. gouldii* in 1925 at Billing's Bridge, Ontario, on April 21st, only a day later than in 1924, and a day earlier than in 1922, but a week earlier than in 1923. In a small pool not half a foot deep, on the pasture here at Billing's Bridge, I secured, by using a pipette, several nauplii ("turtle-shell", etc.) and metanauplii (double "clam-shell", etc.) of *L. gouldii*. The metanauplii were of about the same size as the nauplii, and had thus just transformed; all of these larvae had undoubtedly hatched on that day, the first real warm day for a week. Air at 4 P.M., 50°F.; temperature of water in this pool, about 58°F. (clear). Some of these nauplii and metanauplii of *L. gouldii* were sent to Dr. R. Gurney, in England, for special study.

Four days later, I collected more nauplii and metanauplii (the latter the most numerous) in the same pool and in others nearby, which shows that the hatching of the eggs takes place in the course of several days. Weather clear and warm.

On May 10th, I again visited the pools at Billing's Bridge and found that the young *L. gouldii* now had a size of 1-1½ mm., and were a vivid orange colour. I kept a number of them. The temperature of the air and water in the pools at 5 P.M. was about 60°F.

A week later, I investigated the pools on the pasture between Fairy Lake and King's Mountain, Quebec (see under *E. gelidus*) and found many 1¼-1½ mm. large *L. gouldii* in a small, almost dried up pool here. This is a new locality for *L. gouldi i* around Ottawa.

On May 25th, I again went to Billing's Bridge. Most of the pools on the pasture had dried up now, but in the pools still containing water I secured 1-2 mm. large *L. gouldii* all of an orange colour. Most of them had a size of about 1 mm. long, only some of the ones found in a deeper pool being larger.

On June 2nd, I visited Tenaga, Quebec, and found many *L. gouldii* in the pond on the fields here. They had a size of 1½ to 3 mm., and most of the larger ones had a more vivid, orange colour than the smaller ones. The temperatures around Ottawa for June 3-8 were very high (60° to 94°F.); weather mostly clear, with rainshowers on June 3rd and 7th.

On June 21st, I looked for *L. gouldii* in the pools near Fairy Lake, Quebec, where I found so many on May 17th, but the pools on the pasture here had now all dried up and no Eyphyllopoda were seen. Temperatures around Ottawa, June 9th to 27th, were between 44° and 84°F., with mostly overcast and rainy weather, but clear on June 9th, 11th, 14th, 19th, 24th and 27th.

On June 27th, I paid my last visit to Billing's Bridge. On the pasture here were only a few small waterholes (cattle-tracks) left of the two largest ponds, all the other pools had dried up completely. In one of these "ponds", I secured, by careful search, nine *L. gouldii* (one of which was a female with small eggs), all I was able to find. The largest of these two (former) ponds contained no *L. gouldii* at all this year, though it had more water left than the other, former pond, in which I got the nine clam-shrimps. The observations thus show that the life-time of *L. gouldii* is up now, this year, and also that these clam-shrimps do not occur in the same ponds here at Billing's Bridge year after year. In 1924 I found them here as late as July 6th, but that was apparently an exceptionally late occurrence, for, in 1923, I found the last ones on June 26th, and in 1921 and 1922 on June 18th.

The temperatures around Ottawa, June 28th to July 4th, 1925, were between 48° and 80°F. Clear on June 28th-29th, and July 3rd. The other days, overcast, with much rain on July 4th. The weather was thus not warmer than during most of June, which shows that it is not the temperature which kills off *L. gouldii* around Ottawa each year, but the drying up of the pools in which they occur, and the dying off of these Crustacea as their life-cycle is completed.

II.—AMPHIPODS AND ISOPODS

Hyalella azteka. On August 28th, 1925, I collected a number of adults with eggs and young,

attached to submerged pieces of wood in Robinson Lake, eight miles west of Dalhousie, N.B. This is apparently the first record of this freshwater amphipod from the St. Lawrence side of New Brunswick; but I have formerly recorded it both from the Gaspé Peninsula and from the vicinity of St. John, N.B., so it undoubtedly occurs all over New Brunswick.

On October 4th, 1925, I collected a number of young *H. azteka* attached to floating pieces of wood and filamentous algae in the dam at Leamy Lake, outside of Hull, Quebec. I noticed that the purple colour between the body-segments in the live animals was of varying intensity, and particularly found as a dot at the base of each leg.

The Amphipods *Gammarus limnaeus*, *Pontoporeia hoyi* and *H. azteka* have recently been recorded from Lake Nipigon, Ontario (See Univ. of Toronto Studies, Nos. 22, 24, 25, published 1923-24), and *H. azteka* by R. E. Foerster from Trout Lake, on the lower Fraser River, B.C., collected on July 14th, 1922 (see Contrib. Canad. Biol., New Ser., Vol. II, pp. 335-422, table 9, Toronto, 1925).

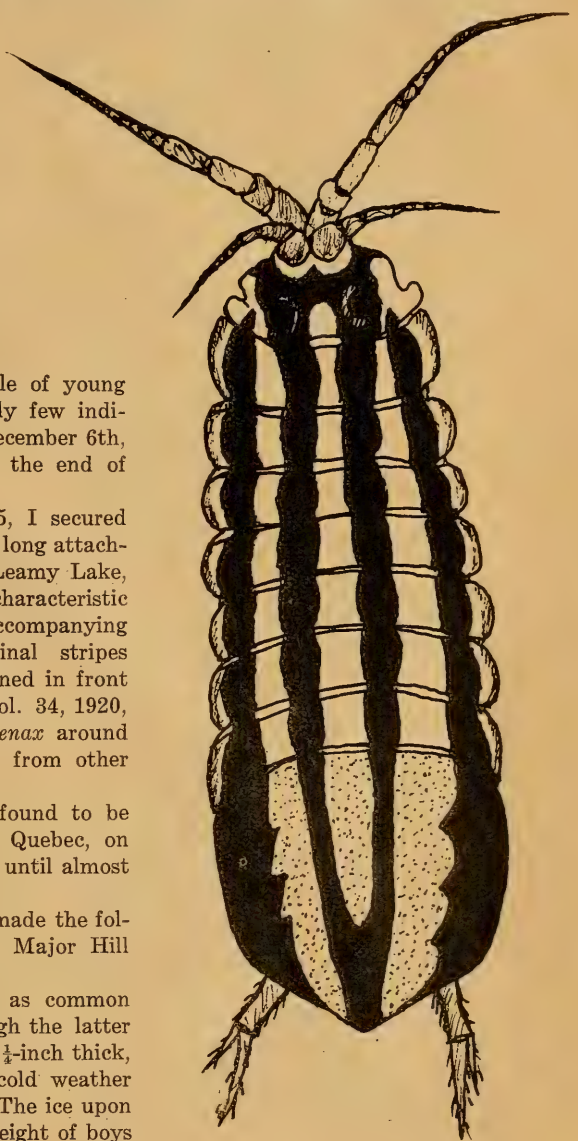
Eucrangonyx gracilis. On November 22, 1925, I collected specimens of all stages from newborn to adults, of this Amphipod, in the pond in Major Hill Park, Ottawa, Ontario, and two weeks later I found a couple of young ones in the outlet from the same pond. Only few individuals of this species were to be found on December 6th, probably owing to the freezing of the pond in the end of November (see under *Asellus communis*).

Mancasellus tenax. On October 4th, 1925, I secured half a dozen young of this species, 3 to 6 mm. long attached to floating pieces of wood, in the dam at Leamy Lake, Hull, Quebec. They had the colouration so characteristic of the young of this species, as shown in the accompanying sketch, namely four, dark-brown, longitudinal stripes dorsally, the two middle ones of which are joined in front and behind (see *Canadian Field-Naturalist*, Vol. 34, 1920, p. 146). This is a new locality for *M. tenax* around Ottawa, though I have formerly recorded it from other places around Hull, Quebec.

Asellus communis. This isopod was also found to be common in the dam at Leamy Lake, Hull, Quebec, on October 4, 1925. A number of young ones until almost full-grown, were secured.

During November and December, 1925, I made the following observations on *A. communis* in the Major Hill Park, Ottawa, Ontario.

All through November, I found this isopod as common as ever among dead leaves in the pond, though the latter occasionally (November 12) was covered by ¼-inch thick, new ice. In the end of November, very cold weather came, with quite a little snow on the 27th. The ice upon the pond became thick enough to carry the weight of boys on sleds, but during the first week of December, it thawed again and on December 6th, the outlet from the pond was running and there was water on top of the ice. On this day, I found *A. communis* of various sizes common among dead leaves in the outlet. From December 9th on, the weather was fairly cold, so that the pond became covered with thick ice, as also the outlet, except at the place where it leaves the pond. By visiting the place on December 13th and 20th, I found that *A. communis* were both active and numerous among the dead leaves in this open part of the outlet. A small, living *Corixa* was also secured here. The very cold weather, December 25th to 30th, froze solid the open place in the outlet from



the pond so that when I visited it on the last day of the month, no observations on crustacea could be made.

I kept several of the *A. communis*, collected in November and December, 1925, in this pond, alive in a jar with a little mud and filamentous algae, in my office, and although I gave them no food, they thrived admirably and lived for several months. The largest individuals died first, but at the time of writing this article (March, 1926) there is still one smaller specimen alive.

These observations on the occurrence of *A. communis* around Ottawa during the winter, show definitely that the species does not die off at all, but live under the ice and at ice-free places all winter. The only other similar observation from the same vicinity was almost twenty years ago, by Odell (see *Canadian Field-Naturalist*, Vol. 34, 1921, p. 148), who does not give the exact date on which he observed *Asellus* under the ice of Rideau River. The thickness of the ice (about one foot) he gives, indicates, however, that the observation was made in January, 1907.

NEW LIGHT ON FORGOTTEN TRAILS IN THE FAR NORTHWEST

By G. H. BLANCHET

(*Concluded from April issue*)

JULY 15TH.—I found nests of a herring gull and a Bonaparte gull on a small island, each with two eggs. One of the former broke from its shell during the day, but died from no apparent cause. One of the little Bonapartes had its beak out of the shell, and I assisted it out. In the evening, though the parent birds were near, the chick was nowhere to be seen.

Observing during the night, I noted: "It hardly became dark and about one A.M. dawn was breaking in the northeast. There is really no sense of night. Distant hills become dark blue and clear-cut against the sky. The lights and colours of late twilight hold until the east brightens up. The birds keep up their song throughout the night though they are noticeably quieter than a couple of weeks ago. The monotonous repetition of certain notes ends by becoming a trifle melancholy."

Two men were left at the base camp and, with the third, the little canoe and the lightest possible outfit, I set out for the Thelon. The second day, we reached the big lake which I named Lake Eileen and started working our way east and north. At first stormy weather prevailed that made the little canoe look and feel very small on the big lake. Bad weather also means poor fishing and, before the first trout "struck", our little stock of pemmican had almost melted away. I might note that after trying pemmican in a number of forms, we found it to be most palatable in a well-boiled soup. A handful of macaroni improves it. The "rubaboo" of the Northern Indians is made of pemmican soup with a little flour to thicken it.

At the extremity of the southeast bay, we found a fair-sized river flowing in and, at its mouth, some old raft logs and a sleigh with wooden runners. Seeing such relics of ancient travel in a place which even the natives no longer visit, one's mind builds up from the scanty evidence, the life of long ago. Perhaps here sled travel came to an end and, in order to cross the river flooded with spring freshets, the raft was constructed and the party continued with dogs and women packed and hunters scouring the country for the spring season was often a hungry one, and sometimes the more adventurous families that went far to the east were never heard of again.

The travel up the east coast was made up of a series of disappointments. A succession of fiord-like arms led off to the east, each promising a river but always closed, after a few miles, by marsh land leading to the bold hills that feature this shore.

Trees became more and more scarce and the country more typical "Barren Lands", but far from unpleasant. The rounded hills, with their white moss and green shrubbery, the grassy valleys, the shingle and sand beaches present scenes that delight the eye and the extended views were most interesting after our restricted horizons in the woods and hills.

Evening, JULY 20TH.—We are camped at what is "the big point" of the lake. In all our views of the lake it has stood out as a predominating feature. Although we can now see around it, we cannot make much out of the confusion of hills, islands and bays. The sand hills of the north end stand out clearly, now. Timber is reduced to a few dwarfs and an odd timbered valley on sand and what life there is is that of the open plains, a few loons, gulls and terns on the water and on shore chiefly the Lapland longspur and plovers. There is the vast stillness of the north on the hills and the water and one feels an indescribable sense of isolation from the ordinary ways of life. Even the life of the past was only recorded twice in to-day's travel. Some old teepee poles on a small island where we were windbound, and an ancient stone spearhead that I found when following a caribou trail up a hill.

JULY 21ST.—This is the day that will stand out in our memory of the trip, for we are camped at the rapids where the lake discharges into Thelon River at its northern extremity. There is a renewal of the forest at the rapids here, and the eddy below is constantly broken by trout fins. In a short time, we landed one hundred and fifty pounds of trout, grey and of the Arctic red variety.

In addition to our satisfaction at finding the river and the fishery that rendered further travel possible, the scene itself is one of interest.

The view is closed by two high, bare, overlapping ridges resembling the outer foothills which enclose a small lake into which the river drops. The lake is calm and the sun is setting behind clouds, some black and others golden. The noise of the water and the cheerful crackling of our fire gives a touch of intimacy and life to our situation, while from a distant hill the long-drawn hunting cry of a wolf and at the rapids the quarrelling of some gulls recall our wild surroundings.

PORTAGING ACROSS THE OPEN PLAINS

When we found ourselves embayed, rather than retrace our course we struck cross-country for the open lake.

Proceeding down-stream, it soon became evident that we were across the divide, which here is comparatively narrow, for, after a few miles of lake, the river commenced to descend rapidly. We had been confident that we should meet the caribou here but, though many early summer signs were observed, there was no evidence of their return.

JULY 24TH.—We reached a second large, straggling lake. We are now over fifty miles from our base, including much water on which we might easily be windbound with our little canoe. There are no signs of the caribou; fish are difficult to get, and supplies are down to tea and a little dry fish. Although we should very much like to continue to Tyrrell's 1900 upstream farthest some hundred miles further, we would not be justified in taking the risk. Much against our inclinations, we are forced to decide to return.

Favoured by fine weather and travelling very long days, the return to the base camp was made rapidly. It was with a feeling of genuine regret that we left Thelon waters and the open plains, and we could not help thinking that perhaps in a few days the caribou migration might arrive drifting over the hills and valleys and giving life and animation to the country. We arrived at the base camp on the evening of July 26th, after eleven days travel. We found our companions here for the second time deciding that we were lost. The first was when they figured our supplies were exhausted and the second when it was decided that we had no more tobacco. We had had our last smoke half-way across the long portage.

Of the life observed on this journey, we must record the absence of expected species rather than discoveries. The most interesting feature is the abrupt change from the characteristic note of the woods—the white-throated sparrow—to that of the plains—the Lapland longspur. One soon becomes attached to this little sparrow, who is very friendly and always cheerful. Certain plovers and snipe seek the open plains to breed and the ptarmigan is both interesting to see and valuable for the kettle. One pair of jaegers and a lone yellow-billed loon were the only ones of these species noted, which was rather surprising.

To take the big canoe down Thelon, up Hanbury and across Pike's Portage would involve too much heavy portaging for the time available. To return as we had come offered neither interest nor accomplishment. We therefore decided on a compromise—we should return to the big lake, Nonachoh, and proceed to its unexplored north bay, from which it seemed reasonable that we could find a portage route to Snowdrift river, which we should descend to Great Slave Lake.

Returning, we had the good fortune to shoot a moose, which gave a present supply of fresh meat and a reserve of "dry" meat. There is a noticeable change in the bird life. Noisy colonies of yellow-legs have already departed, the young gulls and terns are on the wing and young broods of duck are growing rapidly. The cheerfulness and song of the early season is replaced by subdued but busy preparation for the migration or to meet the coming stormy, cold weather. The migrating birds of the far north spend scarcely two months

there. It is a strange provision of nature that has planted in them the instinct to rear their young in the far north. Casualties must be heavy on the long migrations, that of the golden plover including 2500 miles over the Atlantic to South America. In the north, they must often meet severe conditions of life, and they have many enemies, but to them the call is irresistible. The raven and the Canada jay, both of whom winter here, gather at our camps, quarrelsome and aggressive. One old raven adopted the base camp and gorged till he could not rise above the ground.

Entering Nonachoh Lake, a group of white objects were observed on a distant island and presently shouts and the barking of dogs proved it to be an Indian camp. We landed and had a long, unsatisfactory pow-wow through a member of my party who spoke Chipewyan. They expected to meet the caribou migration in two or three days and were rather disconcerted on hearing that we had seen nothing of them. Their knowledge of the country was very limited except one very old, blind woman who, hearing us talk of the Thelon and the Barren Lands, became very animated and talked volubly. I was only able to understand a little of her talk, which was to the effect that when she was a young girl she had travelled with the people far to the east and had seen the Thelon (she used this name) and had crossed the barren land, wintering on a lake on which the forest extended half way (Artillery Lake). Her mind went back to the more adventurous days and she complained about being unable to see the country now and that her people did not travel as formerly. She ended rather lamely by saying she had very little tobacco. She described the route to her son, who made a map which was quite recognizable.

Asked about Snowdrift River, only one of the band had seen it and then as a boy, many years ago. His one impression was trouble, long portages over high mountains and great falls on the river, but he said the point from which we had decided to go north, Eagle Rock, was correct. As we proceeded up the bay, another band was encountered from whom we obtained more information and what proved to be an excellent map of the route to the Snowdrift. This was fortunate, as we were still fifty miles from the portage. Presents were exchanged with both parties; to the first we had given fresh moose meat, and from the second we received some "old stock" dry meat.

These people seldom visit the posts, but spend the year on the upper plateau, moving out to meet the caribou in the late summer and returning down-stream after the spring break-up to the good fish lakes, especially Thekulthili and Hill Island Lakes. The camps of the Caribou Eaters are truly pleasant places, set with an eye to beauty in a bountiful country. Their seasonal drift is through picturesque and excellent waterways by which, if they wish, all parts of the plateau may be reached. It may be remembered that Hearne's pivotal point, Thelew aza yeth, lay in this country, which probably always has been a meeting place of the wandering Dene people.

The northeast arm of Nonachoh Lake is featured by bold, rocky headlands extending from the massive parallel ranges that enclose it. A heavy pall of smoke gave an air of unreality to our journey up it. Distances were magnified and the short views of lake and cliff emerging from the smoke and soon swallowed up by it added to the sense of isolation. Through this difficult travel, we reached the extremity of the arm, made a short portage to "No Man's" Lake and picked our way to the Indian portage to the Snowdrift. This followed an unexpected shattered defile through the rugged hills, using three small lakes and entailed some heavy portaging.

On such a journey as ours, certain episodes stand out. One of these was the first view of Snowdrift River. We had camped on the portage, too tired to change our wet clothes, and too warm to enjoy greasy pemmican soup and mouldy dry meat. The next day started with a grinding climb up a steep boulder moraine

CARIBOU EATERS OF THE INTERIOR PLATEAU

Their life is passed in migration from the fish lake in summer to the caribou range in winter. A failure of the seasonable food supply generally means starvation.

of small stones. Then, reaching the summit, an extensive view of Snowdrift Valley stretched before us. It is probable that the factors of surprise and contrast are largely accountable for the interest in such cases. The wild, torn rocky country behind was here replaced by a wide valley enclosed by imposing hills and floored by a sandy plain. Through the plain, Snowdrift River meandered with wide, swinging curves. Park-like groves of spruce stretched to the river banks and surrounded small crescent lakes representing old meanders. And, giving meaning to the name of the river, the white sand of the valley broke against the dark, rocky hills, suggesting breakers or drifts of snow. If it requires darkness to enable one to appreciate light, "Beniah" portage had served its purpose in preparing us to enjoy Snowdrift Valley.

For nearly three days we dropped down-stream through long stretches of easy current with occasional rapids where boulder moraines crossed the valley. The river was crooked locally and its valley swung almost in a semi-circle to the south. Then it unexpectedly cut through the northern range and started its descent over six hunbred feet to Great Slave Lake. This was accomplished in about fifteen miles, at first spilling down the natural slopes in a series of cascades, then it entered a narrow gap and flowed through a gorge with walls three or four hundred feet high. Finally, it burst from this narrow valley with the "Double" and "Glory" Falls, and, after a few miles of boulder rapids, it eased itself gently into the clear, sparkling waters of Great Slave Lake. The navigation of this portion of the river in which extensive portages could not be made, left with us a confused impression of roaring water, threatening rock, the mental strain of deciding how to handle the situations, and the physical efforts of accomplishment. It was therefore with a feeling of great satisfaction that, with canoe and equipment intact, we emerged from the difficulties and confinement of the valley to the interest of wide familiar views and peaceful waters.

This concluded our journey of some 600 miles through the unknown interior. By it, the ancient Indian route has been given new life and King's dream of nearly 100 years ago has been proved practicable. The rivers of the interior furnish a highway leading across the height of land, which by the Arctic or Hudson Bay coast may be reached.

FRESHWATER CLADOCERA FROM SOUTHERN CANADA

By CHANCEY JUDAY

A PLANKTON collection obtained in southern Canada mainly by Mr. Frits Johansen was recently submitted to the writer for the identification of the Cladocera. Twelve species belonging to this group were found in the material, and the localities in which they were secured are indicated in the following list.

Diaphanosoma brachyurum (Lieven).—A few specimens of this form were found in a catch taken at Solomon Lake, near Yarmouth, Nova Scotia, on October 4, 1920, by A. G. Huntsman.

Holopedium gibberum Zaddach.—This species was common in the material obtained from Solomon Lake, N.S., on October 4, 1920.

Sida crystallina (O. F. Mueller).—Specimens of this form were obtained in a creek pool at Rideau River, Ottawa, Ontario, July 7th, 1918.

Daphnia arcuata Forbes.—Found in the material from Solomon Lake, N.S., collected on October 4, 1920, by A. G. Huntsman.

Daphnia pulex (de Geer).—This cosmopolitan form was more widely distributed than any other species represented in the collection.

1. Pool in woods near Gatineau Point, Quebec, near Ottawa, May 11, 1918.

2. Pond in fields near Ironsides, Gatineau River, Quebec, May 1, 1921.

3. Pond in fields at Tenaga, Gatineau River, Quebec, May 2, 1921.

4. Pools in pasture at Chelsea Road, Quebec, near Ottawa, May 9th, 1920.

5. Pools in fields left from overflow of Rideau River, Ottawa, Ontario, May 16, 1921.

6. Hydra Lake, 400 feet elevation, north of Departure Bay, Vancouver Island, B.C., end of May, 1923, C. H. O'Donoghue coll.

7. Pool in fields at Ironsides, Gatineau River, Quebec, May 13, 1923.

8. Rock-pools at Kirk's Ferry, Gatineau River, Quebec, May 14, 1923.

9. Pools at Billing's Bridge, Ottawa, Ontario, May 20, 1923.

10. Quarry-pond at Britannia, near Ottawa, Ontario, July 1, 1923.

11. Pools on rocks at Tenaga Falls, Gatineau River, Quebec, July 18, 1923.

Simocephalus vetulus (O. F. Mueller).—Found in pond in fields at Tenaga, Gatineau River, Quebec, May 2, 1921.

Simocephalus serrulatus (Koch).—This form was obtained in two localities.

1. Pool near McLaurin Bay, Quebec, near Ottawa, August 4, 1918.

2. Creek pool at Rideau River, Ottawa, Ontario, July 7, 1918.

Scapholeberis mucronata (O. F. Mueller).—Taken in pools on rocks at Tenaga Falls, Gatineau River, Quebec, July 18, 1923.

Bosmina longirostris (O. F. Mueller).—In the catch from Solomon Lake, N.S., taken on October 4, 1920, by A. G. Huntsman.

Chydorus sphaericus (O. F. Mueller).—In creek-pool at Rideau River, Ottawa, Ontario, July 7, 1918.

Polyphemus pediculus (Linnæus).—In pools on rocks at Tenaga Falls, Gatineau River, Quebec, July 18, 1923.

Leptodora kindtii (Focke).—Several specimens of this form were found in material from Solomon Lake, collected on October 4, 1920, by A. G. Huntsman.

CANADIAN GOVERNMENT MOTION PICTURE FILMS SHOWING NATURAL HISTORY SUBJECTS

By HOYES LLOYD

THE Council of the Ottawa Field-Naturalists' Club requested that I prepare a list of motion picture films, available in the various Government Departments, which depict natural history subjects.

The Canadian Government Motion Picture Bureau, of which R. S. Peck is the Director, Department of Trade and Commerce, has a very considerable number of films which are available for renting by persons who wish to show them in any non-theatrical exhibition. There is a fixed nominal rate of $1.00 per subject for renting such films from this Bureau. No admission may be charged and express charges on films borrowed are to be paid both ways by the borrower. All the films of this Bureau are standard width, and, as many of them are printed on nitro-cellulose, exhibitors must comply with fire protection restrictions. This Bureau advises that there are many projection machines which take a narrow-width film, and the Bureau will be pleased to put owners of sub-standard projectors in touch with organizations that can supply film to fit their machines. The motion pictures, given in this list, are grouped by subjects, but the initials "M.P.B." will follow all titles which may be secured through this Bureau.

The Canadian National Parks Branch, Department of the Interior, has a very considerable number of films available for distribution. These are all standard-width film, and some are nitro-cellulose film, while others are available in slow-burning stock. If this stock be desired, please specify in requesting films. Films from the Canadian National Parks Branch are available free of charge. It is expected that the public will be admitted free to places where Canadian National Parks' films are being exhibited. Films which are obtainable from this Branch are indicated in the following list by the initials "C.N.P."

The Victoria Memorial Museum (National Museum of Canada) produces films, and its current material can always be learned from the Director. One film is listed.

The North West Territories and Yukon Branch, Department of the Interior, has certain films available for distribution and these are included in the list given, being indicated with the initials "N.W.T.". These are all standard-width film and no charge is made persons desiring to borrow them.

There are many films available that show the scenery of various parts of Canada. Some of these might prove of interest to naturalists, although they do not treat specially of natural history subjects. It is suggested that, for most audiences, one scenic or travelogue picture be included with those that deal more strictly with natural history.

The Entomological Branch, Department of Agriculture, has the following motion picture film available for distribution:—

INSECTS

FIGHTING INJURIOUS INSECTS—THE GYPSY MOTH.

Description: Life History and Methods of Control.
Photographer: C. Ross.
Edited and titled by: W. N. Keenan and F. C. Badgley.

SCENIC

IN CANADIAN FJORDS (C.N.P.)

Description: Home Life at Bella Coola, British Columbia.
Photographer: H. I. Smith.
Author of Titles: M. B. Williams.

MOTORING IN CLOUDLAND (C.N.P.)

Description: This film covers the Banff-Windermere Highway, and has excellent shots of moose, bear, elk, buffalo and Rocky Mountain sheep, these being the chance shots with a camera during a one-day trip down the road and one day back.
Photographer: C. Ross.
Author of Titles: M. B. Williams.

JASPER OF THE LAKES (C.N.P.)

Description: In this film, the bear, beaver and squirrel are shown quite clearly.
Photographer: B. Bach.
Titled with a Poem by: T. P. O'Connor.
Arranged and Edited by: R. S. Peck and F. C. Badgley.

JASPER TRAILS (C.N.P.)

Description: Shows a bear visiting an abandoned camp.
Photographer: J. M. Alexander.
Author of Titles: Terry Ramsaye.

DINOSAURS

Department of Mine's Film.

HUNTING DINOSAURS IN THE BADLANDS OF ALBERTA.
Two Reels.

Description: Shows work of collecting, preparing and mounting dinosaurs. Very valuable instruction in ancient geography of North America is depicted. By courtesy of W. R. Rothacker, dinosaurs in action are shown from the film, "The Lost World", by Sir Arthur Conan Doyle.
Photographers: P. A. Taverner, in the field, and C. Ross, scenes in Ottawa.
Authors of Titles: P. A. Taverner and C. M. Sternberg.

MAMMALS

MONARCHS OF THE PLAINS (C.N.P.)

Description: This film gives a very good conception of Wainwright Park, showing buffalo in herds and also in small groups—several very good close-up views.
Photographer: B. Bach.
Author of Titles: M. B. Williams.

GENERAL

ON WILD LIFE TRAILS (C.N.P.)

Description: This is the latest film to be put on circuit. Shows Wild Life preservation in New Brunswick. There are shots of moose, deer, foxes, Cedar Waxwings, Arctic Three-toed Woodpecker, and a Ruffed Grouse drumming. The close-up views in this film are exceedingly good.
Photographer: Burton S. Moore.
Author of Titles: M. B. Williams.

HARVEST OF THE SUGAR MAPLE TREE (M.P.B.)

Description: An interesting educational film depicting life in the sugar bush, demonstrating the old and new methods of tapping maple trees, of gathering sap, of transporting it to the kettles. It shows the boiling in modern evaporators, the bottling and canning of the maple syrup in the factory and, finally, a real old-fashioned sugar bush party.
Photographer: J. M. Alexander.
Author of Titles: R. S. Peck.

A FISH AND BEAR TALE (M.P.B.)

Description: An interesting film showing fishing in its various forms on the Miramichi River, New Brunswick, finally ending with the capture alive of three young bears. Produced in co-operation with the New Brunswick Guides' Association.
Photographer: J. M. Alexander.
Author of Titles: M. B. Williams.

LA ROCHE PERCEE (M.P.B.)

Description: An interesting film of the famous Percé Rock, which is a picturesque and unique land-mark on the Gaspé Coast, of the Gulf of St. Lawrence.
Photographer: C. Ross.
Author of Titles: F. C. Badgley.

LUMBERING IN EASTERN CANADA (M.P.B.)

Description: This film describes in an interesting manner every phase of this important basic industry which has played such an important part in the development of Eastern Canada.
Photographer: W. S. Carter.
Author of Titles: R. S. Peck.

LUMBERING IN BRITISH COLUMBIA (M.P.B.)

Description: This film is replete with scenic beauties and depicts in a graphic manner the lumbering operations from the felling of the giant trees to the export of the finished product.
Photographer: W. S. Carter.
Author of Titles: F. C. Badgley.

BIRDS

ANNE'S AIGRETTE (C.N.P.)

Description: The plumage of birds and millinery.
United States Biological Survey film.

BIRD REFUGES (C.N.P.)

Description: Southern Sanctuaries.
United States Biological Survey film.

CANADIAN SEA FOWL SERIES (C.N.P.)
Five Reels

Description: Birds of the Canadian Labrador.
Photographer: C. Ross.
Author of Titles: Harrison F. Lewis.

HOME OF THE BIRDS (C.N.P.)

Description: Birds of the Canadian Labrador.
Photographer: C. Ross.
Author of Titles: Harrison F. Lewis.

MAKING FRIENDS WITH WILD LIFE (C.N.P.)

Description: Mostly chickadees at the home of Mr. and Mrs. J. C. Middleton, London, Ontario.
Photographer: J. M. Alexander.
Author of Titles: Hoyes Lloyd.

TRUMPETER SWANS (C.N.P.)

Description: An excellent reel of this rare species in the wild.
Photographer: Byron Harmon.
Author of Titles: Hoyes Lloyd.

WHISTLING SWANS (C.N.P.)

Description: Shows flock of Whistling Swans on the Lake Erie shore, near Kingsville, Ontario. Splendid portrait of Jack Miner and some of his Canada Geese.
Photographer: C. Ross.
Author of Titles: Harrison F. Lewis.

BIRD NEIGHBOURS IN SUMMER (C.N.P.)

Description: A garden picture, mostly at the home of Mr. R. O. Merriman, Hamilton, Ontario.
Photographer: C. Ross.
Author of Titles: Hoyes Lloyd.

BIRD NEIGHBOURS IN WINTER (C.N.P.)

Description: A garden and winter feeding picture taken at the home of Mr. R. O. Merriman, Hamilton, Ontario.
Photographer: C. Ross.
Author of Titles: Hoyes Lloyd.

A BIRD CITY (M.P.B.)

Description: A novel bird film taken at the bird sanctuary near Moose Jaw, Saskatchewan. Here in their native haunts, are Gulls, Great Blue Herons, Terns and many other birds, as in every day life; nesting, swimming and flying.
Photographer: Byron Harmon.
Author of Titles: Hoyes Lloyd.

THE BIRDS OF A CITY GARDEN (Nat. Museum)

Description: A very charming garden and bird picture, taken at Ottawa.
Photographer: P. A. Taverner.
Author of Titles: P. A. Taverner.

ARCTIC

1923—CANADA'S ARCTIC EXPEDITION (N.W.T.)

Photographer: George H. Valiquette.
Edited by: J. D. Craig and F. C. Badgley.

1924—ARCTIC EXPEDITION (N.W.T.)

Photographer: R. H. Tash.
Edited by: F. C. Badgley and R. H. Tash.

FRONTIERS OF THE NORTH—PART I—
FROM QUEBEC TO BAFFIN LAND (M.P.B.)

Description: The first of a series of films dealing with the Canadian Government Arctic Expedition of 1922, and depicting the first leg of the northward journey from Quebec City to Pond's Inlet, Baffin Land. Included are views of the departure of the expedition from Quebec, the voyage through the northern ice floes, a polar bear hunt, the killing of an Arctic seal, typical Arctic scenery and glimpses of the Eskimos of Baffin Land.
Photographer: George H. Valiquette.
Edited and Titled by: F. C. Badgley.

FRONTIERS OF THE NORTH—PART II—
POLICING THE ARCTIC (M.P.B.)

Description: The second of a series of films dealing with the Canadian Government Arctic Expedition of 1922, and particularly with the location and establishment of Canada's most northerly white settlement at Craig Harbour, Ellesmere Island. The film also contains interesting glimpses of Eskimo life in this region.
Photographer: George H. Valiquette.
Edited and Titled by: F. C. Badgley.

FISH

TRAPPING TUNA (M.P.B.)

Description: An intensely interesting educational picture treating of a comparative new industry on the east coast of Canada. This film was made in co-operation with the Department of Marine and Fisheries.
Photographer: B. J. Bach.
Author of Titles: R. S. Peck.

IN QUEST OF THE BRONZE BACK (M.P.B.)

Description: A film story of a bass fishing expedition to Lake Weslemkoon, north of Belleville, Ontario.
Photographer: W. S. Carter.
Author of Titles: R. S. Peck.

FISHING GAMELY FOR GAME FISH (M.P.B.)

Description: A film designed to foster good sportsmanship with rod and reel and containing useful hints concerning modern fishing tackle.
Photographer: W. S. Carter.
Author of Titles: R. S. Peck.

*NOTES ON THE EDMONTON FORMATION OF ALBERTA**

By CHARLES M. STERNBERG

DURING the last three field seasons, the writer has been engaged in the collection of dinosaurian and other vertebrate remains from the Edmonton formation, along Red Deer river above Drumheller, Alberta. During this time, a number of observations have been made which should be of interest to future workers. We are able to add several species of vertebrates to the hitherto reported Edmonton fauna and it is proposed to list these as well as note some observations with reference to geographical distribution of certain forms. The observations with reference to geographical distribution are not put forth as final conclusions, but rather as an aid to future observers along this line.

Brown* has given a very good description of the formation, in a general way, and of the distribution of the fauna as it was known in 1914, but several common species have been described since that time and certain other species have been collected which have not heretofore been recorded. Allan†, in a more recent paper, has described the geology of the Drumheller region with special reference to the coal.

The Edmonton formation consists mainly of sandy clays and clayey sands and contains many

*Published with the permission of the Director of the Geological Survey of Canada.

*Brown, B.: Cretaceous Eocene Correlation In New Mexico, Wyoming, Montana, Alberta. Bull. Geol. Soc. of Amer., Vol 25, pp. 355-380 (1914).

†Allan, J. A.: Geol. of the Drumheller Coal Field, Alta.; Third Ann. Rept. of the Mineral Resources of Alta. (1921).

seams of lignite, ranging up to several feet in thickness. Brown refers to the deposits as of marine or brackish-water origin, while Allan describes them as of fresh or brackish-water origin.

Certain strata must be of fresh-water origin, for there are no less than four horizons at which erect fossil tree stumps are preserved with their roots imbedded in the sandy clay. These trees appear to be conifers and without doubt must have been above high tide when growing. One such locality is in Sec. 30 T. 32 R. 21 W. of 4. on the east side of the river 25 feet above the water and nearly 100 feet below the oyster bed which is so general throughout the formation in this region. At the above mentioned locality, six upright fossil stumps are preserved within a radius of 100 yards. They are from 6 to 10 inches in diameter and are partly silicified and partly carbonized or turned to coal. Allan has recorded 4 upright fossil tree stumps at two horizons in the Drumheller district.* Both horizons are at a lower level than the ones observed by the writer. Another upright fossil stump was observed farther up stream and about 240 feet above the group of six.

Most of the vertebrate fossils preserved represent land or swamp animals and of these dinosaurs are the most numerous. Brown calls attention to the absence or scarcity of champsosaurs, crocodiles, turtles, fishes and mammals and their absence at most horizons is very noticeable. Brown records a fragment of a Trionychid turtle from the base of the formation and another with a champsosaur and a crocodile from the upper part of the beds, and these, with a plesiosaur, are the only vertebrates except dinosaurs recorded by him from the Edmonton formation.

At least two genera of turtles, *Basilemys* and *Aspideretes*, are well represented by fragments in Secs. 4 and 5 of T. 32, R. 21, W. of 4, at a horizon 50 feet above the river. The writer collected a fine carapace and plasteron of *Basilemys* from this locality. Crocodiles, champsosaurs and *Myledaphus bipartitus* are represented in this same bed. At another horizon in the upper part of the formation, in a coarse, gray to brownish, sandstone bed, 260 feet (anaroid) above the river or 50 feet below the prairie level, fragmental remains of turtles, champsosaurs, crocodiles, and fishes are quite numerous. From this locality, which is seven miles north-west of Rumsey, Alta., the writer collected a mammal tooth and a nearly complete skeleton, with parts of the skull, of *Thescelosaurus* sp. This is the first record of the genus *Thescelosaurus* from rocks of other age than Lance. The specimen has not yet been prepared and therefore it is not possible to give its specific determination but there is no doubt as to the generic identification. It is proposed to study and describe the species as soon as it is prepared.

The presence of *Thescelosaurus* in the Edmonton formation is considered important, as it extends the range of the genus and makes one more genus common to the Edmonton and Lance formations. Except for *Thescelosaurus*, the dinosaurian fauna of this zone does not seem to differ from that of the lower beds in this region, as *Anchiceratops*, *Hypacrosaurus*, *Albertosaurus* and *Ornithomimus* were observed here.

The mammal tooth has been examined by Mr. G. G. Simpson, of the Peabody Museum, and he reports that it is "A didelphid the closest allies of which are *Eodelphis* on the one hand and *Diaphorodon* on the other. *Eodelphis* is a Belly River form and *Diaphorodon* comes from the Lance. In many respects this tooth appears intermediate between the two, but there is very little difference between them as far as isolated, worn molars go and the present specimen has little or no value for precise correlation independent of other evidence."

The first dinosaur tracks to be reported from the Edmonton formation were collected by the writer from approximately 10 feet above the oyster bed, above referred to, at a point seven miles southwest of Rumsey, Alta. It is surprising that dinosaur tracks have not been discovered before in these rocks, for ripple-marked sand-stones are everywhere common and in several cases these are covered with the tracks of worms or other invertebrates.

An interesting feature resulting from the work in the Edmonton formation is the apparent geographic distribution of certain forms. From Drumheller up stream to the northern edge of T. 31, R. 21 the flat-headed duck-billed dinosaurs (*Hadrosaurinæ*) predominate. In fact, not a single specimen was observed which could be referred to a crested (*Saurolaphinæ*) or hooded (*Lambeosaurinæ*) form. From the middle of T. 32, R. 21, and up stream, the flat-headed forms are absent and the hooded and crested forms take their place.

No attempt to explain the above geographic distribution is made. It was not a matter of time as shown by the fact that the same strata which contain the flat-headed forms in one region contain the hooded and crested forms in another. It would seem that conditions which suited one subfamily may not have been as favorable to the others. The fact that in the Belly River formation all three sub-families are found together makes it all the more singular that they should be separated in the Edmonton beds. In the region where the flat-headed forms are found, limbs and sections of trees, usually encrusted with chalce-

*Allan, J. A.: Loc. Cit. Pl. II, p. 34.

dony, are abundant and many of the dinosaur bones have the medulary cavity more or less filled with quartz crystals. There is very little of this crystalization of bone and wood in the region farther up stream.

Three genera of horned dinosaurs have been described from the formation. Of these, *Anchiceratops* is the most common and the remains of this genus have been observed in all parts of the formation worked by the writer, but they are by far most commin in T. 31 and 32, R. 21, W. of 4, at a horizon from 50 to 80 feet above the river. In sections 7, 8, 17 and 18 of T. 32 at a horizon about 50 feet above the river, *Anchiceratops* remains are the most common vertebrate fossils.

Following is a list of the vertebrate fossils thus far reported and additional ones collected by the writer, from the Edmonton formation.

PISCES

**Myledaphus bipartitus.* Cope.
**Acipenser* sp. indet.
**Palæospinax ejuncidus* Lambe.
**Lamna* sp.
*Bony fish, not determined.

REPTILIA

Plesiosauria
Leurospondylus ultimus Brown.
Chelonia
**Aspideretes sp.*†
**Aspideretes* sp.
**Trionychid* (probably undescribed form).
**Basilemys* sp.
**Crocodilia.*
**Champsosaurus* sp.

DINOSAURIA

Saurischia
**Albertosaurus sarcopagus* Osborne.
*Small Theropod not determined.
**Ornithomimus* sp.
**Ornithomimipus angustus* Sternberg.
Ornisthischia
**Saurolophus osborni* Brown.
**Hypacrosaurus altispinus* Brown.
**Cheneosaurus tolmanensis* Lambe.
**Edmontosaurus regalis* Lambe.
**Thespesius edmontoni* Gilmour.
**Thescelosaurus* sp.
**Anchiceratops ornatus* Brown.
**Anchiceratops* sp.
**Leptoceratops gracilis* Brown.
**Arrhinoceratops brachyops* Parks.
**Ankylosaurus magniventris* Brown.
**Ankylosaurus* gen. et. sp. nov.
**Troodon* sp.

MAMMALIA

**Eodelphis* sp.

Brown states that "Most of the Edmonton genera are structurally more primitive than those of the Lance and several not found in the Lance are common to the Judith River. The faunal facies, as a whole, is intermediate, but closer to that of the Judith River formation than to the Lance." Though Brown states that several genera are common to the Judith River and Edmonton formations, there seems to be little ground for such a conclusion with our present knowledge of the two faunas. Lambe and Gilmore have shown the improbability of the genus *Trachodon* being found in beds other than of Judith River age and the genus *Thespesius*, which has been recorded from the Edmonton and Lance formations, has not yet been reported from the Belly River (Judith River) beds. The Belly River form, which had been referred to the genus *Ornithomimus* has since been referred, by Osborne, to a new genus, *Struthiomimus*. Brown refers Lambe's species *Euoplocephalus tutus* with some doubt to the Lance genus *Ankylosaurus*. Gilmore considers this genus more nearly related to *Palæoscincus*. The identification of the genus *Troodon*, in the above list, is based on fragmentary material and, though it certainly belongs to the family *Troodontidæ*, it may prove to be generically distinct. On the other hand, several genera are common to both the Edmonton and Lance formations. Though *Triceratops* and *Tyranosaurus*, typical Lance forms, have not been recorded from the Edmonton beds, *Ornithomimus*, *Thespesius*, *Ankylosaurus* and *Thescelosaurus* are common to both. The vertebrates, other than dinosaurs, have very little value for precise correlation due to the fragmentary nature of the material or the long range of the genus.

With the exception of those mentioned above, most of the Edmonton dinosaurs, while generically distinct from the Belly River forms, are closely related to them. It would seem, therefore, that although the Edmonton formation must still be considered as intermediate in age between the Belly River and Lance formations, it is closer to the Lance.

*Not previously reported from the Edmonton formation.

†Mr. C. W. Gilmore, Curator of Vert. Palæontology in the U.S. Nat. Museum, has very kindly identified the turtle material.

SCIENTIFIC ADVICE FOR WILD LIFE CONSERVATIONISTS*

By P. A. TAVERNER
Victoria Memorial Museum

IN *California Fish and Game*, II, Sept.-Oct., 1925, p. 177, Aldo Leopold is quoted regarding game propagation. The words apply so aptly to wild life protection that they are well worth repeating in full.

"Attention is called to the slowness with which the technique of game production has developed. Agriculture and Forestry have advanced rapidly because taught in the schools. Right public attitude, effective game wardens, ample funds, use of voting power—all these are of no avail unless we *know how*. Laws, men and money without skill will no more grow game on our farms and in our forests than they will grow wheat or pine saw logs. There has been a growing acceptance of this fact in the last ten years, but lots of people do not know it yet. And we who do know, seem singularly slow in building up a technique. The average sportsman is contributing too little to the 'know how' of game production. He may be a good woodsman, but a poor scientist. He is missing a lot, because acquiring a personal skill in raising as well as hunting game doubles the attractiveness of the sport."

Game production, either natural or artificial, is only an elementary factor in wild life conservation, for we must raise stock before we can utilize the increase. What applies to the contained lesser question must necessarily apply with even stronger force to the containing greater one. Many of the problems of game conservation are similar to those of forestry or agriculture, but more difficult and complicated. In forestry or agriculture, the objects of study are stationary and under critical observation at all times, and experimental conditions are under a maximum of control. In wild life work, neither of these conditions prevail. The objects of observation are elusive and difficult to study and the conditions under which they live are beyond any but the slightest and most indirect control. Both forestry and agriculture have long been under scientific direction, whereas with rare exceptions, wild life conservation has proceeded empirically and seldom with full knowledge of habits, requirements, reactions or even specific recognition of the forms dealt with. Unfortunately, technical experience has not always been regarded as an essential qualification to wild life preservation. The surprise is not that mistakes have been made, but that the system has worked as efficiently as it has. That many appointed under these auspices have developed considerable knowledge of the difficulties of their office is a matter for congratulation, but is no defense of the system itself for such success has not invariably been attained and at best this casual education of the guardian has been at the expense of the interests guarded. Too often, one guardian has no sooner gained more or less grasp of his problems than he is replaced by another amateur and the course of education has to be repeated. Perhaps this uncertain tenure of office has been more conspicuous in the States to the south of us than in Canada, but we also have seen its undesirable results.

The sources of accurate information to inexperienced executives in this line are not obvious. There is much council of a sort, but often of the most conflicting nature. Lacking technical knowledge of their subject, these executives require nice judgment to choose between qualified and unqualified, conscientious and self-interested advisers.

Again, experience has not been cumulative. Many of the problems that are continually arising have been solved more or less satisfactorily many times before, but the results have not generally been recorded in places or in a manner that renders them available without considerable research. Consequently, the results are practically useless to those who have not made particular study of the literature of the subject. As an example, there are many complaints that gopher poison is killing Prairie Chicken and other grouse and partridge, yet but a few years ago, Mr. Bradshaw, in Saskatchewan, proved by experiment that such birds are practically immune to strychnine, which is commonly used for this purpose.

As a rule, advice on most questions is obtained from authorities next to hand. These may be representatives of various lay organizations, individual sportsmen, hunters and trappers. Many of these will be conscientious and public-spirited, but others will have axes of their own to grind, pet theories to advance, and few will have the breadth of knowledge or experience to make them safe advisors. It is not always a fact that the successful hunter or trapper knows much more about his game than is sufficient for its pursuit. In certain directions he may be well informed, but in larger aspects he is usually lacking. His accurate knowledge is generally confined to the small area of his acquaintance, to the seasons when he is most in the field and to those habits of his game that are contributory to its capture. His other

*Paper read before the Conference of Provincial and Dominion Game Officers, called by the Minister of the Interior at Ottawa, April 14, 1926. Published with the permission of the Acting Director, Victoria Memorial Museum, Ottawa.

observations are likely to be casual, superficial, assumptional or traditional. For instance, how many sportsmen know that in midsummer the drake of our common ducks take on an "eclipse" plumage almost identical with the female and hides in the marsh like a rail? How many know where the migrant game spends the seasons during which they are not with us; how they get there and just what dangers they experience and avoid?

To-day, I would hesitate to say that there are, in Canada, a dozen professed sportsmen who can correctly name half of the legitimate game they are entitled to pursue. Personally, I know of but one or two whose identification of any but the commonest species carries weight of conviction. The confusion that exists across the continent between Brant and Geese, Wood Duck and Goldeneye, Coot and Scoter, Cormorant and Black Duck amongst those whom we expect to know better, is supporting evidence of this lack of general information. The result is not always happy. But shortly ago, according to different sections of a certain act, the season was defined both open and closed on the same species under different names. Eagle bounties have been paid on Red-tailed Hawks and Horned Owl bounties on specimens of Long-eared Owls. We have but too often attempted to protect or control species that are but names to us and of which we know too little. Is it not time that those concerned with wild life conservation followed the example set in the less complex subject of forestry and surround their executives with scientifically trained naturalists who can supply ascertained fact instead of guess-work, who can see the subject comprehensively and who have made themselves familiar with the history of the subject, its failures and successes both at home and abroad? A beginning has been made in developing such talent in several of our larger universities. As soon as a demand for this special information and training is expressed, other institutions will follow suit and the demand will be met in Wild-life Conservation as it has been in Forestry.

*OFFICIAL CANADIAN RECORD OF BIRD-BANDING RETURNS**

EARED GREBE, No. 210,513, banded by R. Lloyd, at Davidson, Saskatchewan, on September 27, 1924, was found dead at a place about two hundred yards from where it was banded, on April 30, 1925. The condition of this bird's body showed that the bird had been dead over winter.

COMMON MURRE, No. 204,800, adult, banded by Harrison F. Lewis, on St. Mary's Islands, Saguenay County, Quebec, on July 8, 1924, was shot at a place about two miles north-east from Moreton's Harbour, Notre Dame Bay, Newfoundland, on November 13, 1925.

MALLARD, No. 296,690, banded by L. V. Walton, at Cuivre Island, Firma, Missouri, on March 30, 1924, was shot at a place about four and one-half miles north of McAuley, Manitoba, on September 18, 1925.

MALLARD, No. 313,127, male, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on September 14, 1924, was killed at Rough Creek, Hardin County, Kentucky, on December 25, 1924.

MALLARD, No. 313,129, male, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on September 14, 1924, was killed at Snake River, north of Filer, Idaho, on November 21, 1924.

MALLARD, No. 313,131, female, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on September 14, 1924, was killed at Merion, Colorado, on December 9, 1924.

MALLARD, No. 313,133, male, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on September 14, 1924, was killed at the Eastham State Farm, Weldon, Texas, on December 8, 1924.

MALLARD, No. 313,134, male, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on September 14, 1924, was shot in the same vicinity on October 9, 1924.

MALLARD, No. 313,137, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on September 17, 1924, was shot on the Snake River, Glenn's Ferry Idaho, on November 14, 1924.

MALLARD, No. 313,138, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on September 17, 1924, was killed at a place seven and one-half miles west of Manito, Mason County, Illinois, on November 4, 1924.

MALLARD, No. 313,139, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on September 17 1924, was re-trapped on September 21, 1924, and found partly eaten in the trap.

MALLARD, No. 301,757, banded by H. S. Osler, at Lake Scugog, Ontario, on September 18, 1924, was shot at the Ottawa Shooting Club, at the head of Sandusky Bay, mouth of the Sandusky River, Ohio, on November 5, 1924.

MALLARD, No. 313,140, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on September 21, 1924, was shot in Umatilla County, Oregon, about eight miles south-west of Walla Walla, Washington, on November 11, 1924.

MALLARD, No. 313,141, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on September 22, 1924, was killed at Pea Ridge, Arkansas, on November 6, 1924.

MALLARD, No. 313,142, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on September 23, 1924, was shot in the same vicinity, some time before November 20, 1924.

MALLARD, No. 313,144, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on September 25, 1924, was killed on the Ohio River, near Newburgh, Indiana, on December 11, 1924.

BLACK DUCK, No. 297,845, banded by H. S. Osler, at Lake Scugog, Ontario, on September 14, 1924, was killed in the same vicinity, during the fall of 1924, before November 26, 1924.

BLACK DUCK, No. 297,847, banded by H. S. Osler, at Lake Scugog, Ontario, on September 14,

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1924, was shot in the Township of Ops, Victoria County, Ontario, on or about October 20, 1924.

BLACK DUCK, No. 297,849, banded by H. S. Osler, at Lake Scugog, Ontario, on September 14, 1924, was shot at Hog Island Bay, Broadwater Bay, near Short Prond along Deep Channel, Virginia, on January 14, 1925.

BLACK DUCK, No. 297,857, banded by H. S. Osler, at Lake Scugog, Ontario, on September 15, 1924, was shot at a place near Chincoteague, Virginia, on January 26, 1925.

BLACK DUCK, No. 297,861, banded by H. S. Osler, at Lake Scugog, Ontario, on September 15, 1924, was killed at Cedar Island Beach, Wachapreague, Virginia on January 20 1925.

BLACK DUCK No. 297,866, banded by H. S. Osler, at Lake Scugog, Ontario, on September 16, 1924, was killed at a place ten miles west of Oklahoma City, Oklahoma, on November 23, 1924.

BLACK DUCK, No. 297,868, banded by H. S. Osler, at Lake Scugog, Ontario, on September 16, 1924, was shot at Port Rowan, Ontario, on November 25, 1924.

BLACK DUCK, No. 297,874, banded by H. S. Osler, at Lake Scugog, Ontario, on September 16, 1924, was shot at the Winous Point Shooting Club, Sandusky, Ohio, on October 15, 1924.

BLACK DUCK, No. 297,877, banded by H. S. Osler, at Lake Scugog, Ontario, on September 17, 1924, was killed in the same vicinity, during the fall of 1924, before November 26, 1924.

BLACK DUCK, No. 297,882, banded by H. S Osler, at Lake Scugog, Ontario, on September 17 1924, was killed in the same vicinity, during the fall of 1924, before November 26, 1924.

BLACK DUCK, No. 297,886, banded by H. S. Osler, at Lake Scugog, Ontario, on September 17, 1924, was killed in the same vicinity, during the fall of 1924, before November 26, 1924.

BLACK DUCK, No. 297,891, banded by H. S. Osler, at Lake Scugog, Ontario, on September 17, 1924, was shot in the same vicinity, on October 11, 1924.

BLACK DUCK, No. 297,894, banded by H. S. Osler, at Lake Scugog, Ontario, on September 17, 1924, was shot in the same vicinity, on the day on which it was banded.

BLACK DUCK, No. 297,895, banded by H. S. Osler, at Lake Scugog, Ontario, on September 17, 1924, was shot on the Pigeon River, Omemee, Ontario, about October 16, 1924.

BLACK DUCK, No. 297,896, banded by H. S. Osler, at Lake Scugog, Ontario, on September 17, 1924, was killed at Oregon, Missouri, on October 25, 1924.

BLACK DUCK, No. 297,899, banded by H. S. Osler, at Lake Scugog, Ontario, on September 17, 1924, was shot at a place five and one-half miles east of Morley, Michigan, on October 29, 1924.

BLACK DUCK, No. 301,764, banded by H. S. Osler, at Lake Scugog, Ontario, on September 18, 1924, was killed in the same vicinity, during the fall of 1924, before November 26, 1924.

BLACK DUCK, No. 301,766, banded by H. S. Osler, at Lake Scugog, Ontario, on September 18, 1924, was killed on the Pamunky River, Leste Manor, King William County, Virginia, on December 4, 1924.

BLACK DUCK, No. 301,768, banded by H. S. Osler, at Lake Scugog, Ontario, on September 18, 1924, was shot in the same vicinity, on October 11, 1924.

BLACK DUCK, No. 301,771, banded by H. S. Osler, at Lake Scugog, Ontario, on September 18, 1924, was killed at Cedar Island, Virginia, on December 22, 1924.

BLACK DUCK, No. 301,776, banded by H. S. Osler, at Lake Scugog, Ontario, on September 18 1924, was killed at Deep Creek, Virginia, on December 31, 1924.

BLACK DUCK, No. 301,781, banded by H. S. Osler, at Lake Scugog, Ontario, on September 18, 1924, was shot on the Kalamazoo River, between Battle Creek and Augusta, Michigan, on November 20, 1924.

BLACK DUCK, No. 301,792, banded by H. S. Osler, at Lake Scugog, Ontario, on September 19, 1924, was shot on Nicholson's Island, Hillier Township, Prince Edward County, Ontario, one mile out in Lake Ontario between Huyck's Point and Scotch Bonnet Light, about November 1, 1924.

BLACK DUCK, No. 301,816, banded by H. S. Osler, at Lake Scugog, Ontario, on September 24, 1924, was shot in the same vicinity, during the latter part of October, 1925.

BLACK DUCK, No. 301,822, banded by H. S. Osler, at Lake Scugog, Ontario, on September 24, 1924, was killed at the Monkey Island Club Currituck Sound, North Carolina, on January 2, 1925.

BLACK DUCK, No. 301,824, banded by H. S. Osler, at Lake Scugog, Ontario, on September 24, 1924, was killed in the same vicinity, during the fall of 1924, before November 26, 1924.

BLACK DUCK, No. 301,827, banded by H. S. Osler, at Lake Scugog, Ontario, on September 25, 1924, was caught in a muskrat trap and found dead at a small lake south of Jellicoe, Ontario, on the Canadian National Railways and east of Port Arthur, Ontario, on April 19, 1925.

BLACK DUCK, No. 301,837, banded by H. S. Osler, at Lake Scugog, Ontario, on September 25, 1924, was killed in the same vicinity, during the fall of 1924, before November 26, 1924.

BLACK DUCK, No. 301,846, banded by H. S. Osler, at Lake Scugog, Ontario, on September 26 1924, was shot on Mud Lake, Camden Township Addington County, Ontario, on November 28, 1924.

BLACK DUCK, No. 301,848, banded by H. S. Osler, at Lake Scugog, Ontario, on September 26, 1924, was shot in the same vicinity, on October 26, 1925.

BLACK DUCK, No. 301,850, banded by H. S. Osler, at Lake Scugog, Ontario, on September 26, 1924, was killed at a place near Georgetown, South Carolina, about November 27, 1924.

BLACK DUCK, No. 323,102, banded by H. S. Osler, at Lake Scugog, Ontario, on September 26, 1924, was shot in the Township of Ops, Victoria County, Ontario, on November 6, 1924.

BLACK DUCK, No. 323,123, banded by H. S. Osler, at Lake Scugog, Ontario, on September 27, 1924, was shot at Barnegat Bay, New Jersey, on November 1, 1924.

BLACK DUCK, No. 323,130, banded by H. S. Osler, at Lake Scugog, Ontario, on September 28, 1924, was shot at Cartersville, Georgia, on November 6, 1924.

BLACK DUCK, No. 323,133, banded by H. S. Osler, at Lake Scugog, Ontario, on September 28, 1924, was killed at Rosindale, North Carolina, on December 30, 1924.

BLACK DUCK, No. 323,134, banded by H. S. Osler, at Lake Scugog, Ontario, on September 28, 1924, was killed in the same vicinity, during the fall of 1924, before November 26, 1924.

BLACK DUCK, No. 323,135, banded dy H. S. Osler, at Lake Scugog, Ontario, on September 28, 1924, was killed at Shirley Farm, James River, Charles City County, Virginia, on January 30, 1925.

BLACK DUCK, No. 323,151, banded by H. S. Osler, at Lake Scugog, Ontario, on September 28, 1924, was killed at Chincoteague Bay, Virginia, on January 8, 1925.

BLACK DUCK, No. 323,160, banded by H. S. Osler, at Lake Scugog, Ontario, on September 29, 1924, was killed at a place eight miles south of Ocean City, Maryland, on December 20, 1924.

BLACK DUCK, No. 323,161, banded by H. S. Osler, at Lake Scugog, Ontario, on September 29, 1924, was killed in Iowa Grove Township, Davis County, Iowa, on November 19, 1924.

BLACK DUCK, No. 323,167, banded by H. S. Osler, at Lake Scugog, Ontario, on September 29, 1924, was killed in the same vicinity, on November 6, 1924.

BLACK DUCK, No. 323,168, banded by H. S. Osler, at Lake Scugog, Ontario, on September 29, 1924, was shot in the Bay of Quinte, Ontario, on November 21, 1924.

BLACK DUCK, No. 323,169, banded by H. S. Osler, at Lake Scugog, Ontario, on September 29, 1924, was shot at Anchor Bay, Lake St. Clair, Michigan, about October 25, 1924.

BLACK DUCK, No. 323,170, banded by H. S. Osler, at Lake Scugog, Ontario, on September 29, 1924, was killed at Horseshoe Lake, Tennessee, on November 27, 1924.

GREEN-WINGED TEAL, No. 313,135, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on September 16, 1924, was killed at a place forty miles west of Bozeman, in Broadwater County, Montana, on October 10, 1924.

BLUE-WINGED TEAL, No. 301,794, banded by H. S. Osler, at Lake Scugog, Ontario, on September 20, 1924, was killed in the same vicinity, on October 4, 1924.

STELLER'S JAY, No. 262,145, banded by G. D. Sprot, at Mill Bay, Vancouver Island, British Columbia, on September 16, 1924, was recaptured several times at the same station during the month of September, 1924, and was killed in a poultry house at a place one-half mile north of where it was banded, on November 16, 1924.

SONG SPARROW, No. 140,810, banded by Claude E. Johnson, at 87 Cameron Street, Ottawa Ontario, on September 24, 1924, was found dead at 145 Glen Avenue, Otrawa, Ontario, on June 11, 1925.

ROBIN, No. 72,223, female, banded by Howard F. Cant, at Galt, Ontario, on June 17, 1924, was found dead in the same vicinity, on August 6, 1925. The bird looked as though it had been dead for about two weeks.

MALLARD, No. 205,988, male, banded by L. V. Walton, at Cuivre Island, Missouri, on February 23, 1924, was killed in a slough on Section 13, Township 16, Range 14, Municipality of Lansdowne, County of Beautiful Plains, five miles north of Arden, Manitoba, on October 7, 1925.

MALLARD, No. 232,002, male, banded by R. Lloyd, at Davidson, Saskatchewan, on May 9, 1924, was killed on the waters of the Colorado River, Runnel's County, Texas, on January 17, 1926.

MALLARD, No. 323,223, banded by H. S. Osler, at Lake Scugog, Ontario, on September 30, 1924, was shot at Great Kills, Staten Island, New York, on December 31, 1924.

MALLARD, No. 323,275, banded by H. S. Osler, at Lake Scugog, Ontario, on October 2, 1924, was killed in the same vicinity, during the fall of 1924, before November 26, 1924.

MALLARD, No. 323,319, banded by H. S. Osler, at Lake Scugog, Ontario, on October 3, 1924, was killed in the same vicinity, during the fall of 1924, before November 26, 1924.

MALLARD, No. 313,154, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on October 11, 1924, was killed on the south fork of the Onachita River, twelve miles east of Mount Ida, Arkansas, on January 6, 1925.

MALLARD, No. 323,446, banded by H. S. Osler, at Lake Scugog, Ontario, on October 12, 1924, was killed in the same vicinity, during the fall of 1924, before November 26, 1924.

MALLARD, No. 323,468, banded by H. S. Osler, at Lake Scugog, Ontario, on October 16, 1924, was shot in the Township of Ops, Victoria County, Ontario, on or about October 20, 1924.

MALLARD, No. 323,506, banded by H. S. Osler, at Lake Scugog, Ontario, on October 17, 1924, was killed at Skagg's Creek, between Lucas and Game, Kentucky, on December 6, 1924.

MALLARD X ENGLISH CALL DUCK, No. 232,140, dark, male, banded by R. Lloyd, at Davidson, Saskatchewan, on July 31, 1924, was killed about one-quarter of a mile north of Masters, Weld County, Colorado, about thirty miles east of Greeley, Colorado, on November 12, 1925.

BLACK DUCK, No. 323,138, banded by H. S. Osler, at Lake Scugog, Ontario, on September 28, 1924, was shot at Brookhaven, New York, on December 28, 1925.

BLACK DUCK, No. 323,189, banded by H. S. Osler, at Lake Scugog, Ontario, on September 29, 1924, was killed on Snake Island, fifty-six miles south-east of Little Rock, Arkansas, on January 26, 1925.

BLACK DUCK, No. 323,195, banded by H. S. Osler, at Lake Scugog, Ontario, on September 29, 1924, was killed near Cedar Island, Accomack County, Virginia, on November 24, 1924.

BLACK DUCK, No. 323,201, banded by H. S. Osler, at Lake Scugog, Ontario, on September 29, 1924, was killed on the Chester River, near Rock Hall, Maryland, on December 12, 1924.

BLACK DUCK, No. 323,204, banded by H. S. Osler, at Lake Scugog, Ontario, on September 29, 1924, was killed on the Nanticoke River, Wicimico County, Maryland, on November 21, 1924.

BLACK DUCK, No. 323,207, banded by H. S. Osler, at Lake Scugog, Ontario, on September 29, 1924, was killed on the Patuxent River, near Brooms Island, Maryland, about December 1, 1925.

BLACK DUCK, No. 323,209, banded by H. S. Osler, at Lake Scugog, Ontario, on September 29, 1924, was killed in the same vicinity, during the fall of 1924, before November 26, 1924.

BLACK DUCK, No. 323,210, banded by H. S. Osler, at Lake Scugog, Ontario, on September 29, 1924, was killed at a place three miles from the Virginia line on Grassie Creek, North Carolina, on January 29, 1925.

BLACK DUCK, No. 323,211, banded by H. S. Osler, at Lake Scugog, Ontario, on September 29, 1924, was killed in the same vicinity, during the fall of 1924, before November 26, 1924.

BLACK DUCK, No. 323,235, banded by H. S. Osler, at Lake Scugog, Ontario, on October 1, 1924, was killed in the same vicinity, during the fall of 1924, before November 26, 1924.

BLACK DUCK, No. 323,250, banded by H. S. Osler, at Lake Scugog, Ontario, on October 1, 1924, was shot at Hunting Creek, New Alexandria, Virginia, on November 3, 1924.

BLACK DUCK, No. 323,258, banded by H. S. Osler, at Lake Scugog, Ontario, on October 2, 1924, was killed at Big Island, Ontario, on November 22, 1924.

BLACK DUCK, No. 323,259, banded by H. S. Osler, at Lake Scugog, Ontario, on October 2, 1924, was killed at Accokeek, Stafford County, Virginia, on November 14, 1924.

BLACK DUCK, No. 323,267, banded by H. S. Osler, at Lake Scugog, Ontario, on October 2, 1924, was shot at the Winous Point Shooting Club, Sandusky, Ohio, on October 4, 1924.

BLACK DUCK, No. 323,270, banded by H. S. Osler, at Lake Scugog, Ontario, on October 2, 1924, was found crippled and was killed on the Potomac River, Satfford County, Virginia, on January 16, 1926.

BLACK DUCK, No. 323,272, banded by H. S. Osler, at Lake Scugog, Ontario, on October 2, 1924, was killed on Emily Creek, near Sturgeon Lake, in the County of Victoria, Ontario, on November 3, 1924.

BLACK DUCK, No. 323,280, banded by H. S. Osler, at Lake Scugog, Ontario, on October 3, 1924, was killed at Bogue Banks, near Bogue, North Carolina, on December 4, 1924.

BLACK DUCK, No. 323,291, banded by H. S. Osler, at Lake Scugog, Ontario, on October 3, 1924, was shot at Rice Lake, Northumberland County, Ontario, on October 20, 1924.

BLACK DUCK, No. 323,292, banded by H. S. Osler, at Lake Scugog, Ontario, on October 3, 1924, was killed at Marshall, Virginia, about December 8, 1924.

BLACK DUCK, No. 323,297, banded by H. S. Osler, at Laek Scugog, Ontario, on October 3, 1924, was shot at a place about 49°30′ North, 75° 30′ West, Quebec, during the month of May, 1925.

BLACK DUCK, No. 323,298, banded by H. S. Osler, at Lake Scugog, Ontario, on October 3, 1924, was shot near Knott's Island, at the head of Currituck Sound, North Carolina, on November 13, 1924.

BLACK DUCK, No. 323,303, banded by H. S. Osler, at Lake Scugog, Ontario, on October 3, 1924, was killed in the same vicinity, during the fall of 1924, before November 26, 1924.

BLACK DUCK, No. 323,313, banded by H. S. Osler, at Lake Scugog, Ontario, on October 3, 1924, was killed at Chanderlier Island, Mississippi, on December 6, 1924.

BLACK DUCK, No. 323,331, banded by H. S. Osler, at Lake Scugog, Ontario, on October 4, 1924, was shot at the Currituck Shooting Club, Poplar Branch, North Carolina, on November 13, 1924.

BLACK DUCK, No. 323,338, banded by H. S. Osler, at Lake Scugog, Ontario, on October 4, 1924, was killed in the same vicinity, during the fall of 1924, before November 26, 1924.

BLACK DUCK, No. 323,340, banded by H. S. Osler, at Lake Scugog, Ontario, on October 4, 1924, was killed in the same vicinity, during the fall of 1924, before November 26, 1924.

BLACK DUCK, No. 323,343, banded by H. S. Osler, at Lake Scugog, Ontario, on October 4, 1924, was shot in the Sheawassee River Marshes, Saginaw County, Michigan, on November 25, 1924.

BLACK DUCK, No. 323,344, banded by H. S. Osler, at Lake Scugog, Ontario, on October 4, 1924, was killed at Chicamuxen Creek, Maryland on November 14, 1925.

BLACK DUCK, No. 323,354, banded by H. S. Osler, at Lake Scugog, Ontario, on October 5, 1924, was shot at Whitby, Ontario, on October 22, 1924.

BLACK DUCK, No. 323,355, banded by H. S. Osler, at Lake Scugog, Ontario, on October 5, 1924, was shot at Pennsville, Salem County, New Jersey, on November 27, 1925.

BLACK DUCK, No. 323,357, banded by H. S. Osler, at Lake Scugog, Ontario, on October 5, 1924, was caught in a trap and got its leg broken, at a place about two miles north of Rice Lake, on the Otonabee River, Peterboro County, Ontario, on April 1, 1925. It was found necessary to amputate the bird's leg, and therefore the band was removed.

BLACK DUCK, No. 323,366, banded by H. S. Osler, at Lake Scugog, Ontario, on October 6, 1924, was killed at Nightingale Plantation, Georgetown, South Carolina, on January 19, 1925.

BLACK DUCK, No. 323,367, banded by H. S. Osler, at Lake Scugog, Ontario, on October 6, 1924, was shot at Gross Lake, Ingham County, Bath Township, Michigan, on October 25, 1924.

BLACK DUCK, No. 323,378, banded by H. S. Osler, at Lake Scugog, Ontario, on October 7, 1924, was shot on the Sassafras River, Kent County, Maryland, on December 5, 1924.

BLACK DUCK, No. 323,384, banded by H. S. Osler, at Lake Scugog, Ontario, on October 7, 1924, was killed on the Tennessee River, near Rockwood, Tennessee, on January 14, 1925.

BLACK DUCK, No. 323,393, banded by H. S. Osler, at Lake Scugog, Ontario, on October 7, 1924, was killed on the Tennessee River, sixteen miles below Decatur. Alabama, about January 21, 1925.

BLACK DUCK, No. 323,415, banded by H. S. Osler, at Lake Scugog, Ontario, on October 8, 1924, was killed at Aurora, North Carolina, on November 29, 1924.

BLACK DUCK, No. 323,438, banded by H. S. Osler, at Lake Scugog, Ontario, on October 10, 1924, was shot at Green Run Beach, Maryland, on January 23, 1925.

BLACK DUCK, No. 323,442, banded by H. S. Osler, at Lake Scugog, Ontario, on October 11, 1924, was shot at Rural, Clermont County, Ohio, on the Ohio River, three miles above Chilo, on December 10, 1924.

BLACK DUCK, No. 323,449, banded by H. S. Osler, at Lake Scugog, Ontario, on October 12, 1924, was killed in the same vicinity, during the fall of 1924, before November 26, 1924.

BLACK DUCK, No. 323,451, banded by H. S. Osler, at Lake Scugog, Ontario, on October 12,

1924, was killed in the Great Sounds, Cape May County, New Jersey, on January 29, 1926.

BLACK DUCK, No. 323,452, banded by H. S. Osler, at Lake Scugog, Ontario, on October 12, 1924, was killed at Tangier Sound, Maryland, on January 28, 1925.

BLACK DUCK, No. 323,454, banded by H. S. Osler, at Lake Scugog, Ontario, on October 12, 1924, was killed in the same vicinity, during the fall of 1924, before November 26, 1924.

BLACK DUCK, No. 323,457, banded by H. S. Osler, at Lake Scugog, Ontario, on October 12, 1924, was shot at Stuttgart, Arkansas, on November 25, 1924.

BLACK DUCK, No. 323,472, banded by H. S. Osler, at Lake Scugog, Ontario, on October 16, 1924, was killed at Havana, Florida, on December 27, 1924.

BLACK DUCK, No. 323,483, banded by H. S. Osler, at Lake Scugog, Ontario, on October 16, 1924 was shot at Long Point Marsh Ontario, on November 14, 1924.

BLACK DUCK, No. 323,484, banded by H. S. Osler, at Lake Scugog, Ontario, on October 16, 1924. was killed at Crisfield, Somerset County Maryland, on November 28, 1924.

BLACK DUCK, No. 323,488, banded by H. S. Osler, at Lake Scugog, Ontario, on October 16, 1924, was shot on Lake Erie, in Ottawa County, Ohio, on November 25, 1924.

BLACK DUCK, No. 323,492, banded by H. S. Osler, at Lake Scugog, Ontario, on October 16, 1924, was shot at Eastwood, New York, on November 18, 1924.

BLACK DUCK, No. 323,495, banded by H. S. Osler, at Lake Scugog, Ontario, on October 16, 1924, was killed at Yemassee, South Carolina, on January 20, 1925.

BLACK DUCK, No. 323,497, banded by H. S. Osler, at Lake Scugog, Ontario, on October 16, 1924, was killed at Little Lake, twenty-five miles south-west of New Orleans, Louisiana, on December 7, 1924.

BLACK DUCK, No. 323,504, banded by H. S. Osler, at Lake Scugog, Ontario, on October 17, 1924, was shot at Pigeon Creek. Omemee, Ontario, on October 25, 1924.

BLUE-WINGED TEAL, No. 323,347, banded by H. S. Osler, at Lake Scugog, Ontario, on October 4, 1924. was killed in the same vicinity on the same day.

RING-NECKED DUCK, No. 231,944, banded by Clarence E. Chapman, at Oakley, Berkeley County, South Carolina, on February 27, 1924, was shot on the Jack River, about thirty-five miles south-east of Norway House. Manitoba, on May 12, 1925.

CROW, No. 226,171, banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on June 29, 1924, was shot at Windthorst, Saskatchewan, on August 12, 1925.

PROSECUTIONS UNDER THE MIGRATORY BIRDS CONVENTION ACT BY OFFICERS OF THE CANADIAN NATIONAL PARKS AND ROYAL CANADIAN MOUNTED POLICE

ADDITIONAL CASES COMPLETED DURING 1925

HISELER, Lloyd, Steven's Island, Lunenburg Co., N.S. Having Old-squaws in possession during the close season. Fine, $20.00; Forfeitures, 4 Old-squaws.

DOUGLAS, George, Tuft's Cove, N.S. Killing a Heron. Fine, $10.00; Forfeitures, 1 Heron.

ATTEWOOD, James, Bridgeport, Glace Bay, N.S. Shooting Curlew—Having a Curlew in possession. Fine, $15.00.

TRECARTEN, Edward, Summer St. W., St. John, N.B. Hunting Black Ducks during the close season. Fine, $10.00; Forfeitures, 1 shot gun.

TURNER, Vance, Baie Verte, N.B. Having a Canada Goose in possession in close season without lawful excuse. Withdrawn. Forfeiture, a few decoys.

VICARRE, Joe, Maria, P.Q. Having Black Ducks in possession without lawful excuse. Convicted, Sentence Suspended.

CAPLIN, Geo., Maria, P.Q. Having Black Ducks in possession without lawful excuse. Convicted, Sentence Suspended.

HARRIS, Wilson, St. Johns, Nfld. Having a Great Black-backed Gull in possession without lawful excuse. Sentence Suspended.

On board fishing schooner *Alice Pike*, at Long Point, P.Q.

JUVENILE, Barton, Digby Co., N.S. Having a Semipalmated Plover in possession. Sentence Suspended.

JUVENILE, Brighton, Digby Co., N.S. Having a Semipalmated Plover in possession. Sentence Suspended.

DAY, Garret, Barton, Digby Co., N.S. Hunting Willet. Forfeitures, 1 Willet; Sentence Suspended.

SMITH, Stephen, Barton. Digby Co., N.S. Hunting Willet. Forfeitures, 1 Willet; Sentence Suspended.

LE BLANC, Samuel, Arcadia, Yarmouth Co., N.S. Hunting migratory birds—a Great Blue Heron. Sentence Suspended. Forfeitures, 1 Great Blue Heron.

SURRETTE, Andrew, Comeau's Hill, N.S. Hunting Dowitchers. Fine, $10.00.

GALLAGHER, Douglas, Melbourne, N.S. Hunting Willet. Forfeitures, 1 Willet. Fine, $10.00.

SHEDIAC, L. J., Yarmouth, N.S. Hunting Willet. Fine, $10.00. Forfeitures, 4 Willet.

O'CONNOR, Guy, Yarmouth, N.S. Hunting Willet. Fine, $10.00. Forfeitures, 1 Willet.

ATKINS, Albert, Yarmouth, N.S. Hunting Willet. Fine, $10.00. Forfeitures, 1 Willet.

MUISE, Reuben, Yarmouth, N.S. Hunting Willet. Fine, $10.00. Forfeitures, 1 Willet.

FITZGERALD, Ralph, Comeau's Hill, Yarmouth Co., N.S. Having a Great Blue Heron in possession. Fine, $10.00. Forfeitures, 1 Great Blue Heron.

FITZGERALD, Laurie, Comeau's Hill, Yarmouth Co., N.S. Having five Willet in possession. Fine, $10.00. Forfeitures, 5 Willet.

ALLEN, Gordon. Union Corner, Prince Co., P.E.I. Molesting Herring Gulls. Sentence Suspended.

BIRCH, Milford, Belmont, Lot 16, P.E.I. Hunting Canada Geese in the close season. Fine, $10.00.

MCLAREN, Arthur R., Central, Lot 16, P.E.I. Killing Mergansers in the close season. Sentence Suspended.

SIMMONS, Frederick, Wilmot, Prince Co., P.E.I. Hunting Brant in the close season. Fine, $20.00.

TAGGART, Henry, 24 Huron Place, Ottawa, Ont. Molesting Canada Geese during close season. Fine, $10.00.

LAURENDEAU, Armand, High River, Alta. Shooting migratory insectivorous birds. Fine, $10.00. Forfeitures, 1 Rifle, 1 Robin, 1 Flicker 1 Catbird.

MERCREDI, Emile, Fort Chipewyan, Alta. Killing wild Ducks during the close season. Fine, $10.00. Forfeitures, Duck Feathers.

PRINCE, H. A., Main St., Glace Bay, N.S. Shooting at Curlew. Fine, $10.00.

PESHERA, Peter, Caledonia Mines, C.B., N.S. Killing a Great Blue Heron. Fine, $10.00.

DAKIN, Aubrey, Wolfville, N.S. Killing a Bittern. Sentence Suspended.

LIBBIS, A. K., Sydney, C.B., N.S. Hunting Wilson's Snipe during the close season. Fine $10.00.

KING, Alfred, 365 Victoria Ave. N., Hamilton, Ont. Having in possession two Killdeer and one Hudsonian Godwit. Forfeitures, 2 Killdeer, 1 Hudsonian Godwit. Fine, $10.00.

JUVENILE, Islington, Ont. Hunting a Hairy Woodpecker. Forfeitures, 1 Hairy Woodpecker. Fine, $10.00.

STEENER, Wm. T., Bathurst, N.B. Attempting to kill Canada Geese by the use of a sail-boat. Sentence Suspended.

STEENER, Leonard, Bathurst, N.B. Attempting to kill Canada Geese by the use of a power-boat. Sentence Suspended.

MAKINSON, David, St. Johns, Nfld. Killing an Eider Duck near Wolfville, N.S. Sentence Suspended. Forfeitures, 1 Eider Duck.

IN MEMORIAM

ADAM BROWN

BORN APRIL 3, 1826 **DIED JANUARY 16, 1926**

In the death of Adam Brown, the cause of conservation of the wild life of Canada has lost one of its oldest friends. Mr. Brown was born in Edinburgh, but he had lived in Canada for more than an average lifetime and was a thorough Canadian. Among his many and varied public interests, too numerous to list here, none was dearer to him than the work of the Humane Society and the Society for the Prevention of Cruelty to Animals; and his interest in conservation was humanitarian rather than scientific or economic in its origin. He remembered the days when the ideas of the Humane Society were far from popular, and one of his own proposed amendments to the Cruelty to Animals Act (to prevent the use of living birds in trap-shooting) was twice killed by ridicule in the Dominion House of Commons; but he lived to see his early principles generally accepted, and to see such evils as the slaughter of birds for millinery abolished by the public opinion which he had helped to awaken. In spite of his great age, he retained to the end his keen interest in current affairs, and his sympathy, encouragement and advice will be greatly missed by all who had the privilege to be associated with him, and not least by the Hamilton Bird Protection Society Inc., of which he was Honorary President.—R. O. M.

NOTES AND OBSERVATIONS

RUSTY AND OIL-CORRODED WILD GEESE.—For the last ten or twelve years, we have had a few families of what we call "Rusty Geese" coming here to our Sanctuary every spring. The breasts and sides of these geese all seem to be dyed with iron rust right up to the water line. For a time, I thought possibly there might be a little strain of some other variety of goose mixed in.

I have called different naturalists' attention to this, but all seemed quite puzzled. Finally, W. E. Saunders, of London, Ontario, and Dr. Sloane, of Leamington, Ontario, both advanced the theory that these rusty geese winter in some iron rust stained river or lake in the southern states and I am compelled to believe this, as there are no rusty geese ever seen here in the fall.

But the last week or so, I have been more interested in three families of geese that came here almost water-logged with black oil. It may seem strange to the reader, but it is a fact, if a goose comes here wounded or in trouble, they are the first ones to come to the pond nearest our home. Possibly this is because there is more privacy there for them.

Last Saturday I noticed a family of seven in the north pond that were in an awfully drabbled condition and, behold you, Sunday morning here they are right by our dining-room window and in the

most pitiful condition birds could possibly be in. They could not swim on the water. They could only plunge through it for their feathers are all corroded in bunches with this dirty black oil. To be sure, they get out of the water as soon as possible, and, after eating a meal off the corn cobs, they all stand in line on the sunny side of the bank and start preening and preening their feathers, hardly going to the water once an hour. There they are, still preening and fairly picking their breasts to pieces. Even the old gander could be seen off his guard, picking and preening.

Really, as I put my eight-power glasses on them, they seemed to be eating or drinking the oil as they pick it off with their beaks and one of the most cheerful reports I have to make to the bird-lovers of America is that to-day, Thursday, April the first, there are three inches of snow and it is very cold and blustery, but, in spite of this cold, unseasonable weather, these seven geese are all clean and out in society again, and if I did not know it, I would never think there had been anything wrong with them.

Now, to any person knowing where these geese might be getting their iron rust from, I am sure all the northern bird-lovers would be glad to have it reported. As to the grease, we all know there are many places in the south this might come from, but the cheerful part is to know they can get it off. —JACK MINER.

ARCTIC THREE-TOED WOODPECKER (*Picoides arcticus*) AT TORONTO.—This woodpecker is considered a very rare, almost accidental winter visitant to the vicinity of Toronto, never more than one or two individuals being seen during any one fall and winter season previous to the present, while during many years it appears to have been entirely absent. In view of the erratic occurrence of the species in the Toronto region, what seems to have been a small invasion during the past winter (1925-26) is of interest.

The first one, a female, was seen by R. V. Lindsay on September 27, 1925, in a pine grove in High Park. Leslie H. Miller saw a female on October 26th, at Milliken, ten miles northeast of Toronto, notice of which appeared in the Toronto *Globe* of January 12, 1926. On November 1st, a female was seen by Lindsay and the writer, in the Old Belt Line ravine in the western part of the city. In the Toronto *Globe* of January 16th, 1926, one was reported as having been seen on November 21, last, at Oakville, seventeen miles west of Toronto, by Mrs. Anna E. MacLoghlin. On December 20th, Stuart Thompson saw one individual near Leaside, and on the Christmas Bird Census of the Brodie Club, December 23, a female was seen by L. L. Snyder and the writer in Jones Creek ravine of the Don Valley: both in the northeastern section of the city. On December 31st, a male was collected by the writer in a dense cedar swamp north of Pottageville (some thirty-five miles northwest of Toronto), the specimen now being in the collection of the Museum. On January 24th, 1926, one individual was seen in High Park by H. B. Haugh.

It is of interest in this connection to record that a male Arctic Three-toed Woodpecker was seen at Listowel, Perth County, Ontario, on November 9th, 1925, by W. Climie, report of which appeared in the Toronto *Globe* of January 5th, 1926.—JAS. L. BAILLIE, JR., Royal Ontario Museum of Zoology, Toronto.

The following reference was omitted from Mr. A. H. Leim's article *Squid Pursuing Herring*, which appeared in the March issue.—ED.

IT IS INTERESTING to note that W. F. Ganong, in his paper *On the Zoology of the Invertebrate Animals of Passamaquoddy Bay* (Bull. Nat. Hist. Soc. New. Brunswick, No. 4, 1885) states on page 93 that the squid is "pernicious both from the number of herring it destroys and from the fact that its presence in considerable numbers at any locality keeps these fish from entering the weirs at that place."

AN ATLANTIC LINER BIRD PASSENGER.—In the autumn of 1902, a friend of mine in this town paid a visit to England. While his ship, outward bound, was passing through the Straits of Belle Isle, and not far from land, a small bird, closely pursued by a hawk, flew on board and took refuge under one of the boats. The hawk kept watch for a considerable time, perched in the rigging, eventually returning to land, but the little bird stayed with the ship right across the Atlantic, becoming a regular pet with the passengers, who used to feed it. When the vessel touched at Moville, on the north coast of Ireland, it flew ashore. My friend is no ornithologist and does not know what the bird was, but, from his description, "brown, and rather smaller than a Sparrow", and from its confiding ways, I should guess it may have been a House Wren. The story illustrates how a New World species might become included in the Irish list, and the detection of this particular one by a local naturalist would have furnished an interesting item in one of the British ornithological journals.—L. B. POTTER, Eastend, Sask.

CYPRIPEDIUM CANDIDUM.—Until three years ago my understanding was that this plant had been found in the Western Peninsula only near Sarnia, where Mr. W. A. Dent had a small colony under observation. But in 1924 Mr. Frank McCrea, of this City, brought me a plant which he got in a

swamp near Bothwell. It was in bloom when I received it and the flower lasted well, but no bloom appeared in 1925, although it sent up three stems. Then in May, 1925, I was taken by Mr. Munro Landon, of Simcoe, to a swamp where he had found this rare plant, and there I was delighted to see it, for the first time, in full bloom in its native haunts. The clumps vary in size, but they apparently have from five to ten flowers out at once, and while I made no survey whatever of the area of the sphagnum swamp in which they were growing, yet I am inclined to believe that it covers at least fifty acres, and contains over one hundred clumps of the orchid. The sphagnum is more or less sparingly covered with Cornus, Tamarack and Black Spruce, and the plants are not absolutely confined to that area, as I dug up one which was growing on a sandy ridge in a sort of a trail where I judged it had a poor chance of survival.

The exact location will be cheerfully given to any conservationist who wishes to visit it.—W. E. SAUNDERS.

The late C. K. Dodge found this orchid on Walpole Island, St. Clair Flats, about 1906, and gave me a root of it. In the garden, it bloomed yearly, even standing a second movement from Detroit to Ottawa, where it survived until about three years ago.—P. A. T.

HUDSONIAN GODWIT IN ONTARIO.—While at Long Point in May, 1925, I was informed that a wader was killed there in October or November, 1921, and that no person had been able to identify it. That sounded interesting, and, as the bird had gone into the possession of Mr. Cayley, at Stratford, I took advantage of a delayed train connection in January to call at his house. Mrs. Cayley kindly showed me the bird which grew to be a juvenile Hudsonian Godwit. It may be that the nearest preceding record was when Taverner took a high plumaged specimen on May 13, 1905, at Point Pelee.—W. E. SAUNDERS.

WOLF! WOLF!—Anyone who has heard the hunger call of the Timber Wolf will remember the peculiar feeling that seems to strike to the marrow, and freeze the blood in his veins. This call I have heard many times while travelling in parts of Northern Manitoba and the vicinity of Port Arthur, and I can remember how terror-struck I was at one time when, driving in a cutter and a pack of five huge wraith-like marauders dashed into the road just behind me. They stopped suddenly, as if paralyzed, and, after a moment's hesitation, discontinued their former plan, if they had one, and began to stalk the cutter. Although afraid to attack, they followed until I reached the outskirts ofthe town, and as suddenly disappeared, but throughout the night at intervals, I could distinguish their call, and, although I heard of no particular depredation that they had committed, still I have no doubt that they satisfied their hunger before leaving that locality.

Remembrances such as these were brought vividly to my mind some two years ago when it was stated that a wolf had been sighted about three miles west of Brockville, Ontario, where I now reside. All the original thrills were renewed, and, although not a hunter, I listened for the calls and watched the papers for verification, and even as a child cannot keep away from fire, I literally haunted the location where the wolf was said to have been seen, but without result.

Then it happened. A farmer, named Samuel J. Poole, lived about the entrance to Hill Crest, some three miles west, on the highway, and it had been a hobby of his elder son to roam the woods thereabouts for game of any kind that offered.

Many times he had seen his dogs tear madly away across the fields in pursuit of an invisible enemy, but, although he frequently followed, he assured me he could find no cause for their erratic behaviour. Then he saw tracks, and marvelled, for they were not the tracks of a fox, and, although they resembled that of a dog, yet they were not those of any dog in the neighborhood. Other signs, too, failed to give the clue. It so happened that a horse had died, and had been hauled into the bush and left, and the tracks leading in that direction, Poole Junior followed and saw, to his great surprise a large bleached-looking animal which he took to be a wolf. A chase ensued and although superlatively swift, the wolf was not as fast as the missile. He had eaten his last meal. This was on January the thirteenth, 1924, and the kill was displayed to the public as that of a wolf and considerable publicity followed. I saw the animal and it looked to me remarkably like that of a Prairie Wolf, the type that used to beguile my evenings in Manitoba by their call of *yap-yap-yap-ky-ouwl.*

This carcass was sent to Toronto to be mounted, but has not yet been returned; still, I am of the opinion that it was a wandering Coyote or Prairie Wolf, seeking new fields of exploration.

Mr. Poole informed me that there was evidently a mate, as tracks had been seen afterwards, but in spite of a very careful search, it had not been discovered.—H. G. BREAKELL.

OCCURRENCE OF THE PTARMIGAN NEAR SHARBOT LAKE.—Some twenty-five miles north of Sharbot Lake lies one of the numerous lakes called "Brule", and I am indebted to Mr. J. R. Ostler, of the Department of Agriculture for the following note:—

During the hunting season of 1913, that is, between October 15th and November 15th, when Mr. J. F. Card was hunting partridges on the

banks of Brule Lake, a Ptarmigan crossed his path and lit in a tree just across the lake from his cottage. He secured it, but the bird, I understand, was not mounted. Without any question, it would be a Willow Ptarmigan.—W. E. SAUNDERS.

CORRECTION—Re a note by the Ornithological Editor, page 88, April number, *Canadian Field-Naturalist*.—There is evidently a geographic misapprehension here and the above editor mistakenly inferred that the Britannia Bay referred to was a western locality instead of being near Ottawa, Ont. The species referred to was an Eastern Bluebird of course.

EDITOR'S NOTE.—We wish to again express our thanks to *The Graphic Publishers* for their donation in the form of an extra twelve pages to the May number.

BOOK REVIEW

ANIMAL TRACKING FOR BOY SCOUTS. *Hints on Animal Tracking, Prepared under personal direction of the Dominion Camp Chief, Rodney C. Wood, Boy Scouts Association, Canada. Drawings by Leonard Rossell. Published by the Canadian General Council of the Boy Scouts Association. Ottawa, 1924. Printed by The Mortimer Co., Ltd., Ottawa.*

This is an interesting and valuable booklet (9½ x 12 inches), with twelve pages of plates, black-and-white pen sketches of thirty-two of the most common and typical of the Canadian wild mammals, with sketches of their tracks, the latter both individually in natural size, and grouped in miniature.

Mr. Rodney C. Wood, who did very successful and valuable work in Canada instructing Boy Scout leaders in woodcraft, has returned to his home in Nyassa Land, Africa. In the preface to this booklet, he truly says that the first-hand study of the lives and doings of wild animals is becoming more and more rare among Canadians as the country becomes more settled, and other activities seem to have taken the place of the woodcraft knowledge and games which constituted the ordinary life of every out-of-door boy of a generation ago. From tracks on the ground they read the story of what each animal had done as plainly as if written in a book. It is in an endeavour to help men and boys to learn the rudiments of knowledge necessary to enjoy to the fullest extent the fellowship of the wild life in our woods that this book is produced, as well as in the hope that an intimate knowledge and love for the creatures of the woods, may excite real, lasting interest in the conservation of our wonderful heritage of wild life.

Two pages of text give general instructions for studying animal tracking or trailing, discuss the similarity of tracks made by some different species, the rarity of perfectly complete tracks, and the effect of condition on tracks. The author divides four-footed animals into four main groups for purposes of tracking, but reiterates that only actual practice in the open can really teach tracking properly, and emphasizes the golden opportunities afforded in Canada for tracking in the snow. A method is given for making plaster casts for securing track-dies of actual tracks.

The tracks, from meadow mouse to moose, are drawn life-size, for the author says that in ordinary practice, it is found that any reduction of size in the drawing makes it quite valueless for adequately picturing to the boy what size track he really will see. On the whole, the book seems to be a useful one for the purpose intended.—R. M. A.

ANIMAL LIFE IN THE YOSEMITE. *An Account of the Mammals, Birds, Reptiles and Amphibians in a Cross-section of the Sierra Nevada, by Joseph Grinnell and Tracy Irwin Storer. University of California Press, Berkeley, California, 1924.*

The Yosemite is rather outside our field, but, having lived with this splendid book of 752 pages in easy reach for some months, I cannot refrain from making a few remarks in praise of it. It will be to such works that we, in Canada, will turn when the time comes to write the Natural History of our National Parks, although I fear it will be a long time before an elaborate treatise of the kind can be written and published.

The twelve coloured plates are by Brooks and comprise nine of birds, two of mammals, and one of reptiles. The frontispiece, Sierra Nevada Rosy Finch, and the Band-tailed Pigeon, appeal to me most, and next to these I like the Marmot and the Thrush plates. The plate showing twelve head and shoulders views of sparrows is attractive and useful, giving a maximum of information for the one plate. In addition there are scores of half-tones and figures. Life zone maps and maps of distribution species by species for use with them simplify the understanding of distribution problems in an area that includes zones from Lower Sonoran to Alpine Arctic.

The following extracts are from the Preface.

"The national parks of America render as their

most important service a full free opportunity to all who will find in them a complete recreation, physical, mental, esthetic. In performing this service, the animal life existing within their borders constitutes a valuable asset. For the best recreative forces in nature are those which serve most quickly to call into play latent or seldom used faculties of mind and body whose exercise tends to restore to normal balance the human mechanism that has been disturbed by special or artificial conditions of living. Foremost among these forces are the living things that move and utter sounds, exhibit color and changing form, and by these qualities readily attract and hold our interest. To seek acquaintance with those primal objects of interest is to know the joy of vigorous muscular activity; better still, it is to realize the possession of the generally neglected senses of far-seeing and far-hearing, and to invite an esthetic appeal of the highest type and an intellectual stimulus of infinite resource." Surely this is a concise expression of the need for national parks, and the part that wild life takes in helping the parks fulfil their destiny.

"The principal objects in view in undertaking the survey were: To find out what species of mammals, birds, reptiles and amphibians exist, or have within modern times existed, in the circumscribed area selected for study; to learn as much as possible concerning the local distribution of each of these species, and to map out the general life areas within the region; to learn as much as time permitted of the food relations, the breeding habits, and the behavior, individually, of each of the species; and, finally, tp put all this information on permanent record, in a form accessible to, and generally assimilible by, the public, both lay and scientific."

A splendid short essay upon the interrelations of living things should not be passed without comment. In it the authors point out the necessity for dead and decaying tree trunks in the forest if such birds as the White-headed Woodpecker are to survive. In their opinion, no trees, whether living or dead, should be cut down beyond what it may be necessary to remove in building roads or for practical elimination of danger, locally, from fire. "Dead trees are in many respects as useful in the plan of nature as living ones, and should be just as rigorously conserved." "The brilliant-hued woodpeckers that render effective service in protecting the living trees from recurrent scourges of destructive insects, in other words, in keeping up the healthy tone of the forest, depend in part on the dead and even the fallen trees for their livelihood." This chapter closes with, "Nor do we approve, as a rule, of the destruction of carnivorous animals—hawks, owls, foxes, coyotes, fur-bearers in general—within the Park. Each species occupies a niche of its own, where normally it carries on its existence in perfect harmony on the whole with the larger scheme of living nature."

It is impossible to give more than a glimpse into this work, but perhaps even this brief comment will help to bring the book and the students of the subjects it treats into contact.—H. L.

BREEDING, FEEDING AND OTHER LIFE HABITS OF MEADOW MICE (*Microtus*). *By Vernon Bailey, Chief Field Naturalist, Division of Biological Investigations. (Contributions from Bureau of Biological Survey, Journal of Agricultural Research, Vol. XXVII, No. 8, Washington, D.C., February, 1924. Published by authority of the Secretary of Agriculture, with the co-operation of the Association of Land-grant Colleges. Washington, Government Printing Office, 1924, pp. 523-536, pl. 3.*

The meadow mice, field mice, or ground voles, comprise numerous species and geographic varieties, found throughout Europe, Asia and North America, mainly in temperate and boreal zones. Having a wide range of adaptation, one or two, or sometimes three or four species in a locality occupy most of the fertile areas of the United States and Canada, where they become of economic importance as farm and orchard pests.

The common species of the Ottawa region, *Microtus pennsylvanicus pennsylvanicus* (Ord.), has probably been glimpsed by every one who has walked through our fields and meadows. Adults are considerably larger than house mice, have a rougher fur of a dull brownish colour, and a short, stubby tail. Most of the small runways found in the dead grass in the spring and fall are made by this species.

Modifying factors may control breeding activities, the most important factors being food, weather, cover, proximity, and contentment, while peculiar combinations of climate in connection with some of these factors may bring about serious "mouse plagues", which may be disastrous locally, but are of minor importance in comparison with the steady drain on crops by the mice over the country at large in normal years.

Experiments in captivity have shown that the breeding activities are practically continuous, the females mating immediately after the birth of the young, producing litters of usually four at first, but, when full grown, after the first or second litter, usually six or eight at a birth. Seventeen consecutive litters have been produced by one female in captivity within a year. Another female born on March 25, produced thirteen families of young, totalling seventy-eight in number, before she was a year old. At this rate of increase,

allowing equal numbers of males and females, and the young beginning to breed at forty-six days old, the total increase from one pair, if all lived and bred, would be over one million individuals at the end of a year. If these were confined to one acre of ground, this would mean a little more than twenty mice to every square foot.

Mr. Bailey found that the quantity of food eaten is astonishing. In one cage, thirty days feeding of ten mice with all the clover, cantaloupe, grain and seeds they would eat, showed that an average of 55% of the weight of each animal was eaten every twenty-four hours. This was on the richest kind of food, such as they rarely obtain in the wild satte. In another cage, during the same period, nine mice that were fed green clover, etc,, with no grain or seeds, consumed an average of 100% of their weight every twenty-four hours. This would seem more nearly their normal ration in a wild state. At 30 grammes a day, one meadow mouse would consume 10,950 grammes (23 pounds) of green food in a year, and 100 mice 2,300 pounds, or a little over a ton of green grass or clover, which would make about half a ton of dry hay.

A hundred mice to an acre is not an unusual number in meadows favourable to their habits, while in "mouse years", or during mouse plagues the number has been estimated at thousands to an acre. Even with 1,000 to the acre, it is easily shown that mice consume more vegetation ($11\frac{1}{2}$ tons) than would ordinarily grow on an acre in a year.

In thirteen closely printed pages, Mr. Bailey gives concise accounts of mouse plagues, general habits, voices, disposition, individuality, playing, fighting, sanitation, breeding habits, mating, nests, care of young, factors modifying breeding, food habits, stores, habits in captivity, quantity of food required, aggregate destructiveness, methods of control, uses, and a valuable list of literature cited.

Mr. Bailey believes that total extermination of meadow mice would be as impossible as it would be undesirable. They are firmly intrenched in many waste places where they serve to transform vegetation into food for fur-bearing carnivores, anb supply the daily bread of numerous birds of prey that agriculture could not spare without great danger from other rodent pests. In agricultural districts, the importance of keeping these mice under control and at a minimum number is clearly seen. The most economical and practical method of control is by natural enemies, i.e., hawks and owls, gulls, herons, bitterns, crows, shrikes jays, etc. Snakes and even fish help to keep them under control.

Simple cultural methods, clean fields and meadows, clean borders, roadsides, and ditch banks are a great aid in giving these natural enemies a chance to see and catch the mice, solve the problem of control by preventing occasional heavy losses, and add consiberably to the yearly farm returns.

The whole paper is an interesting account of one of our most common native mammals, frequently casually observed, but heretofore little known. It is not only a valuable biological study but an important economic contribution, and may serve as an example which might profitably be followed and applied to other of our common native mammals.—R. M. A.

A DISTRIBUTIONAL LIST OF THE BIRDS OF BRITISH COLUMBIA, *by Allan Brooks and Harry S. Swarth. Pacific Coast Avifauna, No. 17; Contribution No. 423 from the Museum of Vertebrate Zoology of the University of California. Published by the Cooper Club at Berkeley, California, September 15, 1925, pp. 158. Frontispiece in color by senior author. Map of Life Zones of province in colors and many illustrations and line maps in text.*

This is probably the most valuable scientific contribution to Canadian ornithology since the publication of the Macoun Catalogue of Canadian Birds in 1909. It should be in the hands of every student of North American Distribution and will be invaluable to the ornithologists of British Columbia and adjoining areas. The authorship assures the accuracy and thoroughness of the work. No collaboration of authorities could be happier for a Birds of British Columbia. The senior author has had a wide experience in the province and the junior author has studied deeply the broader Pacific Coast problems and has a deserved reputation for meticulous care in his work.

The general appearance of the volume is that of a model of clean and dignified typography, material and make-up. After a short Introduction, giving the general plan and methods of Authorship, follows a page of suitable "Acknowledgements". Then comes seven pages of "Previous Work in British Columbia", giving a history of ornithology in the province from the time of Captain Cook's Voyages, published in 1784, to the completion of the manuscript. Unfortunately, this does not include the important work of the two authors in the extreme northern part of the province in the summer of 1924.

A chapter on "Life Zones and Faunal Areas" of the province occupies five pages and from comment in other reviews, seems to have surprised many who did not realize the varied extent of the area in question. A map showing the Life Zones in four colors is a very valuable addition to this

section and presents visually the complication of British Columbian problems. From it we see that the Upper Sonoran Zone intrudes into British Columbia in two small areas near the southern boundary in the Okanagan and Skagit valleys. The main river valleys of the southern parts of the province, the inner coast of southern Vancouver Island and mainland coasts adjacent are Transition. The remainder of the southern two-thirds of the province is Canadian, with Alpine-arctic (Boreal) and Hudsonian at higher elevations and over most of the remaining northern third in the low lands.

The annotated List of Birds, pp. 23-126, covers 409 species and subspecies as stated in the Introduction, an extraordinarily large number for any single political division. The list follows the plan of others that have been published under the same auspices and is purely distributional, with no extraneous matter. It gives full range in the province of each form recognized to occur. A welcome addition is the inclusion in the text of many small outline maps with the occurrence of the more interesting or complicated forms plotted thereon in appropriate symbols.

A list of eight "Introduced Species" follows, then a "Hypothetical List" of twelve species and a "List of Birds Accredited to British Columbia on Unsatisfactory Grounds" of eleven species. This last is a rather unusual feature in such publications, but a good one, as it shows each an obvious act of exclusion and not an accidental omission. An admirable index completes the volume.

While the general reaction to the Birds of British Columbia is most favorable, there are points of possible improvement that the critic can find in the most excellent presentations. It is with the idea of suggesting methods of making the admirable still more so that the following remarks are made.

No two people can ever see simultaneously from the same view-point and, no matter how congenial two authors may be, collaboration always necessitates a certain amount of compromise and deference, one to the other. In many cases decisions are bound to be made that are unsatisfactory to one author or the other, or even to both. It would be well if such conflicts of judgment could be indicated. There are findings expressed in this work hardly in harmony with expressed conclusions of one or the other of the authors and we are left in doubt in particular cases whether this indicates a change of opinion or only deference to a confrere.

In the Introduction we are given to understand that, where the authors have felt unable to make personal decisions, they have followed the A.O.U. Check List. While, for the sake of uniformity, there are strong arguments for following this authority, unless there is definite evidence for the contrary, we think that where this course is followed it should be so indicated. Where the question is purely nomenclatural, as in attributing priority to this or that particular name, the matter is inconsequential, as no source of confusion is thereby raised. But where questions of fact are involved, as the distinction of certain postulated races, the disadvantages appear. There are a number of subspecies in this list that it is assumed neither author had material for an original decision but from the context we are unable to say which are included as definite acts of judgment and which are mere acceptance of tradition. There should be some way to separate these cases, so that the weight of the really valuable judgment of the authors will not be attributed to cases where it has not been exercised.

The synonymy of the Northwestern Horned Owl, *Bubo virginianus lagophonus*, seems a little unhappy. *B. v. subarcticus*, *B. v. arcticus* and *B. v. pallescens* are all included under this head. This would certainly give the impression that *lagophonus* was a pale, instead of a very dark form. It does not seem at all probable that these pallid birds ever have been included in *lagophonus*.

In the opinion of the reviewer, the usual practice here followed of relying entirely on appended "Introduced", "Hypothetical", etc., lists for mention of certain species could be improved upon. It necessitates the searching of several inconspicuous lists at the back of the volume to find some given species, or to make certain that they are not included. To one familiar by frequent consultation with the list in question, the existance of such appendices is known, but they are very easily overlooked by the occasional consultant and, in any event, are a needless complication. We are entitled to find information in the first logical place we are expected to look for it. There are several methods by which these names could be included in their systematic place in the general list. The whole matter could be transferred there and plainly marked "Introduced", "Hypothetical", etc., as the case may be, by word, special type, marginal inset or other distinction, or the name alone might be introduced in its proper sequence and reference made to the fuller discussion on its subsequent page.

These are minor details in an excellent work, and our only serious disappointment in it is that a work on Canadian birds, largely by a Canadian author, could not have had a Canadian publication. As long, however, as we fail to provide facilities for scientific publication ourselves, we are glad to see it so well done by others.—P.A.T

THE GEOLOGICAL FORMATIONS OF MANITOBA, *by R. C. Wallace, Professor of Geology and Mineralogy, University of Manitoba.*

This bulletin, published by the Natural History Society of Manitoba, gives a summary of the information available regarding the geological formations of Manitoba and is thus of interest to the teacher, to the student, and to the general reader interested in geology. The last chapter of eighteen pages consists of a bibliography of publications on Manitoba geology which will be most helpful to students who wish for more detailed information.

Chapter I gives a brief summary of the geological history of Manitoba to serve as an introduction to the description of the formations described in more detail in subsequent pages. In Chapter II the Precambrian formations which cover more than three-fifths of the surface of the province are dealt with. Recent practice in Precambrian mapping has been to employ local classifications for each particular district, but, for the sake of clearness, a correlation for the province using terminology employed elsewhere, has been made. Chapter III discusses the Palaeozoic succession and faunas. Plates showing the more characteristic fossils of these formations are included. Chapter IV discusses the Cretaceous deposits of the Mesozoic and Chapter V the Tertiary, Pleistocene and Recent deposits of the province. Chapter VI is devoted to a description of the physiographic features of Manitoba, explaining when and how the various types of topography were developed. The bulletin includes a copy of Map 55A of the Geological Survey of Canada, showing the geology of Alberta, Saskatchewan and Manitoba. Copies of the Bulletin may be obtained from A. A. McCoubrey, Room 307, C.P.R. Depot, Winnipeg, Man., at fifty cents per copy.—F. J. ALCOCK.

OPENWAY, *by Archie P. McKishnie.*

This is an entertaining tale of early days in Ontario, but it is hardly suitable for acceptance as a source of information on almost anything between the covers. For instance, we are told that Sandwich is sixty miles south of Rondeau, whereas Sandwich is in Ontario and Ohio is sixty miles south of Rondeau!

The use of the word "popular" for "poplar" may be just spelling the pronunciation of some of the less educated countrymen, but that hardly justifies the use of a word so palpably wrong.

The book essays to teach natural history, but the errors are frequent and quite disturbing. For instance, a Quail is said to line her nest with down, a habit which this reviewer believes is confined to the water birds. Overlooking the fact that the male Quail has been actually photographed in the act of incubation, the intimation is very plain that the Author believes that the male takes no part in the housekeeping duties; but, on the contrary, a male Wood Duck is given great credit for assisting his mate in caring for the young; whereas the male ducks are notorious for neglect of the home. The old belief that Wood Ducks convey their young from the nest on their backs, is revived, and these young Wood Ducks are even carried back to the nest at night, which feat surpasses the wildest imagination of the nature student.

In speaking of the Great Horned Owl, the bird is made to pick the bones of a Rail and is supposed to have gorged himself upon one single Rail. The appetite of this species is notorious and it is doubtful if a Great Horned Owl begins to think of losing his appetite when he has eaten only one Sora. Other mis-information about the Owl follows shortly after, when we learn that the female owl is smaller than the male, whereas the reverse is the truth.

The much-talked-of Crow comes in for a good deal of attention, and we learn that a Crow incubates two eggs and that, when a young one was lost from the nest, the old birds cry far into the night, drowning the song of the Whip-poor-will and the Curlew's call! Even when the Crow is roosting in very large numbers, one hardly even hears any sound but the rustling of wings, but the climax of absurdity is reached when a young bird which had fallen out of the nest, flops on to his mother's back and is carried up to the nest again!

It is very well known that the nest of the Woodcock is the most sketchy sort of an affair; in fact, the bird practically appears to have made no nest at all, but our Author has pointed out that a Woodcock carried the fluffy youngsters off to the feeding ground and brought them back again to the nest, as though they could not find an equally good nest in two minutes anywhere.

Other birds are treated with just as little regard for their ordinary habits. For instance, the Reed Bird, which is the Bobolink, is said to nest in a clump of rushes in a marsh; probably the Red-winged Blackbird is meant, but it is not fair to mislead children with such erroneous statements.

Towards the end of the book is a very graphic account of a desperate encounter between the Sea Hawk, probably meaning the Fish Hawk, and Wamper, or Marsh Snake, which is the least able of all large snakes to protect itself, owing to the small size of the teeth, but the writer has no difficulty in making the Sea Hawk scream with pain when the snake strikes him three times!

The battle results in favor of the snake—quite in opposition to the custom of the birds of prey in attacking only those varieties of prey that they are able to overcome. The battle has been watched by the brown mate of the Sea Hawk, lying under a prostrate tree! The story does not fit either the Fish Hawk or Marsh Hawk, that is now, or ever was, at Rondeau, and can only be characterized as "bunk".

There is a great deal of mis-information about the reptiles, also, and we learn that a Black Snake stands on guard near its mate, which has a brood of young beneath a log, and the snake of the story develops such long fangs that one stroke from them puts fear and rage into a Wild Cat. Later on, we learn that snakes' eggs are hatched in water, and putrid water, at that.

Wild animals are not neglected by our Author who develops a Skunk so powerful and courageous that it kills a Woodchuck; and ascribes to the Weasel the diving and swimming powers of the Loon, though it has never been the fortune of this reviewer to see a Weasel in the water even once, although a mink, of course, feeds and lives largely in the water.

The book is not even free from lapses in grammar, as we learn on one page that an Owl brought a rat "for he and his mate".

The story is entertainingly written, but the natural history of the book is so far from the truth that it should not be allowed to fall into the hands of young people who would be apt to believe what they read.—W. E. S.

PUBLICATIONS RECEIVED

HABITS AND ECONOMIC IMPORTANCE OF WOLVES, *by Norman Criddle.*

Bulletin No. 13, Department of Agriculture, New Series.

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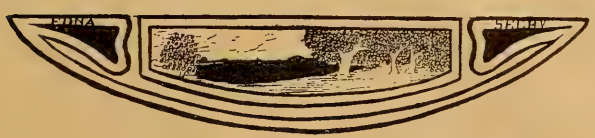

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CONTENTS.

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The Canadian Field-Naturalist

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CHAMPLAIN AS A NATURALIST

By CHARLES MACNAMARA

SAMUEL DE CHAMPLAIN was not primarily a naturalist. He was an explorer and colonist, concerned with the topography of new lands and the prospects of founding settlements in them. His mention of flora and fauna is more or less incidental to these chief ends; but, of course, the natural resources of the countries he discovered were important to him, and he records many observations on the wild life of Canada which are interesting as giving some idea of what the country was like when there was no other kind of life in it. He was an honest if not always very exact observer, and compared with the mass of myth, legend and superstition that passed for natural history in his day, his records are accuracy itself.

He first visited the New World in 1599 to 1601 as captain of a vessel chartered by the Spanish government to carry a cargo to the West Indies and Mexico. The remarkable things he saw on this voyage are set down in a "Brief Discourse", illustrated from his own drawings, which are crude enough to please even admirers of Epstein. He paid more attention to natural history on this journey than he did on any of his later travels in the North, and he describes and pictures many of the plants and animals of the strange lands he visited. Most of his descriptions are accurate enough, and his beasts, birds and trees are nearly all quite recognizable. But it was an age when the world was full of wonders, and science had not yet grown skeptical. So, among the animals more familiar to us moderns, Champlain includes a fearsome winged dragon with a murderously sharp beak and a long, spiked tail. It appears, however, that these creatures were, after all, only the size of a sheep; and their unpleasant looks belied them, for the author assures us, "they are not dangerous, and do no harm to anyone, although to see them, one would say the contrary."

But we are more interested in the natural history of Canada, and this begins when he next reached the shores of America in 1603, and sailed up the St. Lawrence in the glorious summer weather of June and July. His opinion of the lower stretches of the river was unfavorable, but the scene around the rock of Quebec pleased him. "A level and fine country, where there is good land full of trees." The forests along this part of the St. Lawrence were principally hardwoods then, as they are to-day, and he remarks on the scarcity of spruce and pine. He recognizes the trees from the allied kinds he knew in France, for none of our native species are the same as those of Europe. He names oak, birch, aspen, poplar, cherry, ash, maple, beech, cedar and spruce, "also other trees I do not know, which are very pleasant". He overlooked the elm at this time, and does not mention it until next year when he records it among the trees of Cape Breton. He speaks also of the walnut (noyer) and the chestnut (chastaigne), and on his map of 1612 he figures what is obviously a chestnut burr, and labels it "chastaigne". But it is doubtful if he really saw either of these trees in the St. Lawrence valley. At present they grow only in the southern peninsula of Ontario, and there is nothing to show that their range was ever more extended in Canada. His walnut may well have been the butternut, but it is hard to say what tree he mistook for the chestnut. In his list of trees, sandwiched between the poplar and the oak, he enters "houblon", the hop. Some botanists think that the hop (*Humulus Lupulus*) is an Old World plant introduced by white man into America. But if Champlain encountered it on the St. Lawrence in 1603 it must be as native as a Red Indian.

He is much pleased with the profusion of wild fruits: hazel-nuts, cherries, June berries, strawberries, raspberries, and currants, "red, green and blue." The green ones were probably gooseberries, which the French quite correctly regard as a kind of currant. Remembering the "sunny vines of the pleasant land of France", he hoped far too much from the luxuriant growth of wild grapes he saw along his course. At this season the grapes were not ripe or he would have discovered that they are scarcely edible. Sixty-eight years before, Jacques Cartier had to admit that "they be not so kind as those of France". As another food resource he mentions, "certain little roots the size of a small nut, resembling in taste truffles, which are very good roasted or boiled". This is one of the many forgotten wild roots that the Indians used as food. It is probably the ground nut, *Apios tuberosa*, which, Waugh says in

his "Iroquois Foods", is still eaten by the Iroquois, and even planted in suitable places, though not cultivated. Raw, it has something the unpleasant taste of a raw bean, and cooked it has not much flavor of any kind, but is slightly reminiscent of the sweet potato.

The wild beasts, he says, were bears, porcupines, rabbits (really hares), foxes, beavers, otters, musk-rats, "and other kinds of animals which I do not know, which are good to eat, and on which the Indians live". Besides these, he lists four kinds of deer: orignas, moose; cerfs, probably wapiti; biches, probably the female wapiti; and dains, the red deer. The magnificent wapiti, now found only in the West, was at this time an inhabitant of Eastern Canada. The caribou, which Champlain often had occasion to speak of later on, he does not mention here.

The land continually improved as he ascended the river. At every new place he stops, he says, "and this country is still better than any other I have yet seen." The phrase becomes a formula with him, and he uses it all the way up to the Falls of St. Louis (Lachine), where his advance on this occasion ended.

The natives described to him the water route farther west up the great lakes, and here we find the first mention of Niagara. Like our own ancestors up to the 18th century, the Indians had no eye for natural scenery, and the mighty cataract that now draws sightseers from all over the world aroused no enthusiasm in them. It was simply "a fall which is rather high", where they were put to the inconvenience of portaging their canoes a quarter of a league.

So far, the honest, unimaginative Champlain had been setting down what he saw himself, plain sober observations without amazement or prodigy. But he was uncritical enough to end his account with the story of another explorer, who seems to have been a disciple of the notorious Sir John Mandeville. This was le Sieur Prevert, who told of a strange tribe living in Gaspé, "as thin as skeletons", with extremely slender legs of such length that when they sat on their heels, their knees came above their heads. Another wonder of the new land was a frightful giant "Gougou", who lived on an island in the Gulf of St. Lawrence. This creature seems to have been the New World counterpart of the Greek giant, Polyphemus. The Indians told Champlain that the mast of the French ship would not reach the monster's waist, and that he caught men and kept them in an enormous bag until he was ready to eat them. Although the veracious Sieur Prevert did not hesitate to give this story some confirmation—as he sailed past he heard the strange noise the creature made in his island—Champlain records the tale with considerable reserve, and suggests as a simple explanation, that some devil was tormenting the Indians in this way; devils being commoner in those days than they are now. Modern science has identified Gougou with the earthquake spirit "Kuhkw" of Micmac legend. To Champlain's credit be it said that no more marvels of this kind appear in any of his subsequent writings.

After a winter in France, Champlain was back again to America in 1604, under the command of de Monts, who had obtained a trade monopoly of the country. The summer was spent exploring the shores of Nova Scotia and part of the coast of Maine. Champlain was struck, as Jacques Cartier had been before him, with the vast number of sea fowl frequenting these waters. His list of the different kinds he saw is the first known catalogue of Canadian birds. The often-obscure French names are translated by Prof. W. F. Ganong thus: cormorants, ducks of three kinds, snow geese, murres, wild geese, puffins, snipe, fish hawks and other birds of prey, sea gulls, plover of two or three kinds, herons, herring gulls, curlews, turnstones, divers, loons, eiders, ravens, cranes and other kinds. The sailors gathered cormorants' eggs by the caskful, and killed large numbers of gannets with sticks. Cartier describes the great auk unmistakably, and many later explorers speak of it, but Champlain does not specifically mention it, although it was certainly abundant in his time. It seems to have been good eating, and was pitilessly slaughtered by every passing craft. A labor-saving method of dealing with the foolish, flightless birds was to round them up in flocks and drive them into the boats across a gang-plank and there knock them on the head. They were finally exterminated about 1844.

There was no lack of food, in summer at least. Fish were abundant and easily caught, and the shores were covered with seals, and shell-fish could be gathered plentifully at low tide, "which did much good to everyone".

One of the company was Messire Aubry, a priest of Paris, who had listened to the call of the wild, and sailed with the expedition against the wishes of his relatives, who sent in vain to the port to stop him and bring him back to Paris. He must have earnestly wished himself back there in the street of the cook-shops, la rue aux Ours, when shortly after his arrival in America he got lost in the woods of Nova Scotia on Long Island near St. Mary's Bay, and had to live for seventeen days "on some sour and bitter herbs like sorrel and some small fruits of little substance large as currants which creep along the ground". The

sorrel (oseille) to which Champlain refers is doubtless the cultivated pot-herb of Europe (*Rumex*) and the herbs Messire Aubry ate were probably the wood-sorrel (*Oxalis Acetosella*) native to the northern hemisphere. There are several Canadian creeping plants that bear small berries, but the only one on which Messire Aubry would find any fruit at the time he was lost—the end of May—is the partridge berry (*Mitchella repens*) whose red berries persist over winter. They are dry and insipid and truly "of little substance"; and if the poor cleric had nothing else to eat, it is no wonder "he was a long time coming back to his former condition", as the chronicle runs. Lescarbot, the early historian of New France, suggests that Aubry was sustained in part by "some nutritive strength which is in the air of that country".

All the early explorers have something to say about mosquitoes. Here is Champlain's first mention of them; it was by no means his last. The colonists were building their "habitation" on the badly chosen site of Ile Ste. Croix. "All worked so energetically that in a short time it was put in a state of defense, although the mosquitoes, which are little flies, caused us great trouble at work. For there were several of our men whose faces were so swollen by their bites that they could scarcely see."

Ill prepared for the unexpected severity of the cold, they passed a miserable winter. The dread scurvy set in, "a very desperate malady", and many of the company died before spring. Champlain says nothing of what was done to combat the disease, but it appears later they made enquiries of the natives about the "herb" Aneda, which had miraculously cured Jacques Cartier's men of scurvy at Quebec seventy years before. The Indians, however, could tell them nothing about it, perhaps because Aneda was not a herb but a large forest tree; and because, being Algonquins, they did not know the word, which is Iroquois for an evergreen tree.

What the tree really was is still in some doubt. Hakluyt surmised the sassafras, but that is not a large tree and does not grow as far north as Quebec. Laverdière thought it was the spruce; Grant suggests the white pine, and Douglas supposes it was balsam. Biggar, however, is probably right with hemlock, the leaves of which were regularly used by the Iroquois to make a drink. Thoreau's Indian guide in the Maine woods served him with hemlock tea for breakfast. A hot infusion of hemlock needles makes quite a pleasant drink, slightly astringent, a little gummy and strongly aromatic. From our present knowledge of vitamins, it seems likely that a "tisane" of almost any green vegetable matter would have cured the scurvy sufferers.

In the summer of 1605, Champlain accompanied de Monts on an exploration of the New England coast as far as Cape Cod. Unlike the nomadic hunters the French had encountered in Canada, the natives here lived in permanent villages, and cultivated crops of maize, beans, squashes, pumpkins and tobacco, all native American plants, although some of them had originated in the south. The potato, indigenous to South America, was unknown to the North American Indians at this time. When it reached them later, it came by way of Europe.

Purslane, which botanists say is native to the south-west and naturalized northward, was seen growing as a weed among the corn. Valued from ancient times in the Old World as a pot-herb, it was also known to sailors as a sovereign cure for scurvy, and perhaps that was why the French noticed it. In one plantation they saw roots which the Indians were cultivating "having the taste of an artichoke". This was the Jerusalem artichoke (*Helianthus tuberosus*), a kind of sunflower native to Eastern North America. The artichoke to which Champlain compares it is the European artichoke (*Cynara scolymus*), related to the thistles, of which the flower buds only are eaten. The bone fish hooks of the Indians were bound with hemp obtained from a wild plant four or five feet high, which, from Lescarbot's fuller description, appears to have been the Indian hemp (*Apocynum cannabinum*). Small nuts that have several divisions were probably hickory nuts; and Champlain's mention of "little birds which have a song like blackbirds, and are black excepting the ends of the wings, which are orange" is the first record of our familiar red-winged blackbird. The orange marks are on the shoulder, however, and not on the ends of the wings. The infinite number of pigeons they saw, and of which they took a large quantity were, of course, the now extinct passenger pigeon. The immense flights of these birds had been noticed long before this. Laudonnière's men on the St. John's River in Florida in January, 1565, were saved from starvation by the coming of "so great a manna of wood pigeons for the space of about seven weeks that our French killed of them each day more than two hundred in the wood, which did not come in badly for them."

The curious King crab of the New England coast interested Champlain much and he describes it at length. The savages used the shells to heap soil around the growing corn, and with parts of it they tipped their arrows. The Indians spoke of large birds which, Champlain understood them to

say, came in summer when the corn was ripe, and at the beginning of winter went away to warmer countries. These appear to have been wild turkeys, which were not migratory. Champlain must have misunderstood what the natives said. The strangely-shaped bill of the shearwater causes him to wonder how the bird can obtain food with such a contrivance. Zoology in his day had not speculated on the adaption of organs to use.

The name cyprès (cypress) is used by modern French-Canadians to designate the jack pine (*Pinus Banksiana*), but with Champlain it meant the cedar, either white (*Thuja*) or red (*Juniperus*). Thus he saw on this coast "beautiful cypresses which are of a reddish color and have a very pleasant odor."

On the 25th July, having progressed as far as Cape Cod they turned back, and reached Ile Ste. Croix on the 3rd August. One winter there was enough for them, and they moved to the much better situation of Port Royal on the Nova Scotia coast. The succeeding winter was mild, and although scurvy broke out, it was not as bad as before, and Champlain was pleased to write that only twelve died out of forty-five, a heavy enough mortality, in all conscience.

Next year (1606) through various delays, they did not set out exploring until September, and then they went over much the same ground as before. Jerusalem artichokes appear in Champlain's journal again as "very good roots which the savages cultivate", but this time their taste is compared to that of the cardoon or prickly artichoke of the Mediterranean region. Among other trees seen growing near Gloucester Harbor, Champlain mentions the sassafras, and calls it by that name. The sassafras is a native American tree, and its name, variously derived, comes through the Spanish. Champlain must have recognized the tree from specimens he had seen in France, introduced by Spanish or French explorers of the 16th century, probably for medical purposes. Early botany, apart from food plants, had to do almost entirely with therapeutics, and the Americas were eagerly searched for new drugs. A black letter book of 1596 has for title: "Joyfull News out of the New-found World; wherein are declared the Rare and Singular Vertues of divers Herbs, Trees, Plantes, Oyles and Stones, with their Applications, as well to the use of Phisicke as of Chirurgery." Preparations of sassafras are still official in the British Pharmacopæia.

Fleas were plentiful in the Indian huts and even in the fields. "One day when we went walking, we caught such a quantity that we were obliged to change our clothes."

Lice are never mentioned, probably because both to the white and the red men, they were matters of course, as they are yet to many populations. Bedbugs were an import from Europe and doubtless landed from the Mayflower with other notables. But loving a quiet, sedentary life, they never took up with the more or less nomadic natives. Kalm, in 1748, says bedbugs were plentiful in the English Colonies and in Canada, though unknown among the Indians.

They found very good oysters in what is now Barnstable Harbor, Cape Cod; and Champlain says: "All the harbors, bays and coasts . . . were filled with all sorts of fish . . . in such abundance that I can safely assert that there was not a day or night that we did not see and hear passing beside our barque more than a thousand porpoises, which were chasing the smaller fish."

In Champlain's account of a skirmish with the Indians on this coast, in which four of the French were killed, is found what is likely the first mention of the warwhoop: "The savages set up a desperate noise with howlings which were something terrible to hear".

They turned back from near Martha's Vineyard, and reached Port Royal on the 14th November, 1606. Only seven died of scurvy in the succeeding winter. Word came from France, in the spring, that the Company's trade monopoly had been rescinded and in August, 1607, Port Royal was abandoned.

The next year, 1608, is a date to remember in Canadian history. Again Champlain sailed for Canada, this time as lieutenant for Sieur de Monts, who had obtained another trade monopoly, and, reaching Quebec on the 3rd of July, at once set some of his men to work clearing the "nut-trees"—doubtless butternuts—from what is now the site of the Champlain market in lower town. One man was put to sawing boards, and another to digging a cellar and making ditches. That humble, unnamed workman who dug the cellar began the first permanent foundation in Canada, and this was the beginning of the City of Quebec and of the settlement of the country. The "Abitation de Quebec", when completed that fall, consisted of three adjoining buildings of two stories each, surrounded by a ditch and wall.

A plot to murder Champlain and hand the fort over to the Spaniards or Basques was fortunately discovered in time, and the ringleader, Jean du Val, was hanged and his head exposed on the walls on a pike, while his accomplices were deported to France.

In the autumn a large number of Indians gathered at Quebec to fish the eels which passed there from the 15th September to the 15th Octo-

ber on their way to the sea. As far back as the time of Aristotle it was noticed that eels did not breed in fresh water, and were never found with eggs in them. But only a few years ago was their real life history discovered. It is now known that they migrate from both America and Europe to the vicinity of the Bermudas to breed. The adults never return. The young, after living in the ocean for about one year in the case of the American eels and three years for the European eels, reach fresh water when they are six to eight inches long and ascend rivers far into the interior. After five to twenty years growth in rivers and lakes, they set out again on their last long journey to the sea.

Part of the Indians' catch of eels was dried as a winter provision. But famine was always common in winter among these improvident people, and in February, 1609, a wretched band came starving to Quebec and fed greedily on disgusting carrion that the French had thrown out. The French themselves had a bad time that winter. Out of twenty-eight, twenty of them died before spring. Dysentry—from eating too many eels, Lescarbot suggests—and scurvy carried them off.

In July, 1609, Champlain with two French companions joined an Algonquin war party against the Iroquois, and, ascending the Richelieu River, discovered the great lake that has been called after him. The enemy, who were encountered on the shores of the lake near Crown Point, were thrown into a panic by the effects of the French firearms, and were easily defeated. Nevertheless it was a fatal victory for the French, for thus they incurred the age-long hatred of the brave and warlike Iroquois, which was a constant source of trouble to them in later years.

Champlain remarks on the abundance of fish in Lake Champlain. Salmon were still caught there by the thousand in the early eighteen hundreds. He was so much taken with the garpike which he saw here for the first time that he figures it on his "Carte Geographique de la Nouvelle Franse," and on his return to France, presented a head of the fish to His Majesty, King Henri IV. He describes it fairly enough as resembling a pike in shape, "with a long snout armed with a double row of very sharp and dangerous teeth". Its scales, he says, are so strong that the blow of a poignard cannot pierce them. The Indians told him the fish grew to eight or ten feet long. The largest known nowa-days are five to six feet. The Indians also told him, mixing folk lore with natural history, that the garpike caught birds by hiding in the reeds and sticking its snout out of water to imitate a stump. When the birds lit on the supposed stump, the fish closed its jaws on them and drew them under. Champlain says nothing about the value of the fish as food. No doubt the natives ate it, as they ate practically everything that was not poisonous, but its flesh is now considered tough and rank and unfit for food.

The Indians presented Champlain with a garpike head which they recommended as a cure for headache. "They bleed themselves with the teeth of this fish on the spot where they suffer the pain, when it suddenly passes away." This may have been the head he afterwards gave to the King along with "two little birds the size of blackbirds and of a carnation color," being the first mention of the scarlet tanager, although he forgets to say the wings are black. The winter was spent in France as usual and in the early summer of 1610 he was back to Canada. Another expedition against the Iroquois is the chief occurrence of this year, but nothing of natural history interest is recorded. In July he sailed for France. On the voyage, the vessel ran over a sleeping whale, which gives Champlain occasion to describe at length how whales were harpooned and killed.

In 1611 Quebec was reached on the 21st May, and Champlain proceeded up the river to Montreal, and began to clear a place for a post. (The permanent settlement of Montreal dates, however, from Maisonneuve's arrival in 1640.) The Iroquois town of Hochelaga, which Jacques Cartier had visited in 1535, had utterly disappeared; but there was still "more than sixty arpents of land cleared up, like meadows, where grain can be sown and gardens made." Among other kinds of fruit growing here, "which are very good to eat", Champlain describes particularly "one which is very excellent, with a sweetish taste, rather like tbat of plantains (which is a fruit of the Indes) and is as white as snow, with a leaf resembling nettles, and which creeps along the trees and the ground lke ivy." This description is not quite consistent with any Canadian fruit, and all Champlain's editors, as far as I know, have passed it over in silence. Professor M. L. Fernald, whom I asked for his opinion, suggests the Snowberry (*Chiogenes hispidula*). He says: This little plant is a creeping vine and it has remarkably sweet and aromatic white berries; but the suggestions implied in the description, of its growing up trees and of its leaves being like nettles, are, of course, pretty extreme. It creeps in humus and often creeps a few inches up the trunks of woodland trees, but its leaves are only perhaps a quarter of an inch long. They are, however, very bristly, which would legitimately make them *nettle-like*."

Professor W. F. Ganong writes me that although the Snowberry is everywhere too scarce and

difficult to gather in quantity to be considered among actual food plants, still it is frequently used in Northern New Brunswick to make a highly and justly esteemed preserve. It is known as Capillaire by the French and sometimes called Teaberry by the English.

An Indian called Savignon brought word that, in coming down the Lachine rapids, he had seen an island "where there was such a great quantity of herons that the air was covered with them". These were Great Blue Herons, which often gather in large numbers to nest in such situations. Nobody eats heron now, but in those days it made a favorite dish at great tables, and was the chief quarry of the falconer. So, on this report, a Frenchman whom Champlain calls simply Louis, induced Savignon and another Indian, Outetoucos to paddle him to the heron island. They soon filled their canoe with the birds, and, against the advice of the Indians, Louis insisted on running the rapids home. The overloaded canoe swamped in the rough water and Louis and Outetoucos were drowned.

The year 1612 was spent in France negotiating for a monopoly of trade rights. On the 6th March, 1613, he embarked at Honfleur, the usual port of departure. The wretched Indians at Tadousac, where he arrived at the end of April, were starving, as they often were at that time of year, and greedily devoured the entrails of game thrown overboard by the French. "They also scraped off with their nails the fat with which our vessel had been coated, eating it gluttonously, as if they had found some great delicacy."

The principal event of this year of 1613 was Champlain's fruitless and difficult journey up the Ottawa to discover the mythical Northern sea that the impostor, Nicholas de Vignau, had told him of. At Constant Bay, on Lake Deschenes he says, "there is found here a root which dyes a crimson color, and with which the savages paint their faces, and also little geegaws according to their custom." Prof. W. F. Ganong says this was no doubt a Gallium or Bedstraw belonging to the madder family.

The lands about Lac des Chats were covered with pines, which had been almost all burned by the savages. A magnificent pine forest clothed all this part of the country when lumbering began here in the early 19th century—Quyon timber was rated at Quebec as the very best—so it is evident that not more than two hundred years were necessary for the regrowth. It was on the portage from the Cheneaux Rapids to Muskrat Lake that Champlain probably lost the astrolabe which was found on that route in 1867. His complaint of the mosquitoes, "whose importunity is so extraordinary that it is impossible to describe it", will awaken the sympathy of everyone who frequents our woods in June.

Mr. J. L. Morris, of Pembroke, Ontario, has pointed out that the Indian village where Champlain stopped was not on Allumette Island as generally supposed, but on Morrison's Island situated about four miles below the town of Pembroke. De Vignau's falsehoods were soon uncovered by the Indians, and Champlain had to return disappointed.

Champlain did not visit Canada in 1614, probably on account of the civil war which his patron, Condé, was carrying on against the Queen Mother. In 1615, however, he was back again, and again he journeyed up the Ottawa with two Frenchmen and ten Indians. Above Allumette Lake, the country was very unattractive with many rocks and somewhat hilly. But even this "hideous and desert land" had some compensations. "For," he says, "I assure you that there are along the rivers such a great quantity of blueberries, which is a little fruit very good to eat, and many raspberries, and other little fruits in such quantity that it is a marvel, which fruits the people who live here dry for the winter as we do with plums in France for Lent." The Upper Ottawa basin is still famous for blueberries. I know of a shanty gang on the Kipawa who, to amuse themselves one Sunday in September, went out and picked eight barrels of the berries!

Their route led them up the Mattawa River, whence they portaged across to Lake Nipissing, and from there paddled down the French River to Georgian Bay. The Indians, improvident as usual, had eaten so heartily at the beginning of the journey that supplies were now running short, and they were down to one meal a day eked out with blueberries and raspberries.

On the shores of Georgian Bay, he met with Indians who had come to dry blueberries for a winter store. The party stayed at a village near the present site of the town of Orillia in Simcoe County, and one incident recorded by Champlain is that he was driven out of his cabin by fleas. It is to be noted that the only insects he ever mentions are mosquitoes and fleas. Vertebrate Zoology and Botany develop naturally among primitive hunting and agricultural peoples, but the Entomologist is the product of a higher civilization. While awaiting the assembly of a war party, which his expedition was to accompany, he visited other neighbouring villages. The country was fertile and well cleared, and extensively planted in Indian corn, which grew here finely. The Indians also grew sunflowers, "from the seeds of which they make an oil to rub on the head."

Champlain continues: "There were many good vines and plums, which are excellent, raspberries, strawberries, little wild apples (pommes), nuts, and a kind of fruit of the form and color of small lemons and having something the same taste, but the inside is very good, and something like that of figs . . . There are many of the plants in various places, the fruit being very good and of good flavor." This remarkable plant is the May-apple (*Podophyllum peltatum*), and the fruit Champlain praises so highly is not held in any esteem now-a-days. An old edition of Gray's Manual describes it as "slightly acid, mawkish, eaten by pigs and boys." The plums he mentions are native, but there are no indigenous apples. The word "pomme" had a wide meaning in old French, and in this case may have meant marsh cranberries or haws.

The braves having assembled, the war party set out about the 10th September, and, travelling from Lake Simcoe by inland water-ways and portages, came out on the Bay of Quinte. "A very fine and pleasant region; the trees seem to have been planted for ornament." Champlain now revises his earlier estimate of the wild grape and admits that, while they ripen, "there always remains a very acrid sharpness which is felt in the throat on eating a quantity of them." In which Champlain is quite right. The Indians conducted a deer and bear hunt by forming a line of 400 or 500 men and driving the animals out onto a point and into the water, where other natives in canoes killed them. Wild fowl were in great quantities, and he notices particularly, "many cranes, white like swans". There are three American birds that might be loosely described as white cranes: the egret, the white heron, and the whooping crane. The first two are sub-tropical species, and, except for a possible straggler, it is unlikely they ever occurred in Ontario. In Mr. P. A. Taverner's opinion, the birds Champlain saw must have been whooping cranes, now confined to the west. They have black wing feathers, but Champlain doubtless overlooked that feature as he forgot to mention the scarlet tanager's black wings.

The war party coasted around the end of Lake Ontario and, concealing their canoes, travelled inland for several days through a forested country. There were many chestnut trees, the fruit still in the burr, small, but of good flavor. The Onondaga fort they came to attack was situated some miles south of Oneida Lake in what is now Madison County, New York. But now the French arquebuses no longer terrified the Iroquois; and this, with lack of discipline and co-operation, and the failure of 500 expected allies to arrive on time, caused the defeat of the attackers, who were forced to withdraw. Champlain himself received two arrow wounds in the leg, and had to be carried on the retreat in a kind of hammock, wherein he suffered severely from the jolting.

When they got back to where the canoes were hidden, the Indians refused to take Champlain and his men to Quebec, and the Frenchmen had to make up their minds to pass the winter in the native villages. The return journey to Lake Simcoe was made via Cataraqui Creek and Loughborough Lake, and the progress was quite leisurely. At one place the Indians spent ten days building an elaborate corral into which they hunted deer by forming a line of beaters. In 38 days they captured 120 deer in this way.

Near this place, which was in the vicinity of the present village of Tamworth in the County of Addington, Champlain got lost in the forest for some days. He went astray through following a bird which, he says, seemed strange to him. And from his description, it would seem strange to anyone. It had a beak something like a parrot's and was the size of a hen, all yellow save for a red head and blue wings, and it flew in short flights like a partridge. Champlain followed it from tree to tree for a long time until it flew away altogether. Then he found he was lost, and he did not get back to the encampment until the fourth day. After this, the Indians never let him go out hunting alone.

My first guess at this bird was the Carolina Paroquet which, now confined to Florida, and almost extinct there, at one time ranged as far north as the Great Lakes and Wisconsin. But the general color of the Paroquet is bright green, not yellow, and while the orange on its forehead and cheeks might give an impression of red, its wings are not blue.

On submitting the question to Mr. P. A. Taverner, he proposed the male Sparrow Hawk. It has a thick, curved bill, something like a parrot's; and, as Mr. Taverner says, the fawn and cream breast is very likely to be described as yellow, the small red cap may stick in the memory as a red head, and the blue wings are quite conspicuous. The bird also is quite unlike any of the European hawks that may have been familiar to Champlain through the sport of falconry, and so he would not recognize it as a hawk.

After a hard journey through the half-frozen country, they got back to their villages by the end of December. During the winter, Champlain visited various neighboring tribes, and gives a long account of their ways of living. They were much pestered by fleas in their cabins; and they had to suspend pieces of wood from the roof on which to put their clothes and provisions to keep

them away from the mice, which were in great numbers. These were likely white-footed mice which are still very ready to come into summer cottages and camps in the woods. He says the natives sometimes kept bears for two or three years, fattening them for their banquets.

At length, on the 20th May, 1616, he set out for the French settlements, and, after 40 days travel, reached the Falls of St. Louis (Lachine) to the great relief of his friends, who had feared he was dead. On the 20th July he sailed from Quebec for France, and made what was considered a quick crossing in seven weeks and three days.

This expedition of 1615 to 1616 was his last extended journey in New France. His later writings are mostly taken up with the difficulties of trying to establish a self-supporting colony at Quebec, the quarrels of rival trading companies, troubles with the Indians, and attacks by English privateers. After this, his journals have not much to do with natural history, but a few items may be culled here and there through them.

He made a voyage to Canada in 1617, but, as nothing of importance occurred, he published no account of it. The happenings of this year are, however, chronicled by Frère Sagard, one of the early historians of Canada. And to him, as an ecclesiastic, an event of much consequence was the celebration of the first mass at Tadousac by Père Paul Huet, just arrived from France. The ceremony, which was held in a rustic chapel built by the sailors, was conducted under difficulties. "During the mass, two men, decently clad, stood beside the celebrant, each with a branch in his hand to drive off the mosquitoes and gnats, which beset the priest so unbearably that they would have blinded him and compelled him to cease the mass without this remedy, which is simple enough and as useful as it is easy." It is well known that newcomers to this country are much more fiercely attacked by mosquitoes than are old residents or the native born; and Père Paul, prepared, no doubt, for sufferings in Canada, may have thought his martyrdom had already begun.

In the introduction to the 1632 edition of his Voyages, Champlain enumerates the many kinds of fish, fowl and beasts that were to be found in New France. Most of them have already been mentioned and we need not repeat them. But he distinguishes here for the first time three kinds of "partridge" (perdrix)—a misnomer persisting to this day—which can be identified as the ruffed grouse, the spruce partridge, and the ptarmigan. The latter, he says, "are white and come in winter." He did not know them in their brown summer plumage. Falconry being one of the great diversions of his time, he lists about fifteen birds of prey available for the sport. Among the others he describes a bird evidently intended for the Osprey, which he alleges to have "one foot like the talon of a bird of prey with which he catches fish, the other is like that of a duck which serves him to swim in the water when he dives to catch fish, a bird which it is thought is not seen elsewhere than in New France." Of course such a bird is not seen anywhere, but the myth was not confined to the New World, for Champlain here repeats an ancient fallacy which can be traced back to Albertus Magnus in the thirteenth century. A good example of how an easily detected error may escape down the ages.

In 1620 Champlain brought his family to live in Quebec, but he still made frequent trips to France, and in recording his voyage to Canada in 1626, when he reaches the Gulf of St. Lawrence, he interpolates a description of some of the adjacent shores, including Newfoundland. The rivers of this island, he says, abounded in salmon and other fish, and there were plenty of eslans or elk in the woods. "Eslans" meant moose with the early French, but the only native deer of Newfoundland is the caribou, which still exist there in considerable numbers. Strangely enough, he says the land was not inhabited, but was visited by natives from the mainland who came to trade with fishing vessels. Perhaps this mistaken statement was due to the fact that the Beothuks, the native race of Newfoundland, were very unfriendly to strangers, and had as little intercourse as possible with them. They are long extinct—the last survivor died in 1829—and very little is known of them.

The Bird Rocks harbored incredible numbers of sea birds he calls "tangueux", which translators have taken to mean the great auk. However, as he describes the birds as "large as a goose, with a very dangerous beak, and all white except the end of the wings", it would appear that he meant gannets, which still nest on the islands.

No one lived on Anticosti, and it was reported that there were many white bears there, very dangerous. From passages in Jacques Cartier and the journals of other early explorers it seems possible that the polar bear may have ranged down to the coast of Labrador in early times. Less than 50 years ago the Anticosti was still noted for its bears, but black ones. The name of the island is thought to be a corruption of the Montagnais *Nataskoueh*, "the place where one goes to seek bears".

In these years, Quebec was still mostly a trading post and fort, and very little land was under cultivation. The few small fields of the first habitants did not yield enough to feed even the fifty or sixty more or less permanent residents.

So when the supply ships from France failed to arrive on time, famine set in, and Champlain tells how the Quebecers had to go out and search the woods for edible roots and herbs. This country that now exports vast quantities of food to feed the rest of the world, could not then support three score people over winter.

A number of edible roots grow wild in our woods, but seldom in sufficient quantity to serve as a food supply of any importance. The ground-nut (*Apios tuberosa*), has already been mentioned. Its tubers, though well-tasted, are only about the size of a bean, and to gather enough for a meal would mean a lot of work. Another edible root is the bulb of the Spring Beauty (*Claytonia*). These are flat and about as large as the end of a man's finger. They are probably wholesome enough, but have an unappetizing earthy taste. The pepper-root (*Dentaria*) is more of a relish than a food, and so is the Indian cucumber-root (*Medeola*) and the wild leek (*Allium*). I cannot think that a man could live on them. And anyone trying to breathe the same air as a person on a leek diet would probably die also. The large, spongy root stocks of the yellow pond-lily (*Nuphar*), said to have been eaten by the Iroquois, and much favored by the moose, have an unpleasant, bitterish flavor when raw, but perhaps this is removed by boiling*, like the exceedingly acrid juice of the Jack-in-the-pulpit (*Arisaema*) corm, which the Indians also used to eat. Thoreau's Indian told him the root of the yellow lily (*Lilium canadense*) was good to thicken soup, and the roots of the cat-tail (*Typha*) are said to be nourishing. Other roots used by the Indians, and perhaps by the starving French at Quebec, were the unattractive skunk cabbage (*Symplocarpus*), burdock (*Arctium*) and Solomon's seal (*Polygonatum*). That all these wild roots have remained wild, and have never come into cultivation, is good proof that they have little food value.

On Christmas Day, 1635, Samuel de Champlain died in his city of Quebec, and was buried there, but no one knows with certainty where his bones lie. His body was first buried in the Parish church, and after a couple of removals, was finally placed in a chapel specially built by the succeeding Governor, M. de Montagny. This building was in the upper town, somewhere near the present Buade Street, but no mention of it later than 1649 has been discovered. It was either allowed to fall into ruin, or was burned in one of the fires that were frequent in Quebec from the earliest times, or it may have been demolished to make way for new constructions. In any case, Champlain's tomb dropped out of record, and his last resting place is unknown to this day.

*My experience in boiling this root is that it becomes even more bitter when boiled. It is too disagreeable to eat unless by persons who are starving and even then it seems too spongy to afford much nutriment.—R. M. ANDERSON.

NOTES ON CANADIAN FRESHWATER ENTOMOSTRACA

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IN 1921 I published, in *The Canadian Field-Naturalist*, Vol. XXXV, p. 72, a list of the freshwater Entomostraca which I had collected in Ontario. Since that time I have done further work in other localities in Ontario, and have made more than a hundred collections in southern New Brunswick. I have also, through the kindness of Dr. A. P. Knight and Mr. J. Russell Martin, received some material from Prince Edward Island and Saskatchewan respectively. The following list gives the species which I have up to the present determined from Canadian waters, and includes, for the sake of completeness, the records previously published.

ORDER CLADOCERA

Sida crystallina, O. F. Muller. Fairly common in shallow water among reeds at margin of Bocabec Lake, N.B.

Latona setifera, O. F. M. Scarce at margin of Chamcook Lake, N.B.

Diaphanosoma leuchtenbergianum, Fischer Scarce in plancton at 1 metre in Lake Missanag, Ont. Common in surface plancton in Lake Utopia, N.B.

Holopedium gibberum Zaddach. Surface, Bocabec Lake, N.B.

Daphnia pulex (de Geer). Abundant in pools in woods, Aylmer, Ont. Common in pool on bank of Aux Sauble River, Grand Bend, Ont.

Daphnia pulex pulicaria Forbes. Surface, Bocabec Lake. Abundant in material sent from near Charlottetown, P.E.I., by Dr. A. P. Knight. Volvox globator was abundant in the water in which they were shipped and the intestines of the individuals dissected were filled with young Volvox colonies.

Daphnia longispina hyalina Leydig. A very common limnetic species in Ontario and New Brunswick.

Daphnia longispina hyalina mendotæ Birge. Common at surface, mouth of Cataraqui River, Ont.

Daphnia arcuata Forbes. Collected by J. Russell Martin in an alkaline slough at Assiniboia, Sask.

Daphnia netrocurva Forbes. Common in plancton in Lake Utopia, N.B.

Simocephalus vetulus (O. F. M.). Common in marsh at edge of Cataraqui River.

Simocephalus serrulatus (Koch). Very common in ponds and pools in New Brunswick and Ontario

Scapholeberis mucronata (O. F. M.). Very common in ponds in Ontario and New Brunswick

S. cornuta (Schoedler). One individual taken in plancton from a marshy pond at St. Andrews, N.B. First record for North America.

Ceriodaphnia megalops Sars. Scarce in marsh at edge of Cataraqui River, Ont.

C. reticulata (Jurine). Common in marshy pond St. Andrews, N.B. Abundant in pond at Head Harbour, Campobello, N.B.

C. quadrangula (O. F. M.). Scarce in spring-fed pool near Chamcook, N.B., July 5. Common in swamp near Bocabec, N.B.

Bosmina longirostris (O. F. M.). Common in surface plancton in lakes in Ontario and New Brunswick.

B. obtusirostris Sars. Common in large pond at Springwater, Ont.

B. longispina Leydig. Common in plancton at one metre in Lake Missanag, Ont. Common in Chamcook Lake and Lake Utopia, N.B.

Ophryoxus gracilis Sars. Scarce at margin of Little Cataraqui River, Ont. Rare at surface, Bocabec Lake, N.B.

Camptocercus rectirostris Schoedler. Scarce at margin of Little Cataraqui River, Ont.

Kurzia latissima (Kurz). Rare in pool at St. Andrews. Scarce in pool on bank of Aux Sauble River, Ont.

Acroperus angustatus Sars. Scarce at margin of Little Cataraqui River, Ont. Scarce at surface, Bocabec Lake.

Pleuroxus procurvatus Birge. Common at margin of Little Cataraqui River, Ont. Abundant in Keaton's Pond, Kingston, Ont. Scarce in pool on banks of Aux Sauble River, Ont.

P. hastatus Sars. Scarce in pool near Chamcook Lake, N.B. Frequent at surface of reedy margin of Bocabec Lake, N.B.

P. striatus Schoedler. Common at mouth of Little Cataraqui River. Common at surface of Bocabec Lake.

Alona guttata Sars. Scarce in shallow channel in marsh at edge of Cataraqui River. Fairly common in marshy pond at Kingston, Ont.

Alona costata Sars. Frequent in a rock pool on the shore of Bocabec Lake, N.B.

Chydorus faviformis Birge. Frequent at margin of mouth of Little Cataraqui River, Ont. Rare in pond in limestone rock, Barriefield, Ont.

C. sphaericus (O. F. M.). Abundant in pools, ponds and the margins of lakes and slow-flowing rivers in Ontario and New Brunswick.

C. sphaericus nitidus Schoed. Abundant in a pool near Chamcook Lake, N.B.

Polyphemus pediculus (Linn.). Scarce in plancton at one metre in Lake Missanag, Ont. Scarce at surface of Bocabec Lake. Abundant in a little rock pool on the shore of Bocabec Lake, N.B.

Leptodora kindtii (Focke). Common in Lake Utopia, N.B.

ORDER OSTRACODA

Cypridopsis vidua (O. F. M.). Abundant in pools, ponds and at the margins of lakes amid vegetation in Ontario and New Brunswick.

Potamocypris smaragdina Vavra. Common in pools off Moira River, Ont. Common in pool at Barriefield, Ont.

Ilyocypris bradyi Sars. Scarce in pond near St. Andrews, N.B.

Spirocypris tuberculata Sharpe. Common in pond at Port Bruce, Ont.

Cyprinotus incongruens Ramdohr. Common in two spring-fed pools at St. Andrews, N.B. Common in a spring-fed pool near Kingston, Ont.

C. dentata Sharpe. Pool, near Kingston, Ont.

Cypris testudinaria Sharpe. In pools in woods, near Aylmer, Ont. Collected by H. C. White.

C. virens Jurine. Common in marshy pool at Port Bruce, Ont.

C. reticulata Zaddach. Common in three pools at St. Andrews, N.B.

C. fuscata Jurine. Common in marshy pool, St. Andrews, N.B.

Cyclocypris lutea Klugh. This species, which has passed in America as *C. laevis* occurs in pools at St. Andrews and near Kingston, Ont.

C. forbesi Sharpe. Fairly common in ponds in New Brunswick and Ontario.

C. castanea Klugh. Common in a small grassy pool at St. Andrews, N.B.

Cypria exsculpta Fischer. Scarce in swamp near Bocabec Lake, N.B. Common in pool near St. Andrews, N.B.

Candona paralella, G. W. Muller. Fairly common in a pool at St. Andrews, N.B.

ORDER COPEPODA

Diaptomus oregonensis Lilleborg. A very common species of lakes in Ontario and New Brunswick.

D. birgei Marsh. Common in pond in limestone rock, Barriefield, Ont., and in a pond at St. Andrews, N.B.

Cyclops ater, Herrick. Scarce in a spring-fed pool near Chamcook, N.B.

C. bicuspidatus Claus. A common species of lakes in Ontario.

C. americanus Marsh. Common in pools at Barriefield, Ont.

C. brevispinosus Herrick. Common in open water of Lake Missanag, Ont.

C. fuscus Jurine. Scarce in marshy pools and common in a pond at St. Andrews, N.B.

C. serrulatus Fischer. A common species in pools in Ontario and New Brunswick.

C. phaleratus Koch. In temporary pools at Aylmer, Ont.

C. fimbriatus Fischer. Scarce in shallow water at edge of Cataraqui River.

Canthocamptus minutus Claus. Common in ponds, lakes and pools in Ontario and New Brunswick.

AGRICULTURAL DEVELOPMENT AS A FACTOR IN WILD LIFE REDUCTION

By NORMAN CRIDDLE

A paper presented to the Provincial-Dominion Game Conference, April, 1926.

IN THEIR anxiety to preserve our wild life, conservationists have advocated numerous measures of reform, they have also advanced many reasons to account for the gradual decrease of the creatures involved. It seems to me, however, that undue emphasis has been placed upon the importance of predatory birds and mammals and not enough upon the innumerable changes brought about through agricultural development. The destruction of our forests, while seriously affecting fur-bearing and the larger game animals, has, on the whole, had less effect on the feathered tribes than has the steady encroachment upon the virgin vegetation by settlers and in the clearing away of shrubs and trees to make room for the planting of crops. By these means vast numbers of breeding birds have been deprived of the necessary cover to shelter their nests from enemies. Pasturing where cultivation is not profitable has probably been a still greater factor in restricting ground birds; areas that once supported a numerous bird population being now so denuded of vegetation as to be useless for that purpose.

Referring particularly to the prairie provinces, we have only to consider that territory forty years ago and compare the conditions then with those of to-day to realize how great has been the change in that time. The country, as I remember it then, was literally a sportsman's paradise; ducks, geese, cranes and other waterfowl inhabited the marshes in thousands, while the prairies were teeming with a great variety of species, including Sharp-tailed Grouse, Upland Plover, Golden Plover and many more. Hawks and owls were relatively as numerous as the game birds and even in those days large flocks of crows might be noted that stretched right across the sky.

Many of the species then so plentiful have now been reduced to the vanishing point; of others, but a remnant survives. The sportsman, the game-hog and the law-breaker have all contributed to this lamentable state of affairs but the agriculturalist has probably assisted still more. The millions of acres of cultivated land were originally breeding places for birds which have been forced to move elsewhere. More important still has been the grazing by livestock. The numerous prairie ponds and small lakes which once harboured birds now support the farmer's herds; the water providing convenient drinking places and the shores, usually embracing a more luxuriant growth of grass than is procurable elsewhere, are cropped so closely that no bird can obtain nesting quarters in the vicinity. Furthermore, the lack of cover leads to the detection of both eggs and young by predators on the lookout for them.

These conditions now prevail over practically all the more thickly settled districts and they are steadily being extended with the arrival of new settlers. It may be said in extenuation for the breaking up of the virgin sod that much food is being made available that was formerly absent and this is true, but the effects are of minor importance in comparison to the harm done.

Having recognized the conditions outlined above, the problem for us to solve is. "How are we to prevent them becoming worse with continued agricultural development?" Should we boldly step in before it is too late and set aside bird sanctuaries despite their agricultural possibilities or should we confine our efforts to protecting areas that have

comparatively small farming value, but which nevertheless support numerous breeding birds? Probably the latter course would be wisest. In any case the first thing to do is to preserve what we have and this means that all our present bird sanctuaries must be defended against both cattle and hay-makers. Lakes and marshes should have a protected shore-line extending outward for at least half a mile, because it is on the land rather than amid the reeds that many ducks nest. Our upland sanctuaries should also be protected from livestock.

Road-side shrubs, hedge-rows and farm plantations should be encouraged as much as possible, because it is among these that many grouse and song birds nest or seek protection from their enemies.

I was asked a short time ago, "Why have Chestnut-collared Longspurs and Lark Buntings ceased to breed in a certain section of Manitoba?". In reply I inquired, "Have you any protected sod land left?" The answer was, "No, it is all utilized for grazing." The obvious explanation is applicable to nearly all the settled parts of Canada to-day.

THE GRAPTOLITES OF THE GLENOGLE FORMATION

By T. H. CLARK

THE Glenogle formation consists of a series of black shales of Ordovician age containing beds rich in graptolites typically exposed at Glenogle, B.C., and locally developed in the vicinity of that place. The earliest mention of graptolites in the rocks of the formation is in a report by McConnell in 1887*. Besides describing the geological relations of the shales he also included a report upon the graptolites by Lapworth, who submitted the following list of species:—

Didymograptus cf. *euodus* Lapworth;
Glossograptus ciliatus Emmons;
G. ciliatus Emmons [=*G. spinulosus* (Hall)];
Cryptograptus tricornis (Carruthers);
Diplograptus angustifolius Hall;
D. rugosus Emmons;
Climacograptus caelatus Lapworth;

Doubtful forms: Lasiograptus and *Phyllograptus.* Lapworth was of the opinion that this assemblage belonged to the Trenton-Utica fauna, but suggested that it might be somewhat older than the typical Normanskill fauna. Lapworth's report was also printed independently elsewhere.†

Allan, in his report on the geology of the Field area‡, B.C., adds little to what McConnell had reported, and repeats Lapworth's list. Gurley in his study of North American Graptolites§ changed the name *Diplograptus rugosus* to *D. foliaceus*, and in a foot-note inclined toward the view that the beds were of Chazy age. Still later, Ruedemann, in his invaluable monograph on the Graptolites of New York*, considered the assemblage to be more properly correlated with the Lowville and Black River, and slightly older than the typical Normanskill fauna, and gave further reasons for his disbelief in assigning the beds to the Chazy. Unimportant references to the Glenogle shales occur in the International Geological Congress Guide Books†. More recently, Walcott has suggested the name Glenogle Formation for these graptolitiferous beds, which had hitherto been referred to as the Graptolite Beds.‡

Lapworth's list of fossils from Glenogle remained unchanged except for refinements of nomenclature until 1924, when Walcott published a new list of fossils from this locality, collected by L. D. Burling, and identified by Ruedemann§. The list is as follows:—

Loganograptus logani mut. tardus Ruedemann;
Didymograptus serratulus Hall;
D. sagitticaulis Gurley;
D. sp. nov. aff. D. forcipiformis Ruedemann;
D. spinosus aff. D. filiformis Tullberg;
D. spinosus Ruedemann;
Cryptograptus tricornis (Carruthers);
Climacograptus antiquus Lapworth [=*C. caelatus* Lapworth];
Diplograptus cf. teretiusculus Hisinger [Probably, instead of *D. rugosus*];
Lasiograptus sp. nov.
Glossograptus horridus Ruedemann [*G. ciliatus* of Lapworth].

Ruedemann's comments include the following words: "This fauna is a new association of forms indicating a horizon between the Deep Kill and Normanskill shales."

*McConnell, R. G., Geol. & Nat. Hist. Surv. Canada, Ann. Rept. 1886, vol. 2, p. 22D, 1887.
†Lapworth, Charles, Sci., 9, p. 320, 1887.
‡Allan, J. A., Geol. Surv. Canada, Mem. 55, geol. ser. 46, p. 100, 1914. In Allan's paper *Glossograptus tricornis* Emmons should read *Glossograptus ciliatus* Emmons.
§Gurley, R. R., Journ, Geology, vol. 4, p. 298, 1896.

*Ruedemann, R., N.Y. State Mus., Mem. 11, pt. 2, p. 9-25 1908.
†Geol. Surv. Canada, Guide Book No. 8, pt. 2, pp. 142, 181, 200, 1913.
‡Walcott, C. D., Smithson, Misc. Coll., 67, no. 8, p. 463, 1923.
§Walcott, C. D., Smithson. Misc. Coll., 75, no. 1, p. 33, 1924.

Without exception the descriptions of the outcrops at Glenogle have mentioned in detail only the small creek at the western end of the railroad cut. The Glenogle formation extends for several hundred feet in a well exposed cut some quarter of a mile west of the Glenogle station. Throughout most of its extent the shale is much crumpled, its structure obscure, and breaks into small fragments; graptolites are common only in a few horizons, and collecting is not "good". At the western end of the cut there is a small creek, along whose course there are exposed fissile black shales which break readily with broad flat surfaces, some of which are crowded with graptolites. It is doubtless from this latter locality that most, if not all of the collections prior to that made by Burling came. Ruedemann's list, however, shows not only the species common in these flat shale beds, but also an admixture of other graptolites from the contorted beds to the east. Burling's collection was, then, made from the whole cut, but apparently no attempt was made to keep separate the collections from different points. This is one of the cardinal virtues in collecting graptolites, for collections made only a few feet apart sometimes show surprising differences in graptolitic content. Within the contorted shales there is very little structure or stratigraphic succession observable, so that it is at present impracticable to separate into zones the graptolites from that part of the cut. However, it is quite apparent that the graptolites from Glenogle come from shales which, though they may have been deposited continuously, are equivalents, in part of the upper Deep Kill beds, and in part also of the lower Normanskill strata. The fossils from the creek, whence Lapworth's collection came, belong to the latter horizon, whereas the shales of the rest of the cut have yielded only Deep Kill forms. The following faunal lists, which are as nearly complete as possible, are compiled from the reports of Lapworth and Ruedemann, and from the writer's collection. The letters accompanying each name indicate the authority responsible for the inclusion of that species, "L" signifying Lapworth, "R" Ruedemann, "C" the present writer.

LIST OF SPECIES OF GRAPTOLITES FROM BEDS OF NORMANSKILL AGE IN THE GLENOGLE FORMATION, GLENOGLE, B.C.

R	*Didymograptus serratulus* (Hall);
R	*D. sagitticaulis* Gurley;
L C?	*D. euodus* Lapworth;
L R C	*Cryptograptus tricornis* (Carruthers);
L R C	*Climacograptus antiquus* Lapworth (= *C. caelatus* Lap.)
L R C	*Diplograptus teretiusculus* Hisinger (? = *D. rugosus* Emmons);
L C	*D. angustifolius* Hall;
L R	*Lasiograptus sp.*
R	*Glossograptus ciliatus mut. horridus* Ruedemann;
L C	*G. ?ciliatus* Emmons.

LIST OF SPECIES OF GRAPTOLITES FROM BEDS OF DEEP KILL AGE IN THE GLENOGLE FORMATION, GLENOGLE, B.C.

C	*Bryograptus cf. kjerulfi* Lapworth, probably a new species;
RC	*Loganograptus logani* (Hall);
C	*L. logani mut. tardus* Ruedemann;
C	*Tetragraptus quadribrachiatus* (Hall);
C	*Didymograptus euodus*? Lapworth;
R	*D. spinosus* Ruedemann;
C	*D. gracilis* Törnquist;
C	*D. nicholsoni* Lapworth;
C	*D. affinis* Nicholson;
R	*D. filiformis* Ruedemann;
RC	*D. forcipiformis* Ruedemann;
C	*D. (Isograptus) caduceus mut. nana* Ruedemann;
C	*Lasiograptus sp.*
C	*Trigonograptus ensiformis* (Hall);
C	*Glossograptus inutilis* (Hall);
C	*G. ciliatus* Emmons;
C	*G. sp. indet., probably new;*
C	*Climacograptus antennarius* Hall;
C	*Retiograptus tentaculatus* (Hall);
C	? *Diplograptus dentatus* (Brogniart).

Of the species in the second list, all except *Bryograptus cf. kjerulfi, Loganograptus logani, Didymograptus gracilis, D. affinis,* and *D. nicholsoni* are characteristic of Ruedemann's *Diplograptus dentatus* zone (Deep Kill, Divisions 6 and 7) The three species of Didymograptus have been reported from the *D. bifidus* zone by Elles and Wood (their zone 6), so that with the exception of *Loganograptus logani* and *Bryograptus cf. kjerulfi,* all of the species are characteristic of the upper part of the Deep Kill series, or beds of equivalent age. It is remarkable that no specimens of *Didymograptus murchisoni* occur, although some of its congeners have been found. Bryograptus has previously been recorded from beds older than Ruedemann's Tetragraptus zone. At Glenogle *Bryograptus cf. kjerulfi* is found on slabs alongside of *Trigonograptus ensiformis, Glossograptus inutilis, G. ciliatus* and *Climacograptus antennarius.* This is the most remarkable association shown in these beds. Loganograptus has been previously reported from beds much higher than those in which its characteristic development occurs, but Bryograptus has not.

OTTAWA FIELD-NATURALISTS' CLUB RECOVERS VALUABLE PAPERS

THROUGH the energy of Mr. Frits Johansen and the friendly assistance of Mr. Chas. H. Thorburn, the Club recently regained possession of certain very important papers that had been accidentally mislaid following the death of an early officer of the Club. Probably the most important document is the complete declaration of the officers and members, setting forth the name and purpose of the Society, the names of the first Trustees, the mode in which their successors are to be appointed, etc., which, when endorsed by a Judge as being in conformity with the Statute, and when a similar document was filed in the office of the Provincial Registrar became the Charter of the Club. This procedure made the Club "a body corporate and politic" or an Incorporated Society, having "the powers, rights and immunities vested by law in such bodies, 37 V. c. 34, s. 2; 40 V. c. 7, Sched. A. (149 and 150)."

The application for incorporation is made under the provisions of Revised Statutes of Ontario, Chapter 167 (1877). It is in longhand covering four sheets of foolscap, and the declarants making the application were: Henry Beaumont Small, President; R. B. Whyte, 1st Vice-President; John Macoun, 2nd Vice-President; Wm. P. Anderson, Treasurer; W. H. Harrington, Secretary; Henry M. Ami, Librarian; J. Fletcher; W. L. Scott; J. B. Tyrrell.

The endorsation that the written declaration "appears to me to be in conformity with the provisions of Chapter 167, etc.," is by William Aird Ross, Judge of the County Court of the County of Carleton, and is dated 29th day of February, 1884. The Provincial Registrar's certificate is endorsed on the document as well and reads: "I hereby certify that a duplicate of the within Declaration was duly fyled this day in the office of the Provincial Registrar for the Province of Ontario, John F. C. Ussher, Deputy Registrar, 3rd March, 1884."

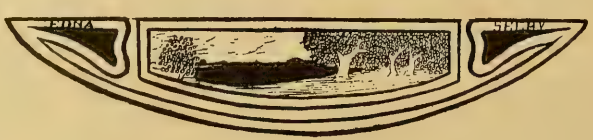
In addition to the written declaration the application for incorporation was accompanied with a printed programme of activities for 1883-1884 and a list of soirees for the same period.

Following this incorporation of the Club, a special general meeting was held on March 28th, 1884, and the Constitution adopted that day conforms generally with the declared application for incorporation. This is the foundation for our present Constitution, and may be found in O.F.-N.C. Trans. 5, Vol. 11, No. 1, pp. 9-11, 1883-4.

The other papers that were returned to us comprised a scrap book that had evidently been kept up by the Secretaries The first entry is an account from the Herald of May 22, 1879, of the first excursion of the Club which was held to Kingsmere the previous day. I wish space would allow me to quote from this charming account of a day afield. *The Citizen's* account of the same excursion follows—a full column. Turning over the pages, where all sorts of Club announcements as well as newspaper clippings have been preserved with meticulous care, one comes to the accounts of the lecture delivered March 11, 1881, by Professor Macoun, F.L.S. "On the capabilities of the Prairie Lands of the North West Territories as shown by the Fauna and Flora". The address was repeated on the evening of the 7th of April by special request of His Excellency the Governor-General, and it was without doubt one of the most important lectures ever delivered before the Club.

The record is carried on till 1887 and is especially useful because the minutes for this period of the Club's existence are missing. We are all indebted to the gentlemen who have so kindly assisted in completing the records of the Club's work by returning these papers to the Club. They were presented to Council at a meeting held on January 23rd, 1926, when ex-President Dr. Frank T. Shutt took the Chair temporarily and extended thanks to the men who had helped us in this way.

Reported at the request of Council by Hoyes Lloyd.



FIELD WORK OF THE VICTORIA MEMORIAL MUSEUM, 1926

By W. H. COLLINS, Acting Director

A CONSIDERABLE amount of field work is done each summer by the Victoria Memorial Museum, which occupies the position of a national Canadian museum. Its field parties are distributed throughout Canada and are engaged chiefly in collecting natural history specimens and records for the museum collections and in scientific investigations of various sorts.

The Museum originated seventy-eight years ago in the Geological Survey. It is still closely related with the present institution and its departments of geology, mineralogy and palæontology are maintained by the Survey, but in its other departments of anthropology and biology it has attained more nearly to the status of a distinct institution.

During 1926 field work is being done as follows:

ANTHROPOLOGY

D. JENNESS is investigating and collecting relics from the sites of ancient Eskimo habitations on the Alaskan and Siberian coasts of Bering Sea. Bering Strait has been a route for migration of aboriginal peoples between Asia and America and is a favourable place for the study of these migrations and the spread of Asiatic ethnological influences among the Eskimo of Northern Canada. In the course of this work, study will be made of modern Eskimo culture and language, particularly for the purpose of augmenting a "Comparative Grammar and Vocabulary of the Western Eskimo Dialects", which Mr. Jenness is compiling.

C. M. BARBEAU is continuing a study of the social organization, religion and legends of the Tsimshian Indian tribes of Skeena river, upon which he has been engaged for some years. He is also collecting information concerning the totem poles of these tribes.

H. I. SMITH is continuing the work of restoring and preserving totem poles in the Skeena river area. Owing to decline of Indian social organization under the influence of white civilization, these interesting relics are rapidly deteriorating and in danger of complete disappearance. Last year the Canadian National Railways, the Department of Indian Affairs, the Parks Branch, Department of the Interior, and the Victoria Memorial Museum took prompt action to preserve the remaining totem poles. In the course of this work, Mr. Smith is also studying and collecting archæological specimens for the museum.

W. J. WINTEMBERG is excavating ancient Indian village sites and other ruins near Collingwood, in Grey County, near Creemore, Simcoe County, near St. Williams, Norfolk County, and at Lake Medad, Halton County.

BIOLOGY

P. A. TAVERNER has made a zoological survey of the region northwest of Edmonton between the Canadian National and Edmonton, Dunvegan and British Columbia railways and collected specimens for the museum. He was assisted by Messrs. Hamilton M. Laing and C. G. Harrold. He also cooperated with Professor William Rowan of the University of Alberta in placing identification bands upon gulls at Beaverhill lake.

C. H. YOUNG is collecting specimens of birds, mammals and other animals in the northern part of Cypress hills, Saskatchewan, and from the foothills of the Rocky Mountains in southern Alberta.

R. M. ANDERSON has made some zoological observations in the Ottawa region.

M. O. MALTE conducted a systematic botanical survey of the flora of New Brunswick, particularly in the region of the Bay of Chaleur. A visit was also made to Prince Edward Island to examine certain species of bent grasses which appear to be suitable for lawns and golf greens. He attended the International Congress of Plant Sciences at Ithaca, New York, in August and devoted the remainder of the season to field work in the Ottawa district.

A. E. PORSILD and R. T. PORSILD who are being sent by the Department of the Interior to the country just east of the Mackenzie river delta to investigate conditions for introduction of reindeer, will, through the courtesy of their Department, make a botanical survey of this region and collect plants for the National Herbarium.

J. D. SOPER, who was sent to Baffin Island in 1924 with the annual Canadian Government supply expedition, continued general biological survey work and collection of specimens until August of this year. Mr. Soper travelled from Pangnirtung, on Cumberland Sound, which has been his headquarters, through Mettilling and Amadjuak lakes to the coast of Hudson strait, where he was picked up by a Hudson Bay Company's steamer and is expected to return to Ottawa early in October.

W. S. ODELL, C. L. PATCH and C. S. JOHNSON collected zoological and botanical specimens in the vicinity of Ottawa. Mr. Patch is engaged in collecting material for an illustrated systematic report upon the amphibia and reptilia of Canada.

GEOLOGY AND MINERALOGY

No parties are being sent out expressly for museum purposes, but contributions to the Geological and mineral collections will be made incidentally by parties of the Geological Survey.

PALÆONTOLOGY

C. M. STERNBERG was sent by the Geological Survey to the Red Deer river valley, near Rumsey, Alberta, to collect fossil remains of dinosaurs and other vertebrate animals. This area is one of the richest repositories in the world and has yielded many fine specimens to Canadian and United States museums.

Other palæontological investigations and collections will be made incidentally by parties of the Geological Survey.

NOTES AND OBSERVATIONS

ASELLUS AQUATICUS NOT FOUND IN LABRADOR.—This freshwater Isopod, which is so common in Europe, North Africa and Siberia, also occurs in Greenland, from where it was first recorded (as *Oniscus aquaticus*) by O. Fabricius, in his "Fauna Groenlandica", Hafniæ 1780, p. 251, No. 227. Later H. Kroeyer, in his "Groenlands Amfipoder", Copenhagen, 1838, p. 318, considered Greenland specimens of *A. aquaticus* as a separate species, which he called *A. groenlandicus;* but the latter is now recognized as the same as *A. aquaticus* (K. Stephensen, "Conspectus Crustaceorum et Pycnogonidorum Groenlandiæ", Copenhagen, 1913 (1917), p. 240).

Its reported occurrence in Labrador is a mistake (apparently now corrected for the first time) by H. Richardson (Monograph Isopods North America, Wash., 1905, pp. 428-29) in considering the "*Asellus groenlandicus*" recorded by A. S. Packard (Memoirs Boston Soc. Nat. Hist., Vol. 1, 1867, p. 296) from Labrador, as *A. aquaticus*. Richardson (1905, p. 429) states that Packard records it from Greenland, as *A. groenlandicus*; for the word "Greenland" should of course be read "Labrador". I quote in full Packard's record of "*A. groenlandicus*" (italics by me):—

> "Specimens agreeing *in length* with those noticed by Fabricius (Fauna Groenlandica) were common at Square Island and Hopedale, Labrador, *in soil*, under stones, etc., in company with *Limax*."

From this it is evident that Packard made no attempt to identify his specimens from Labrador, nor has it been done by others since his time. The fact that they occurred in the soil, together with a pulmonate slug, shows that they were really *woodlice* (Oniscidae), and not aquatic isopods.

What species of land-isopod these specimens collected by Packard in Labrador were, we do not know; but they were probably the widely distributed form, *Porcellio scaber* Latr., known both from Newfoundland, the Province of Quebec, etc. (Richardson, 1905, p. 622), and which has apparently also been introduced to Greenland (Stephensen, 1913 [1917], p. 256).—FRITS JOHANSEN.

THE WAPITI IN ONTARIO.—There is in the collection of the Department of Biology, University of Toronto, a number of antlers of the Wapiti (*Cervus canadensis*) that are perhaps worthy of record. One is from the collection of the late Prof. Henry Montgomery. The label attached to it reads, "Ind. grave, Manvers, Simcoe Co.". Another is from Hungerford township, Hastings County. A third specimen belonged to the collection of Dr. Garnier who lived at Lucknow, Bruce County. The label attached to this specimen indicates that information concerning its discovery was to be found in his catalogue of Indian relics (No. 101). This catalogue, unfortunately, cannot be found, but it is almost certain that these antlers are from southwestern Ontario, where most of Dr. Garnier's material was secured. Accurate data for the fourth pair of antlers in the collection are also lacking. The catalogue contains the following information: "Found in marsh. Present in museum before 1870".

In May, 1921, there was found near Caledon some forty-five miles northwest of Toronto, an almost complete skeleton of the Wapiti. The skeleton was examined by Professors W. A. Parks and B. A. Bensley of the University of Toronto, who found that it lacked only a few parts of the skull, some vertebrae and other smaller pieces. Included with the parts as found was a very fine pair of antlers, each a little over four feet in length (measured in a straight line) one with six, the other with seven points. Some evidence as to the occurrence of the wapiti in southwestern Ontario was presented by L. H. Smith in the *Ottawa Naturalist*, Vol. XV, pp. 95-97.—J. R. DYMOND.

THE BLUE-JAY AS A BIRD OF PREY.—One morning, about the middle of June, I noticed a Blue-Jay in a tree about ten feet from a window of my house, tearing and eating something held in its feet. From the window, I could clearly see that it held with its toes a young live bird, only partly covered by feathers. The young bird had apparently been stolen from its nest. Hoping to get the young bird for identification, I went out and disturbed the Jay expecting it to fly up and drop its prey. However, to my surprise, it immediately flew away with its prey held in its foot like so many of the large carnivorous birds. I should like to know if it is a common thing for the Jays to carry prey in this manner?—CHAS. W. LOWE, *Winnipeg, Man.*

THE TEMPEST IN THE TEAPOT.—Some months ago a well-known member of the Ottawa Naturalists' Club and of a Government Department, prepared a paper and, in a spirit of good-natured humor not too common in the scientific world, titled it "In Townsend's Labrador" as a sly dig at that gentleman's "In Audubon's Labrador" and many other books on the same subject. In due time it appeared in the pages of this publication.

That there could be any exception taken to this title except perhaps, by Dr. Townsend himself, never occurred to anyone cognizant of the paper. But in certain quarters it was taken as a gratuitous reflection upon the memory of the late and lamented Mr. Napoleon Comeau, who alone by these critics was deemed entitled to the honor of such implied proprietorship. This would scarcely be worth mentioning here were it not that the matter was taken so seriously as to have been made the subject of a broadside bulletin that received considerable republication and distribu tion. Of course, nothing could have been farther from the intentions of the writer, the Department to which he belongs or of this publication than to discredit in any way the work of either Mr. Comeau or of John J. Audubon.

The facts are, that Audubon was the father of Labrador ornithology and Dr. Townsend has been his Boswell as far as his Labrador trip is concerned and—but, pshaw! you cannot explain a joke and no one familiar with the literature and the English history of this coast would have taken the matter otherwise.

This is a good warning to scientific naturalists to suppress their sense of humor and other human characteristics for fear of being misunderstood by a literal-minded public.—ORNITH. ED.

STARLING'S NEST AT TORONTO.—The English Starling has now become a regular occurrence at Toronto, and is known to be nesting. Mr. Harrison Lewis has given this bird a great deal of attention for some months and besides collecting many specimens with a view to studying the bird's food, has established the fact that the bird nests in the open ends of the piping which forms the crossbars of the Hydro Electric towers. This location is not only almost inaccessible, but dangerous to attempt to reach, owing to the nearby high voltage wires. As far as I know, no one has been able to secure a set of eggs from these sites and no one has reported finding other nests.

By one of those mere chances which make bird study so fascinating, I had the good fortune to discover the nest of a starling and secure a set of eggs on May 4th this year. Mrs. Thompson and I had ridden out into the open fields, not far from home, for no other reason than to enjoy the evening and listen to the songs of the meadow lark, vesper and savanna sparrow. We were sitting in the car looking out over the fields and noticed a starling in the tree near-by. The bird flew soon after, circled, and coming up behind us, flew directly to a telephone pole a few yards off and disappeared. I examined the pole and found a woodpecker's hole some fifteen feet from the ground. My repeated knockings failed to bring out any starling. This failure to reappear after entering its hole seems to be characteristic of these birds. Mr. Lewis tells that he might have secured specimens again and again had he been able to bring the birds out from holes he had seen them enter only a moment before.

The following morning, I drove up to the spot carrying a short ladder on the car. With the aid of a kitchen spoon fastened to a piece of iron wire made up only a few minutes before starting, I scooped out the set of six eggs safely. These were pale blue in color, without any markings of any kind and measuring $1\frac{1}{8}'' \times \frac{7}{8}''$, all quite fresh.

Judging from the odd remnants that came to light with the eggs, the nest was composed of hen feathers. The hole which the starling had chosen was about fifteen feet from the ground on the east side of the pole and about two inches in diameter. The pole was excavated to the depth of about nine inches.

It would be interesting to know how six starlings could possibly find room in such a narrow space to hatch, grow and thrive. They must be greatly crowded. There seemed to be scarcely room for the eggs side by side. Measuring these later, I found the least possible space the set would require was about two and a half inches in diameter. This leads me to believe that the young birds must, to some extent at least, cling more or less

uprightly to the sides of their narrow abode, or else lie on the floor two deep. This much is certain—they must first learn to climb before they learn to fly.—STUART L. THOMPSON.

FEMALE REDSTART SINGING AT HAMILTON.—On Sunday, June 28th, while walking through the woods with one of the Directors of the Caledon Mountain Frout Club, I saw a female Redstart singing. She appeared to have a nest in a thick clump of cedars, and was concealed from view while singing for a considerable length of time. As I could not locate the bird, I shook the branches of the tree, and she apparently flew off her nest and sang for us on the top of another cedar tree nearby. The song was the same in length and quality as the male Redstart sings. My companion, who is quite familiar with birds, and their songs, said that for several days, as he passed the tree, a Redstart was always singing, but he had not succeeded in seeing it before.—ANNA E. MACLOGHLIN.

For the female warbler to sing a regular song would be quite an interesting bit of news.

But it is not unusual for the young male to appear, in his first spring, in plumage that is almost identical with that of the female. I suspect that it breeds in that plumage but have never definitely proved it to do so. I think this is the most probable explanation of the circumstances here described.—P. A. T.

WOOD DUCKS AT QUILLIWACK, B.C.—The Wood Duck (*Aix sponsa*) is still fairly common in the Quilliwack Valley. Unfortunately, a few are shot at the beginning of the shooting season in mistake for other species.

On June 7th, in company with Major Theobald, I visited some sloughs south of the Fraser River in this district. We observed two large broods of Wood Duck and flushed two solitary birds.

We also got quite close to a male Hooded Merganser (*Lophodytes cucullatus*). Yesterday I noticed a Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*). This bird has been reported in this district before.—M. W. HOLDOM.

EUROPEAN STARLINGS AT CASSELMAN, ONT.—I had an interesting experience this afternoon, May 9, 1926, with a new bird immigrant, the European Starling. One of our Flicker houses is just in front of our house on a telephone pole. It has been occupied for ten days, or more, and we knew that they were nesting. This afternoon my wife got a glimpse of a Starling just as he flew into the box. I waited some time with my gun and, as he did not come out, got my ladder and succeeded in getting the hole plugged before the rascal escaped. I brought the box into the house and to my surprise found the Flicker also in the box, but the eggs were, of course, destroyed.

The Starling, to say the least, is a bonnie scrapper; he was no more afraid of me than I of him, and as ready for fight as any game rooster I ever saw; however, he lost out.

Three Starlings arrived about three weeks ago. I shot one of them, and thought they had left us. So far as I know, this only leaves the one, and I hope to get him or her. One thing sure, is that they would soon clean out our few song birds if to-day furnishes a true sample of their habits.

After this experience, I feared that the Flickers would desert the box, and so I put up another one hundred feet away. In three or four days' time both boxes were occupied by Flickers.

When we came to Casselman, Ontario, two years ago, and secured this property, which is about one hundred and fifty feet square, there was only one tree on it, and that a poplar. There were no birds but Sparrows and Blackbirds. We set out spruce, pine and cedar, as well as shrubs. This year we have now nesting Flickers, Robins, Bluebirds, Song Sparrows, White-throated Sparrows and Meadowlarks. Our Wrens, for some reason, have not returned. Last year I put up a Martin house, but so far have no occupants. This all goes to show that one can attract birds almost anywhere. By the careful use of a small gauge shot gun and a twenty-two rifle, we have pretty well cleaned out the Sparrows and Blackbirds, and I have not seen any Starlings since my experience with the one that took the Flicker box.—E. W. BROCKLEBANK.

NOTES ON SOME SASKATCHEWAN VOLES—A good indoor sport for the field mammalogist is to devote long winter evenings to the study of maps, railroad guides and faunal lists of a prospective trapping ground; to make a list of the expected mammals and to then await the inevitable surprises.

April, 1925, found me stopping (en route to Crow's Nest Pass) at Swift Current, Saskatchewan, in hopes of securing specimens of Drummond's Vole (*Microtus pennsylvanicus drummondii*), the Rabbit-tailed Vole (*Lagurus pallidus*) and the Lesser Upland Vole (*Microtus minor*). The first names proved to be common in both low and high ground; several colonies of the second were found on high and rather arid slopes, and six specimens taken. No specimens of *Microtus minor* were taken.

However, two pale gray Voles, which were trapped under sagebrush and recumbent dwarf

junipers on high, arid slopes a mile west of town, proved to be puzzling. Subsequent examination of their skulls indicated that they belonged to the *Microtus pennsylvanicus* group. Comparison with topotypes of the bean mouse (*Mictorus pennsylvanicus wahema*), since taken by me at Glendive, Montana, proves that the two Swift Current voles are of this race. None were trapped in low, wet sloughs among many Drummond voles, yet latter species ranged up to the dry hillsides to meet the bean mouse.

Swift Current is about 290 miles in an air line from Glendive, Montana.—MORRIS M. GREEN, *Ardmore, Penn.*

CORRECTIONS.—Mr. Johansen calls attention to the figure of a young Mancasellus, page 95, in the May issue. The measure (4 mm.) should have been from the base of the antennae to the tip of the body (abdomen).

In Mr. Sternberg's article, page 102 of the same issue, the asterisk should have appeared with only fourteen of the species named. Mr. Sternberg also wishes to say that the prominence given to the *Dinosauria* in the article should not be taken as implying that he considers it as a class, but rather a super-order.

PUBLICATIONS RECEIVED

List of Mushrooms and Other Fleshy Fungi of the Ottawa District. W. S. Odell.

The Mystery Pearl Shells, by Ernest A. Chapman, London, Eng.

Oberlin College Laboratory Bulletins, 42 to 48 inclusive.

United States Department of Agriculture Bulletins and Circulars.

Dogs of the Labrador Indians, by Frank G. Speck.

American Game, Bulletin of the American Game Protective Association.

Our Migratory Wild Fowl and Present Conditions Affecting Their Abundance, by Edward W. Nelson.

44th Annual Meeting of the American Ornithologists' Union

Naturalists all are reminded that October 11th to 14th the American Ornithologists' Union hold their 44th Annual Meeting at Ottawa as the guests of the Dominion Government and the Ottawa Naturalists' Club. Although this body is internationally American in scope, this is the first time it has ever held its meeting outside of the United States.

Beginning Tuesday, October 12th, there will be open morning and afternoon sessions in the Victoria Memorial Museum at which ornithological papers will be read and problems relating to them discussed.

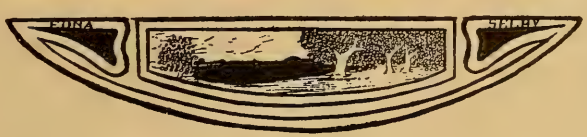
Tuesday evening there will be an informal conversazione at the Museum.

Wednesday evening the annual dinner will be held at the Chateau Laurier.

Thursday evening there will be informal receptions to visiting members and their friends at the houses of local ornithologists.

Friday and Saturday there will be various field excursions in the neighborhood of Ottawa and, weather permitting, such as can remain over the week end are invited to visit Blue Sea Lake in the Laurentian hills, some seventy miles north of the city.

All members of the Ottawa Field Naturalists' Club, affiliated societies and friends are invited to attend and assist in welcoming the guests to Canada.



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The Club has for sale complete sets of its publications. Enquiries regarding price should be addressed to the Secretary of the Club, Dr. J. F. Wright, Geological Survey, Ottawa, Canada.

Any member having copies of the March, 1896, January, February, March and August, 1898, and December, 1900, issues of *The Ottawa Naturalist*, and who desires to dispose of the same, is requested to communicate with the Secretary.

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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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THE OTTAWA FIELD-NATURALISTS' CLUB

CONTENTS

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VOL. XL OTTAWA, ONTARIO, OCTOBER, 1926 No. 7

CANADIAN WILLOWS OF SECTIONS PENTANDRÆ, NIGRÆ AND ALBÆ

By CARLETON R. BALL

NO COMPREHENSIVE survey of the willows of Canada, by themselves, has been made since the appearance of Macoun's Catalogue* in 1886 and the supplement in 1900. All Canadian species were treated by Schneider, of course, in his series of papers on American willows between 1918 and 1922. Numerous rich collections have been made in the last quarter of a century and the knowledge of relationship, habitat, and distribution has been greatly extended in that period. As much of this material has come to the writer for determination or verification, there seems to be some obligation resting on him to make the resulting data available to others. The present paper is the first of a series designed for that purpose.

This and each of the following papers will include: (1) Brief descriptions of the sections of the genus Salix discussed, (2) simple natural keys to the species of each section which occur in Canada, and (3) notes on the synonomy, characters, habitats and distribution of the species. The native species occurring in the Dominion will be numbered serially. Introduced species and those of doubtful occurrence, if listed, will not be numbered.

The sections Pentandræ and Nigræ comprise the Pleonandræ group, characterized by 3 to 5 or more stamens. The species in section Albæ resemble those of the sections Pentandræ and Nigræ but have only 2 stamens, like all the remaining sections except one, which has only 1 stamen. All three of these sections, however, have one character in common, namely, yellow or straw-coloured *deciduous* scales subtending the flowers of both sexes. As a whole, these sections of the genus are adapted to regions having a warm temperate, temperate, or cool temperate climate. They are widely distributed in the Sonoran (especially Upper Sonoran), the Transition, and the Canadian zones. Of the 6 native species, at least three, *S. caudata*, *S. lasiandra*, and *S. serissima* of the Pentandræ, penetrate beyond latitude 55° N. This is approximately the latitude of the central portions of Manitoba, Saskatchewan, Alberta and British Columbia and the southern extremity of Alaska.

For most of the specimens cited, the herbarium containing the particular sheet examined is indicated by abbreviations in parentheses. For most of the specimens of the Canadian Government collectors, the serial herbarium number is the only collector's number, and then is given directly after the name of the collector. Where there is a separate collection number, the serial number is given afterwards in parentheses with the initial "O" prefixed. The abbrevations used in the current paper and the herbaria for which they stand are as follows:

A,—herbarium of Arnold Arboretum, Jamaica Plains, Mass.
Ay,—herbarium of the New York State Museum, Albany, N.Y.
B,—Salix herbarium of Carleton R. Ball, Washington, D.C.
F,—herbarium of Field Museum (including the Bebb Salix Herbarium), Chicago, Ill.
I,—herbarium of Iowa State College, Ames, Iowa.
M,—herbarium of the Univ. of Minnesota, Minneapolis, Minn.
Mo.,—herbarium of the Missouri Botanical Gardens, St. Louis, Mo.
N,—U.S. National Herbarium, Smithsonian Institution, Washington, D.C.
ND.,—herbarium of the No. Dakota Agricultural College, Agricultural College, No. Dakota.
O,—National Herbarium of Canada, Victoria Memorial Museum, Ottawa.
RM.,—herbarium of the Rocky Mountains Museum, Banff, Alberta, Canada.
SD.,—herbarium of the University of So. Dakota, Vermillion, So. Dakota.

SECTION 1.—PENTANDRÆ

Shrubs to small or midsized trees, usually with sparingly cespitose stems, 2-6 or 8 m. high, and reddish brown bark; branchlets and obtuse buds olive to reddish brown, lustrous; leaves large, narrowly to broadly lanceolate and long-acuminate, or elliptical or ovate and acute, mostly closely glandular-serrate, especially near the base, glabrous, petioles stout, usually glandular above

*Macoun, John, *Catalogue of Canadian Plants*, 1(3): 444-55, 1886; 2(5): 356-361, 1890.

near the distal end; stipules small or none; aments cœtaneous, stout, dense, oblong or elliptical, 1-2 cm. wide, on short lateral leafy peduncles; scales pale yellow, lanceolate to obovate, often somewhat erose at apex, thinly pilose at the base, deciduous; stamens 3 to usually 5, or more; filaments free, thinly pubescent below; capsules large, 5-10 or 12 mm. long, glabrous; pedicels 1-2 mm. long, styles 0.5-0.7 mm. long, entire; stigmas short, notched or bifid.

Leaves distinctly pale to subglaucous beneath.
- Leaves lanceolate, acuminate; fruit in early summer.
  - Young branches glabrous or glabrate.....1. *S. lasiandra.*
  - Young branchlets more or less densely pubescent.....1a var. *lancifolia.*
- Leaves elliptical-lanceolate, acute; fruit in late summer.....2. *S. serissima.*
- Leaves ovate, acute (introduced tree).....*S. pentandra..*

Leaves green beneath, lanceolate, long-acuminate.
- Tall shrub or small tree of western watercourses.
  - Leaves lanceolate, 6-13 cm. long.....3. *S. caudata.*
  - Leaves narrowly lanceolate, 5-8 cm. long.....3a var. *parvifolia.*
- Cespitose, low or midhigh shrub of eastern swamps.
  - Leaves lanceolate or broader.
    - Leaves glabrous beneath.....4. *S. lucida.*
    - Leaves thinly pubescent beneath.....4a. var. *intonsa.*
  - Leaves narrowly lanceolate.....4b var. *angustifolia.*

Of the four native and one introduced species comprising this section, all are found in both the United States and Canada. Of the five varieties now recognized, four occur in both countries. The fifth, *S. lasiandra abramsi* Ball (Bot. Gaz. 72: 224, 1921), is found in the Sierras of central California. It has the same relationship to that species as var. *parvifolia* has to *S. caudata.*

The two western species, *lasiandra* and *caudata,* are tall, sparingly cespitose shrubs or small to mid-sized trees of mountainous areas. They usually occur along or near watercourses and never in bogs or swamps. The two eastern species, *serissima* and *lucida,* on the contrary, are cespitose, low or occasionally taller shrubs. They are plants of swampy lands or bogs and seldom, if ever, are found along streams.

1. **Salix lasiandra** Bentham.

S. lasiandra Benth. Pl. Hartweg. 335. 1857.

S. speciosa Nutt. N. Am. Sylva 1: 58. pl. 17. 1843, not Host, 1828, or Hook. and Arn. 1832.

S. arguta lasiandra Anderss. Svensk. Vetensk. Akad. Handl. (Monog. Sal.) 6: 33. 1867.

S. lasiandra lyallii Sarg. Gard. & For. 8: 463. 1895.

S. lyallii (Sarg.) Heller, Bull. Torrey Bot. Club 25; 580. 1898

Throughout most of its range this species, sometimes called the Red Willow, is a large shrub or small tree 4-8 meters in height. Under the favourable climatic conditions occurring in parts of the Pacific Coast States, it probably attains the largest size of any member of the section Pentandræ. In the lower Columbia Valley between Oregon and Washington and in the Puget Sound District of the latter State and British Columbia, it sometimes reaches a height of 20 meters and has proportionately large trunks and leaves. This tree form was described first as a variety of *lasiandra* and later as a species under the name *lyallii.* The leaves on vigorous shoots under those conditions sometimes exceed three decimeters in length.

Salix lasiandra is found throughout the western mountainous portion of North America from southern California and central New Mexico to Yukon Territory. In the northern part of its range it extends as far east as Peace River Landing in west central Alberta, and as far west as the lower Stikine River in northwestern British Columbia. Eventually the wide gap between these two localities and the vicinity of Dawson may be closed by further collections.

In discussing its Canadian distribution, John Macoun (Cat. Can. Plants 1(3): 449, 1886; 2(5): 358, 1890) cites specimens from only southern British Columbia, extending from Vancouver Island to the Thompson River in the western part of Yale district. The specimen from Shuswap Lake cited by him in Vol. 2 under *S. lasiandra fendleriana* is referable to *lasiandra,* as *fendleriana* is now regarded as a synonym of *lasiandra.*

Schneider in his discussion of its distribution says (Journ. Arnold Arb. 1: 17, 1919): "British Columbia (coast region, but also in Kootenay), and it has been collected in northwestern Alberta (Peace River Landing, J. M. Macoun, No. 21266; O.) and in the Yukon Territory (vicinity of Dawson)."

The following Canadian specimens have been examined by the writer:

BRITISH COLUMBIA.—Vancouver Island District, vicinity of Victoria, J. Macoun 76795-76798, some 15-20 ft. high and 3-4 inches in diameter (B). New Westminster District, Hatzic, Jack 2875, 2876, 25 ft. high, 6 inches in diameter (A,B); Mons, J. M. Macoun 97785 (B). Yale District, Shuswap Lake, J. Macoun, 1889 (N). Cassiar District, flood plain lake of Stikine River

near International Boundary, about latitude 57°, W. S. Cooper 97 (B).

ALBERTA.—Jasper Park, Athabaska River near Jasper Station, Jack 2581 (A,B); near Yellowhead Pass, Mt. Cavell Station, Jack 2746, 2747, 2748 (A,B).

I have not seen the Alberta specimen from Peace River Landing cited by Schneider. It was collected by J. M. Macoun and is No. 21266 in the National Herbarium of Canada at Ottawa. He refers also to a collection in the vicinity of Dawson, Yukon Territory, but does not cite a specimen. It probably was a collection by Miss Alice Eastwood as specimens collected by her in the vicinity of Dawson are cited by him under the variety *lancifolia*.

1a. **Salix lasiandra lancifolia** (And.) Bebb.

Salix lancifolia And. Svensk. Vetensk. Akad. Handl. (Monog. Sal.) 6: 34, pl. 2, fig. 23, 1867.

Salix lasiandra lancifolia (And.) Bebb in S. Watson, Bot. Calif. 2: 84, 1879.

This variety differs from the species in having more or less densely pubescent seasonal shoots and petioles. It occupies the northern two third of the range of the species and is nearly as common in southwestern Canada. It occurs rather commonly from Vancouver Island eastward to Rocky Mountains Park in Alberta and less commonly northward.

John Macoun (Cat. 1(3): 450; 2: 358) cites several British Columbia collections from Vancouver Island to the Selkirk Mountains in southeast Kootenay District. Schneider also (Journ. Arnold Arb. 1: 18, 1919) lists specimens from the southern part of British Columbia from Vancouver Island on the west to Revelstoke and Deer Park in southern Kootenay District on the east. In addition to those he cites, the writer has seen the following:

BRITISH COLUMBIA.—Vancouver Island, Victoria, J. Macoun 76794 (B); New Westminster District, Hatzic, Jack 2886 (A,B); Cassiar District, Hazelton, Skeena River, latitude 55°—, J. M. Macoun 97802 (B).

ALBERTA.—Rocky Mountains Park, vicinity of Banff, Sanson 69, 401, 402, 403 (B).

YUKON TERRITORY.—(The following are listed by Schneider. CRB) vicinity of Dawson, A. Eastwood 113, 304, 466 (All A, fide Schneider, l.c)

2. **Salix serissima** (Bailey) Fernald. Autumn Willow.

Salix lucida serissima Bailey in Arthur, Bull. Geol. and Nat. Hist. Survey Minn. 3: 19, 1887.

Salix serissima (Bailey) Fernald, Rhodora 6: 7, 1903.

This species is remarkable among willow species, not only of the section Pentandræ but of the entire genus in America, because of its late fruiting. The flowers appear in early summer (June-July) and the fruit ripens in July or August and often persists through September. From this peculiar habit it takes it specific name *serissima* and its common name of Autumn Willow. Throughout its wide range it is remarably uniform, judging by herbarium material, except for certain Manitoba specimens previously discussed by the writer (Bot. Gaz. 72: 222, 1921) as possibly representing the form described by Andersson as "*S. arguta* *S. *pallescens hirtisquama*". More mature material is needed from Manitoba before an adequate study can be made.

As noted previously, the Autumn Willow is a species of swamps or poorly drained land rather than of watercourses. East of the Rocky Mountains it keeps wholly within the glaciated area. Where collected by the writer north of Edmonton, Alberta, it was growing in a grassy park-like depression some 300 feet or more in diameter, which at that season was dry. The dominant willow of the area was *S. balsamifera* Barr. (*S. pyrifolia* And.), there present as an abundant low densely cespitose shrub, 1-2 m. high. Only a few plants of *serissima* were seen.

S. serissima was first recognized by American botanists in 1887 as a variety of *lucida*, and in 1903 as a distinct species. At that time Fernald was able to indicate a range only from Connecticut to northeastern Minnesota (the type locality) and the north shore of Lake Superior. In 1906, J. M. Macoun (Ottawa Nat. 20: 139-40) cited specimens collected from Anticosti, Quebec, and Albany River, James Bay, on the east, across Ontario and Manitoba ("Keewatin", Severn River) to Alberta as far west as Battle River, Edmonton, and the Bow River at Morley. The writer first recorded (in Coulter & Nelson, New Man. Rocky Mtn. Bot. 130, 1909) its occurrence in the western United States at Chouteau, Montana. Schneider, in 1919, (Journ. Arnold Arb. 1: 13-14) extended the range east to Newfoundland and west to the Rockies of southern Alberta The writer (Bot. Gaz. 72: 220-222, 1921) cited specimens extending the range westward through Pembina and Rolette Counties, in North Dakota, to eastern Flathead Co., Montana (all three counties bordering on Canada), and north to the Slave River. Hunnewell (Rhodora 25: 67-68, 1923) cites a specimen, identified by Fernald, from Pike's Peak in Teller County, east-central Colorado.

These data show that the Autumn Willow, instead of being of limited range; has a very

extensive distribution. For a species recognized only 23 years ago, its distribution has been remarkably well mapped.

The northern limits of its known range are Newfoundland; Anticosti Island in Quebec; mouth of the Albany River on the west shore of James Bay, Hudson Bay (Spreadborough 62628, O.); and the Severn River ("Keewatin", J. M. Macoun 2028, O.) both in northern Ontario; the Slave River in Mackenzie, and Battle River in northwest Alberta.

In the Rocky Mountains it extends from the Rocky Mountains Park of southwest Alberta, southward on the east side of the Continental Divide to Flathead County in northwest Montana and thence jumps to Pike's Peak in east-central Colorado.

On the south it extends from Connecticut to Morris County, New Jersey, and westward across New York, northern Ohio, northern Indiana and south-central Minnesota to north-central North Dakota (Rolette County) and northwestern Montana (Chouteau and Flathead Counties), with an outlying station far south on Pike's Peak, Colorado.

Below are listed the Canadian specimens which the writer has examined, together with similar specimens from Minnesota, North Dakota and Montana. In Minnesota the specimens represent the northern two-thirds of the State, but the four counties represented in North Dakota and Montana all border on Canada.

ONTARIO: Toronto, two specimens with ripe fruit (N), July 11, 1901. Lambton District, east of Point Edward, wet ground near a pond, C. K. Dodge (B), June 11, August 9, 1915.

MANITOBA: Bog north of Carberry, Macoun and Herriot (O) 70262), June 11, 1906 (B); near Sidney, Macoun and Herriot (O) 70263), June 12, 1906 (B); (O70264), June 13, 1906 (B).

ALBERTA OR MACKENZIE: Slave River, R. Kennicott, July, 1860 (N).

ALBERTA: Crow's Nest Lake, Rocky Mountains, J. Macoun 39 (O) 94440), August 8, 1897 (B). Calgary, J. Macoun, 16 (O) 94336), June 5, 1897 (B). Rocky Mountains Park: Banff, shrub 6 ft. tall, low ground near the village, alt. 4500 ft., W. C. MacCalla 2252, June 19, 1899 (N); vicinity of Banff, N. B. Sanson 304, July 14; 307, 309, 315A, 2167, July 15; 2173, June 27, 1911 (B); Shore of Vermillion Lake, near Banff, 4500 ft. elev., Malte and Watson 913 (O116810), July 8, 1925 (B, O); Castlemount Ranger Station, swampy thicket, 4500 ft. elev., Malte and Watson 539 (O116953), June 22, July 2, 1925 (B, O); east of Castlemount Ranger Station, 4300 ft. elev., Malte and Watson 509 (O116775), 510 (116776), June 21, Sept. 4, 1925 (B, O). Nordegg: Fish Lake near Nordegg, 4700 ft. elev., Malte and Watson 1597 (O116884), July 28, 1925 (B, O), boggy shore of Lake Nordegg, 4500 ft. elev., Malte and Watson 1658 (O116889), July 30, 1925 (B, O). Red Deer River about 4 miles west of Red Deer, Malte and Watson 1739 (O116890), Aug. 3, 1925 (B, O). North of Edmonton, 5 miles south of Legal, Ball 2366 (B, I, N, O), 1925. Grattan Creek, near Battle River, Macoun and Herriot (O70252), August 17, 1906 (B).

MINNESOTA: Dakota Co., Fort Snelling, Mearns 629 (N) Sept., 1890. Hennepin Co., Lake Minnetonka, Over 15429 (B, SD) 1923. Kandiyohi Co., east of New London, Metcalf 2163 (B, N) 1922. Clearwater Co. (vicinity of Lake Itasca), Rosendahl 4851, 4856 (B, M) 1925.

NORTH DAKOTA: Pembina County, Walhalla, L. R. Waldron 1666, August 16, 1902 (B, ND). Rolette County, Turtle Mountains, woods around Upsilon Lake (Fish Lake), D. C. Mabbott 464, September 7, 1917 (B, N).

MONTANA: Chouteau County, Chouteau, on Teton River, about 4000 ft. elevation, lat. 112°10′ W., Griffiths and Lange, August 22, 1900 (B). Flathead County, 3-4 ft. high in open marsh along Swiftcurrent Creek below Lake McDermott, alt. about 1350 m., P. C. Standley 16053, July 20, 1919 (B, N).

Salix pentandra L. Bay or Laurel-leaf Willow.

Salix pentandra L. Sp. Pl. 1442, 1753.

This introduced tree is planted as an ornamental in parks and similar locations and sometimes as a street tree. The ovate leaves with their shining green upper surfaces and glaucuous lower surfaces are strikingly handsome. Normally this species fruits in early summer. On August 15, 1925, however, the writer collected specimens (Ball 2309) from a row of trees in the western edge of the town of Oak Lake, in Lansdowne District, Manitoba, which were then in full fruit. In this late fruiting, these plants were like *S. serissima*.

3. **Salix caudata** (Nuttall) Heller.

Salix pentandra caudata Nutt. Sylva. 1: 61. pl. 18. 1842.

Salix lasiandra caudata (Nutt.) Sudw. Bull. Torrey Bot. Club 20: 43. 1893.

Salix caudata (Nutt.) Heller Muhlenb. 2: 186. 1906.

Salix fendleriana of various authors, not Anderss.

Salix lasiandra fendleriana (Anderss.) Bebb. Willows Calif. (repr. S. Wats. Bot. Calif. 2: 84.) 1879.

This species has much the same habitat and range as *S. lasiandra*, except that it is not found west of the Sierra-Cascade Range and has not yet

been recorded from the Yukon Territory. It differs from *lasiandra* chiefly in leaves green throughout. In size it seldom exceeds the stature of a tall shrub, 4-6 meters. If it occured in the favourable conditions of the Columbia and Puget Sound Districts it might more nearly attain the tree-like dimensions of *lasiandra*. Indeed, it will be noted that the Laing specimens from the Athabaska Delta in northeastern Alberta were from plants reaching a height of 25 feet and a maximum diameter of 10-12 inches. Part of these specimens are immature, however, and there is some possibility that they may belong to *S. lasiandra*. It is difficult to distinguish these two species until the leaves are old enough to show clearly whether the lower surface is green or glaucous.

In the supplement to his catalogue of Canadian Plants, John Macoun (2(5): 358, 1890) records this species only from "Shore of Shuswap Lake, B.C., near Scotch Creek, June, 1889." This is in Yale District at about latitude 51°.

Schneider (Journ. Arnold Arb. 1: 20, 1919) says of this plant, which he regards as a variety of *lasiandra*, "In the north I know var. *caudata* from eastern Kootenay (Fernie) in British Columbia, and from Calgary in Alberta. The western borderline runs from Yale District in British Columbia southward." Besides the British Columbia specimen listed above, the writer has seen the following from Alberta:

ALBERTA.—Bow River at Calgary: J. Macoun 94335, June 5, 1897; same locality, 3400 ft. Malte and Watson 22 (O116728) June 4 and July 15, 1925 (B, O). Elbow River ar Calgaty, 3200 ft., Malte and Watson 7 (O116724), 8 (O116725), June 3 and 28, 1925 (B O). Athabaska Delta, Main Branch, 8 miles from mouth, tree willow 4-6 inches in diameter, bark rough, H. M. Laing 33, June 3, 1920 (B, N); same place, 9 miles from mouth, highest banks of rivers and sloughs, 3 feet above water, common, largest 10-12 inches in diameter and 25 feet high, Laing 51, June 17, 1920 (B, N).

3a. **Salix caudata parvifolia** Ball.

Salix caudata parvifolia Ball Bot. Gaz. 72: 225-226, fig. 1, 1921.

This variety differs from the species in small and very narrow leaves. As noted by the writer at the time of publication: "It occurs rather commonly and appears to be the dominant form in the mountains of northwestern Montana and southern Alberta." (pp. 225-6). It ranges south to the Wahsatch mountains near Ogden, Utah, and west to the east slope of the Cascades in Wasco Co., Oregon.

It probably will be found eventually in other localities in the foothills and mountains of southern Alberta and in similar situations in southern British Columbia.

ALBERTA—Rocky Mountains Park, N. B. Sanson 164., June 17, 1911 (B); 265, July 5, 1911 (B); 413, 414, August 21, 1911 (B); 2056, June 22, 1912 (B). Calgary, along Bow River, 3400 ft. elevation, Malte and Watson 1201 (O116851), July 15, 1925 (B, O).

4. **Salix lucida** Muhlenberg. Shining Willow.

Salix lucida Muhlenberg, in Neue Schrift. Gesell. Naturfor. Freunden Berlin 4: 239, *t6*, fig. 7, 1803.

The shining willow usually is a low and cespitose shrub, 1-3 m. high, in the swamps of the northeastern United States and adjacent Canada. Under more favourable conditions it becomes a larger shrub or small tree 4-6 m. high. It is very similar to *S. caudata* of the West. It flowers and fruits about six weeks earlier than *S. serissima* under the same conditions. This probably is the reason why no hybrids between the two species have been noted.

In the United States, *S. lucida* occurs somewhat farther south than *S. serissima*. It is found in Delaware, Pennsylvania, the northern third of Ohio, Indiana, Illinois, and Iowa, and thence across Minnesota to Rolette Co., North Dakota (fide Schneider).

In Canada, it formerly was held to have a much wider range to the west than is conceded now. In 1886, John Macoun (Cat. Can. Pl. 1(3): 450) said: "A widely spread and easily distinguished willow found in ditches and swamps from the Atlantic to the Rocky Mountains." He cited specimens and published records showing a range west to the Rockies and north to Fort Franklin on the Mackenzie River in Mackenzie (Lat. 65°, long. 124°). Twenty years later (Ottawa Nat. 20: 139-140, 1906) J. M. Macoun recognized that *S. serissima* had been confused with *S. lucida* by some of the persons cited in the former publication. He did not then attempt to define the actual distribution of *lucida*. Most of the Manuals of Botany give *lucida* a much wider range than it actually has. Some show its occurrence as far south as Kentucky and some extend its range westward to various States of the Great Plains and Rocky Mountain areas.

Schneider, in 1919 (Journ. Arnold Arb. 1: 21-22) points out that "There is likewise no proof that it (*lucida*) occurs in Manitoba, Assiniboia, Saskatchewan, northwestern Alberta, Athabasca and the Northwest Territories as far north as Great Bear Lake." In his discussion of *S. lasiandra* (p. 16), however, he refers to *S. lucida* two of

Bourgeau's specimens from the Saskatchewan River, one being from "Carlton House" or west of the center of Saskatchewan. This contradiction is not explicable, as the writer has pointed has pointed out previously (Bot. Gaz. 72: 227, 1921).

Salix lucida occurs from western Newfoundland across Canada from Labrador to central Manitoba, at least. It is doubtful if its farthest northern and western range is yet discovered. The writer has seen the following specimens, except that from Labrador which, according to Wetmore (Rhodora 25: 8, 1923), was determined by Fernald and is at the National Herbarium of Canada in Ottawa.

NEWFOUNDLAND: Between Bay St. George and Bay of Islands, St. George's Pond, Fernald and Wiegand 3143 (N), 1910.

NEW BRUNSWICK: Bass River, Fowler 2635 (N), 1872.

QUEBEC: Labrador, Ground Lake near Hamilton Inlet, Wetmore (O), 1921. St. Lawrence Valley, "Lieux bas", Marie-Victorin 9427 (N) 1919; Longueuil, Marie-Victorin (N), 1916.

ONTARIO: Between Peninsular Lake and Lake of Bays, Coville 1159 (N), 1901; Kingston, Fowler (N), 1901; Leamington, J. Macoun 26885 (B, O), 1901.

MANITOBA: Norway House (northeast corner of Lake Winnipeg) Knechtel 612 (B), 1912.

4a. **Salix lucida intonsa** Fernald.

Salix lucida intonsa Fernald, Rhodora 6: 2, 1903.

This variety differs from the species in having the leaves thinly pubescent beneath with shining or brownish hairs. It has about the range of the species but seems to be more common in the eastern than the western part of their range. But few Canadian specimens have been seen. Fernald cited specimens from New Brunswick and eastern Quebec. J. M. Macoun (Ottawa Nat. 20: 140, 1906) records two, Nos. 68782 and 68783, collected by John Macoun at Montmorency Falls, Quebec. Wetmore records it from the Hamilton Inlet district of Labrador previously cited under *lucida*.

4b. **Salix lucida angustifolia** Andersson.

Salix (pentandra) lucida angustifolia And. Ofv. Svensk. Vetensk. Akad. Forh. 15: 115, 1858. (Proc. Am. Acad. Sci. 4: 54, 1858).

Salix lucida augustifolia And. Svensk. Vetensk. Akad. Handl. 6: 32 (Monog. Sal.) 1867; in D.C. Prod. 16^2: 205, 1868.

This narrow-leaved variety is comparable to *caudata parvifolia* Ball and *lasiandra abramsi* Ball, previously discussed. It seems to be confined to the eastern part of the range of the species but this apparent restriction may be due to oversight by collectors rather than to nonoccurrence. Of the following specimens, the first two are cited by J. M. Macoun (Ottawa Nat. 20: 140, 1906) and the first, third and fourth have been examined by the writer.

NEWFOUNDLAND: Banks of Exploits River near the mouth of Badger Brook, Robinson and Schrenk 465 (N) 1894, (13674, O).

NEW BRUNSWICK: Grand Lake (near Fredericton), Brittain 24586 (N).

ONTARIO: Kettle Island near Ottawa, Malte 881 (O111806) 1922 (B, O).

NEW YORK: Essex Co., marsh near Newcomb, 1600 feet, House 7205 (Ay) 1920.

SECTION 2—NIGRÆ

Trees 3-15 m. high; bark brown; twigs long and slender, often drooping in No. 6, usually grey: leaves linear-lanceolate to broadly lanceolate, acuminate, closely and finely serrulate, glabrous; stipules small and deciduous or none: aments coetaneous, slender cylindrical, terminal on lateral leafy twigs: scales deciduous, light-yellow, lanceolate or broader, mostly glabrous outside, crisp-villous within: stamens 3-7, filaments hairy below; capsule small, 3-5 mm. long, glabrous, pedicellate; styles 0.3-0.5 mm. long; stigmas short.

Leaves linear-lanceolate, deep green beneath.....5. *S. nigra.*
Leaves lanceolate or broader, glaucous beneath.....6. *S. amygdaloides.*

The species of this section are the most austral of any American willows. Most of the ten or more species are southern and one, *S. humboldtiana*, occurs also in South America. Both *nigra* and *amygdaloides* range far south and their northern limits are not far above the southern boundary of Canada.

5. Salix nigra Marshall. Black Willow.

Salix nigra Marshall, Arbust. Am. 139, 1785.

S. falcata Pursh, Flora Am. Sept. 2: 614, 1814.

?*S. ambigua* Pursh, ibid, 617.

S. ligustrina Michx. Hist. Arb. Am. 3: 326, t.5, fig. 2, 1813.

S. nigra falcata (Pursh) Torrey, Fl. N.Y. 2: 209. 1843.

The Black Willow varies from a large shrub to a large tree, depending on age and environment. It often reaches a height of 20 meters and sometimes exceeds 30 meters. Its favourite habitat is the alluvial soil of stream valleys and lake shores and it is seldom or never found in rocky soil. In the northern part of its range it flowers from the middle of May until the middle of June.

John Macoun (Cat. Can. Pl. 1(3): 451, 1886) shows a range from Harris Cove, N.B., and the cities of Quebec and Ottawa, across southern Ontario to "the Kaministiquia Valley west of Lake Superior" (Thunder Bay District, Ontario) and the "valley of Maple Creek, N.W.T.", (southwestern Saskatchewan).* No mention of the species is made by John Macoun in his "Additions" (Cat. Can. Pl. 2(5): 356-361, 1890). Fernald (Gray's New Man. Bot. 321, 1908) says "N.B. to Ont." Rydberg, in 1917, (Fl. Rocky Mtns. and Adj. Plains, 191) mentions N.B. and N.D. in its distribution. Schneider says (Journ. Arnold Arb. 1: 6, 1919)

> "For the northern limit of its range may be taken a line running from about the 95th degree W. L. along the north shore of Lake Superior through southern Ontario and Quebec to southern New Brunswick."

The ninety-fifth meridian at that latitude (47°) would be in north-central Minnesota not far from the southeast corner of Manitoba. On the same page Schneider had mentioned South Dakota as being the northwestern limit of its range. The two statements definitely require its presence in South Dakota and Minnesota. However, in a footnote on the same page he says: "I have not yet seen material from the Dakotas and Minnesota." The fact is that neither has anyone else.

A recent examination of the material in the National Herbarium at Washington, the herbarium of the Missouri Botanical Garden at St. Louis, the herbarium of the Field Museum of Chicago (which includes the Bebb Salix Herbarium), and the large Salix collections of the writer, shows no specimens of *S. nigra* from the Dakotas or from Minnesota. Dr. Rosendahl states (in letter of Nov. 9, 1925) that there are none from those States in the herbarium of the University of Minnesota.

The most northwestern specimen seen by the writer is from Emmet Co., Iowa (Cratty 101). In Wisconsin, however, the species is common in Chippewa, Eau Claire, Wood, Marathon and Lincoln Counties in the central and north-central portion of the State and less common in northern Price Co. in the northern part of the State. Specimens from all five counties are in the herbarium of the Public Museum of Milwaukee and from Lincoln and Marathon Cos. in that of the Field Museum.

When the known range in northern Iowa and in north-central Wisconsin is mapped, it would seem that the Black Willow ought to occur in southeastern Minnesota and perhaps in the south-central and east-central portions of the State also.† The species is found in central Michigan northwestern New York and northwestern Vermont.

The recorded distribution in Canada from New Brunswick to southwestern Ontario is all south of latitude 49°, which is the international boundary farther west. If the record by Macoun of its occurrence in the Kamanistiquia valley in western Ontario is correct it brings the range almost to the 49th parallel and directly north across Lake Superior from the area of common occurrence in Wisconsin. Quebec is at about 47° and the other Ontario localities at about 45°. The following specimens have been examined by the writer.

QUEBEC: Vicinity of Ottawa; Ottawa, Rolland 10125 (Mo); McGregor Lake, Malte 111717-111720 (B, O), 1923; Leamy's Lake, near Hull, Malte 111741 (B, O), 1923; along Ottawa River, Quyon, Malte 111804 (B, O), 1922.

ONTARIO: Ottawa, Cloverdale, Malte 111820 111821 (B, O), 1923. Frontenac District, Kingston, J. Fowler (N), May, 1895; June, 1901. Port Stanley, Macoun 84819 (F).

6. **Salix amygdaloides** Andersson. Peachleaf Willow.

S. amygdaloides Anderss. in Of. Svensk. Vetensk. Akad. Forh. 15: 114. 1858.

S. nigra subsp. *amygdaloides* Anderrss. Svensk. Vetensk. Akad. Handl. (Monog. Sal.) 6: 21, 1867.

S. nigra amygdaloides Anderss. in D. C. Prod. 16^2: 201, 1868.

The Peachleaf Willow varies from a small to a large tree up to 12 meters high. It is a tree of alluvial stream banks and lake margins and not usually found in swampy ground. The slender yellowish more or less drooping branchlets and yellowish green foliage give it a habit and colour effect which are very characteristic. It presents a marked contrast, in these two characters, to its nearest relative, *S. nigra*, which has shorter, more spreading and darker branchlets and dark green foliage.

In the northern United States, *S. amygdaloides* occurs along or near the international boundary from Lawrence Co., in northeastern New York, to Flathead Co., northwestern Montana. The writer has not seen specimens from the extreme northern parts of Michigan, Wisconsin and Minnesota. In northern North Dakota, specimens have been seen from Benson, Pierce, Mountrail and Williams Counties, all in the second tier

*The latter record is based on three specimens in the National Herbarium of Canada, one, O24240, collected by Dawson, June 6, 1883, and two, O24239 and 24241, collected by J. M. Macoun, May 29, 1884. A recent examination of them has revealed that No. 24239 is *S. amygdaloides* and the other two *S. lutea*.

†Since the above was written, the writer has seen a specimen from Minnesota (Chicago Co., Taylor's Falls, on St. Croix River, L.H. and H.E. Pammel, August 6, 1914). B.T.

from the northern boundary. In northern Montana, specimens are in hand from Havre, near the juncture of Montana, Saskatchewan and Alberta, and from Belton in Flathead Co., some 30 miles south of the juncture of Montana, Alberta and British Columbia.

West of the Rockies, the Peachleaf Willow extends to the Sierra-Cascade Range. No specimens have been seen from Idaho north of Nez Perce Co., and none from Washington north of Asotin and Whitman Counties in the southeastern corner of that State. All three localities are about 180 miles from the Canadian border.

In Canada, *S. amygdaloides* occupies a narrow strip in southern Quebec and southeastern Ontario and a second narrow strip in the extreme southern portions of Manitoba, Saskatchewan and Alberta, and perhaps in southeastern British Columbia also. It is not certain that the long gap in the known range, in the area north of Lakes Huron and Superior and the State of Minnesota, actually is occupied by the plant.

John Macoun, in 1886, (Cat. Can. Pl. 1(3): 444) reported *S. amygdaloides* only from the Red River in Manitoba, based on specimens of Bourgeau and Burgess. In the "additions" (Cat. Can. Pl. 2(5): 356-361, 1890), John Macoun does not add any localities. Fernald (Gray's New Man. Bot. 321, 1908) says "W. Que. and centr. N.Y. to B.C." Rydberg (Fl Rocky Mtns. and Adjac. Plains, 191, 1917) mentions Quebec and British Columbia in the range but does not indicate if the provinces lying between are to be included. Henry (Fl. So. B.C. and Vancouver Island 96, 1915) says: "Along streams, East Kootenay," which is in the southeast corner of the Province and directly north of the locality at Belton, Mont. He does not cite any specimens, nor has the writer seen any, or record of any, from British Columbia. The following Canadian specimens have been examined.

QUEBEC: Montreal, J. G. Jack (F), 1894. Along Ottawa River at Queen's Park, near Aylmer, Malte 111721 (B, O), 1923.

ONTARIO: Vicinity of Ottawa, Malte 111849-111851 (B, O), 1913; Cloverdale, Ottawa, Malte 111818-111819 (B, O), 1913. Kingston, J. Fowler (F); Amherst Island, Kingston, J. Fowler (N), 1894. Galt (F).

MANITOBA: Morris, Red River, J. Macoun (F), Aug., 1896. South of Portage la Prairie, Macoun and Herriot 70286 (B, O), 1906. Near Carberry, Macoun and Herriot 70284, 70285 (B, O), 1906.

SASKATCHEWAN: "Northwest Territories," Maple Creek, J. M. Macoun 24239 (F,O), May 29, 1884.

ALBERTA: Medicine Hat, J. Macoun 5942, (B, O), 1894. Lethbridge, shurb 10 ft. high under R.R. bridge over Belly River, Ball 1783 (B, N), 1912.

SECTION 3.—ALBÆ OR FRAGILES

This section is represented in the New World only by introduced trees and therefore is not discussed in full. The key and brief notes are inserted in order that these widely distributed willows may be recognized. These species have pale yellow scales but only 2 stamens and therefore properly are placed after the Nigræ and before the Longifoliæ.

Branchlets spreading or ascending; leaves lanceolate, petioles glandular.
- Coarsely serrate (5-6 per cm.); capsule long-conic, short-pedicelled.... *S. fragilis.*
- More finely serrate (9-10 per cm.); capsule ovoid-conic, sessile.
  - Leaves glabrate to thinly sericeous..... *S. alba.*
  - Leaves densely silvery sericeous throughout..... var. *argentea.*

Branchlets pendulous; leaves linear-lanceolate; petioles not glandular.
- Unevenly spinulose serrulate; capsule ovoid, sessile..... *S. babylonica.*

All three of the species are large trees, planted usually in low ground or along watercourses, though *babylonica* frequently is planted on higher and relatively dry ground.

Salix fragilis L., the Crack or English Willow, is by far the most common, at least in the United States, where it was introduced in early Colonial times to furnish charcoal for making gunpowder and later was widely used for hedges. *Salix alba* L., the White or Cricket-bat Willow, is much less common but more ornamental. Its more symmetrical growth, and smaller leaves with silvery hairs, especially in the variety *argentea* Wimmer, make it a beautiful object. *S. babylonica* L. is the well-known Weeping Willow.

(*Concluded in the November issue*)

MARINE MOLLUSCA COLLECTED BY FRITS JOHANSEN IN THE GULF OF ST. LAWRENCE AND NEWFOUNDLAND IN 1922, 1923 AND 1925

By W. H. DALL

(HONORARY CURATOR, DIVISION OF MOLLUSCS, U.S.N.M., WASHINGTON, D.C.)

A COLLECTION of marine molluscs secured by Mr. F. Johansen in the Gulf of St. Lawrence and Newfoundland during his excursions here in 1922, 1923 and 1925, was submitted to me for identification. The specimens given in this list are all found in the Government collections in Ottawa, apart from certain duplicates retained for the U.S.N.M.

About forty species are represented in the collection; and for their distribution in the Gulf of St. Lawrence, etc., see J. F. Whiteaves "Catalogue of the Marine Invertebrata of Eastern Canada", Ottawa, 1901, pp. 115-213; and later papers, particularly in "Contrib. Canad. Biology", Ottawa and Toronto. For Molluscs of Anticosti Island, see also J. Schmitt "Monographie de l'Ile Anticosti", Paris, 1904, pp. 277-79; and for the natural surroundings of the molluscs collected by Mr. Johansen in Newfoundland, see his article "Fishes collected in Newfoundland during the autumn of 1922", ("Canad. Field-Nat.", Ottawa, Vol. 40, 1926, pp. 1-6, 31-36.)

In the following list, the localities are arranged from west to east:—

I. Godbout; north side of Gulf of St. Lawrence, Que., July 25, 1923, beach (long. 67½° W.)

Colus lividus, Moerch.
Polinices (Euspira) heros, Say.

II. Dalhousie; Bay of Chaleur, N.B.; end of August 1925; low tide.

Mya arenaria, L.
Mytilus edulis, L.
Nassa (Tritia) trivittata, Say.
Littorina litorea, L. (young).
L. palliata, Say. (young).
L. rudis, Don. (young).
Acmæa testudinalis, Muell.
Lacuna vincta, Mont.

III. Outlet of Eel River, four miles east of Dalhousie, N.B., August 30, 1925.

Littorina rudis, Don.
Mya sp. (very young).

IV. Scallop-beds off Carlton, Que., Bay of Chaleur, 15 fathoms, August 25, 1925.

Placopecten grandis, Solander.
Chlamys islandicus, Mueller.
Saxicava arctica, L. (and young).
Lepeta cæca, Muell.
Anomia sp. (young).

V. Beach on north side of Heron Island, Bay of Chaleur, N.B. August 22, 1925.

Polinices (Euspira) heros, Say.

VI. Bay of Chaleur, between Jacket River, N.B., and Cascapedia Bay, Quebec, August 22-24, 1925, 15-20 fathoms.

Serripes (Liocardium) grœnlandicum, Gmel. (dead).
Modiolaria discors, L. (from cod stomachs).
Yoldia limatula, Say (from cod stomachs).
Saxicava arctica, L. (young) (from cod stomachs).
Opercula of *Buccinum* and *Euspira* (from cod stomachs).

VII. Beach at Sea-side Cove, Restigouche Co., and at Green Point, Gloucester Co., N.B., September 3-4, 1925.

Littorina litorea, L.

VIII. Mouth of Burnt Church River, north side of Miramichi Bay, N.B., September 19 1925.

Fished by Indians
Ostrea virginica, Gmel.
Crepidula fornicata, Lam. (young).
Odostomia trifida, Totten.
Mytilus edulis, L.

IX. South arm of St. Simon Inlet, near Shippigan, N.B., Sept. 9, 1925.

Modiolus demissus, Dillwyn.

X. Beach at Savoy Landing, south side of Shippigan Island, N.B., September 10th, 1925.

Ostrea virginica, Gmel.
Cyrtodaria siliqua, Spengler.

XI. Beach at St. Marie, east side of Shippigan Island, N.B., Sept. 10, 1925.

Nucella (Purpura) lapillus, L.

XII. Beach at north end of Miscou Island, N.B., Sept. 12, 1925.

Placopecten grandis, Solander.
Teredo novangliæ, Bartsch (in driftwood).
Teredo (Psiloteredo) dilatata, Stimp. (in driftwood).
Polinices (Euspira) heros, Say.
Ovicapsules of *Buccinum* sp.
Zirfæa crispata, L. (in limestone-boulders).

XIII. Port Daniel, Gaspé Peninsula, Que. August, 1922.

Mytilus edulis L. (young) (from cunner stomachs).

Lacuna vincta, Fabr. (young) (from cunner stomachs).
Fry of Bivalve (on sea-weeds).
Cingula minula, Gould (distorted) (low tide in lagoon).
Littorina rudis, Don. (low tide in lagoon).
Littorina litorea, L. (low tide in lagoon).
Mya sp. (young) (low tide in lagoon).

XIV. Beach near Perce, Gaspé Peninsula, Que. August 17th, 1922.
Littorian litorea, L.
Polinices (*Euspira*) *heros*, Say.

XV. Beach at Cape Ozo, north side of Gaspe Bay, Que.. August 10, 1922.
Mya arenaria, L.
Ensis directus, Conrad.
Acmæa testudinalis, Muell.
Euspira heros, Say.
Littorina litorea, L.
Ovicapsules of *Buccinum* sp.
Fry of *Mytilus* sp. (attached to sea-weeds).

XVI. Eskimo Point, north shore of Gulf of St. Lawrence (about long. 63½°W.), July 27th, 1923.
Mya arenaria L. (beach).
Lacuna vincta, Fabr. (attached to *Laminaria*).

XVII. Ellis Bay, west end of Anticosti Island, Que. July-August, 1923. Low tide and beach.
Ovicapsules of *Buccinum* and *Chrysodomus*.
Littorina rudis.
Littorina palliata, Say.
Acmæa testudinalis, Muell.

XVIII. English Bay, west end of Anticosti Island, Que. August 4th, 1923.
Margarites helicinus, Fabr. (from stomach of sculpin).

XIX. North side of Anticosti Island, Que. (about long. 63½° W.), August 4, 1923; Attached to *Laminaria* in about 2 fathoms.
Margarites helicinus, Fabr.
Lacuna vincta, Mont.

XX. Fox Bay, northeast end of Anticosti Island, Que. August 6, 1923.
Buccinum undatum L. (beach).
Cingula minuta, Gould (lagoon).

XXI. Abrahams Cove, St. George Bay, west side of Newfoundland, Sept. 6, 1922.
Cyrtodaria siliqua, Spengler (from cod stomachs).
Buccinum totteni, Stimpson (from cod lines)
Buccinum ciliatum, Fabr. (from cod lines).
Ovicapsules of *Chrysodomus* sp. (on stone from deeper water).

XXII. "Piccadilly", Port au Port Bay, west side of Newfoundland, September 5, 1922. Low tide and beach.
Mya arenaria L.
Littorina litorea, L.
Littorina palliata, Say. (young).
Euspira heros, Say.
Euspira triseriata, Say.
Acmaea testudinalis L. (young).
Nucella lapillus, L. (young.)

XXIII. West Bay, Port au Port Bay, west side of Newfoundland, Sept. 3, 1922. Beach.
Mya arenaria, L.
Modiolus modiolus, L.
Astarte borealis, Schum ? (worn).
Ensis directus, Conrad.
Placopecten grandis, Solander (*Pecten magellanicus*, Gmel.).
Polinices (*Euspira*) *heros*, Say.
Buccinum undatum L. (worn).
Littorina litorea, L.
Nucella lapillus, L.
Spisula polynyma, Stm.
Stone bored by Pholads (*Zirphæa* ?).

XXIV. As XXIII, but attached to algae; low tide; Sept. 3-4, 1922.
Littorina rudis, Don. (young).
Littorina litoréa, L (young).
Littorina palliata, Say (young).
Nucella lapillus, L. (young).
Acmæa testudinalis, Muell.
Mytilus edulis, (young)
Ovicapsules of *Euspira* sp.

XXV. Bay St. George, at Port au Port, west side of Newfoundland, September 7, 1922; attached to algæ on beach.
Saxicava arctica L. (young).
Anomia sp. (young).
Lacuna sp. (young).

XXVI. Kelligrews, Conception Bay, east end of Newfoundland, August 26, 1922. In *Lithothamnion*-growths on beach.
Anomia aculeata, Muell.
Saxicava arctica L.
Littorina litorea L.
Littorina rudis, Don.
Chiton ruber, L.

XXVII. As XXVI, but low tide.
Mytilus edulis, L. (very young).
Saxicava arctica L.
Acmæa testudinalis, Muell.
Littorina litorea, L.
Lacuna vincta, Fbar.
Margarites sp.

XXVIII. Torbey, north of St. Johns, east end of Newfoundland, August 28, 1922. On seaweeds just below low tide.

Lacuna vincta, Mont.
Two small Nudibranchs (*Aeolid* and *Dendronotus* ?).
Littorina sp. (young).

XXIX. Quidi Vidi village (outside cove), at St. Johns, Newfoundland, August 25, 1922. Attached to washed up sea-weeds.

Mytilus edulis L. (young).
Lacuna vincta, Fabr. (Mont.) (young).
Littorina rudis, Don. (young).
Margarites helicinus, Fabr. (young).

NOTE.—Specimens of the common, Atlantic squid (*Illex illecebrosus* Les.) were kept from the following places—

(1) Mouth of Eel River, N.B., August 30, 1925.
(2) Shippigan, N.B., September 10, 1925.
(3) South side of Anticosti Island, Que. (long. 62½° W.), August 7th, 1923.
(4) Torbey, north of St. Johns, Newfoundland, August 28, 1922.

ECHINODERMS FROM THE GULF OF ST. LAWRENCE AND NEWFOUNDLAND

By FRITS JOHANSEN
Identified by A. H. Clark, U.S.N.M.

OPHIUROIDEA.

Ophiura sarsii Lueticken.

Bay of Chaleur, off Cascapedia Bay, Quebec; from stomach of cod and long rough dab; 15-20 fathoms; August 23-24, 1925 (2).

Ophiopholis aculeata (Retzius).

Bay of Chaleur, off Cascapedia Bay, Quebec; from stomach of cod and long rough dab; 15-20 fathoms; August 23-24, 1925 (1).

Scallop-beds in the Bay of Chaleur, off Carlton, Quebec; 14-15 fathoms; August 26, 1925 (8).

Beach at Eskimo Point (long. 63½° W.), Quebec; on *Laminaria*, July 27, 1923 (1).

ASTEROIDEA

Crossaster papposus (L).

Scallop beds in the Bay of Chaleur, off Carlton, Quebec; 14-15 fathoms; August 26, 1925 (2).

Leptasterias polaris (Mueller and Troschel).

St. Helier (Grand Etang), north side of Gaspé peninsula, Que.; beach at low tide; August 15, 1922 (7).

Ellis Bay, west end of Anticosti Island; July 30, 1923 (1).

Asterias vulgaris (Packard).

Shippigan Harbour, N.B.; September 15, 1925 (1).

Beach at Savoy Landing, southern end of Shippigan Island, N.B.; September 10, 1925 (1).

Dalhousie, N.B.; low tide; end of August, 1925 (5).

North side of Heron Island, Bay of Chaleur N.B.; August 22, 1925 (1).

Cape Ozo, northern side of Gaspé Bay, Quebec; August 10, 1922 (5).

Abrahams Cove, Bay St. George, Newfoundland; September 6, 1922 (1).

West Bay (Port au Port Bay), west side of Newfoundland; September 3-5, 1922 (12).

ENCHINOIDEA.

Strongylocentrotus drœbachiensis (O. F. Mueller)

Miscou Point, N.B.; beach; September 12, 1925 (1).

Cape Ozo, northern side of Gaspé Bay, Quebec; beach; August 10, 1922 (1).

Off Carlton, Gaspé, Quebec; 15 fathoms; August 26, 1925 (3).

Ellis Bay, Anticosti Island; July 30, 1923 (1); and August 1923 (1).

Kelligrews, Conception Bay, Newfoundland; August 26, 1922 (10).

Abrahams Cove, Bay St. George, west coast of Newfoundland; September 6, 1922 (1).

Washed up at Quidi Vidi, St. Johns, Newfoundland; August 25, 1922 (1).

Echinarachnius parma (Lamarck).

Cape Ozo, northern side of Gaspé Bay, Quebec; beach; August 10, 1922 (2).

NOTE.—The numbers in brackets mean number of specimens.

THE SONG OF THE WOOD PEWEE "Myiochanes virens"

By ANNA E. MACLOGHLIN

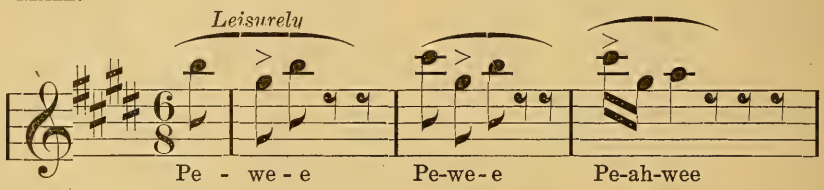
THIS SUMMER I was trying to make a complete record of the song of the Wood Pewee. According to a writer in the *Auk*, for April, 1926, this bird sings three phrases, the last of the three, only in the early morning, or very rarely in the evening. Now I had never succeeded in hearing all three phrases at once. I heard the first two phrases repeatedly, but only on rare occasions heard the third phrase and then it (the third phrase), seemed to be the solo of one bird.

I went into the woods at various hours of the day (sometimes in the Lake of Bays district, before dawn). On several occasions I stayed in one spot listening to a Wood Pewee for three and a half hours at a time, but never succeeded in hearing one bird sing more than two phrases (those marked 1 and 2).

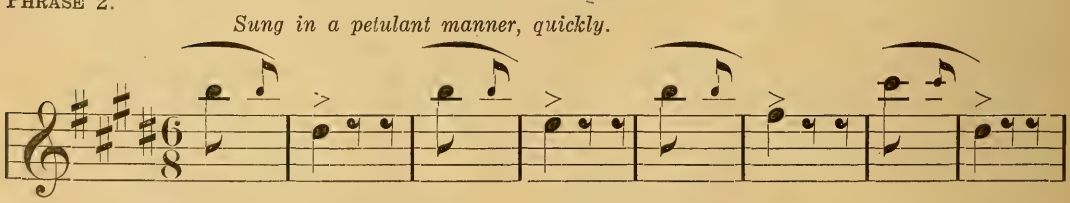
However, on July 25, 1926, I heard a Pewee singing in an orchard on the Mountain Top, Hamilton, slightly different from all three phrases, but practically the same as the third one. I was fortunate enough to discover the nest which contained two young ones. This was placed on the bough of an apple tree near a crotch. The bird repeated its phrases every two seconds for over half an hour while I stayed there, darting out from the trees to catch insects without interrupting its song.

The next morning before daylight I visited the nest and found both parents flying about. One was singing the slightly altered third phrase constantly. About ten minutes later (4:40 a.m.) the other bird, apparently the male, began to sing the two well-known phrases. He sang in the same leisurely fashion which characterizes most Pewee's songs. The first bird sang much faster, as if it were anxious about something. The second bird's singing corresponded exactly to the description given by the writer in the *Auk*. In the meantime, the first bird kept on singing its one phrase, and continued to do so any hour of the day I happened to go in the orchard, until the young birds left the nest. On July 29th, when I went there I heard the mother-bird singing its phrase in a wood-lot adjoining the orchard and the nest was empty. I could see the bird which sang, quite plainly, and also the other bird which sang only phrases one and two. They were darting in and out of the bushes, and both sang in the same key. I did not see the two young birds again, after they left the nest but imagined they were in the bush from the actions of the female bird. I think there is no doubt that the rare third phrase

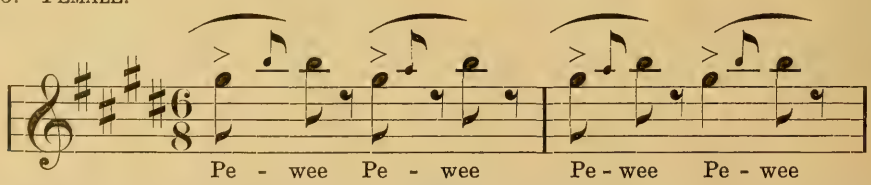
PHRASE 1. MALE.



PHRASE 2.

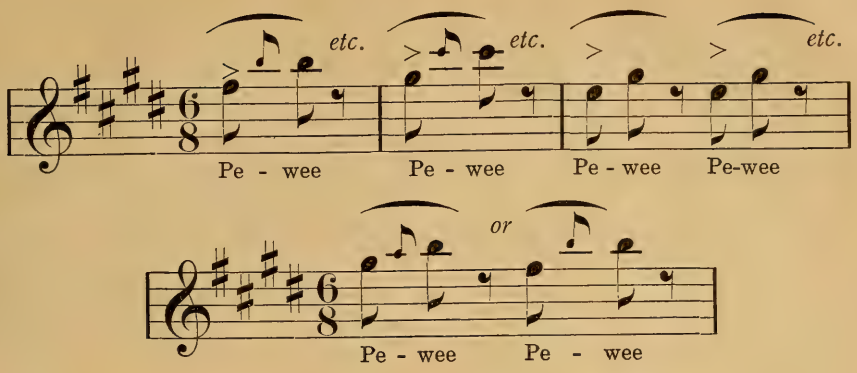


PHRASE 3. FEMALE.



The mother bird sang phrases all day with little interruption, until the young had left the nest. The male bird often answered her, and always in the same key.

OR,



is the song of the Female Wood Pewee. Perhaps it sings only at nesting-time or when the young are learning to fly!

As far as I know this is the first recorded instance of the Female Wood Pewee's singing.

P.S.—Since visiting this from July 25th to the present time (August 9th), these birds have sung in the following keys: C, D flat, E, E flat, F sharp major, G, A flat and B flat.

NOTES AND OBSERVATIONS

AN INDICTMENT OF THE HUNGARIAN PARTRIDGE.—The European Grey or Hungarian Partridge is now fairly numerous in southwest Saskatchewan, and in all probability will be plentiful in another couple of seasons. Like most people, I was much interested when I saw my first pair, in May, 1924, and in noting the gradual increase of the species since that time. But I am now beginning to realize that the Partridge like the House Sparrow and the Starling, is an undesirable alien, that we should be better without. From time to time I have been hearing vague reports of the Partridge interfering with our indigenous birds, the Sharp-tailed Grouse in particular. A few days ago I was talking with a friend who does a lot of shooting every fall, and we both agreed that the Sharp-tail is barely holding its own in numbers, at any rate in this immediate district. When I went on to say that I was afraid that the coming of the Partridge might be partly the cause, "Now," he replied, "you're talking." My friend then told me that a few weeks ago he was motoring with another man past a field of stooked grain, and there they saw a partridge chasing a sharp-tail which was endeavouring to escape by dodging around the stooks. They saw the partridge seize the grouse by the neck and worry it in a most ferocious manner. Before leaving the scene they went to the rescue of the unfortunate grouse. My informant, whose word I would believe unhesitatingly, said also that he knew of cases where partridges had destroyed prairie chicken eggs. From other people I had previously heard of similar treatment of ducks' eggs. All this, I admit, is second hand information, and personally I have noted no ill behaviour on the part of the newcomer; but then the bird is yet rather scarce, and I do not get about much. At the present time there is an open season, during October, for Chicken, while the Partridge, in order to enable it to become established, is protected altogether. In my humble opinion the situation might well be reversed. Elsewhere in the Province I believe Chicken are plentiful, but here they emphatically are not. The Pinnated Grouse is another recent arrival, and if it be true that this is also antagonistic to our native prairie chicken, then the latter will be in bad case and may disappear altogether.—Laurence B. Potter, Eastend, Sask.

EVENING GROSBEAK AT HAMILTON IN MAY.—About noon on May 6, 1926, a single male Evening Grosbeak, (*Hesperiphona vespertina,*) visited our garden, 96, West Second Street, Hamilton, Ontario, for about half an hour, feeding on undertermined food on the ground under wild plum and cherry trees and on the old fruit of the Staghorn Sumach (*Rhus typhina*). It was very tame; and while it was here it was watched by Mrs. F. E. MacLoghlin, Mr. E. A. Baxter and several members of our household here, as well as by me. The lateness of this bird's visit seems to make it worth recording.—R. OWEN MERRIMAN.

The New England Federation of Natural History Societies held its annual meeting at Cambridge last April. Ten societies were represented by members and letters were received from four others. The Secretary of the Federation is J. H. Emerton, 30 Ipswich Street, Boston, Mass.

OFFICIAL CANADIAN RECORD OF BIRD-BANDING RETURNS*

In the following returns upon banded birds it will be noted that some returns may be thought to indicate, from the date of capture, violations of the Migratory Bird Act of Canada or the United States. The great majority of returns, which seem to indicate violations, are from birds accidentally caught in traps set for fur-bearing mammals, from birds caught in fish nets, killed by oil, or from birds found dead from unknown causes. Appropriate action has been taken in connection with the few returns which indicate illegal shooting.

RETURNS UPON BIRDS BANDED IN 1913.

GREAT BLACK-BACKED GULL, No. A.B. B.A. 13,637, juvenile, banded by Harrison F. Lewis, at Lake George, Nova Scotia, on July 15, 1913, was caught alive at a place between Old Orchard and Richmond Island, Maine, on October 4, 1914.

RETURNS UPON BIRDS BANDED IN 1915.

LOON, No. A.B.B.A. 26,518, immature, banded by L. L. Lofstrom, at Cambridge, Minnesota, on July 7, 1915, was caught alive at Morpeth, Ontario, on August 28, 1915.

RETURNS UPON BIRDS BANDED IN 1921.

HERRING GULL, No. 100,700, young, banded by Ernest Joy, at Little Wood Island, Grand Manan, New Brunswick, on August 16, 1921, was found with its wind badly injured, at Rockaway Point, New York, on June 18, 1922. The bird lived alone all summer in the inlets of that vicinity. Reported in U.S. Dept. of Agriculture Bulletin No. 1268, October 16, 1924.

CATBIRD, No. A.B.B.A. 53,981, banded by K. Grant McDougal, at Lot 50, East Kildonan, Manitoba, on May 30, 1921, repeated at the same station until June 2, 1921, and was trapped again at the same station, on May 28, 1925.

RETURNS UPON BIRDS BANDED IN 1922.

GLAUCOUS-WINGED GULL, No. 200,990, nestling, banded by Theed Pearse, at Mitlenatch Island, north of the 50th parallel, in the Gulf of Georgia, British Columbia, on July 30, 1922, was caught and released again on the Pacific Coast, eighty-six miles north of Vancouver, British Columbia, on February 16, 1923. Reported in U.S. Dept. of Agriculture Bulletin, No. 1268, October 16, 1924.

GLAUCOUS-WINGED GULL, No. 201,254, nestling, banded by Theed Pearse, at Mitlenatch Island, north of the 50th parallel, in the Gulf of Georgia, British Columbia, on July 30, 1922, was captured and released again at Princess Louise, Jervis Inlet, British Columbia, on February 21, 1925.

BLACK DUCK, No. 207,745, banded by H. S. Osler, at Lake Scugog, Ontario, on September 21, 1922, was found with a broken wing at Pindell, Maryland, on October 29, 1922. The bird was alive and received care. Reported in U.S. Dept. of Agriculture Bulletin No. 1268, October 16, 1924.

CHIPPING SPARROW, No. 26,825, adul, male, banded by Ralph E. DeLury, at 330 Fairt mont Avenue, Ottawa, Ontario, on July 24, 1922- was recaught at the same station on July 30, 1922; returned to the same place, but to a different trap, on May 12, 1923, and repeated several times at the same station until July 24, 1923; was re-caught on May 2, 1924, at the same station, and repeated there several times until June 4, 1924; and was re-caught at the same station on May 8, 1925, and repeated there several times until May 31, 1925.*

SONG SPARROW, No. 26,829, adult female, banded by Ralph E. DeLury, at 330 Fairmont Avenue, Ottawa, Ontario, on August 6, 1922, was re-caught at the same station on August 19, and August 26, 1922; returned to the same station on April 29, 1923, and repeated on May 13, and May 17, 1923; was re-caught at the same station on September 9, 1924.*

RETURNS UPON BIRDS BANDED IN 1923.

BLACK GUILLEMOT, No. 210,101, banded by Ernest Joy, at Little Wood Island, Grand Manan, New Brunswick, on July 3, 1923, was found on the same nest on June 1, 1924, and June 22, 1925.

BLACK GUILLEMOT, No. 210,104, banded by Ernest Joy, at Little Wood Island, Grand Manan, New Brunswick, on July 3, 1923, was found on the same nest on June 8, 1924.

BLACK GUILLEMOT, No. 210,123, banded by Ernest Joy, at Little Wood Island, Grand Manan, New Brunswick, on July 3, 1923, was found on the same nest on July 9, 1925.

BLACK GUILLEMOT, No. 210,124, banded by Ernest Joy, at Little Wood Island, Grand Manan, New Brunswick, on July 3, 1923, was found on the same nest on June 8, 1924.

BLACK GUILLEMOT, No. 114,543, adult, banded by Harrison F. Lewis, at St. Mary's Islands, Saguenay County, Quebec (Canadian Labrador), on July 23, 1923, was found on the same nest during the breeding season of 1924, and on July 11, 1925. Its band was in good condition.

BLACK GUILLEMOT, No. 114,552, adult, banded by Harrison F. Leiws, at St. Mary's Islands, Saguenay County, Quebec (Canadian Labrador), on July 24, 1923, was re-caught in the same locality, on July 30, 1925.

BLACK GUILLEMOT, No. 210,117, banded by Ernest Joy, at Wood Island, Grand Manan, New Brunswick, on August 20, 1923, was found on the same nest, on June 8, 1924.

BLACK GUILLEMOT, No. 210,120, banded by Ernest Joy, at Wood Island, Grand Manan, New Brunswick, on August 26, 1923, was found on the same nest, on June 22, 1925.

COMMON MURRE, No. 2(04),685), adult, banded by Harrison F. Lewis, at Boat Islands, Saguenay County, Quebec (Canadian Labrador), on July 20, 1923, was re-caught at its breeding place on the Boat Islands, on July 18, 1925. The band on this bird showed no corrosion worthy of mention, but the two missing figures (in brackets had been lost through abrasion. The band was not causing the bird any trouble or difficulty.

COMMON MURRE, No. 2(04),710, adult, banded by Harrison F. Lewis, at St. Mary's Islands, Saguenay County, Quebec (Canadian

*Published by authority of the Canadian National Parks Branch, Department of the Interior, Canada.

*C.P.-N., XXXVIII, 1924, p. 156.

Labrador), on July 24, 1923, was re-caught at its breeding place on St. Mary's Islands, on July 17, 1925. The band on this bird showed corrosion to some extent, but was not causing the bird any trouble or difficulty. The figures in brackets may not be correct, as they were more or less illegible, as the result of abrasion against the rocks.

COMMON MURRE, No. 2(04),713, adult, banded by Harrison F. Lewis, at St. Mary's Islands, Saguenay County, Quebec (Canadian Labrador), on July 24, 1923, was re-caught at its breeding place on St. Mary's Islands, on July 17, 1925. The band on this bird showed corrosion to some extent, but was not causing the bird any trouble or difficulty. The figures in brackets may not be correct, as they were more or less illegible, as the result of abrasion against the rocks.

COMMON MURRE, No. (204),717, adult, banded by Harrison F. Lewis, at St. Mary's Islands, Saguenay County (Canadian Labrador), on July 24, 1923, was re-caught at its breeding place on St. Mary's Islands, on July 17, 1925. The band on this bird was so badly abraded beneath the tarsus that it was worn entirely through, and likely to fall off the bird. The first part of the number was on the portion of the band that was worn away. Hence, the figures in brackets may not be correct. The band did not cause the bird any trouble or difficulty, but its remains were removed and band No. 334,221 was placed in its stead.

MALLARD, No. 232,087, banded by Reuben Lloyd, at Davidson, Saskatchewan, on August 12, 1923, was re-captured in the same locality, on June 10, 1924.

CALIFORNIAN PARTRIDGE, No. 260,921, male, banded by G. D. Sprot, at Mill Bay, Vancouver Island, British Columbia, on November 2, 1923, was re-captured at the same station on November 13, 1923, January 5, 1924, May 11, 1925, May 13, 1926, and May 15 and 25, 1926.

DOWNY WOODPECKER, No. 15,836, adult male, banded by Ralph E. DeLury, at 330 Fairmont Avenue, Ottawa, Ontario, on February 18, 1923, was re-captured several times at the same station. until March 2, 1925; it was captured again at the same station on November 29, and December 2, 1925.*

FLICKER, No. 110,137, female, banded by Dan Patton, at Midnapore, Alberta, on June 7, 1923, was re-captured at the same station on, April 18, 1924. This bird nested in the same place and had the same mate as it had in 1923.†

STELLER'S JAY, No. 260,902, adult, banded by G. D. Sprot, at Mill Bay, Vancouver Island, British Columbia, on September 27, 1923, repeated several times at the same station until June 8, 1924; and was captured again at the same station, on January 24, and March 10 and 26, 1925.

STELLER'S JAY, No. 260.903, juvenile, banded by G. D. Sprot, at Mill Bay, Vancouver Island, British Columbia, on October 2, 1923, repeated at the same station on October 5, 1923; and was captured again at the same station on January 5, 1924, and May 16, 1926.

*C.F.-N., XXXVIII, 1924, p. 177.
†C.F.-N., XXXVIII, 1924, p. 179.

STELLER'S JAY, No. 260,908, banded by G. D. Sprot, at Mill Bay, Vancouver Island, British Columbia, on October 12, 1923, repeated at the same station until November 2, 1923; was re-captured at the same station, on March 15, 1924, and repeated there several times until June 11, 1924; and was re-captured at the same station on March 26, 1925, and on May 9, 1926, repeating there until May 23, 1926.

RED-WINGED BLACKBIRD, No. 18,945, adult male, banded by Ralph E. DeLury, at Dow's Lake, Ottawa, Ontario, on September 1, 1923, was re-captured at the same station, on May 6, 1924.

AMERICAN GOLDFINCH, No. 81,714, female, banded by Paul Kuntz, at 140 Luxton Avenue, Winnipeg, Manitoba, on September 3, 1923, was re-captured at the same station, on August 16, 1924.

AMERICAN GOLDFINCH, No. 115,522, male banded by Paul Kuntz, at 140 Luxton Avenue, Winnipeg, Manitoba, on September 23, 1923, was re-captured at the same station, on June 21, 1924.

WHITE-THROATED SPARROW, No. 52,418, immature, banded by Ralph E. DeLury, at 330 Fairmont Avenue, Ottawa, Ontario, on August 11, 1923, repeated several times at the same station, until August 25, 1923; and was re-captured at the same station, on May 10, 1924.

SLATE-COLOURED JUNCO, No. 74,994, adult banded by R. W. Tufts, at Wolfville, Nova Scotia, on February 19, 1923, repeated at the same station, until February 21, 1923; and was re-captured at the same station, on May 8, 1926. This bird had a scar on one side, and was noted about the feeding station for a number of weeks before its capture on May 8, 1926; it was noted nesting in the vicinity after its re-capture.

SONG SPARROW, No. 64,021, adult, banded by K. Grant McDougal, at East Kildonan, Manitoba, on May 6, 1923, repeated on May 15, 1923; returned to the same station on April 27, 1924, and repeated there on June 9, 1924; and was re-captured at the same station, on April 14 and 16, and May 7, 1925.*

SONG SPARROW, No. 64,042, adult, banded by K. Grant McDougal, at East Kildonan, Manitoba, on May 21, 1923, was re-captured at the same station on July 12, 1925.

SONG SPARROW, No. 52,389, adult, banded by Ralph E. DeLury, at 330 Fairmont Avenue, Ottawa, Ontario, on July 13, 1923, repeated until July 31, 1923; was re-captured at the same station, on August 11, 1924, and repeated until August 14, 1924; and was re-captured at the same station on May 25, 1925.

SONG SPARROW, No. 52,414, adult, banded by Ralph E. DeLury, at 330 Fairmont Avenue, Ottawa, Ontario, on August 9, 1923, repeated on August 29, 1923; was re-captured at the same station, on May 16, 1924, and repeated on May 30, 1924.

SONG SPARROW, No. 81,308, banded by Claude E. Johnson, at 87 Cameron Street, Ottawa, Ontario, on September 23, 1923, was re-captured at the same station, on July 18, 1924.

OREGON TOWHEE, No. 119,513, male, banded by G. D. Sprot, at Mill Bay, Vancouver Island, British Columbia, on October 23, 1923, repeated several times at the same station, until May 31, 1924; and was re-captured at the same station, on January 24, 1925.

BARN SWALLOW, No. 54,769, female, banded by Reuben Lloyd, at Davidson, Saskatchewan, on May 27, 1923, was re-captured at the same station, on June 28, 1924, and built its nest in the same building in which it built in 1923; and was re-captured at the same station, on June 5, 1925. In 1925 it had its 1924 mate and the same nest as they occupied in 1924. Two brooods were raised each year.*

BARN SWALLOW, No. 36,853, banded by Ernest Joy, at Wood Island, Grand Manan, New Brunswick, on July 1, 1923, was re-captured at the same station, on July 3, 1925.

TREE SWALLOW, No. 65,808, adult male, banded by Herman Battersby, at Oak Lake, Manitoba, on July 10, 1923, was re-captured in the same bird box, on May 3, 1924.

TREE SWALLOW, No. 80,671, adult, banded by A. L. Holm, at Otto, Manitoba, on July 11, 1923, was re-captured in the same bird house, on April 30, 1924.

CATBIRD, No. 28,140, banded by K. Grant McDougal, at East Kildonan, Manitoba, on September 11, 1923, was re-captured at the same station, on May 29, 1926.

WHITE-BREASTED NUTHATCH, No. 26,-844, adult male, banded by Ralph E. DeLury, at 330 Fairmont Avenue, Ottawa, Ontario, on January 11, 1923, repeated several times until March 18, 1923; was re-caught at the same station, on September 22, 1923, and repeated several times until December 30, 1923; and was re-captured at the same station, on April 1, August 14, and September 3, 1924.†

CHICKADEE, No. 83,541, adult, banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on October 21, 1923, was re-caught ot the same station, on February 9 and September 9, 1924, and March 26, 1925.

CHICKADEE, No. 83,545, adult, banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on October 28, 1923, repeated until February 18, 1924, and was re-caught at the same station, on October 12 and December 21, 1925.

CHICKADEE, No. 83,551, adult, banded by R. H. Carter, Sr., at Muscow, Saskatchewan, on November 4, 1923, was re-captured at the same station, on November 7, 1923, February 6, 8 and 9, 1924, and March 21, October 12 and November 1, 1925.

ROBIN, No. 18,934, adult female, banded by Ralph E. DeLury, at 330 Fairmont Avenue, Ottawa, Ontario, on April 27, 1923, repeated several times at the same station in different traps, until July 6, 1923, and was re-captured at the same station on October 6, 1923, and April 24, 1924.‡

ROBIN, No. 18,935, adult male, banded by Ralph E. DeLury, at 330 Fairmont Avenue Ottawa, Ontario, on May 5, 1923, was re-captured at the same station, on April 20 and 26, 1924.

ROBIN, No. 110,922, adult female, banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on June 10, 1923, while it was feeding its young at its nest, was caught at its second nest in the same locality, on July 19, 1923; was re-captured at the same station, on June 12, 1924, and at its second nest in the same locality, on June 26, 1924; and was re-caught at its nest at the same station, on June 29, 1925.

RETURNS UPON BIRDS BANDED IN 1924.

COMMON MURRE, No. 2(04),733, adult, (a "ringed" Murre, with white eye-ring and white line behind the eye), banded by Harrison F. Lewis, at St. Mary's Islands, Saguenay County, Quebec, on July 8, 1924, was re-caught at its breeding place at St. Mary's Islands, on July 16, 1925. The band on this bird was not noticeably corroded and was not causing the bird any trouble or difficulty, but the figures in brackets may not be correct, as they were somewhat illegible because of abrasion of the band against the rocks on which the bird had perched.

COMMON MURRE, No. 3(09),402, adult, (a "ringed" Murre, with white eye-ring and white line behind the eye), banded by Harrison F. Lewis, at St. Mary's Islands, Saguenay County, Quebec, on July 11, 1924, was re-caught at its breeding place at St. Mary's Islands, on July 17, 1925. The band on this bird was not causing the bird any trouble or difficulty, but the figures in brackets may not be correct, as they were more or less illegible as the result of abrasion of the band against the rocks.

COMMON MURRE, No. 309,456, adult, banded by Harrison F. Lewis, at Cocoacho, Saguenay County, Quebec, on August 11, 1924, was re-caught at its breeding place at Coacoacho, Quebec, on July 26, 1925.

CALIFORNIAN PARTRIDGE, No. 260,939, male, banded by G. D. Sprot, at Mill Bay, Vancouver Island, British Columbia, on January 8, 1924, repeated on March 17, 1924, and was re-captured at the same station, on May 7 and 19, September 4 and November 7, 1925. Band No. 260,939 was re-placed by band No. 279,692 on September 4, 1925.

HAIRY WOODPECKER, No. 274,121, male, banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on February 8 1924, was re-captured at the same station, on December 25, 1925.

HAIRY WOODPECKER, No. 219,935, male, banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on February 19, 1924, was re-captured at the same station, on December 22, 1925.

LEAST FLYCATCHER, No. A4342, nestling banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on July 10, 1924, was re-caught as an adult female, at its nest at the same station, on July 11, 1926.

BALTIMORE ORIOLE, No. 241,924, male, banded by Paul Kuntz, at 140 Luxton Avenue, Winnipeg, Manitoba, on May 27, 1924, was re-captured at the same station, on July 15, 1926.

BRONZED GRACKLE, No. 113,356, male, banded by Hoyes Lloyd, at 406 Queen Street, Ottawa, Ontario, on May 4, 1924, was caught by a dog, at a place within one block of 406 Queen Street, on April 15, 1926. Its right leg and wing were injured and its tail partly pulled out. The ibird was kept in captivity and cared for until it could fly. It was released from 406 Queen Street, on April 30. 1926, wearing band No. 314,283 instead of No. 113,356.

AMERICAN GOLDFINCH, No. 86,515, female, banded by Paul Kuntz, at 140 Luxton Avenue, Winnipeg, Manitoba, on July 5, 1924, was re-captured at the same station, on July 16, 1926.

*C.F.-N., XXXVIII, 1924, p. 178.
†C.F.-N., XXXVIII, 1924, p. 177.
‡C.F.-N., XXXVIII, 1924, p. 178.

VESPER SPARROW, No. 129,826, banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on May 18, 1924, was re-captured at the same station, on June 4, 1925.

CHIPPING SPARROW, No. 52,449, adult male (?), banded by Ralph E. DeLury, at 330 Fairmont Avenue, Ottawa, Ontario, on May 3, 1924, repeated several times, until June 5, 1924; and was re-captured at the same station, on April 28, 1925, and repeated several times until May 22, 1925.

CHIPPING SPARROW, No. 96,824, adult, banded by Ralph E. DeLury, at 330 Fairmont Avenue, Ottawa, Ontairo, on May 13, 1924, repeated several times until August 13, 1924, and was re-captured at the same station, on May 7, 1925, and repeated until June 22, 1925.

CHIPPING SPARROW, No. 87,827, banded by Claude E. Johnson, at 87 Cameron Street Ottawa, Ontario, on August 10, 1924, was re-caught at the same station, on June 26, 1925.

CHIPPING SPARROW, No. 96,860, adult, banded by Ralph E. DeLury, at 330 Fairmont Avenue, Ottawa, Ontario, on September 1, 1924, was re-caught at the same station, on May 21, 23 and 26, 1925.

OREGON JUNCO, No. 85,183, male, banded by G. D. Sprot, at Mill Bay, Vancouver Island, British Columbia, on January 11, 1924, repeated on January 19 and February 8, 1924; and was re-captured at the same station, on March 4, 1925, and repeated there several times until April 1, 1925.

OREGON JUNCO, No. 119,536, female, banded by G. D. Sprot, at Mill Bay, Vancouver Island, British Columbia, on February 28, 1924, was re-captured at the same station, on January 31, February 17 and March 1, 1925.

SONG SPARROW, No. 52,437, adult male, banded by Ralph E. DeLury, at 330 Fairmont Avenue, Ottawa, Ontario, on April 11, 1924, repeated until August 17, 1924; and was re-captured at the same station, on July 5 and August 5, 1925.

SONG SPARROW, No. 136,662, adult (?), banded by Ralph E. DeLury, at 330 Fairmont Avenue, Ottawa, Ontario, on April 12, 1924, repeated on August 14, 1924; and was re-captured at the same station, on May 31 and June 26, 1925.

SONG SPARROW, No. 136,669, adult (?), banded by Ralph E. DeLury, at 330 Fairmont Avenue, Ottawa, Ontario, on August 21, 1924, was re-captured at the same station, on April 9, 1925.

SONG SPARROW, No. 136,648, adult, banded by Ralph E. DeLury, at 330 Fairmont Avenue, Ottawa, Ontario, on July 10, 1924, repeated several times until September 3, 1924; and was re-captured at the same station, on April 10, 1925, and repeated there several times until July 2, 1925.

SONG SPARROW, No. 140,960, banded by P. S. Walker, at The Universtiy of British Columbia, Point Grey, British Columbia, on October 11, 1924, repeated on November 22, 1924; and was re-captured at the same station, on December 19, 1925.

SONG SPARROW, No. 142,580, banded by P. S. Walker, at The University of British Columbia, Point Grey, British Columbia, on October 25, 1924, was re-caught at the same station, on January 17, 1925, and February 13, 1926.

OREGON TOWHEE, No. 119,531, female, banded by G. D. Sprot, at Mill Bay, Vancouver Island, British Columbia, on February 27, 1924, repeated several times until June 18, 1924; and was re-captured at the same station, on March 3, 1925, and May 10 and 25, 1926.

BARN SWALLOW, No. A1256, male, banded by Reuben Lloyd, at Davidson, Saskatchewan, on June 29, 1924, was re-captured at the same station, on June 6, 1925. It had the same mate and nest as it had in 1924, and two broods were raised each year.

HOUSE WREN, No. 21,139, male, banded by Howard F. Cant, at 35 Lansdowne Road North, Galt, Ontario, on May 11, 1924, repeated on May 24, 1924, raised two families in 1924, and was re-captured at the same station, on May 5, 1925.

HOUSE WREN, No. 96,835, adult male, banded by Ralph E. DeLury, at 330 Fairmont Avenue, Ottawa, Ontario, on May 28, 1924, was re-captured at the same station, on August 12, 1925.

HOUSE WREN, No. 87,814, banded by Claude E. Johnson, at 87 Cameron Street, Ottawa, Ontario, on June 13, 1924, was re-captured in the same nest box at the same station, on May 31, 1925.

HOUSE WREN, No. A4296, adult, banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on June 24, 1924, was re-caught at the same station, on June 2, 1925.

HOUSE WREN, No. A4297, adult, banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on June 27, 1924, was re-caught at the same nest, on June 2, 1925.

HOUSE WREN, No. A4315, adult, banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on July 2, 1924, was re-caught at the same nest, on June 1, 1925.

HOUSE WREN, No. 96,851, adult female (?), banded by Ralph E. DeLury, at 330 Fairmont Avenue, Ottawa, Ontario, on July 5, 1924, was re-caught at the same station, on May 16, 1925.

HOUSE WREN, No. A4353, nestling, banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on July 11, 1924, was re-captured at the same station but at three different nests, on May 24, June 2, and July 21, 1925.

WHITE-BREASTED NUTHATCH, No. 76,-037, male, banded by K. Grant McDougal, at East Kildonan, Manitoba, on March 15, 1924, was re-captured at the same station, on November 17, 1924.

WHITE-BREASTED NUTHATCH, No. 96,-856, banded by Ralph E. DeLury, at 330 Fairmont Avenue, Ottawa, Ontario, on August 14, 1924, repeated several times until January 25, 1925; and was re-captured at the same station, on August 21, 1925, and repeated until September 15, 1925.

CHICKADEE, No. 86,677, banded by A. L. Holm, at Otto, Manitoba, on March 6, 1924, was re-captured at the same station, on December 8, 1924.

CHICKADEE, No. 86,715, adult, banded by A. L. Holm, at Otto, Manitoba, on December 7, 1924, repeated until December 12, 1924; and was re-captured at the same station, on February 11 and December 18, 1925.

CHICKADEE, No. 86,716, adult, banded by A. L. Holm, at Otto, Manitoba, on December 7, 1924, repeated on December 10, 1924; and was

re-captured at the same station, on December 11, 1925.

CHICKADEE, No. 83,556, banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on January 14, 1924, was re-captured at the same station, on February 9, May 2, and October 12, 1925.

CHICKADEE, No. 83,557, banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on January 15, 1924, repeated on February 8 and March 30, 1924; was re-captured at the same station, on January 13, 1925, and repeated until March 24, 1925; and was re-captured at the same station, on December 21, 1925.

CHICKADEE, No. 83,559, banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on January 19, 1924, repeated until February 19, 1924; and was re-captured at the same station, on March 12, 1925.

CHICKADEE, No. 83,560, banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on January 19, 1924, was re-captured at the same station, on February 7 and September 8, 1924.

CHICKADEE, No. 83,562, banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on January 24, 1924, repeated on February 8, 1924; and was re-captured at the same station, on February 18 and March 9, 1925.

CHICKADEE, No. 83,564, banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on Feburary 8, 1924, was re-captured at the same station, on March 30 and 31, September 7 and 8, 1924, January 15, March 20 and 21, September 19 and 27, and November 1, 1925.

CHICKADEE, No. 83,566, banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on February 8, 1924, was re-captured at the same station, on September 8, 1924, and February 19, and March 20 and 23, 1925.

CHICKADEE, No. 83,567, banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on February 8, 1924, was re-captured at the same station, three times on February 9, 1924, and once on May 9, 1925.

CHICKADEE, No. 83,569, banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on February 26, 1924, was re-captured at the same station, on June 14, September 27 and October 12, 1925.

CHICKADEE, No. 83,570, banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on February 28, 1924, repeated on March 30, 1924, and was re-captured at the same station, on January 15, 1925.

CHICKADEE, No. 92,891, banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on March 30, 1924, was re-captured at the same station, on January 14, March 12, 19 and 21, and October 12, 1925.

CHICKADEE, No. A4393, adult, banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on September 8, 1924, was re-captured at the same station, on September 21 and October 26, 1924, and March 20, 1925.

ROBIN, No. 72,871, banded by Claude E. Johnson, at 87 Cameron Street, Ottawa, Ontario, on August 18, 1924, was re-captured as an adult male, in the same trap, on June 10, 1926.

RETURNS UPON BIRDS BANDED IN 1925.

MALLARD, No. 232,012, female, banded by Reuben Lloyd, at Davidson, Saskatchewan, on April 24, 1925, was re-captured at the same station, on May 18, 1926.

MALLARD, No. 309,774, banded by Reuben Lloyd, at Davidson, Saskatchewan, on August 9, 1925, was re-captured as an adult female, at the same station, on May 18, 1926.

BLUE-WINGED TEAL, No. 323,734, banded by H. S. Osler, at Lake Scugog, Ontario, on September 23, 1925, was caught alive, in a small spring creek near a big swamp on a farm at Consecon, Prince Edward County, Ontario, on January 27, 1926 The bird had one of its wings injured and could not fly very well.

CALIFORNIAN PARTRIDGE, No. 279,715, banded by G. D. Sprot, at Mill Bay, Vancouver Island, British Columbia, on May 7, 1925, was re-caught at the same station, on May 16 and 30 1926.

CALIFORNIAN PARTRIDGE, No. 289,703, young female, banded by G. D. Sprot, at Mill Bay, Vancouver Island, British Columbia, on October 19, 1925, repeated on November 7, 1925; and was re-caught at the same station, on May 15 and June 11, 1926.

DOWNY WOODPECKER, No. 15,845, adult female, banded by Ralph E. DeLury, at 330, Fairmont Avenue, Ottawa, Ontario, on April 22, 1925, repeated until May 14, 1925; was re-captured at the same station, on November 25, 1925, and repeated until December 1, 1925.

BREWER'S BLACKBIRD, No. 260,628, adult male, banded by P. S. Walker, at The University of British Columbia, Point Grey, British Columbia, on March 4, 1925, was re-captured at the same station, on May 22, 1926.

BREWER'S BLACKBIRD, No. 260,631, adult male, banded by P. S. Walker, at The University of British Columbia, Point Grey, British Columbia, on March 5, 1925, was re-captured at the same station, on May 8, 1926.

BRONZED GRACKLE, No. 113,358, male, banded by Hoyes Lloyd, at 406 Queen Street, Ottawa, Ontario, on April 5, 1925, was re-captured at the same station, on May 4, 1926, and band No. 113,358 was re-placed by band No. 314,285.

BRONZED GRACKLE, No. 106,198, adult male, banded by Ralph E. DeLury, at 330 Fairmont Avenue, Ottawa, Ontario, on July 29, 1925, was caught in the baggage room of the Railroad Station at Williamstown, Oswego Conuty, New York, (one hundred and forty miles almost exactly straight south of Ottawa), on November 10, 1925. The bird had a broken toe, but was otherwise in good condition, and was released.

SONG SPARROW, No. 134,042, banded by Willie LaBrie, at Kamouraska, Quebec, on April 19, 1925, was re-captured at the same station, on September 14, 1925, and May 9, 1926.

YELLOW WARBLER, No. A8396, adult male, banded by R. W. Tufts, at Wolfville, Nova Scotia, on June 28, 1925, returned with a new mate, nested in the same rose bush as it did in 1925, and was re-captured on July 5, 1926.

HOUSE WREN, No. A8977, adult male, banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on May 29, 1925, was re-captured at two different nests with two different mates, at the same station, on June 28 and July 16, 1926.

HOUSE WREN, No. A25,949, adult, banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on June 23, 1925, was re-captured at a different nest at the same station, on June 12, 1926.

HOUSE WREN, No. A25,953, adult, banded by R. H. Carter, Jr., at Muscow, Saskatchewan,

on July 1, 1925, was re-captured at a different nest, at the same sation, on June 8, 1926.

HOUSE WREN, No. A35,169, adult female, banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on July 21, 1925, was re-captured at the same station, with a different mate and at a different nest, on June 11, 1926.

HOUSE WREN, No. A35,176, adult female, banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on July 26, 1925, was re-captured at the same station, but at a different nest, on May 27, 1926.

CHICKADEE, No. 86,720, adult, banded by A. L. Holm, at Otto, Manitoba, on February 11, 1925, was re-captured at the same station, on December 11, 1925.

CHICKADEE, No. A8962, adult, banded by R. H. Carter, Jr. at Muscow, Saskatchewan, on January 12, 1925, repeated until March 23, 1925; was re-captured at the same station, on September 20, 1925, and repeated until November 18, 1925; and was re-captured at the same station, on February 7, 1926.

CHICKADEE, No. A8967, adult, banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on February 11, 1925, repeated until March 12, 1925; and was re-captured at the same station, on December 21, 1925, and repeated until January 6, 1926.

CHICKADEE, No. A8972, adult, banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on March 13, 1925, was re-captured at the same station, on March 20, September 20 and 27, and November 1, 8 and 11, 1925, and February 7, and June 6, 1926.

MALLARD, No. 323,591, banded by H. S. Osler, at Lake Scugog, Ontario, on October 24, 1924, was shot in the Township of Ops, Victoria County, Ontario, on Novmeber 6, 1924.

MALLARD, No. 297, 937, banded by H. S. Osler, at Lake Scugog, Ontario, on October 27, 1924, was shot on the Gunpowder River, at Harewood Park, Maryland, on November 3, 1924.

MALLARD, No. 297,946, banded by H. S. Osler, at Lake Scugog, Ontario, on October 28, 1924, was shot at a place two miles north of Lake Scugog, Ontario, on November 14, 1924.

MALLARD, No. 321,822, banded by H. S. Osler, at Lake Scugog, Ontario, on November 3, 1924, was killed on the Santee River, South Carolina, on January 21, 1925.

MALLARD No. 321,823, banded by H. S. Osler, at Lake Scugog, Ontario, on November 3, 1924, was shot at Port Clinton, Ohio, on November 20, 1924.

MALLARD, No. 323,608, banded by H. S. Osler, at Lake Scugog, Ontario, on November 6, 1924, was killed in the same locality, during the same fall, before November 26, 1924.

MALLARD, No. 323,609, banded by H. S. Osler, at Lake Scugog, Ontario, on November 6, 1924, was killed on the Cumberland River, at Castalian Springs, Tennessee, on December 13, 1924.

MALLARD, No. 323,627, banded by H. S. Osler, at Lake Scugog, Ontario, on November 11, 1924, was shot on the Patuxent River, Valvert County, Maryland, on December 11, 1924.

MALLARD, No. 350,337, male, banded by J. A. Munro, at Colquitz, Vancouver Island, British Columbia, on December 31, 1924, was shot at a place one and one-half miles from where it was banded, on January 1, 1925.

MALLARD, No. 305,341, male, banded by J. A. Munro, at Colquitz, Vancouver Island, British Columbia, on December 31, 1924, was shot at Royal Oak, Vancouver Island, British Columbia, one mile east of where it was banded, on January 1, 1925.

BLACK DUCK, No. 323,520, banded by H. S. Olser, at Lake Scugog, Ontario, on October 19, 1924, was shot at Fenelon Falls, Ontario, on November 5, 1924.

BLACK DUCK, No. 323,521, banded by H. S. Osler, at Lake Scugog, Ontario, on October 19, 1924, was killed in the same locality, during the same fall, before November 26, 1924.

BLACK DUCK, No. 323,527, banded by H. S. Osler, at Lake Scugog, Ontario, on October 20, 1924, was killed at DeWitt, Arkansas, on November 28, 1924.

BLACK DUCK, No. 323,528, banded by H. S. Osler, at Lake Scugog, Ontario, on October 20, 1924, was shot at a place one mile west of the entrance to Pensacola Harbor, Florida, on November 27, 1924.

BLACK DUCK, No. 323,530, banded by H. S. Osler, at Lake Scugog, Ontario, on October 20, 1924, was killed at Jellico Creek, twelve miles east of Williamsburg, Kentucky, on December 19, 1924.

BLACK DUCK, No. 323,536, banded by H. S. Osler, at Lake Scugog, Ontario, on October 20, 1924, was shot at Sheepshead Meadows, inland from Little Egg Harbor Light House, New Jersey, on December 26, 1925.

BLACK DUCK, No. 323,541, banded by H. S. Osler, at Lake Scugog, Ontario, on October 20, 1924, was killed at Dublin, Virginia, about December 10, 1924.

BLACK DUCK, No. 323,543, banded by H. S. Osler, at Lake Scugog, Ontario, on October 21, 1924, was shot at the mouth of the Detroit River, Lake Erie, on November 16, 1924.

BLACK DUCK, No. 323,564, banded by H. S. Osler, at Lake Scugog, Ontario, on October 22, 1924, was killed in the same locality, during the same fall, before November 26, 1924.

BLACK DUCK, No. 323,565, banded by H. S. Osler, at Lake Scugog, Ontario, on October 22, 1924, was killed on Cedar Island, Charleson County, South Carolina, on November 2, 1925.

BLACK DUCK, No. 323,565, banded by H. S. Osler, at Lake Scugog, Ontario, on October 22, 1924, was killed on Cedar Island, Charleson County, South Carolina, on November 2, 1925.

BLACK DUCK, No. 323,569, banded by H. S. Osler, at Lake Scugog, Ontario, on October 22, 1924, was killed at a place four miles north of Barnegat Inlet, Barnegat Bay, New Jersey, on January 3, 1925.

BLACK DUCK, (?) No. 323,574, banded by H. S. Osler, at Lake Scugog, Ontario, on October 22, 1924, was killed on the Combahee River, South Carolina, on January 2, 1925.

BLACK DUCK, No. 323,580, banded by H. S. Osler, at Lake Scugog, Ontario, on October 23, 1924, was killed at a place five miles north-west of Yorktown, Virginia, on November 20, 1924.

BLACK DUCK, No. 323,582, banded by H. S. Osler, at Lake Scugog, Ontario, on October 24, 1924, was shot at the mouth of the Indian River,

Rice Lake, near Keene, Ontario, on November 2, 1925.

BLACK DUCK, No. 323,584, banded by H. S. Osler, at Lake Scugog, Ontario, on October 24, 1924, was killed at Piscataway Creek, near Fort Washington, Maryland, on January 15, 1924.

BLACK DUCK, No. 323,588, banded by H. S. Osler, at Lake Scugog, Ontario, on October 24, 1924, was caught in a game trap at Point au Fer, Terrebonne Parish, Louisiana, on November 15, 1924.

BLACK DUCK, No. 323,595, banded by H. S. Osler, at Lake Scugog, Ontario, on October 25, 1924, was killed in the same locality, during the same fall, before November 26, 1924.

BLACK DUCK, No. 323,596, banded by H. S. Osler, at Lake Scugog, Ontario, on October 25, 1924, was killed in the same locality, during the same fall, before November 26, 1924.

BLACK DUCK, No. 323,599, banded by H. S. Osler, at Lake Scugog, Ontario, on October 25, 1924, was shot at the Lake St. Clair Flats Fishing & Shooting Club, on the Canadian side, opposite Alginac, Michigan, on November 29, 1924.

BLACK DUCK, No. 297,901, banded by H. S. Osler, at Lake Scugog, Ontario, on October 26, 1924, was killed on the Great Kanawha River, Mason County, West Virginia, on November 25, 1924.

BLACK DUCK, No. 297,902, banded by H. S. Osler, at Lake Scugog, Ontario, on October 26, 1924, was shot at Bishipville, South Carolina, on November 27, 1924.

BLACK DUCK, No. 297,914, banded by H. S. Osler, at Lake Scugog, Ontario, on October 26, 1924, was shot at Port Rowan, Ontario, on November 21, 1924.

BLACK DUCK, No. 297,915, banded by H. S. Osler, at Lake Scugog, Ontario, on October 26, 1924, was shot on the Trent River Marshes, six miles from Campbellford, Ontario on November 12, 1924.

BLACK DUCK, No. 297,916, banded by H. S. Osler, at Lake Scugog, Ontario, on October 26, 1924, was killed in the same locality, during the same fall before November 26, 1924.

BLACK DUCK, No. 297,933, banded by H. S. Osler, at Lake Scugog, Ontario, on October 27, 1924, was killed in the same locality, during the same fall before November 26, 1924.

BLACK DUCK, No. 297,942, banded by H. S. Osler, at Lake Scugog, Ontario, on October 28, 1924, was shot at a place near Savannah, Georgia, during the month of December, 1924.

BLACK DUCK, No. 297,949, banded by H. S. Osler, at Lake Scugog, Ontario, on October 29, 1924, was shot at Grassy Bay, Galloway Township, Atlantic County, New Jersey, on December 29, 1924.

BLACK DUCK, No. 321,752, banded by H. S. Osler, at Lake Scugog, Ontario, on October 29, 1924, was killed at a place near Georgetown, South Carolina, on January 21, 1925.

BLACK DUCK, No. 321,753, banded by H. S. Osler, at Lake Scugog, Ontario, on October 29, 1924, was shot on the Neabsco Marshlands, Virginia, about thirty miles south of Washington, D.C., on January 18, 1925.

BLACK DUCK, No. 321,758, banded by H. S. Osler, at Lake Scugog, Ontario, on October 20, 1924, was shot at Williamsburg, Virginia, on January 7, 1925.

BLACK DUCK, No. 321,765, banded by H. S. Osler, at Lake Scugog, Ontario, on October 31, 1924, was killed on a lake at Brown Summit, ten miles north of Greensboro, North Carolina, on December 7, 1925.

BLACK DUCK, No. 321,772, banded by H. S. Osler, at Lake Scugog, Ontario, on October 31, 1924, was killed at the head of the Hunga River, at the mouth of Wallace Creek, Maryland, on January 1, 1925.

BLACK DUCK, No. 321,774, banded by H. S. Osler, at Lake Scugog, Ontario, on November 1, 1924, was killed at Georgetown, South Carolina, on January 30, 1925.

BLACK DUCK, No. 321,781, banded by H. S. Osler, at Lake Scugog, Ontario, on November 2, 1924, was caught in a fire and burned at Woodville, Alabama, on November 28, 1924.

BLACK DUCK, No. 321,791, banded by H. S. Osler, at Lake Scugog, Ontario, on November 3, 1924, was shot at Rockwood, Michigan, on November 11, 1924.

BLACK DUCK, No. 321,797, banded by H. S. Osler, at Lake Scugog, Ontario, on November 3, 1924, was killed on the Mississippi River at Eagle Lake, four miles north of Vicksburg, Mississippi, on November 15, 1924.

BLACK DUCK, No. 321,800, banded by H. S. Osler, at Lake Scugog, Ontario, on November 3, 1924, was killed at Loudon, Tennessee, on November 20, 1924.

BLACK DUCK, No. 321,801, banded by H. S. Osler, at Lake Scugog, Ontario, on November 3, 1924, was killed at Knott's Island, North Carolina, on January 8, 1925.

BLACK DUCK, No. 321,803, banded by H. S. Osler, at Lake Scugog, Ontario, on November 3, 1924, was killed on the Ogeechee River, a few miles from Savannah, Georgia, on December 22, 1924.

BLACK DUCK, No. 321,804, banded by H. S. Osler, at Lake Scugog, Ontario, on November 3, 1924, was killed in the same locality, during the same fall before November 26, 1924.

BLACK DUCK, No. 321,805, banded by H. S. Osler, at Lake Scugog, Ontario, on November 3, 1924, was shot at the Santee Club, South Carolina, on January 31, 1925.

BLACK DUCK, No. 321,806, banded by H. S. Osler, at Lake Scugog, Ontario, on November 3, 1924, was killed in the same loclity, during the same fall before November 26, 1924.

BLACK DUCK, No. 321,809, banded by H. S. Osler, at Lake Scugog, Ontario, on November 3, 1924, was killed at a place about one mile south of the Winchester Pike Bridge, on Big Walnut Creek, Madison Township, Franklin County, Ohio, on November 9, 1925.

BLACK DUCK, No. 321,813, female, banded by H. S. Osler, at Lake Scugog, Ontario, on November 3, 1924, was shot on a marsh on the ocean side of Currituck Sound, about seven miles east of Poplar Branch, North Carolina, on November 12, 1925.

BLACK DUCK, No. 321,816, banded by H. S. Osler, at Lake Scugog, Ontario, on November 3, 1924, was killed at Georgetown, South Carolina, about November 28, 1924.

BLACK DUCK, No. 321,824, banded by H. S. Osler, at Lake Scugog, Ontario, on November 4, 1924, was shot at Four Mile Run, Virginia, on December 17, 1925.

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CONTENTS.

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The Canadian Field-Naturalist

VOL. XL OTTAWA, ONTARIO, NOVEMBER, 1926 No. 8

ON THE WOODLICE (ONISCOIDEA) OCCURRING IN CANADA AND ALASKA

By FRITS JOHANSEN

INTRODUCTION.

THE PURPOSE of the present article is merely to bring together the records published so far of Woodlice found in Canada and Alaska, so as to show their distribution here, and to create more interest in this group of terrestrial Crustacea among Canadian observers and collectors.

The Woodlice are not insects nor are they found in freshwater or in the sea, they are therefore overlooked or even "despised" by most entomologists and aquatic biologists. As they have little economic importance, the study of them is limited to a few specialists, and has been hitherto sadly neglected in Canada. This in spite of the fact that Canada and Alaska together promise to reveal many interesting points as to the northern limits for each species, their occurrence upon isolated islands, and as beach-forms, etc., not to mention the probable discovery of new species in so vast an area, forming half of the continent.

Professor E. M. Walker, of Toronto, informs me (1926) that he has in hand a study of Canadian woodlice based upon specimens found in the museum there; and in so far as new material is concerned, I propose only in this article to record the few specimens found in the collections in Ottawa. These latter have been kindly identified for me by the Isopod specialist, Mr. J. O. Maloney, at the U.S.N.M., Washington, D.C., who has also furnished me with information about the woodlice from Canada and Alaska preserved in that museum.

Only two or three papers published in Canada appear to deal with the occurrence of our species of woodlice namely:—Smith (1880, p. 218), Wallace (1919), F. Johansen (1924). Most published records of woodlice from Canada, and all from Alaska, are given by Richardson (1905), and in the following list her systematic arrangement in that comprehensive work (pp. 593-700) will be followed. Of the seven families of woodlice belonging to the order (*Oniscoidea*) listed by her as occurring in North America, four have not yet been recorded from Canada and Alaska, though two of them (*Armadillididæ* and *Scyphacidæ*) are found in the northern part of the United States, and probably may occur in Canada. The three families recorded from Canada and Alaska are the typical woodlice (*Oniscidæ*) and *Ligydidæ* and *Trichoniscidæ* (mainly beach-forms).

FAMILY *Oniscidæ*

The general appearance of the common woodlice is well known and need not be detailed here, especially as their structure has been described in a Canadian publication by Dr. F. T. Shutt (1886, pp. 293-94) and good figures are given in Richardson's monograph (1905, pp. 592-637). Their occurrence under stones, in rotten wood, etc., and their ability to roll themselves up into a more or less complete ball are well-known. As with all Isopods, the eggs are carried by the female in a sort of brood-pouch ventrally; according to Richardson (1905, p. 592), the young possess half a dozen thoracic segments before hatching.

Of the twelve genera belonging to this family listed by Richardson (1905, pp. 592-93) as occurring in North America, only four (*Lyprobius*, *Oniscus*, *Cylisticus* and *Porcellio*) have so far been recorded from Canada and Alaska. Four other genera occur in regions of the United States which suggest their occurrence in Canada, viz., *Alloniscus* in Oregon, *Philoscia* and *Actoniscus* in New England, and *Metoponorthus* in New England, Ohio, etc.

Of the genus *Lyprobius*, apparently only one species, *L. pusillus* B.-L., occurs in North America. Richardson (1905, p. 598) gives California as the locality from which it has been recorded and described; but in the U.S.N.M., is a specimen collected by Dr. W. H. Dall on Unalaska, Aleutians, in 1871 (Maloney 1926). There is therefore, reason to expect its occurrence also in Oregon, Washington, British Columbia, and the mainland part of Alaska.

Of the genus *Oniscus* apparently only one species, *O. asellus* Lin., is found in North America. This is a very widely distributed form, originally described by Linnaeus from Scandinavia, etc. It occurs also in central Europe, in Iceland, the Azores, and in New England. Richardson (1901, p. 563; 1905, p. 600) also adds Greenland, upon the authority of Fabricius (1780, p. 251). As pointed out by Stephensen (1913, p. 256), terrestrial Isopods have never been found in Greenland since Fabricius' time; and the specimens described by him from there were probably introduced, and possibly *Porcellio scaber* rather than *O. asellus*. Of Canadian localities for *O. asellus* only two were hitherto known, viz. Newfoundland and (the Canadian side of ?)

Niagara. Stuxberg (1873, p. 4; 1876, p. 51) records it as collected by J. Lindahl on August 21, 1871, at Quidi Vidi village (St. Johns), Nfld.; and (1876, p. 51) as collected by G. Eisen at Niagara, Ont.. He describes his specimens as a "new" species, *O. vicarius*. I am able to add a third Canadian locality, namely Quebec City, where I collected a specimen on September 8, 1919, now in Ottawa (Maloney, 1926). Richardson (1905, fig. 657) reproduces Sars' fine figure (1899) of this species, as of many other Isopods.

Also of the genus *Cylisticus*, apparently only one species, *C. convexus* (De Geer), is known from North America. Richardson (1905, p. 610, fig. 665) gives a number of localities in U.S.A. for it, including New England, Lake Erie, Ohio and Michigan. It is common in Europe. The only recorded Canadian localities seem to be Niagara (omitted by Richardson, 1905, p. 610), collected there by G. Eisen, (Stuxberg, 1876, p. 62, as *Porcellio convexus*), and St. Andrews and Fredericton, N.B., from where it has been recorded by Wallace (1919, p. 41).

Of the genus *Porcellio*, half a dozen species are found in North America, but only four of these apparently in Canada and Alaska. *P. rathkei* Brandt, is found both in Europe and North America; and Richardson (1905, p. 617, fig. 668) gives a number of localities (e.g. Lake Champlain) in U.S.A. for it. Stuxberg (1876, p. 60) records it, as *P. trilineatus* Koch, from Niagara, collected by G. Eisen; this locality being omitted by Richardson, 1905, p. 617. The only other Canadian published records of it are St. Andrews and Fredericton, N.B., from where it has been recorded by Wallace (1919, p. 41). I am, however, able to add several others, specimens having been collected by myself in Quebec City, September 8, 1919 (several specimens); Ottawa, 1917 and 1918, (several specimens); and St. Joseph Island, Lake Huron, Ont., September 3 1918, 1 specimen (Maloney 1926).

The species *P. laevis* Latr. which has a world-wide distribution, has been recorded from Unalaska, Aleutian Islands, by Richardson (1899, p. 863; 1905, p. 614), besides from Ohio, California, etc.

Another species (*P. spinicornis* Say, or *P. pictus* Brandt) occurring in Europe, Richardson (1905, p. 619, fig. 669) lists from New York City and Connecticut. Stuxberg (1876, p. 59) records it as *P. pictus*, from Niagara, collected by G. Eisen; this locality is repeated by Richardson (1901, p. 567; 1905, p. 619). Several specimens are in the museums in Ottawa and Washington, collected by Mr. A. Halkett at Rockcliffe, Ottawa, Ont., on May 5, 1905 (Maloney, 1926).

The species *P. scaber* Latr. has a world-wide distribution, including Greenland, Iceland, etc. (Richardson 1901, p. 568; 1905, p. 622); and the same authority (1901, p. 568; 1905, p. 622, fig. 671) gives also a number of localities in Canada and Alaska which I now mention in detail, together with other records arranged from east to west.

In a published note (Johansen, 1926, p. 140), I mention that this is probably the species recorded by Packard (1876, p. 296) from Square Island (lat. 52¾° N.) and Hopedale (lat. 55½° N.) on the east coast of Labrador, under the name "*Asellus groenlandicus*". Stuxberg (1876, p. 59) records it from Newfoundland, collected by J. Lindahl in 1871; and I collected several specimens at St. Johns in the end of August 1922. I have also recorded it from Anticosti Island (Johansen, 1924, p. 161); and according to Richardson (1905) it occurs on the Magdalens and Cape Breton Island. Wallace (1919, p. 41) records it from the Bay of Fundy part of New Brunswick; and the Grand Manan record given by Richardson refers e.g. to many specimens collected there in 1893 and 1898 by M. J. Rathbun, now in the U.S.N.M. (Maloney, 1926), while two of the specimens (Rathbun 1898 and Benedict 1905 coll.) are in the Ottawa Museum. Stuxberg (1876, p. 59) records it from the vicinity of Niagara, collected by G. Eisen; but no records appear from western Canada, although it is known from Ohio, Michigan, etc. Undoubtedly it must occur in the west.

The records from the British Columbia coast given by Richardson (1904, p. 217; 1905, l.c.) refer to a number of specimens in the U.S.N.M. collected by the "Albatross" and J. E. Benedict in 1903 and 1905; from the vicinity of Victoria, Nanaimo and Comox (including Gabriola Island) on Vancouver Island, Puget Sound, Wash. The only record of this species from Alaska seems to be St. Paul Island, but it occurs in Kamtshatka, Siberia (Richardson, 1905, 1901).

There is therefore every reason to believe that this species is found all over Canada and Alaska right up to the northern limit of trees.

FAMILY *Armadillididæ*

Probably only one genus (*Armadillidium*) of this family occurs in Canada and Alaska, probably *A. vulgare* (Latr.) which has a world-wide distribution, and is known from a great many U.S. localities (Ricardson, 1905, p. 666, fig. 706). It can roll itself up into a perfect ball, hence the generic name ("The little armadillo".).

FAMILY *Ligydidæ*

Of this family probably only two genera,

Ligyda and *Ligidium*, are found in Canada and Alaska; and of the first mentioned genus apparently only one species, *L. pallasii* Brandt, which seems to be limited to the west coast of North America, from California to Bering Sea. It is a large form, reaching a length of 2½ cm., and lives under stones on the beach. Unalaska is its type-locality (Brandt, 1833, p. 172), but it occurs in Puget Sound (Richardson, 1899, 1905). The Alaskan records given by Richardson (1899, p. 866; 1905, p. 862, fig. 726) are based mainly up specimens found in the U.S.N.M. (Maloney 1926). Of records from British Columbia, Richardson gives Victoria and Lowe Inlet, near Prince Rupert (lat. 53½° N., long. 129½° W.). Smith (1880, p. 218) records, as *Lygia dilatata* St., a specimen from Victoria, B.C., collected by Dr. G. M. Dawson in 1878. In the U.S.N.M. is a specimen from Victoria, B.C., collected by J. E. Benedict on May 2, 1905; and two adults and young from Ucluelet, on the west side of Vancouver Island, B.C., collected by Young and Spreadborough in 1909 (Maloney, 1926). Specimens in U.S.N.M. are from the following Alaskan localities: Wrangell (W. H. Jones, May 21, 1882); Revillagigedo Island (near Sitka; T. H. Street, 1885); Lighthouse Rocks ("Albatross" coll., 1888); and of the Aleutian Islands: Unalaska (L. M. Turner coll., 1878; S. Applegate coll., 1881; W. H. Dall coll. 1886), Kiska, Atka, and Chica (W. H. Dall. coll., 1872-73) and Attu ("Albatross" coll. 1906) (Maloney, 1926). I secured for the Ottawa Museum two of the many specimens from Nazan Bay, Atka Island, collected by the "Albatross" on May 30, 1906, and found in the U.S.N.M.; the largest specimen is a female with eggs.

Of the genus *Ligidium* two species are known to occur in Canada and Alaska, one recorded by Stuxberg (1876, pp. 461, 49; G. Eisen collector) from Niagara, Ont., as *L. hypnorum* (Ouvier); but it may be different from European specimens of this species (Richardson, 1905, p. 686, fig. 730). Prof. E. M. Walker of Toronto tells me that he has Ontario specimens of a *Ligidium*.

The other species, *L. tenue* B.-L., has been recorded from Sitka, Alaska (Richardson, 1899, p. 867; 1905, p. 688); and Prof. Walker reports specimens of apparently the same species from the coast of British Colmubia.

FAMILY *Trichoniscidæ*

One genus, *Trichoniscus*, belonging to this family occurs in Canada and Alaska. One species is *T. papillicornis*, Rich. a beach-form, known from Seldovia, Cook Inlet, Alaska (T. Kincaid coll., July, 1899); and also Bering Island, Siberia (L. Stejneger and G. S. Barrett-Hamilton, coll. 1895-1897). The specimens are in the U.S.N.M. (Richardson 1905, pp. 695-96, figs. 734-38; Maloney, 1926). Another species (*T. pusillus* Brandt) has been recorded by Stuxberg (1876, pp. 46, 49) from Niagara, collected by G. Eisen; this locality is not given by Richardson (1905, p. 695, fig. 733).

CONCLUSION

We thus see that a dozen species of terrestrial Isopods are known from Canada and Alaska, exclusive of freshwater forms; and the number will undoubtedly be increased by further collecting and study of unrecorded specimens found in the different museums. As the woodlice so readily spread over large areas, and some species have been found to do damage in greenhouses, vegetable gardens, etc., in the United States, it is well that we should ascertain which species occur in Canada and study them and their habits here. May these notes contribute to that end!

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A VICTORIA DAY BIRD LIST FROM LONDON, ONT.

By E. M. DALE

THE MAKING of a list is usually one of the first things attempted by one who becomes interested in birds, and from such time until circumstances arise which make this impossible or impracticable, the daily list, the annual list and the life list, together with other sorts of lists, form a never-ending source of pleasure, at least to the maker thereof, and oftentimes to others who are permitted to peruse them.

For many years it has been our practice to spend Victoria Day (May 24th) in an endeavour to see how many species might be recorded in the one day from the vicinity of London. Years ago this meant an early start, many weary miles covered on bicycles and a return to the city by noon at least so that wives and families might not feel that they took second place to the birds entirely. The advent of motor cars has, however, changed things considerably. Wives now form part of the expedition, whilst a well-filled lunch basket make a return to the city unnecessary until the call of the Woodcock and Whippoorwill coming from the darkening woods, makes us feel that we have indeed come to the end of a very enjoyable if not indeed a perfect day.

The Victoria Day list differs from the Christmas Census which the McIlwraith Ornithological Club has taken for some years, and which have duly appeared in the columns of *The Canadian Field Naturalist*, in that the observers usually number only two or three or four who remain in one party, instead of ten or a dozen observers scattered in different directions. Were the full club membership called upon and the plan of the Christmas Census followed, no doubt more species would be seen, but the social aspect would be lost and the pleasure of sharing our rare or interesting finds with others would be missed.

The latter part of May, 1925, was quite cool in our part of the province. A killing frost occurred on the night of the 17th, and the following Sunday, the 24th, there were snow flurries at London. The weather was so unpromising and disagreeable that no plans were made for the holiday on Monday. When we arose, however, the day did not appear to be entirely hopeless, so after considerable telephoning, Mrs. E. H. McKone, C. G. Watson and the writer started for the Ponds about an hour behind our usual time for such a trip. If the sun did not shine much, Dame Fortune did and when we came to total up our list about 11 o'clock we were indeed surprised at the number of species observed. We decided to go out again in the afternoon to try to reach 100, which had been our objective since the earlier figure of 75, aimed at in the days of the bicycle, had been duly exceeded on different occasions. We came back to the city, repaired to our several homes for dinner, and shortly afterwards started out again. Mr. McKone joined the party for the afternoon ramble and a lunch was taken along so that we might feel free to stay out as long as we desired.

The morning had been spent in the vicinity of the Ponds, three small bodies of water lying close together about a mile south of the city. The afternoon trip took in a large pasture field near White Oak where we hoped to pick up the Bartramian Sandpiper, the Prairie Horned Lark and the Migrant Shrike. As an example of the good fortune that seemed to follow us throughout the day, the whole three were found almost as we entered the field, whereas there have been times that it has been necessary to tramp back and forth for half an hour to "stir things up" and then probably come away empty-handed. From White Oak we struck west towards Delaware, touching at a muddy spot at the Coves, and also at the Golden-wing Woods en route. At the Coves we found the Least Sandpiper and the Semi-palmated Plover, both rare with us at London in spring, and at the Golden-wing Woods we found the bird after which we have named the spot, also the Cerulean Warbler and a Herring Gull. The latter is common enough earlier in the spring, but was one of the most unexpected finds of the day. A casual glance upwards in the middle of the woods revealed it flying over. Our hunting ground at Delaware is a most delightful spot, a wide river valley with areas of marsh, and a heavily wooded swampy hillside, the summer home of the Winter Wren. Some time was spent here and we were fortunate enough to find a pair of Hooded Mergansers which may very well have been nesting in the neighbourhood, also to hear the Bald Eagle that has its nest in a big buttonwood tree. When the possibilities there had been pretty well exhausted,we moved north a mile to Komoka swamp, formerly a splendid place for birds, but man in his endeavour to clean things up has burned, cut and drained until the place is scarcely worth visiting. It is still a nice spot to picnic, however, and we had planned to have our evening meal there, and sit round the camp fire to wait for the Whippoorwill and Woodcock to give the closing number on the programme.

The following list does not pretend to be a

complete one, but the impossibility of being in several places at once during the morning hours when the birds were in song, meant the missing of certain species. It will also be noted that no owls were recorded, although no doubt both Screech and Great-horned were not far away during the day. The Great Blue Heron was also numbered among the missing, but then it was imposible to find everything, of course, We intend to better this record some day, but just when that will be, time alone will tell.

Herring Gull, 1; Lesser Scaup, 1; Hooded Merganser, 2; American Bittern, 1; Green Heron 1; King Rail, 1; Sora Rail, 1; Woodcock, 1; Least Sandpiper, 1; Spotted Sandpiper, 6; Bartramian Sandpiper, 2 Greater Yellowlegs, 10, Killdeer, 6; Semi-palmated Plover, 3; Ruffed Grouse 1; Ring-necked Pheasant, 2; Mourning Dove, 8; Marsh Hawk, 3; Red-shouldered Hawk, 2; Bald Eagle, 1; Kingfisher, 2; Hairy Woodpecker, 2; Downy Woodpecker, 4; Red-headed Woodpecker, 10; Flicker, 8; Whippoorwill, 1; Nighthawk, 1; Chimney Swift, 35; Hummingbird, 2; Kingbird, 20; Crested Flycatcher, 8; Phoebe, 3; Olive-sided Flycatcher, 1; Wood Pewee, 12; Yellow-bellied Flycatcher, 2; Least Flycatcher, 15; Prairie Horned Lark, 1; Blue Jay, 2; Crow, 40; Bobolink, 40; Cowbird, 25; Red-winged Blackbird, 12; Meadowlark, 15; Baltimore Oriole, 20; Bronzed Grackle, 25; Goldfinch, 25; Vesper Sparrow, 10; Savannah Sparrow, 3; Grasshopper Sparrow, 1; White-crowned Sparrow, 1; White-throated Sparrow, 1; Chipping Sparrow, 4; Field Sparrow, 10; Song Sparrow, 25; Swamp Sparrow, 3; Chewink, 8; Cardinal, 2; Rose-breasted Grosbeak, 4; Indigo Bunting, 3; Scarlet Tanager, 5; Purple Martin, 10; Eave Swallow, 1; Barn Swallow, 20; Tree Swallow, 10; Bank Swallow, 40; Rough-winged Swallow, 10; Cedar Waxwing, 3; Migrant Shrike, 2; Red-eyed Vireo, 10; Warbling Vireo, 3; Yellow-throated Vireo, 1; Black and White Warbler, 1; Golden-winged Warbler, 3; Tennessee Warbler, 10; Parula Warbler, 2; Cape May Warbler, 1; Yellow Warbler, 15; Black-throated Blue Warbler, 1; Myrtle Warbler, 1; Magnolia Warbler, 8; Cerulean Warbler, 2; Chestnut-sided Warbler, 6; Bay-breasted Warbler, 12; Blackburnian Warbler, 4; Blackpolled Warbler, 1; Black-throated Green Warbler, 1; Ovenbird, 8; Connecticut Warbler, 1; Mourning Warbler, 1; Maryland Yellowthroat, 5; Wilson's Warbler, 5; Canada Warbler, 8; American Redstart, 10; Catbird, 10; Brown Thrasher, 4; House Wren, 8; White-breasted Nuthatch, 2; Red-breasted Nuthatch, 1; Black-capped Chickadee, 4; Ruby-crowned Kinglet, 1; Blue-grey Gnatcatcher, 2; Veery, 8; Grey-cheeked Thrush, 1; Olive-backed Thrush, 10; Robin, 25; Bluebird, 10. Total 106 species plus a multitude of English Sparrows, or 107 species all told.

STANDARD AND ADAPTIVE SPECIALIZATION IN RELATION TO MIGRATION AND DISTRIBUTION

By JOHN T. NICHOLS

THESE reflections are mostly a result of a recent reconnaissance trip to Behring Sea, which had as a primary objective to study that region of admittedly great historic interest in the distribution of animals, it having been the only pathway of exchange between the continental faunæ of Asia and North America, and to an almost equal degree the only pathway for non-tropical marine animals between North Pacific and North Atlantic; to study this area for any side-lights obtainable on migration and distribution.

Most of the data which will be considered could have been gleaned from literature and material already on hand and more or less familiar; but a species plus life and environment is a more attractive and possibly a sounder basis from which to speculate than one reconstructed from skins and records. Even physiography and climate gain a certain realness from being received direct by one's senses rather than through the double brokerage of the understanding and the printed page.

As regards sea birds, first in interest to the stranger to these waters is the great abundance and variety of Alcidæ, increasing northward towards the Aleutian Islands. If such abundance, other things being equal, indicates the center of distribution for a group, that of the Alcidæ should lie in the Pacific and their occurrence in the northern waters of the Atlantic be secondary. As a check on such an hypothesis the writer looked about him for signally specialized Alcids. So frequently do specialized forms occur near a group's probable center of evolution and distribution, less specialized ones remote from same, that one has confidence in such a logical condition being the normal expectation.

There was not far to seek. The peculiar Tufted Puffin was everywhere common and extending the whole length of the northwest coast from the

Strait of Juan de Fuca to northern Behring Sea. It is a bird of striking character, not entirely a matter of its physiognomy either, for it has a somewhat different stronger flight than its Alcid associates, travels at a greater elevation, is found further off shore, etc. Compared to the Horned Puffin, which we met only in small numbers and far to the north, it would seem to be a more specialized, more modern and more successful bird. The Horned Puffin is of course much more closely related to the Puffins of the Atlantic. The Tufted Puffin is a specialized form in the Pacific, yes, but how about the specialized Great Auk that has been in the Atlantic. Would not that unique bird balance 2 or 3 Tufted Puffins in an hypothesis where the location of specialized forms tips the scales of probability?

Of that more later. Passerine land birds common and conspicuous on the low coastal tundra of the Seward Peninsula at Nome were few. Setting aside northern circumpolar forms, the Longspur, Redpoll, Snow Bunting, there were 3 others, Savannah Sparrow, Yellow Wagtail and Robin. Whether the Robin is of the eastern or western race, I am not informed. That the Savannah Sparrow was racially distinct from those that nest in small numbers on my Long Island marshes would not have been obvious off hand in the field. Differences are so slight as to have little significance. The Yellow Wagtail also was very like one or more races of this widely distributed bird which occur in Europe.

Per contrast take the Song Sparrow on Akutan Island, of gigantic size for a Song Sparrow, of a uniform smoky grey color, almost without markings. That Western Savannah Sparrow (in Alaska) and Aleutian Song Sparrow stand equally as sub-species rather than full species, would indicate that the differentiation of the 2 forms is equally recent in time, rather than that they have anything like equal evolutionary balance. The Savannah Sparrow is essentially the same standard bird of wide range, the Aleutian Song Sparrow a singularly divergent specialization.

In view of the Aleutian Song Sparrow being a specialized form, if we examine its geographic position and its character, we notice that it occurs at the periphery of the range of the parent group; that its qualities are environmentally adaptive, breaking down such Song Sparrow characters as might be considered standardized, and that they are associated with increased size. The behavior of the bird in the field, I may add, is quite unlike standard Song Sparrow behavior, its voice alone being distinctively that of a more standard Song Sparrow. And its numbers are few.

It is firstly consideration of the Aleutian Song Sparrow that has led the writer to postulate two distinct types of such specialized forms as might be taken up by the zoogeographer for criteria of point of origin or center of distribution. The first of these is a standardized bird, central in origin and likely to be more central in range than similar earlier less specialized forms which have had longer to spread. Such a form arises in a center of abundance and competition, not primarily as an adaptation to a particular physical environment, and is a specialization of strength.

The second type is almost purely an adaptation to adverse or unwonted conditions, usually the physical environment at the periphery of a group's range, very likely hastened by the isolation of little associations of pioneers. It would seem to be accompanied by the loss of standard characters, and sometimes, at least by increased size, and is a specialization not of strength but of weakness. Peripheral in origin it can only be peripheral in position. Among the Alcidæ, the Great Auk is clearly a specialization of this type, and should be expected to be, as it was, peripheral. The Tufted Puffin is clearly a standardized specialization and should be expected to be, as it is, central.

With this thesis in view there is little difficulty in finding examples of specialized yet highly standardized forms occupying positions central to those of their less specialized (standardized) relatives. The Yellow Wagtail has spread to Alaska, but the pipits are Holarctic. The White-crowned Sparrow reaches the tundra land of the Seward Peninsula, but according to Boulton (1926, *Auk*, XVIII, July, p. 328) its less standardized relatives *Emberiza* have preceded it into Asia to the west. It is rather clear that the Eastern Kingbird is breaking through the encircling ranges of less standardized species of Tyrrannus, especially northwestward.

Two interesting corollaries to these reflections have come to mind, highly migratory birds can often maintain a degree of standardization impossible were they resident, hence standardization and extensive migration are frequently associated. Again it is the standardized forms that are successful, which are spreading. The Song Sparrow is an abundant dominant bird over a vast range, but when it gets into the shadows of the humid western forest belt, it loses something more than its distinctive plumage pattern, its habits perforce change, in my experience it is comparatively scarce, a comparatively unimportant factor of the avifauna.

Any critical consideration of this discussion will ask for a more precise definition of what is meant by a standardized specialized form. The definition has been delayed, as it can perhaps be more easily

grasped with various examples in mind. Such a form is one with marked characters of its own which maintains all the essential standard characters of its group, and in which the balance of characters makes for general efficiency.

Flight is a standard character of birds in general, hence a standardized bird will not be flightless, but a strong flyer unless possibly if it is an ostrich or a penguin; pattern is a standard character of sparrows in general, hence a standardized sparrow will not be without pattern, but with a well-marked pattern. Standard specializations are of wider application than more narrowly adaptive specializations. It must be admitted, however, that we are dealing not so much with facts as with a somewhat intangible, though I think useful point of view, and if one would see its limitations, he may figure out which of two of our specialized woodpeckers is the more standardized, the Flicker or the Ivory-bill.

CANADIAN WILLOWS OF SECTIONS LONGIFOLIÆ

By CARLETON R. BALL

THIS is the second paper in a series on the willows occurring in Canada. The first paper* covered the sections Pentandræ, Nigræ, and Albæ, the latter section containing only introduced species.

The present paper includes five species and three varieties of long-leafed willows which are known to occur in Canada. Of these, two speices (*argophylla* and *sessilifolia*) and one variety (*melanopsis bolanderiana*) have been found only along the international boundary in the Rocky Mountain region. One species (*exigua*) and its variety (*exigua luteosericea*) have been found as far as 100 to 150 miles north of the boundary. Two species and one variety (*interior, interior pedicellata* and *melanopsis*) range far northward.

Salix exigua luteosericea seems not to have been definitely reported from Canada previously.

The abbreviations used to distinguish various herbaria are the same as those employed in the previous paper.

SECTION 4. LONGIFOLIÆ

Shrubs 2-5 m. high, with densely cæspitose stems and gray or light brown bark; branchlets slender, gray to dark brown or reddish, often lustrous; leaves linear to linear-lanceolate or elliptical, remotely denticulate or entire; petioles very short; stipules none; aments serotinous, terminating lateral leafy branches, the staminate often and the pistillate occasionally in pairs or threes; scales light yellow, deciduous; stamens 2, filaments hairy below; capsules glabrous to densely villous, 4-7 mm. long; styles none, atigmas short to 1 mm. long, divided.

Leaves and capsules densely villous.
- Blades lanceolate to broadly elliptical, gray; stigma lobes 1 m.m. long, linear.....7. *S. sessilifolia.*
- Blades linear-oblanceolate, silvery; stigma lobes short.....8. *S argophylla.*

Leaves glabrate or merely short-pubescent (except in 9a and 10a); capsules glabrous (except in 10a and 11 when young); stigmas short.
- Branchlets brown to dark brown; blades oblanceolate or narrowly elliptical, denticulate; capsule 4-5 m.m. long, subsessile.
  - Blades glabrous or glabrate, green, often subglaucescent beneath..9. *S. melanopsis.*
  - Blades more or less densely short-tomentose, gray.....9a. var. *bolanderiana.*
- Branchlets gray to reddish; blades narrowly to broadly linear.
  - Blades hairy, gray, opaque, 2-7 or 10 m.m. wide; capsules 5-6 or 7 m.m. long.
    - Blades short-pubescent, subsentire; capsule subsessile.....10. *S. exigua.*
    - Blades villous-pubescent, often spinulose-denticulate; capsule short-pedicelled.....10a. var. *luteosericea.*
  - Blades glabrous (or thinly villous when young), green, translucent, denticulate; capsule 7-9 m.m. long, pedicellate.
    - Blades 5-12 m.m. wide.....11. *S. interior.*
    - Blades 2-6 m.m. wide.....11a. var. *pedicellata.*

The Longifoliæ are a unique group, occurring only in North America. The linear, remotely denticulate, usually slender leaves, yellow, deciduous scales, and short or obsolete styles are distinguishing characters. The aments not only appear after the leaves but oftentimes a second set appears in late summer. The clustering of the aments also is a striking feature. The species often are called "sandbar" willows because they soon occupy newly formed bars of river alluvium or sand. They are found along streams, ditches, and lake margins but never in swamps or stagnant

*Ball, Carleton R., Canadian Willows of Sections Pentandræ, Nigræ and Albæ. *The Canadian Field-Naturalist*, October, 1926, pp. 145-152.

water. Many can stand long periods of drought, provided that there is water from time to time. All but one of the 9 or 10 species occur in the mountains and deserts of western North America. *Salix interior* ranges from the Gulf of Mexico to beyond the Arctic Circle, and the foothills of the Rocky Mountains to some of the States bordering the Atlantic Ocean.

7. **Salix sessilifolia** Nuttall.

Salix sessilifolia Nuttall, Sylva 1: 68, 1843.

Salix macrostachya Nuttall, Sylva 1: 72, 1843.

This beautiful shrub with its relatively broad soft-hairy leaves was not recognized for many years after Nuttall described it. Ball published a full description (Bot. Gaz. 60: 49-51, 1915). Later he made extensive collections of it in the Willamette and Umpqua Valleys in western Oregon. It occurs in river banks and in similar situations, usually well up toward high-water mark, from New Westminster, B.C., southward through the Puget Sound District of Washington, up the Willamette River and on at least the lower Umpqua River of Oregon. Its zonal distribution is Upper Sonoran and Transition.

John Macoun (Cat. Can. Pl. 1 (3): 454, 1886) states only that it was "Collected in the valley of the Fraser River, B.C. (Fletcher)". Henry (Fl. So. B.C. and Vanc. Id. 96, 1915) says: "New Westminster, not common." Ball, in 1923 (in Abrams, Illus. Flora Pacific States 1: 491, fig. 1196), made the error of giving the locality as 1196) made the error of giving the locality as "Vancouver Island, British Columbia," whereas New Westminster is on the edge of the mainland.

The only specimen seen by the writer is that collected at New Westminster, B.C., by J. K. Henry 1421 (N) on Sept. 25, 1914, and June 9, 1915, which is typical. Both shoots bear young flowers. Schneider (Bot. Gaz. 67: 318, 1919) also discussed the Henry specimens as seen in the herbarium of the University of California. The species may be looked for at other points in the Vancouver and New Westminster Districts.

8. **Salix argophylla** Nuttall.

Salix argophylla Nuttall, Flora 1: 71, pl. 20, 1843.

Salix malacophylla Nuttall, ined. (Specimens in Kew and Gray Herbaria.)

This is another striking species of the long-leaf willows. The linear-oblanceolate leaves are beautifully silvery sericeous on both sides and the plant is conspicuous amid the prevailing green of other vegetation. It occurs on stream banks in the Upper Sonoran zone from Washington and Oregon, east of the Cascades, eastward to northwestern Montana and south to northern Utah and Nevada. It crosses the line into Canada only in south-central British Columbia.

John Macoun (Cat. Can. Pl. 1 (3): 450, 1886) confused this plant with the silvery-leafed phases of the common sandbar willow, *S. interior* Rowlee (*S. longifolia* Muhl), discussed later. All of his citations refer to that species or to *S melanopsis*. Henry (Fl. So. B.C. 96, 1915) says: "Common east of the Cascades." Under *S. macrostachya* (usually considered synonymous with *S. sessilifolia*) he says: "Kettle River; Koksilah, V. I." It seems probable that the Kettle River plant was really *S. argophylla* which has been determined as "*macrostachya*". Piper* also cited specimens of *argophylla* under the name *macrostachya* (Contr. U. S. Nat. Herb. (Fl. Washn.) 11; 214, 1906), as Schneider has pointed out (Bot. Gaz. 67: 325-326, 1919). Piper gives no Canadian distribution and Schneider cites only the one given below.

The only Canadian specimen seen by the writer which unquestionably is referable to this species is J. M. Macoun 068128 (N) collected on June 26, 1902, by the Kettle River at Cascade, B.C., on the international boundary in southeastern Yale District. The species is likely to occur elsewhere in the Columbia Valley of British Columbia, which is in the Upper Sonoran zone. There also is another specimen in the U.S. National Herbarium collected by J. Macoun, No. 24 (N), in June, 1890, at Deer Park, southern Kootenay District, B.C., which is puzzling. One shoot has a pubescent stem and broad leaves approaching those of *sessilifolia*. The other shoot is bluish pruinose with linear-oblanceolate leaves like those of *argophylla*. Tbe pruinose twig indicates a hybrid with *subcœrulea* or *bella*.

9. **Salix melanopsis** Nuttall. Dusky Willow.

Salix melanopsis Nutt. Sylva 1: 78, pl. 21, 1843.

This well marked species, collected first by Nuttall near old Ft. Hall on the Snake River in southeastern Idaho, remained long unrecognized by botanists, as did also *sessilifolia*. Specimens could be found under many different names in herbaria. Its dark twigs and dark green leaves give a colour effect which well deserves the specific name.

In the United States it ranges from northeastern Utah and the western parts of Wyoming and Montana westward to Washington, Oregon, and California. It occurs in the same situations as other members of the section, in the Upper Sonoran and Transition zones. Its Canadian

*As this is written, Feb. 12, 1926, comes the sad news of the death of Dr. Piper on Feb. 11.—C.R.B.

distribution is the northward extension of that in Montana, Idaho, and Washington.

John Macoun (Cat. Can. Pl. 1 (3): 444-445, 1886; 2 (5): 356-361, 1890) does not mention it. Piper (Fl. Washn. 213, 1906) includes British Columbia in its range. Ball (in Coulter and Nelson, New Man. Rocky Mtn. Bot. 131, 1908 says: "British Columbia as far east as the Selkirks." Henry (Fl. So. B.C. 97, 1915) cites: "Columbia Valley, Revelstoke." Rydberg in 1917 (Fl. Rocky Mtns., 192) includes "B.C." in its range. Schneider (Bot. Gaz. 67: 337, 1919) states that its range includes:

> "Alberta (Crow Nest Pass and Jasper), where it seems to reach its northern limit at about the 53rd parallel, British Columbia (in the Chilliwack Valley and at Revelstoke), ..."

The writer has examined specimens representing the species from the following localities:

SASKATCHEWAN: Eye Hill Creek (G.T.P. Ry.) Macoun and Herriot O70287 (B), Aug. 8, 1906 (*sub nomine S. fluviatilis;* the leaves are small, linear-oblanceolate, glaucescent beneath and nearly entire but clearly *melanopsis*).

ALBERTA: Pincher Creek, 3700 ft. elev., Malte and Watson 60 (O116734, form with very narrow, somewhat spinulose leaves), 61 (O116735) June 6 and 27, 1925 (B, O). Waterton Lakes Park, 4500 ft. elev., Malte and Watson 168 (O116741), June 9 and Sept. 10, 1925 (B, O); 4200 ft. elev., Malte and Watson 256 (O116758), 259 (O116761, broad, short leaves), June 10-12 and Sept. 10, 1925 (B, O) along Blakiston Brook, 4400 ft. elev., Malte and Watson 408 (O116768) June 16, 1925 (B, O). The Gap, Crow's Nest Pass, Rocky Mts., J. Macoun O94442 (B,O), Aug. 14, 1897. Rocky Mountains Park, east end, on Ghost River, N.B. Sanson 822, 825 (RM), 824 (B, RM), July 18, 1921. Jasper Park, along Athabaska R. near Jasper, J. M. Macoun O95386 (B), 1917.

BRITISH COLUMBIA: Field, alt. 4064 ft., Edith M. Farr (B) July 12, 1904; Emerald Lake near Field, Farr 891, 892 (B), July 17, 1905. Yale District, within 5 miles of Lillooet, Cascade Range, alt. 1000 ft., J. M. Macoun O97792 (B, O), Range, alt. 1000 ft., J. M. Macoun 97792 (B, O), July 3, 1916 (leaves slightly pubescent). Cassiar District, Stikine River, 70 miles from mouth, Preble and Mixter 504 (N) July 9, 1910.

9a. **Salix melanopsis bolanderiana** (Rowlee) Schneider.

Salix bolanderiana Rowlee, Bull. Torr. Bot. Club 27; 257, pl. 9, fig. 12, 1900.

Salix melanopsis bolanderiana (Rowlee) Schneider, Bot. Gaz. 67: 338, 1919.

Rowlee separated *melnaopsis* from *bolanderiana* in his key (p. 248) by describing the former as having "Leaves distinctly glaucous and prominently veiny beneath" and the latter as having "Leaves not distinctly glaucous nor veiny beneath." Schneider says (p. 339) that this is not correct. Leaves of *S. melanopsis* usually are more or less glaucescent beneath at and after maturity but not before. On many specimens they are not conspicuously veiny at any stage of development. The type specimen of *malanopsis* is immature and does not show either character.

Schneider separates the species in his key (p. 314) by ascribing longer leaves, wider aments and longer capsules to *bolanderiana*. The type does not show these characters, however, and at best they are variations of degree and not of kind. The best character for separating the two is one which Schneider himself points out in both key (p. 314) and text (p. 339) but which Rowlee does not mention. The type specimen of *S. bolanderiana* (Bolander 4958, Yosemite Park, Calif.) is somewhat pubescent on both surfaces of the leaves but esepecially beneath. The writer used this character in separating this form as a variety of *melanopsis* (Abrams, Illus. Fl. Pac. States, 493, 1923).

In its extreme form the leaves are fairly densely pubescent-tomentose on both sides. This form is fairly common in eastern Washington, northern Idaho (Priest Lake district) and northwest Montana (Flathead Co., in and around Glacier National Park). The only Canadian specimen seen by the writer which matches these is one collected in Kootenay District, B.C., Deer Park, Lower Arrow Lake, J. Macoun 23 (F, sheet 6522), June 10, 1890 (the leaves entire.) Some other specimens from British Columbia and Alberta show slight pubescence but they are recognized under *melanopsis*, at least until fuller study can be made.

10. **Salix exigua** Nuttall.

Salix exigua Nuttall, Sylva 1: 75. 1843.

Salix longifolia exigua (Nutt.) Bebb, Willows Calif. (Preprinted from S. Wats. Bot. Calif. 2, 85) 1879.

Salix fluviatilis exigua (Nutt.) Sarg. Silva N. Am. 9: 124, 1896 (in part).

"Salix longifolia" of many authors dealing with western species, not Muhl.

Salix exigua is the common gray shrubby willow of the region from the eastern slope of the Rocky Mountains to the eastern slope of the Sierra-Cascade Range. It occurs abundantly along ditch banks and stream margins and in low ground up to 6,000 ft, elevation in the Upper Sonoran and Transition zones. Several varieties are recognized, with somewhat overlapping ranges.

It has not been generally recognized as occurring in Canada. Neither J. Macoun (Cat. Can. Pl.

1 (3): 444-445, 1886; 2 (5): 356-361, 1890) nor Henry (Fl. So. B.C. 95-101, 1915) mention it. Piper (Fl. Washn. 213-214, 1906), does not include Canada in the range. Rydberg (Fl. Rocky Mtns. and Adjac. Pl. 172, 1917) includes British Columbia and Saskatchewan in the range. Schneider (Bot. Gaz. 67: 330, 1919) says:

> "The range of what I call the typical form of *S. exigua* extends . . . northward to British Columbia (where I did not see it from farther north and west than Clinton on the Fraser River) and southern Alberta (Medicine Hat), ..."

but unfortunately he does not cite the specimens on which this extreme northern distribution is based.

Ball (in Abrams, Illus. Fl. Pac. St. 493, 1923) says: "Fraser River in British Columbia southward, . . . and east to Alberta." This was based on the above statement by Schneider. The writer believes that both Rydberg and Schneider probably confused *exigua* with the narrow-leaved *S. interior pedicellata* discussed below.

East of the Continental Divide in the United States *exigua* occurs sparingly as far north as northern Montana and possibly may be found in southern Alberta also. However, the extensive collections of the Macouns, N. B. Sanson, and Malte and Watson, so far as the writer has studied them, do not reveal the presence of the typical *exigua* in Alberta. He has seen only the one Canadian specimen, cited below, which can be referred certainly to this species.

BRITISH COLUMBIA: Shuswap, in Yale District, N. B. Sanson 614 (RM), July 4, 1916.

10a. Salix exigua luteosericea (Rydberg) Schneider.

Salix luteosericea Rydberg in Britton, Man. Pl. No. U.S. and Can. 316. 1901.

Salix exigua luteosericea (Rydb.) Schneider, Bot. Gaz. 67: 334, April, 1919.

The name was applied by Rydberg to a plant from Banner County in western Nebraska, having leaves "permanently yellowish silky." It occurs in Colorado, Nebraska, and South Dakota but has never before been reported from Canada, although Rydberg gave the range as "On sandbars, Saskatch., and Br. Col. to Neb., Ind. Terr. (Okla.), and Ariz." Evidently several different forms were covered by the description and distribution given. The Oklahoma material and that from Saskatchewan represent *S. interior (longifolia)*. That from Arizona was another variety of *exigua*. The British Columbia specimen is unknown to the writer unless it is one collected by Shaw and cited below. There remained the plants of the east-central Rocky Mountain area to which this name properly may be applied.

A large collection of willows made in southwestern Alberta in 1925 by Dr. M. O. Malte, Chief Botanist, National Herbarium of Canada, Victoria Memorial Museum, Ottawa, and his assistant, Mr. W. R. Watson, was presented to the writer. A study of this material revealed seven specimens referable to this variety. Six are from Pincher Creek, in the extreme southwestern corner of the Province and one is from Calgary, farther north. They differ somewhat from the material of Colorado and adjacent States in having longer leaves, with the margins more spinulose-denticulate, and the capsules short-pedicellate rather than subsessile. The spinulose denticulation of the leaf margins is even more strikingly exhibited by the British Columbia specimen.

The following is the material referred here:

ALBERTA.—Pincher Creek, 3700 ft. elev., Malte and Watson, 57, 57a, 58, 59 (O116730-733), June 6 and 27, 1925 (B, O); gravelly creek bottom, 3700 ft. elev., Malte and Watson 660, 661 (O116789-90), June 27, 1925 (B,O). Calgary, Bow River at Bowness Park, 3500 ft. elev., Malte and Watson 1291 (O116853), July 16, 1925 (B, O).

BRITISH COLUMBIA.—Flood-plain of the Columbia River at Beavermouth, alt. 2400 ft., C. H. Shaw 1179, April 18, 1905 (N). (The slender silvery pilose leaves bear numerous long spinulose teeth).

11. Salix interior Rowlee. Sandbar Willow.

Salix interior Rowlee, Bull. Torr. Bot. Club 27: 253, pl. 9, figs. 12, 13. 1900.

Salix longifolia Muhlenberg, Neue Schrift. Gesellsch. Naturfor. Fr. Berlin 4: 238, pl. 6, fig. 6, 1803; not Lamarck.

Salix fluviatilis as understood by Ball (in Coulter and Nelson New Man. Rocky Mtn. Bot. 131, 1908) and other authors, not Nuttall.

The Sandbar Willow is widely distributed from the Gulf of Mexico in Louisiana to Yukon Territory (Lower Austral to Boreal zones) and from the eastern edge of the Rocky Mountains to the District of Columbia, Delaware, New Hampshire, and New Brunswick. No other species of the section *Longifoliæ* is found in this large area. It occurs along ditches, streams and lake margins but never in swamps. It is one of the first plants to appear on sandbars or newly formed alluvium, usually being succeeded by poplars. It forms thickets rather than clumps.

John Macoun (Cat. Can. Pl. 1 (3): 450, 1886) recognized its wide distribution in Canada from near Quebec to the Rocky Mountains and north to northern British Columbia and the Mackenzie River. No additional notes are given in the "Additions" (ibid 2 (5): 356-361, 1900). Fernald

(in Gray's New Man. Bot. 323, 1908) says: "E. Que. to Man." Rydberg (Fl. Rocky Mtns. and Adjac. Pl. 192, 1917) says: "Que. . . . Sask.", but he regards *S. exigua* as occurring in Canada from Saskatchewan to British Columbia. He confuses *exigua* and the narrow-leaved variety, *S. interior pedicellata*, which occurs throughout the western portion of the Great Plains area of the United States and Canada. Schneider (Bot. Gaz. 67: p. 342, 1919) says:

> "The northern border line of the range of *S. longifolia* and var. *pedicellata* is not yet exactly known. Approximately it seems to run in the west from Fairbanks in Alaska to Fort Simpson in the Northwest Territories and through the Athabasca Plains and central (or southern?) Manitoba and southern Ontario to the south of James Bay and to about Lake St. Johns in Quebec, from where the eastern line turns southeast to western New Brunswick (Woodstock, Pokiok) and then southward to New Hampshire along the Connecticut River."

As this species is so well marked and so widely distributed, it seems unnecessary to cite numerous specimens in full. The writer has seen material from NEW BRUNSWICK (St. Johns R., York Co., Fernald and Pease 24985); QUEBEC (Ottawa River near Aylmer, Malte O111736, 111815); ONTARIO (Chatham, J. Macoun O26894; sand banks, Lake Ontario, J. Macoun 36, Aug. 17, 1878); MANITOBA (Portage la Prairie and McGregor); SASKATCHEWAN (Banks of South Saskatchewan River, ferry landing, northwest of Swift Current, Ball 2319 (B), 1925; east bank So. Saskatchewan River, Saskatoon, Ball 2325 (B), 1925; east bank of So. Saskatchewan River, near Batoche, Ball 2327 (B), 1925); ALBERTA (Lethbridge, Exshaw, Calgary; Ft. McMurray on the Athabaska, Preble and Preble 181); MACKENZIE (Slave River, R. Kennicott, 1860; mouth of Nahanni River, Preble 362, July 24, 1904); YUKON (Klondike River, at Dawson, Hitchcock, 1909).

John Macoun (Cat. Can. Pl. 1(3): 450, 1886) also recognized a variety *argyrophylla* Andersson, giving as a synonym *S. argophylla* Nuttall. The latter is a very different species from the Columbia River Basin and Andersson's variety chiefly represents young shoots of *interior*, which are normally sericeous. Schneider (Bot. Gaz. 67; 342-44, 1919) sericeus. Schneider (Bot. Gaz. 67: 342-44, 1919) has included much of the same material under *S. longifolia wheeleri* (Rowlee) Schn. The writer believes that Schneider greatly misunderstood Rowlee's variety.

11a. **Salix interior pedicellata** (Anderson) n. comb.

Salix longifolia pedicellata Anderss. Svensk. Vetensk. Akad. Handl. (Monog. Sal.) 6; 55, 1867).

Salix rubra Rich. in Franklin, Narr. Journ. Polar Sea, App. 752, 1823.

Salix linearifolia Rydberg in Britt. Man. Pl. No. and Canada 316, 1901.

This variety is distinguished by relatively narrow leaves, similar to those of *exigua* in size and shape. The pedicels are not long, as the name seems to indicate, but possibly average longer than those of the typical form of the species. It occurs in the higher drier plains east of the Rocky Mountains from Kansas and Wyoming to Alberta, Saskatchewan, and Manitoba, and north (according to Schneider) to Alaska, Yukon, and Mackenzie Territories. The writer is inclined to believe that the far northern material more nearly represents the species than the variety.

The following Canadian specimens, representing the variety, have been examined by the writer:

MANITOBA: Brandon, J. Fowler (N), July 7, 1887.

SASKATCHEWAN: Assiniboine River, J. Macoun 10 (N), June 16, 1879; 20 miles west of Yorkton, Macoun and Herriot O70288 (B), 1906.

ALBERTA: Calgary, J. Macoun O94329 (B), 1897; Bow River at Calgary, 3400 ft. elev., Malte and Watson 23 (O116729) June 4, 1925 (B); Elbow River, 3200 ft. elev., Malte and Watson 2 (O116719), June 3, 1925 (B, O); Athabaska delta, 9 miles above the mouth, Laing 42, 49 (B), 15-18 ft. high, 1920.

FISHES COLLECTED IN GASPE PENINSULA DURING AUGUST 1922

By FRITS JOHANSEN

AS IS well known, fishing is by far the most important industry in Gaspe, and much has been written about this romantic and picturesque part of Quebec and its old-fashioned, but hospitable, inhabitants. The shores of Gaspe are now much frequented by tourists during the summer, and a number of naturalists from Canada and the United States have made collections of fishes and invertebrates in its waters. Sir William Dawson and Dr. Robert Bell began already in 1858; and Dawson continued his dredgings until 1882, while J. F. Whiteaves carried out extensive marine investigations in Gaspe waters from 1867 to 1874 (See Whiteaves, 1901, pp. 1-4). Mention should also be made of Abbé Provencher's account of his trip in the Gulf

(1872), and his list of the fishes of Canada, which contains observations from Gaspe (1875-76). Also Fortin's observations in the Annual Reports of the Dominion Commissioner of Crown-lands, Quebec, before Confederation, and of the Department of Marine & Fisheries, Ottawa. Finally, Stafford's faunistic observations made in 1905. Odd specimens of fishes from Gaspe are also found in various museums in Canada and United States as indicated in published reports. In the Ottawa Museum are, besides my specimens I collected in 1922, a few fishes collected by others, referred to in this article and marked with double asterisk. Whiteaves' specimens, secured about fifty years ago, were apparently sent to the U.S.N.M. in Washington for identification (see Annual Report Smithson. Inst. for 1875, Wash. 1876, p. 88), and are preserved there.

All the fishes mentioned below I have determined except the fresh-and brack-water species, which Prof. P. Cox of Fredericton, N.B. identified.

This list of fishes observed by me in August, 1922 along the east coast of Gaspe Peninsula, between St. Helier and Port Daniel, is not by any means a complete list, but my main reason for publishing it is that it adds half a dozen species to the list of thirty fishes recorded for Gaspe Bay, according to Stafford (1912, p. 65), and to the following additional species. The common flounder (*Pseudopleuronectes americanus* W.) and a sculpin (*Myoxocephalus octodecimspinosus* Mitch.), both secured by me in Cascapedia Bay, on the south side of Gaspe Peninsula (Johansen, 1925 a); the Haddock (*Melanogrammus aeglefinus*, L.) and the smelt (*Osmerus mordax* Mitch.), all four first recorded by Bell (1859, pp. 246-47) from the Gaspe Coast; also the Mackerel (*Scomber scomber* L.), recorded by Fortin (1863, p. 120), Provancher (1875, p. 195) and Whiteaves (1874, p. 18); the Mutton-fish (*Zoarces anguillaris* Peck), by Clemens (1920, p. 5; 1921, pp. 70-72); the Striped Bass (*Roccus lineatus* Bloch) and the Bill-fish (*Scombresox saurus* Walb.), recorded by Fortin (1864, pp. 1, 7); and probably also the Gaspereaux (*Pomolobus pseudoharengus* Wils.) recorded by him from Bay of Chaelurs (1864, p. 5). Fortin also records from Gaspe the Pollock (*Pollchius virens* L.) (1866, p. 84), the Alligator-fish (*Aspidophoroides monopterygius* Bloch) and the Harvest-fish (*Poronolus triacanthus* Peck) (1865, p. 63, 65.)

Several others may occur along the east coast of Gaspe, such as the Silverside (*Menidia notata* Mitch.); the Silver-Hake (*Merlucius bilinearis* Mitch.); the Squirrel-Hake (*Urophycis chuss* Walb.); the White Perch (*Morone americana* Gmel.); the Rockling (*Euchelyopus cimbrius* L.); and the Cusk (*Brosmius brosme* Muell).

The number of species of marine and brack-water fishes found along the east side of Gaspe is thus probably about fifty, including the deep-water and more pelagic or accidental forms (rays, sharks, etc.). To the list should be added the pelagic fish-eggs and larvæ recorded by Dannevig (1919), and secured by the Canadian Fisheries Expedition in 1915.

What has been written so far about the fishes of the Gaspe coast is largely limited to the species of economic importance; but others particularly the shore-forms, merit attention. My observations in 1922 are a small contribution to this desired end.

LIST OF FISHES

Rose-fish or Norwegian Haddock (*Sebastes marinus* L.). A 35 cm. long female was found floating in the water at L'Anse a Louise (between Fox River and Cape Gaspe), on August 4th. It was of a brilliant rose-red colour (vent purple), and the stomach contained a number of the common Amphipods and Schizopods (*Euphausia*, etc.). This species is not in Stafford's list (1912, p. 65). It is a deep-water form, well known from the Gulf of St. Lawrence (Halkett, 1913, p. 96).

GRUBBY (*Myoxocephalus æneus* Mitch.). A specimen about 5 cm. long was observed among stones in beach-water at Port Daniel on August 6th; and later I secured one 3½ cm. long at low tide in the lagoon there. Stafford (1912, p. 65) does not give this sculpin in his list, but gives the Greenland sculpin (*M. scorpius grœnlandicus* Cuv. & Val.) as "*Acanthocottus scorpius*". This needs confirmation. Fortin states (1863, p. 122) that there are several species along the Gaspe coast.

BUTTER-FISH (*Centronotus gunellus* L.). A half-grown specimen observed on August 6th at Port Daniel, together with the *Myoxocephalus æneus*.

CUNNER (*Tautogolabrus adspersus* Walb.). On August 8th I secured six specimens, 14½-27 cm. long, from the pier at Port Daniel. Some details are to be found in my monograph of this fish (Johansen, 1926, p. 33.).

EASTERN STICKLEBACK (*Gasterosteus atkinsii* Bean). First definite record from Gaspe. Three specimens, 4-5 cm. long, from the outlet of Grand Etang Lakes (St. Helier), August 15th. Each of them had a large Cestod (*Schistocephalus ?*) in the abdominal cavity.

TWO-SPINED STICKLEBACK (*Gasterosteus bispinosus* Walb.). Four young specimens, probably of this species, about 2 cm. long, from creek-outlet at Peninsula, north side of Gaspe Bay, August 10th. Bell (1859, p. 249) records this species.

COMMON STICKLEBACK (*Gasterosteus gladiunculus* Kend.). Nine, immature specimens, 2½-

3¼ cm. long, from "barachois" at Port Daniel, August 9th. Probably it is the *G. aculeatus* recorded by Stafford (1912, p. 65) from Gaspe Bay.

NINE-SPINED STICKLEBACK (*Pygosteus pungitius* L.). Three small specimens from "barachois" at Port Daniel, August 9th. Two specimens from creek-outlet at Peninsula, Gaspe Bay, August 10th.

**In the Ottawa Museum is also a 3 cm. long specimen collected by Mr. A. Halkett at Douglastown in 1893 (Cat. No. 48).

FOUR-SPINED STICKLEBACK (*Apeltes quadracus* Mitch.). First definite record from Gaspe. One young specimen from creek-outlet at Peninsula, Gaspe Bay, August 10th. The species is not listed by Stafford (1912, p. 65, etc.).

SAND-LAUNCE (*Ammodytes americanus* De Kay.). On August 10th I went down to the beach at Cape Ozo (Cape Brule), on the north side of Gaspe Bay, just as the fishermen were coming in with their boats from the N.W. arm, with three barrels full of sand-launce. While the fishes were dumped upon the beach and transferred to boxes to be used for bait, I kept samples of the various sizes (8-15 cm.) of them. Dawson (1858, p. 327) and Bell (1859, p. 246) previously recorded it from the Gaspe Coast.

COMMON COD (*Gadus callarias* L.). was seen everywhere, of course, in great quantities.

HALIBUT (*Hippoglossus vulgaris* L.). When at St. Helier on August 15th, I observed this fish drying upon the platforms ("stages") beside the cod; and I learned that some are got here on lines set in about 80 fathoms. "Flounders" (*Limanda ferruginea* Stor.?) occur here, but are not utilized. Fortin (1863, p. 120) records the halibut from the Gaspe coast.

SMOOTH FLOUNDER (*Liopsetta putnami* Gill). First record from Gaspe. Eight specimens, 4-6 cm. long, collected at Port Daniel, August 9th. It is not listed by Stafford (1912, p. 65). I got young of this species also in Cascapedia Bay (Johansen, 1925 a).

COMMON EEL (*Anguilla chrysypa* Raf.). A male specimen, 24 in. long, was found dead at St. Helier, on August 15th. It had come down from Grand Etang Lakes, where they are said to be common.

COMMON KILLIFISH (*Fundulus heteroclitus* L.) was abundant everywhere in lagoons and pools in the marshes, together with sticklebacks. They are easily caught, e.g. by lowering a dipnet with a piece of codliver in the water, and waiting for the fishes to congregate, and are used for bait. Many specimens from 2 to 10 cm. long, from Port Daniel, August 9th.

**CAPELIN (*Mallotus villosus* Muell.). In the Ottawa Museum are 5 adults of this fish, collected on the beach at Perce by C. H. Young and P. A. Taverner on June 24th, 1914 (Catalogue No. 1069).

BROOK-TROUT (*Salvelinus fontinalis* Mitch.). Two small specimens, about 5 cm. long, from the outlet of Grand Etang Lakes at St. Helier, August 15th; and three specimens, 10-16½ cm. long, from a creek in the valley above Fox River, August 16th The largest is a male, with vivid, breeding colours.

DOG-FISH (*Squalus acanthias* L.). A full-grown specimen was found dead upon the beach at St. Helier on August 15th. It is everywhere a great pest, eating off the cod-fishes caught on the lines, etc. They were said to be very bad in Gaspe Bay in the summer of 1922.

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FURTHER NOTES ON THE ORCHIDS, FERNS AND BUTTERFLIES OF NORTH HATLEY, QUEBEC

By HENRY MOUSLEY

IN THE February number of *The Canadian Field-Naturalist* for 1925, I recorded my experiences with the Orchids, Ferns and Butterflies, up to the time of my coming to reside at Montreal, September 22, 1924. Since that date, my old happy hunting grounds have been visited on a few occasions only, the first being on May 20th, when I found Calypso (*Calypso bulbosa*) fully out, and a few days later, the 28th, the Early Coral Root (*Corallorrhiza trifida*) came into bloom. On the 31st, the Tiger Swallow-tail (*Papilio glaucus canadensis*) first made its appearance, together with the Meadow Fritillary (*Brenthis bellona*), and a few days later or on June 5th, the American Copper (*Heodes hypophlaeas*) was in evidence everywhere. On this same date also, the Pink Lady's Slipper or Mocassin Flower as it is sometimes called, was just coming into bloom, but my whole time was practically taken up with the birds, a further study of the nesting of the Northern Parula Warbler engaging most of my attention from May 22 to June 2, 1925.

However, on June 11th, I visited the site of the little Onondaga Moonwort (*Botrychium onondagense*) colony, finding the usual half a dozen small plants in evidence. The day following, about two miles from this spot, I was surprised to find another example of the Moonwort, 19 cm. in height agreeing with *B. onondagense* so far as its pinnæ were subremote, and not overlapping one another, but disagreeing entirely as to height, length of sterile frond, and size of pinnæ, which last in *B. onondagense* are very small indeed, and the length of the sterile frond rarely exceeds 3 cm., whereas, this one was 8 cm. in length, and the pinnæ some two or three times the size of those of *B. onondagense*. I have an example from the Grampian mountains in Scotland, which matches my example in most respects, the plant being sent to me as *Botrychium Lunaria*. From this it would seem, as if the size as well as the subremote pinnæ, must be taken into account when separating *B. Lunaria* from *B. onondagense*. On this same date, June 12th, the Baltimore, one of the rarer of the small Fritillaries in these parts was just coming out, but I had no time for further investigations, as I left for Montreal the following day, and did not visit Hatley again until August 13, 1926, returning to Montreal again on August 29th.

During this visit of a little over a fortnight, I devoted most of my time to the orchids, and made some interesting discoveries. *Calypso* was just sending up its new leaf for 1927, one plant in particular, having a beautiful coralloid rhizome, in addition to the usual tuberous roots, the leaf of the year, also, still being in an excellent state of preservation. On the 17th, I was fortunate in capturing another Bee (*Bombus vagans* F. Smith) cross-fertilizing the Hooded Ladies' Tresses (*Spiranthes Romanzoffiana*), the only other two agents known, being the small Bees, *Chloralictus smilacinæ* Rob., and *Halictus provancheri*, both of which were taken at Hatley, on August 24, 1924, and recorded in the November number of *The Orchid Review* for the same year. An interesting hybrid was also found on the 17th, apparently, a cross between *S. Romanzoffiana* and *S. cernua* or *S. gracilis*, possibly the latter, which was in bloom at the time, *S. cernua* not coming out until September 8th. Record specimens—for Hatley—of *S. Romanzoffiana* and *S. gracilis* were also found the former measuring 40.5 cm. in height, with a raceme 12.5 cm. in length, whilst a plant of the latter species was 44 cm. in height, with a raceme 11.5 cm. in length. Two fine examples of Loesel's Twayblade (*Liparis Loeselii*) were also discovered one measuring 24 cm., and the other 26 cm. in height, with leaves averaging 11 cm. x 2.5. cm.

These, however, were easily eclipsed on September 6th, by two giant examples I found near St. Rose, Que., whose height was 28 cm., with leaves averaging 22 cm. x 5.6 cm.! These two

plants being 6 cm. in excess of the extreme height given in Gray's Manual 7th ed.

Another interesting plant, was a fine example of the Large Purple Fringed Orchis (*Habenaria fimbriata*), measuring 114 cm. in height—a record for Hatley—with eight leaves, the three largest of which averaged 21 cm. in length, by 8.3 cm. in width. As in previous years, I found several—presumed—white examples of the Small Purple Fringed Orchis (*Habenaria psycodes*). However, the greatest red letter days occurred on August 23rd and 27th, when no less than five examples of the Green Adder's-mouth (*Malaxis unifolia*) were found with two leaves, the only other record I know of, being that of Mr. Olof O. Nylander, of Caribou, Maine, who, in his *Orchids of Northern Maine*, published in the October number of *The Maine Naturalist* for 1921, speaks on page 68, of having found just one plant at Perham, Maine, which bore two leaves. In addition to the above five plants, I found one with a beautiful variegated leaf, the variegation consisting of streaks of yellow and white, extending in some cases, from near the base to the top of the leaf. This species it may be remarked, has the power of propagating itself, not only in the usual way, but also, by means of little bulbils, which form under the sheathing to the old tubers. In a nearly related species (*Malaxis paludosa*), these little bulbils are formed along the edges of the leaves, when they drop off and serve to propagate the plant. On visiting the colony of the Large Coral Root (*Corallorrhiza maculata* forma *punicea*), recorded in *The Canadian Field-Naturalist* for May, 1925, pp. 95-96, I found only three plants that had bloomed, and these were small in comparison with those of July, 1924, when the colony was first discovered. With regard to the four species of orchids introduced by me into Hatley, i.e., the Small White Lady's Slipper (*Cypripedium passerinum*), Broad-leaved Epipactis (*Amesia* (*Epipactis*) *latifolia*), Crane-fly Orchis (*Tipularia discolor*), and the Putty Root (*Aplectrum hyemale*), I regret to say all of them have died out, with the exception of the last named, one root of which was still alive, when I examined it just before leaving Hatley at the end of August. Amongst other interesting items, not directly connected with Hatley, was the finding of a few plants in July of the Ragged Fringed Orchis (*Habenaria lacera*), near Lanoraie, Que., a species which does not seem to be very abundantly distributed in the Province of Quebec, two plants being all that I have found so far round Hatley. At this same place, I also had the satisfaction of seeing three plants of the Rose Pogonia (*Pogonia ophioglossoides*) each bearnig two blooms, an unusual thing, although Dr. Witmer Stone in his "Plants of Southern New Jersey", 1911, mentions on page 370, that in a large bog near Bennett, on June 30, 1909, he found them quite frequently two-flowered. At the beginning of August, I visited Como, Que., for the purpose of seeing the Tubercled Orchis (*Habenaria flava*), which I had been told was found growing there some years ago. My search proved successful, and I had the satisfaction of seeing yet one more North American orchid in its natural surroundings. Later on, from the description of an orchid a friend had found growing near the foot of Mt. Orford, Que., on August 1, 1920, I have every reason to believe that the species may eventually turn out to be *H. flava*. Should this be the case, it would mean another species to the list of Hatley orchids—the district of Mt. Orford coming within my radius—bringing the total up to some forty-five species, varieties and forms for this region.

In conclusion, I must not omit to mention the great abundance of the Painted Lady (*Vanessa cardui*), more specimens having been seen this year at Hatley, than in all the other years put together. Not only in the New World, has this species swarmed at many places, but in the Old World also, as described in my paper, "Notes on the Birds, Orchids, Ferns, and Butterflies of Mt. Royal, Montreal, 1925-1926."

SOME OBSERVATIONS OF THE BIRDS OF THE ISLAND OF ANTICOSTI, QUEBEC, IN 1926

By HARRISON F. LEWIS

IT WAS my good fortune to be on the Island of Anticosti, Quebec, from May 20 to the early morning of June 2, 1926, on my fifth visit to that island. The entire period mentioned was of necessity spent in the vicinity of Ellis Bay, or Port Menier, as it is now called, near the western extremity of the island, where birds were observed and recorded daily during my stay, as much as other duties would permit. From the information thus obtained I have selected that set forth in this paper as being of sufficient interest for publication.

1. *Larus delawarensis*. RING-BILLED GULL. —This species was already present at Port Menier when I arrived there on May 20, and I recorded 10 individuals about the harbor on that date. It was observed every day for some time thereafter, except that none happened to be seen on

May 21, a very stormy day. On May 24 there was a noticeable increase in the number of Ring-billed Gulls present, and this increase continued on May 25 and 26, the number of individuals recorded on the latter date being 24. On May 27, when the increase reached its local maximum, there were fully 100 very noisy Ring-billed Gulls present in Port Menier harbor. The next day they were almost all gone, but I observed 2 of this species on that day, 2 on May 29, and 1 on May 30, after which no more were noted.

It is curious to observe that of this conspicuous species, evidently a common migrant, the only previous records from Anticosti are one by Schmitt, of a specimen killed September 18. 1901, and one (previously unpublished) of two individuals observed by me from the deck of a steamer in Port Menier harbor on May 25, 1925.

2. *Neïtion carolinense.* GREEN-WINGED TEAL.—Two were observed on May 23, two on May 30, one on May 31, and one on June 1. On the three days last mentioned the birds seemed to be settled for the season in a wooded swamp just west of the farm buildings at Port Menier.

3. *Dafila acuta tzitzihoa.* AMERICAN PINTAIL.—On May 26 I saw seven adult Pintails, four drakes and three ducks, about one mile south of Port Menier village. The tide was low, and the birds were on the fringing limestone reef near the land. They were not seriously alarmed, as I was partly concealed by trees, and I was able to observe them in good light with x6 binoculars at a distance of about 100 yards for several minutes. Three individuals were seen at the same place on May 28.

4. *Marila marila.* SCAUP DUCK.—Fifteen Scaup Ducks of uncertain specific identity were observed at Port Menier on May 20. Six birds seen on May 23 and fourteen on May 31 were similarly set down as Scaup Duck (sp. ?). Early on the morning of June 1, however, as I was working through the wooded swamp west of the farm buildings at Port Menier, with a bright sun behind me, I was able to observe for some time, with x6 binoculars, three Scaup Ducks that swam about on a pool near me without heeding my presence. Then I saw very plainly the clear white sides and the greenish gloss on the *ops* and sides of the heads that showed that these three birds, at least, were *Marila marila.*

5. *Tringa solitaria solitaria.* SOLITARY SANDPIPER.—A single individual was closely observed for several minutes in wet, open woods at Port Menier on May 28.

6. *Bonasa umbellus togata.* CANADA RUFFED GROUSE.—This species was first observed near Port Menier on May 26. It was seen on several later dates also, as many as three birds being recorded in one day.

I was told that these birds had been introduced into Anticosti from the mainland in recent years by the Administration of the island, and that they appeared to be thriving, in spite of the very numerous foxes, and were now to be seen for many miles around Port Menier. This is particularly interesting in view of the rapid decrease, and possible extermination, of the native Rock Ptarmigan (*Lagopus rupestris rupestris*) of Anticosti following the deliberately encouraged increase in the numbers of foxes.

7. *Sphyrapicus varius varius.* YELLOW-BELLIED SAPSUCKER.—This was the most common species of Woodpecker, and was observed on nine of the thirteen days of my stay, two being noted on May 20, the day of my arrival. The largest number of individuals seen in one day was four.

8. *Tyrannus tyrannus.* KINGBIRD.—A silent Kingbird, actively catching insects, was seen plainly and repeatedly with x6 binoculars near the farm at Port Menier on May 30. This is the third record of this species in Anticosti.*

9. *Euphagus carolinus.* RUSTY BLACKBIRD.—The only observation of this species obtained was that of a single individual at Port Menier on May 23.

10. *Quiscalus quiscula æneus.* BRONZED GRACKLE.—This species was frequently observed at Port Menier from May 20 onward. On June 1 I saw 25 individuals, of which 24 were in one flock near the railway.

11. *Carpodacus purpureus purpureus.* PURPLE FINCH.—This species was observed daily from May 25 to May 31, both dates inclusive, the largest number observed in one day being four individuals on May 30.

12. *Plectrophenax nivalis nivalis.* SNOW BUNTING.—The only individuals of this species observed were 13 on May 20 and 15 on May 21.

13. *Zonotrichia leucophrys leucophrys.* WHITE-CROWNED SPARROW.—Present in small numbers from May 20 to June 1. The largest number observed in one day was six individuals on May 27.

14. *Spizella passerina passerina.* CHIPPING SPARROW.—One individual in song was closely and clearly observed in a clump of conifers in a field on May 30.

15. *Melospiza melodia melodia.* SONG SPARROW.—This species remains rare in the vicinity of Port Menier. It was observed only on May 30, when three individuals were recorded, and on May 31, when two were noted.

*See *Can. Field-Nat.*, Vol. XXXVIII, No. 5, p. 90, and Vol. XXXIX, No. 5, p. 116.

16. *Melospiza lincolni lincolni.* LINCOLN'S SPARROW.—On May 23 and again on May 29 a single individual in song was observed at Port Menier.

17. *Seiurus noveboracensis noveboracensis.* WATER-THRUSH.—First seen on May 28, when four individuals were recorded, although what was probably its song was heard on the previous day. Fairly common thereafter.

18. *Certhia familiaris americana.* BROWN CREEPER.—On May 26, 1926, while climbing over snowbanks in the woods near the shore about a mile and a quarter south of Port Menier village, I heard the familiar song of a Brown Creeper some distance away. I followed the sound and came out upon a small open space in the woods, fringed with dead and dying trees. Apparently this was in summer a small sphagnum bog, but at the time of my visit it was deeply overflowed and the water extended far back among the surrounding trees. The bird I sought was still singing blithely, in spite of a cold rain, but it was evidently on some of the dead trees well out in the water, and a long time passed before I could see it. Finally, however, it came quite close to me, on my side of a dead tree-trunk, so that I had a most clear and satisfactory view, through x6 binoculars, of a Brown Creeper exhibiting the characteristic markings, form, and actions of its kind.

This is the first record of the Brown Creeper in Anticosti.

NOTES ON THE BIRDS, ORCHIDS, FERNS AND BUTTERFLIES OF MOUNT ROYAL, MONTREAL, 1925-1926

By HENRY MOUSLEY

Read before the Montreal Branch of the Entomological Society of Ontario, Oct. 8, 1926.

IN THE "Journal of the New York Botanical Garden" for August, 1920, will be found an interesting article by Dr. Herbert Denslow, entitled "Further Reflections of an Orchid-Hunter," in which the Author commences by remarking, "How we should welcome a 'Flora of Manhattan,' of the year 1609! We can picture to ourselves the appearance of the island, when Hendrick Hudson and his companions first looked on it; but we very much want something more substantial than fancies or impressions. We want records and herbaria."

In our turn, likewise, we can picture Champlain in 1603, climbing the forest-clad slopes of Mount Royal, in order to obtain a clearer view of the surrounding country. How we should welcome an account of the avifauna and flora of Mount Royal at that remote period! Nay, what would we give for an account dating back say only fifty years ago, for as far as I know, there is nothing of the kind in existence. Certainly, in "The Birds of Montreal," published by the late Ernest D. Wintle in 1896, we find specific mention of some of the birds to be found on Mount Royal thirty years ago. Likewise, in "A Preliminary List of the Insects of the Province of Quebec," 1912, by Mr. Albert F. Winn, many of the references under Montreal, doubtless, are attributable to Mount Royal, but nowhere, can we find a reliable work on the mountain itself. This is much to be regretted, as even at this late date, the flora is varied and interesting, and what it must have been some fifty years or more ago—before the place was overrun with builders, picnic parties and the like—one can only imagine, by what remains to-day.

This being so, is it to be wondered at, that when I first came to reside at Montreal in September, 1924, I looked somewhat askance at Mount Royal as a collecting ground, and like most of my friends went further afield. However, I have since found out that the mountain still offers surprises for the diligent searcher, as the following notes I hope will show.

Of the birds I can say very little, for the simple reason that the two families I am principally interested in, *i.e., the Scolopacidæ and Minotilidæ*, seldom, or never breed on the mountain, except the very commonest species of the last named family, and so I have had to go further afield. This does not mean that there are no interesting birds to be found on the mountain, only, that for the more advanced student, it can hardly be considered an "El Dorado" at the present day. Possibly, the most interesting species I have come across so far, was a male Northern Parula Warbler (*Compsothlypis americana usneæ*), on May 25, 1926, and three days later, a Cape May Warbler (*Dendroica tigrina*). On August 5, 1925, and again on August 4 of the following year, I saw a flock of about 100 Purple Martins (*Progne subis subis*) congregating on a dead tree on the northern slope of the mountain, at the east end of Maplewood Avenue, where also, on June 25, I found the nest of a House Wren (*Troglodytes aëdon aëdon*) in a hole in a dead cherry tree. Among other nests discovered, the most interesting was a double storied one of the Yellow Warbler (*Dendroica æstiva æstiva*), containing in the lower compartment, two eggs of the owner, and one of the cowbird (*Molothrus ater ater*). A

male Indigo Bunting (*Passerina cyanea*) was seen feeding young on July 3, and a partial albino Robin (*Planesticus migratorius migratorius*) was noted on September 13 of the present year 1926.

It is among the Orchids, Ferns, and Butterflies, however, that the most important discoveries have been made. In the Orchids, I have had the honour of adding a new species, the Dark Red Epipactis Amesia rubiginosa—(*Epipactis rubiginosa*), not only to the Canadian Flora, but to that of North America also, full particulars of which it is hoped will appear later.

The plants, three in number, were discovered growing on limestone, on the northern slope of the mountain, on July 18, 1925. This species must not be confounded with the Broad-leaved Epipactis Amesia latifolia — (*Epipactis latifolia*), which is found growing all over the mountain, but which, up to quite recently, was known to occur in Canada at one other station only—Toronto. Now, however, it has been found to have a more extended range, having been located near Peterborough, Ont., besides several other places north of Montreal. In the United States, it is confined to a few places in the State of New York, and perhaps Pennsylvania.

The three plants in question have been submitted to experts in England and France—where rubiginosa occurs in limited areas—all of whom have confirmed the opinion I had formed of their being rubiginosa, and not latifolia. Of the latter species, I have also been enabled to add three new forms to our list, one of which, so far as I am aware of, has never before been described, and for which, I am proposing the name Amesia latifolia forma monotropoides, the plants being snow-white like the Indian Pipe (*Monotropa uniflora*). Amongst other species of orchids still to be found on Mount Royal, it may come as a surprise to many, to learn that the Showy Orchis (*Orchis spectabilis*) still lingers in one or two places, as well as Loesel's Twayblade (*Liparis Loeselii*). The Large Coral Root (*Corallorrhiza maculata*) is fairly well distributed, as is also, the Tall Leafy Green Orchis (*Habenaria hyperborea*), but the small Purple Fringed Orchis (*Habenaria psycodes*), which used to be found in the damp meadows below the toboggan slide, has died out, I fancy, owing to the drainage of these meadows, at least, I have been unable to locate it so far.

Coming now to the ferns, it was certainly a surprise to find the Common Polypody (*Polypodium Virginianum*) so very scarce on the mountain, in fact, I know of only two spots where a very few plants still linger. However, to make up for this, most of the common species can be found in profusion, and amongst the better ones, I have had the very great satisfaction of finding the rare Little Grape Fern (*Botrychium simplex*) the only other record for Montreal, according to the latest book on ferns by Bro. Marie-Victorin, "Les Filicinées du Québec", 1923, being that of McCord, which record dates back about forty years, or at all events, previous to the year 1890. Most of the plants were found growing on somewhat dry ground under the shade of Bracken ferns, on the northern slope of the mountain, on June 16, 1926, and again on July 13. To those unfamiliar with these rare little ferns, I might mention, that some of them are little more than one inch in height, whilst the fertile and sterile fronds are so small, that they almost require a magnifying glass to see them properly—when pressed and dried.

In passing to the Butterflies, I may say, that although they are the last to be considered, they must not be judged by this standard as regards my affection or liking for them, as they appeal to me quite as much as any of the other Orders mentioned.

The greatest surprise came on June 16, 1926, when, in a gulley on the northern slope of the mountain, I noticed a somewhat large and dusky looking Skipper, which was unfamiliar to me, and which I was fortunate enough to capture and have since presented to the collection of McGill University, in the Lyman Entomological room. Upon reaching home, I came to the conclusion that the insect could be none other than Juvenal's Dusky-wing (*Thanaos juvenalis*), which decision seems justified in the opinion of Dr. McDunnough of Ottawa, and Mr. Albert F. Winn of Montreal, both of whom have seen the specimen. There are no actual records in Mr. Winn's, "A Preliminary List of the Insects of the Province of Quebec", published in 1912, except, a note to the effect, that the species has been taken at Ottawa and doubtless occurs on both sides of the river. So far as I am aware, this is not only the first record for the district of Montreal, but also, for the Province of Quebec.

The genus Thanaos is a somewhat complicated one, many of the members being so much alike, that exact identification is often difficult, the present species, for instance, being liable to be confused with *T. petronius, and T horatius*, both of which it greatly resembles, although petronius, I believe, is now considered to be merely a synonym of *T. horatius*. Other interesting species—not hitherto met with during my fourteen years residence at Hatley, Que.—consisted of the Silver-spotted Skipper (*Epargyreus tityrus*) on June 21, 1925, the Coral Hairstreak (*Strymon titus*) on August 9, 1926, and the Banded Hairstreak (*Strymon calanus*) on July 3, 1926, all of which were met with in some profusion, and in the pink

of condition, on the dates named. In addition, the Bronze Copper (*Heodes thoe*) was met with at St. Lambert, on July 11, and 15, 1926, and the Least Copper (*Heodes epixanthe*) at Lanoraie, on July 7, 1926, whilst a few specimens of the beautiful Pearly Eye (*Enodia portlandia*) were seen on Mount Royal during July and August of 1925 and 1926. Very few examples of the Monarch (*Danaus archippus*) were seen, in fact, only one example in the present year 1926. The feature of this last named year, was undoubtedly, the great abundance of the Painted Lady (*Vanessa cardui*), which might be said to have almost swarmed on the mountain on August 9, being the commonest large butterfly out at that date, with the exception of the Red Admiral (*Vanessa atalanta*), which was also very numerous. The abundance of these two species was not confined to the district of Montreal alone, as I found both very plentiful at Hatley later on in the month, in fact, I saw more of the former in the fortnight I was there, than in all my previous fourteen years' experience, from 1910-1924.

In some of the English papers the fact of the great abundance of these two species—especially the former—was referred to. At Brighton on the south coast, eight perfect specimens of the Painted Lady were seen feeding at one time on a pink-flowering plant measuring some two feet across. It is supposed these butterflies originate to the south of the desert stretching across northern Africa, and Asia Minor, between 2,000 and 3,000 miles from southern England. Leaving the desert regions in early spring, England is reached at the end of May or beginning of June, Scotland a week or two later, and they have even been recorded from Iceland—a total flight of about 4,000 miles!—in July.

In conclusion, it is hoped that these few notes may eventually lead to a complete list being made of the avifauna and flora of Mount Royal, a matter which I imagine, would be of great interest, not only to the residents, but also to strangers visiting the city of Montreal.

NOTES AND OBSERVATIONS

THE ANNUAL CHRISTMAS BIRD CENSUS.—It is hoped that as many Canadians as possible will take Christmas Bird Censuses this year and send them to the Editor of *The Canadian Field-Naturalist* for publication.

The chief object of the Christmas Bird Census is to furnish a comprehensive view of the distribution of bird life on this continent at Christmas time each year. The more censuses, the more comprehensive the view, so that each lone observer, even though he may not be able to find more than two or three common species, may here make a contribution of definite value to the study of our birds. Each census record will also have increasing historical value in its own locality as years pass and conditions change. And, finally, the taking of a Christmas Bird Census is a pleasant and beneficial activity for the census-takers, even if the temperature happens to be below zero, and quite frequently results in some surprising records.

A census-walk should last four hours at the very least, and an all-day one is far preferable. It should give results as characteristically representative of the local bird life at Christmas time as it is possible to obtain within the limits of one calendar day but those limits should not be exceeded. If two or more parties can combine to produce a single census for a certain area, such combination will increase the completeness of the report, but only censuses that cover areas that are contiguous and with a total diameter not exceeding 15 miles should be combined into one report.

Christmas Bird Censuses should not be taken earlier than December 22nd or later than December 27th, except in British Columbia, where they should be taken on any day from December 20th to December 26th. It is important that all census reports should be sent to the Editor *as promptly as possible* after the census has been taken.

One very important point to bear in mind is that *each unusual record should be accompanied by a brief statement as to the identification*, and be initialled by the observer responsible for it in the case of a joint report.

Each report should begin with a brief statement of locality, *date*, hours of observation, weather conditions, including direction and force of wind and record of temperature, and the depth of snow, if any, on the ground. Then should follow a list of the species observed, including any native North American species noted, and also such introduced species as the "English" Sparrow, Starling, Pheasant, and Hungarian Partridge. The species should be arranged in the order of the A.O.U. "Check-List", which is that of most modern bird books on this continent, and the number of individuals of each species seen, and the total number of species and of individuals should be stated. Each report should be signed by all observers contributing to it, and the individual names may be accompanied by the name of a club or other organization, if appropriate.

The census reports will be published in *The Canadian Field-Naturalist* for January, 1927.

After sending a census report to *The Canadian Field-Naturalist*, some Canadian census-takers also send a report (omitting the "English" sparrow) to the editor of *Bird-Lore*, at the American Museum of Natural History, 77th Street and 8th Avenue, New York City. *Bird-Lore* publishes Christmas Bird Censuses reports from all over North America, and was the pioneer in this work, and international co-operation of this kind is an excellent thing.

Let us all work together to make *The Canadian Field-Naturalist's* Canadian Christmas Bird Census for 1926 far the best that has yet appeared.—HARRISON F. LEWIS.

FURTHER OBSERVATIONS ON SQUIRRELS EATING *Amanita Muscaria*—In *The Canadian Field-Naturalist* of November, 1925, a short article appeared, "Squirrels Eating *Amanita muscaria*". The locality mentioned has been repeatedly visited during this fall, and as *A. muscaria* was found growing in abundance, evidences of its being eaten by rodents were carefully looked for. On October 14th, eight fine specimens of *A. muscaria* were found in different stages of growth. Next day, one of the larger ones was found broken off and partly eaten, with many fragments of it strewn around. On the 18th the specimens had matured, their caps reaching from four to six inches across. All of the eight specimens were detached from their stems, the bases remaining in the ground. Four adjacent pine trees were decorated in the following manner with large pieces of caps, averaging three by two inches, the first with three pieces of *A. muscaria*, the second with two caps of *Boletus*, the third with three pieces of *A. muscaria*, and the fourth with four pieces of *A. muscaria*. In every case these were placed in crotches of the lower limbs, not more than four feet from the ground, and in such a manner that shaking the branches would not dislodge them. No more than last year were any squirrels seen in the act of eating them, but the evidence points strongly in that direction. It is remarkable that a mushroom so deadly to human beings should be eaten with impunity in considerable quantities by an animal.—W. S. ODELL.

FEMALE REDSTART SINGING.—I note with interest an article by Mrs. Anna E. MacLoghlin and remarks by P. A. Taverner on this subject, in the September number. In the Museum collection is a female Redstart (No. 25,10,16,212) taken by the writer at Lowbush, Lake Abitibi, Ontario, on June 3, 1925. This bird was singing a short song identical with one of the usual songs of the male and containing the usual "swee-a, swee-a" notes; a note to this effect appearing on the back of the label. The sex was determined very carefully and the bird had somewhat enlarged ovaries.—JAS. L. BAILLIE, JR., *Royal Ontario Museum of Zoology, Toronto.*

Epipactis Helleborine.—In a recent issue of *The Canadian Field-Naturalist* I recorded my garden at Toronto. This summer brings some more news about it.

Neville Park Boulevard is almost on the Eastern boundary of Toronto. A few hundred yards further on the North side of Queen Street, is the estate owned by the late Donald Mann, which is about to be broken up and sold for building lots. It is at present all covered with woods, and my brother undertook an exploration of this woods recently, to see what was there. To his surprise he found *Epipactis* in large numbers, scattered through the woods, and as this Orchid is not known from other localities, it would seem advisable that the Toronto botanists take it from the Mann woods and plant it in other locations where it would have a chance to survive. One usually likes to *protect from removal* everything in the way of rare botanical specimens, but the way to protect this *Epipactis* is to remove it, because it is doomed where it is.

Any persons who would like to have some of these plants in their own woods, might write to some of their Toronto friends and suggest it be gathered and shipped to them.—W. E. SAUNDERS.

THE GROWTH OF THE GIANT PUFFBALL (*Calvatia gigantea Batsch*).—Many inquiries have reached us as to the length of time required for the giant puffball to attain its frequently very large size—the popular impression being that this immense growth takes place within the brief space of a few days. Some of these puffballs reach huge dimensions. A very large specimen was obtained from a farm about eight miles from Ottawa, on the Montreal Road, weighing 18½ pounds, and measuring 21 inches in diameter, and 5 feet 6 inches in circumference. One still heavier was found this fall near Ashton, Ont., weighing 19 pounds. Observations on the life history of one such specimen are difficult to obtain; in most cases the puffball has reached maturity when first seen. To obtain a true record one should observe it at its earliest stages, and continue observations till full growth is reached. In most cases, after observtaions are begun on a specimen, one finds it destroyed when next visited. It seems that few boys can pass one without dashing it to pieces from a wanton spirit. Several observations were started on puffballs in woods at Val Tetreau, west of Hull, Que., but invariably

after a few days, the specimens chosen were destroyed before sufficient data were obtained.

One, when first seen on September 25th, was the size of an orange, on October 3rd it had grown to the size of a large grape-fruit, on the 10th it was broken; but by placing the pieces together, it had reached nearly double its former size; this observed growth required fifteen days, with possibly three or four more days added for the growth attained before it was first seen.

On October 10th another specimen was found in the same woods, measuring 23½ inches in circumference, on the 11th it had increased to 24½ inches, on the 13th to 28½ inches, on the 15th to 32½ inches. When next visited on October 17th, it was badly smashed. An examination of the fragments showed pure white with no change in colour of the interior, thus proving that it had not reached the limit of its growth, as change of colour of the interior shows that ripening has begun and that the growth has been arrested. In the five days of observation, it grew 8½ inches in circumference. With the same ratio it would take a little over thirteen days to have grown to the size when first observed, making eighteen days in all. Doubtless weather conditions play an important part in rapid or slow growth.

An examination of the ground with a pointed stick showed an attachment by a taproot about ¼ inch thick, tapering gradually for 3 inches to a fine point. No white threads (*mycelium*) were visible in several specimens examined. One would expect that such a large fungoid growth would require a network of mycelium to furnish sufficient nourishment. Since a puffball is composed of about 90 per cent water, the amazing fact is not so much its size as the scarcity of any visible rootlets to extract and convey moisture from the ground sufficient for it requirements.

From the above it is apparent that the writer has been unable to obtain data for a growth of puffballs any larger than about the size of a football; and that to attain this size it requires a period of about three weeks.—W. S. ODELL.

FEMALE REDSTART SINGING AT QUEBEC.—I have read with interest Mrs. MacLoghlin's article on page 142 of your September issue, re the female Redstart singing at Hamilton.

Last spring I had what I at first thought was practically the same experience, but I afterward decided, in accordance with Mr. Taverner's note, that it was a young male still in its first plumage.

If I had thought there was any question as to whether or not it breeds in this plumage, I think I could have settled it finally in the affirmative.

I saw this bird, and its mate in ordinary female Redstart colours several times in the same locality, when I went to check up the question as to what exactly the male was, and am positive they were nesting there.

I might mention that this male, although yellow, where he ordinarily would have been red or orange, was much blacker in the other parts than the female.—R. MEREDITH.

PUBLICATIONS RECEIVED

New Physical Geography, by Ralph S. Tarr and O. D. von Engeln; revised eidtion, The Macmillan Company, N.Y., 1926.

American Bee Journal, Hamilton, Illinois.

American Game, issued by the American Game Protective Associtaion, New York City.

Bulletin of the Northeastern Bird Banding Association, Boston, Mass.

LECTURES.

The Natural History Society of Manitoba has published a list of lectures and demonstrations to be given during the Session 1926-27. The list includes topics from Geology, Botany, Ornithology, Entomology, in addition to some general ones.

The programme of the first series of free public lectures in the Victoria Memorial Museum has been published. These lectures will deal chiefly with the natural resources of Canada and each will be given by a lecturer from his own experience.

BOOK REVIEW

BIRDS OF WESTERN CANADA, *Museum Bulletin, No. 41; Victoria Memorial Museum; by P. A. Taverner, Ottawa, 1926, 380 pages, 84 colored plates, price 75 cents in paper cover, $1.00 in cloth.*

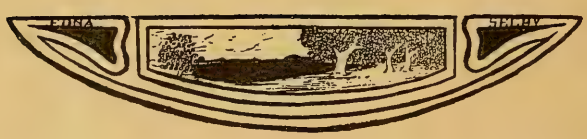
The very favourable reception given to Mr. Taverner's "Birds of Eastern Canada", published in 1919, and the continued demand for copies has shown that such a book was needed and appreciated in Canada, and the authorities of the Victoria Memorial Museum have wisely supported the production of a companion work, dealing with the birds of the Canadian West. The introduction is comprehensive and of much value to the student of birds, covering classification, geographical distribution, migration, protection, bird study, bibliography, and a key to the families of birds referred to in the book; the excellent outline drawings being by the author; the whole treated in a clear and simple manner for the general reader as well as the student.

The body of the work comes under the head of

"descriptive" ornithology, and deals with the subject in a manner both authoritative and easy to understand, each family is discussed with reference to its distinctive peculiarities, description, field marks, nesting habits, and economic status; thus preparing the reader for the description and discussion of each species with a short reference to the sub-species concerned, if any, this latter is by no means glossed over, and students will find much help here. The excellent text figures, nearly all by the author, are a feature of the work especially the wonderful series of hawk outlines, some of which are due to help, acknowledged by the author, from the American artist, Louis Agassiz Fuertes. The glossary at the end of the work is another useful feature. The coloured plates will perhaps attract more attention to the book than it would otherwise receive and will undoubtedly lead many a casual reader to a study of the letterpress; the majority of the plates are from drawings by Major Allan Brooks and we are fortunate in having them in a Canadian book; the other coloured plates reprinted from "Birds of Eastern Canada", are by Mr. Frank Hennessey.

The reviewer has no doubt whatever that the "Birds of Western Canada" will be well received, and nothing better illustrates the author's knowledge of his public than the make-up of the book. Not only is it an original book on Canadian birds, but it shows that two departments of the government can co-operate in producing a really fine piece of work, the officials of the museum, and of the Printing Bureau have worked together, and the care with which the colours of the original paintings have been reproduced is evident.

The author acknowledges the assistance he has received from various sources, but the book is distinctly the author's.—J. H. FLEMING.



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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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THE CANADIAN FIELD-NATURALIST

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THE OTTAWA FIELD-NATURALISTS' CLUB

CONTENTS.

The official publications of THE OTTAWA FIELD-NATURALISTS' CLUB have been issued since 1879. The first was *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 Membership Committee of The Ottawa Field-Naturalists' Club is making a special effort to increase the subscription list of *The Canadian Field-Naturalist* and we are asking every reader to assist in making the campaign the success it should be.

We would particularly urge the Secretary of each Affiliated Society to bring this matter up at EVERY meeting and secure as many subscribers as they possibly can to a Canadian Publication devoted to the study of Natural History in all its phases.

Use the blank below and forward it to the Treasurer.

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The Canadian Field-Naturalist

VOL. XL OTTAWA, ONTARIO, DECEMBER, 1926 No. 9

THE EUROPEAN STARLING

By MANLY F. MINER

(Son of Jack Miner, the Canadian Naturalist).

IN ALMOST every mail coming to our home is to be found a letter from some part of either Canada or the United States containing a description as to colour, size and habit of a new bird which the writer has seen and requesting its name. Invariably the bird described is the European Starling.

It is about five years ago since I first noticed this bird and, at that time, in order at assure myself that my eyes were not deceiving me, I consulted Mr. W. E. Saunders of London, Ontario, who confirmed my belief that it was a starling. During these five years the number of this bird has increased by leaps and bounds.

The first nest I found two years ago in a hole in a telephone pole, a woodpecker having bored into the wood. On his vacating, it was taken up by a pair of starlings that made their home there. This year five or six nests were located in similar places.

On my father's bird sanctuary in Kingsville, Ontario, are planted about thirty-five thousand evergreens, Scotch and white pines, Norway spruce and red cedars. These trees, which were seedlings ten years ago, are now from fifteen to twenty feet in height and form an almost perfect evergreen grove—an ideal place for birds to roost, especially in early spring and late fall. Point Pelee excepted, this is the only evergreen forest in the county of Essex. Literally thousands of birds congregate here, principally mourning doves, blackbirds and cow birds. Added to these this fall are thousands of starlings. The lower limbs of the trees throughout this evergreen grove have been cut off to permit a person walking through without the discomfort of stooping continuously to avoid contact with them. So great is the number of birds in this grove at one time that the present lower branches are permanently bent downwards due to the combined weights of the numbers of birds roosting on them. This can be observed by anyone who cares to satisfy himself on this point. As may be expected in a grove of this kind, the ground is covered with pine needles which, in this case, are scarcely visible owing to the heavy coating of bird droppings—a further proof of the extremely large number of birds which visit this spot twice annually.

Mourning doves, blackbirds and cow birds have been in evidence for several years during the fall season. However, this fall is the first time the starlings have come in such numbers. They flocked in by the thousands to roost, starting to congregate about the first of September and continuing until the latter part of October. When they were first observed they were in their summer plumage—a sort of speckled or mottled colour. Later during October they appeared to have changed to their fall plumage.

It would be difficult for the average person to estimate the number of starlings in the grove at one time if the estimate were based on the flight of the birds over the grove any morning or evening. The figure might, perhaps, be placed at twenty-five thousand. In order to arrive at a comparatively accurate figure I went out one morning about daylight to count them as well as I could. In ten minutes I counted over a thousand leaving the evergreen grove. This flight continues for about one hour and a half, so that to say there were five thousand starlings is to make a very conservative statement.

The flight of the starling is distinctive from that of other birds in that they fly very high when coming in and ascend to a great height when leaving. It is easily distinguished from that of the crow, blackbird or bronzed grackle. Whence and how far the starlings come each evening is a mystery.

Living only thirty miles from Windsor and in the same county, I find it necessary to motor there practically twice a month. Very seldom on that trip do I ever see a starling. Few persons roam the woods and fields more than I and to see from fifteen to twenty starlings in a day is uncommon. Yet, as I say, there were at least

five thousand on father's sanctuary this fall. From where do they come?

During last winter perhaps twenty-five wintered on the sanctuary. They lived on the little blue berries which come on the red cedars. It will be a wonder if these starlings do not become as great a nuisance as the English sparrow and German carp. Many men of authority have already denounced the starling and placed him on the bad list with the crow, bronzed grackle and other birds which do more harm than good.

THE CANADIAN SCHOOL OF PREHISTORY IN FRANCE

By H. M. AMI, F.R.S.C.

THE CANADIAN School of Prehistory was first organized in 1925 at the May meeting of the Royal Society of Canada when twelve fellows were elected to serve on a committee to direct the forthcoming researches of the School.

The first season's work in France under the auspices of "Les Beaux de France" in Paris, the Ministry of Public Instruction, and Department of Historical Monuments, etc., came to a close at the end of last September, and the School may now be said to have made a fair beginning, and to have gathered an extensive and interesting collection of materials for study and distribution to various academic and scientific centres throughout the Dominion.

The site or gisement granted by the Beaux-Arts to Canada is situated in the Dordogne district, at Combe-Capelle near Monferrand up the beautiful valley of the Couze river, Commune of St. Avit-Sénieur. The discoveries in this locality and in the surrounding gisement of La Micoque and other Moustierian sites prove the existence of many problems which the School of Prehistory has yet to solve. Combe Capelle was expected to yield some of the information desired, and the result of the work of the Canadian school at this site in June, July, August and September has revealed a certain amount of excellent material bearing upon some of those problems, more especially at the base of the section examined. No sensational discoveries were made in this virgin piece of excavation, but a large amount of worked stone implements of a very primitve sort were found in four distinct layers or beds at Combe Capelle.

Two nearly complete skeletons of a fairly large rodent (*Marmota*) besides isolated and fragmentary bones and teeth of bison, horse, and possibly rhinoceros were added to the collections of flint or stone implements made on the spot. The work was undertaken as a careful and methodical piece of investigation under the auspices of the Beaux-Arts in order to obtain certain definite results. Roughly made implements of curious shape were found in all four of the layers traversed, and they were specially abundant in the two older beds. The existence of types hitherto unheeded was proved by the discovery of unrecorded implements made by Moustierian man in the Combe Capelle station, exhibiting much cleverness and skill as well as resourcefulness, in the result of his industrial achievements in stone.

In this very early stage of human civilization, primitive man utilized even the simplest or most common type of flint flake obtained by one or more well directed blows given by his right hand or left hand holding a *percuteur* or hammer, and from this flake he wrought a variety of instruments for his every-day use in hunting, skinning, cleaning hides, building canoes, or for domestic purposes. The ancient dweller of the Couze valley, like Moustierian man in other parts of France, of the Channel Islands, and of Great Britain, made a number of racloirs (scrapers), tranchets, blades, knives, saws, and other tools of rough yet intelligent workmanship. History repeats itself: all the implements found reveal two types of men, the one careful and industrious taking an intelligent interest in his work; the other careless perhaps and heedless of the advantage of turning out a well-made tool, satisfied with a comparatively inferior article to meet his undeveloped tastes. There were good, fine, and well-made implements discovered at Combe Capelle, of materials carefully chosen, carefully wrought—which any man of to-day might be proud to be able to produce. Time evidently was no great consideration, and it would appear that much deliberate care must have been expended in fashioning the better-wrought tools. Detailed study of the various types discovered at Combe Capelle by members of the Canadian School in France has yet to be made and it is hoped that the results will illustrate the various epochs in the history of human civilisation for which French

soil provides such fruitful fields of investigation. These periods are best illustrated in the following type localities of France:—

1. The Chellean Period (Chelles: in Seine et Marne).
2. The Acheulean Period (St. Acheul: Somme Valley).
3. The Moustierian Period (Le Moustier in the Vezère Valley).
4. The Aurignacian Period (Aurignac, Southern France, and at Cro-Magnon in Les Eyzies).
5. The Magdalenian Period (La Madeleine of the Vezère Valley).
6. The Azilian Period (Mas d'Azil of Southern France).
7. The Tardenoisian Period (Tardenois-en-Fer).

These are some of the classic French stations marking the advancement and progress of humanity throughout the ages during Quaternary times in the most recent chapter of the history of life on this planet.

In all of these investigations the Canadian School of Prehistory in France is greatly indebted to Monsieur Peyrony of Les Eyzies, Dordogne, France.

THE 44TH STATED MEETING OF THE AMERICAN ORNITHOLOGISTS' UNION

Ottawa, Canada, October 11th to 17th, 1926.

THE AMERICAN Ornithologists' Union accepted the invitation of the Minister of Mines and of the Ottawa Field-Naturalists' Club to hold its 1926 meeting in Canada. The Union has never met beyond the boundaries of the United States before and Canadian Ornithologists found themselves face to face, for the first time, with the responsibility and pleasure of entertaining the leading bird scientists of the Continent.

The Committee of the American Ornithologists' Union in charge of local arrangements consisted of: Dr. R. M. Anderson, Mr. Hoyes Lloyd, Secretary, and Mr. P. A. Taverner, Chairman, and this committee kept in contact with the Ottawa Field-Naturalists' Club Committee, the members of which were Dr. R. E. DeLury, Mr. Norman Leach, Ottawa; Messrs. F. Bradshaw, Regina, Saskatchewan; F. Farley, Camrose, Alberta; J. H. Fleming, Toronto, Ontario; F. Kermode, Victoria, British Columbia; A. B. Klugh, Kingston, Ontario; A. G. Lawrence, Winnipeg, Manitoba; R. O. Merriman, Hamilton, Ontario; J. A. Munro, Okanagan Landing, British Columbia; R. Meredith, Quebec, Quebec; Wm. McIntosh, St. John, New Brunswick; Harry Piers. Halifax, Nova Scotia; Kenneth Racey, Vancouver, British Columbia; W. E. Saunders, London, Ontario; L. L. Snyder, Toronto, Ontario; L. McI. Terrill, St. Lambert, Quebec; R. W. Tufts, Wolfville, Nova Scotia; and C. L. Patch, Ottawa, Ontario, Chariman. This Canadian Committee was appointed by the Club to deal with financial as well as other arrangements for entertaining the guests of the Club.

Canadian members of the American Ornithologists' Union were informed of the arrangements for the meeting early in 1926 and asked to be present at Ottawa for this meeting if they could possibly manage to do so. There was a representative gathering from all parts of Canada—members from all the Provinces except New Brunswick and Prince Edward Island being in attendance.

The visitors arrived in numbers on October 10th and on October 11th the business sessions were held. At the general meeting of the Members and Fellows held on the evening of October 11th, the following Members were elected: May Thacher Cooke, Maunsell S. Crosby, Stanley G. Jewett, Wm. H. Mousley, and J. A. Munro. The officers of the Union elected for the ensuing year are as follows:—President, Alexander Wetmore; Vice-presidents, J. Grinnell and J. H. Fleming; Secretary, T. S. Palmer; Treasurer, W. L. McAtee; Council: A. C. Bent, Ruthven Deane, H. C. Oberholser, W. H. Osgood, T. S. Roberts and E. H. Forbush.

The members of the Union registered at the Victoria Memorial Museum on Tuesday morning and each person registering received an autographed copy of "*The Birds of Western Canada*", which were then distributed for the first time. These books were presented with the compliments of the Minister of Mines. At ten o'clock the Dominion Government, through the Honourable Charles Stewart, Minister of Mines, welcomed the visitors and wished them a successful session, which would serve to advance interest in birds. Mr. C. L. Patch, First Vice-President of the

Ottawa Field-Naturalists' Club, delivered a brief and suitable address of welcome on behalf of the Club, following which the lengthy programme of papers began. Three were fifty-seven items on the programme in all, and on two mornings a separate session was held for the presentation of the more technical papers. These papers occupied three entire days. All our visitors were furnished with a duplicated circular giving places of interest in Ottawa so that short sight-seeing trips could be readily undertaken.

On Tuesday evening the Ottawa Field-Naturalists' Club entertained the visiting Fellows, Members and Associates of the Union at a conversazione which was held in the Museum building. The guests were received by the Honourable Chas. Stewart, Minister of Mines, and Mrs. Stewart, Dr. Chas. Camsell, Deputy Minister of Mines, and Mrs. Camsell, Dr. W. H. Collins, Director of the Museum, and Mrs. Collins, and by Mr. C. L. Patch, 1st Vice-President of the Ottawa Field-Naturalists' Club, and Mrs. Patch. A feature of this entertainment, which appealed to the audience, was the demonstration of the cleaning of eider-down by Mr. Harrison F. Lewis. Motion pictures were shown by the Canadian National Parks. The evening closed with orchestral music and refreshments.

On Wednesday evening the annual dinner was held at the Chateau Laurier. The tickets were in the form of a "Scientific Permit" allowing the bearer to collect one A.O.U. dinner. The menu was arranged as a "supperment" to the Auklet, and a poem from "Out of the Wilderness" entitled "M'sieu", by Wilson MacDonald, was given each guest by courtesy of the Graphic Publishers, publishers of *The Canadian Field-Naturalist*. At each place a miniature of the Great Auk was found and the Chateau management seemed to please all with their part of the arrangements. After dinner the evening was given to entertainment. News boys distributed copies of that great annual publication "THE AUKLET", which was found to be bountifully supplied with local colour. Mr. W. H. Robb of Belleville, Ontario, in a charming short address lauded the work of Major Allan Brooks, and presented Major Brooks with a gold medal. This medal was given by the Canadian National Exhibition of Toronto through the courtesy of the newspaper *The Toronto Globe*, as an appreciation of the exhibit of Major Brooks' work, which Mr. Robb had shown at this year's exhibition.

About this time, a famous explorer who called himself "Dr. Copyright" hammered at the door and demanded to be heard. He claimed to be an author of some considerable importance as well. He delivered an address that contained many surprises and held the audience closely and uproariously. Hot arguments with prominent ornithologists arose because of his suggested nomenclatural changes. The explorer seemed to be rather peppery in temperament and spared not those who questioned the authenticity of his specimens of the veracity of his remarks. Although some of the living specimens, such as a game cock and a Great Black-backed Gull were generally recognized, it is doubtful whether many of the members present identified the geese that were shown. These were two very fine live specimens of the Greater Snow Goose.

On Thursday evening informal receptions were held at the residences of Dr. R. M. Anderson, Mr. Harrison F. Lewis, Mr. Hoyes Lloyd, Mr. P. A. Taverner and Mr. Geo. R. White. These were well attended and seemed to be appreciated, affording as they did an opportunity for members to meet each other.

On Friday morning an excursion was held to Kingsmere. About sixty people attended and for headquarters, the summer residence of Mr. F. H. H. Williamson was kindly placed at our disposal. The trip was made by motor bus, and following our arrival the majority of the members ascended Kings Mountain—the view from the top repaid the effort. Descending again, lunch was served at the cottage. Those who had not ascended the mountain visited the grounds of the Right Honourable W. L. Mackenzie King, Prime Minister of Canada, which were placed at the disposal of our guests through his courtesy. Directly after lunch a party of eight, guided by Mr. B. A. Fauvel, left on foot for Ottawa and it is reported that eighteen kinds of birds were seen by this party. The others walked to Chelsea and were met again by bus for the return trip to Ottawa.

Early Saturday morning, the members taking part in the Blue Sea Lake excursion left Ottawa for the north. In all some thirty-nine persons attended this excursion. Arrangements went smoothly, including the transport of the entire party by boat to an island in Blue Sea Lake where the members were billeted in five cottages. The domestic arrangements were in charge of Mrs. R. M. Anderson, Mrs. W. H. Collins, Mrs. Hoyes Lloyd and Miss Ida Taverner. The Committee is indebted to the following persons for the use of their cottages—Dr. and Mrs. R. M. Anderson, Mr. and Mrs. C. L. Patch, Miss Maud Scott and Mr. and Miss Taverner. The weather for this two-day trip was favourable and our visitors appeared to appreciate this opportunity of seeing the Gatineau River country at this attractive time of the year.

An exhibition of bird art which would not have been possible except for the co-operation of the National Museum, was held in one of the halls of the Museum and attracted much attention. More than four hundred items appeared on the catalogue, and bird artists from the United States, Europe and Canada exhibited examples of their work. In addition to the general exhibit, through the courtesy of the National Gallery of Canada, a hall was furnished the committee for a special exhibition of pictures by Major Allan Brooks. In this hall were shown the Wallace Havelock Robb collection of Brook pictures, and the pictures by Brooks used to illustrated the book "The Birds of Western Canada".

—Reported by Hoyes Lloyd.

PROSECUTIONS

Reported since February 12, 1926

McKENNY, Samuel, Imperoyal, N.S. Shooting Murres. Seizures: Three Murres. Fined: $10.00.

KIRBY, JOSEPH, Halifax, N.S. Shooting Murres. Fined: $10.00.

YOUNG, THOMAS, Halifax, N.S. Shooting Murres. Fined: $10.00.

PERKS, HENRY, Halifax, N.S. Shooting Murres. Fined: $10.00.

INKPEN, MANUEL (Newfoundland), Halifax, Harbour, N.S. Shooting Murres. Fined: $10.00.

KEEPING, ALBERT (Newfoundland), Halifax Harbour, N.S. Shooting Murres. Fined: $10.00. Seizures: Five Murres.

NEARING, FRANK, Glace Bay, N.S. Shooting Hudsonian Curlew. Fined: $10.00.

NICKERSON, JAMES, Shag Harbour, N.S. Having a Herring Gull in possession in close season without lawful excuse. Fined: $10.00. Seizures: One Gull; one double-barrelled shot-gun.

RAYWORTH, F. L., Bayfield, N.B. Buying Canada Geese. Fined: $10.00.

ALLEN, DANA, Cape Tormentine, N.B. Having Canada Geese in possession in close season without lawful excuse. Fined: $25.00.

ALLEN, DANA, Cape Tormentine, N.B. Selling Canada Geese. Fined: $25.00.

ALLEN, C. F., Bayside, N.B. Hunting Canada Geese in closed season. Fined: $20.00.

ALLEN, LLOYD, Bayside, N.B. Hunting Canada Geese in closed season. Fined: $10.00.

ROBICHAUD, ALEX. G., St. Charles, N.B. Having Canada Geese in possession in closed season without lawful excuse. Suspended sentence.

DAIGLE, ALBERT, St. Charles, N.B. Having Canada Geese in possession in closed season without lawful excuse. Suspended sentence.

CANN, ARTHUR, Pembroke, N.S. Killed a Canada Goose in closed season. Fined: $10.00.

LIBBIS, JOSEPH, Ashley Jct., Sydney, N.S. Hunting Wilson's Snipe in closed season. Fined: $10.00.

ARSENAULT, EMANUEL, Richmond, R.R. No. 3, P.E.I. Hunting Canada Geese in closed season. Fined: $10.00.

ARSENAULT, ARCHIBALD, Richmond, R.R. No. 3, P.E.I. Hunting Canada Geese in closed season. Fined: $10.00.

ARSENAULT, ALEIR, Richmond, R.R. No. 3, P.E.I. Hunting Canada Geese in closed season. Fined: $10.00.

GALLANT, MATTHEW C., Richmond, R.R. No. 3, P.E.I. Hunting Canada Geese in closed season. Fined: $10.00.

CRITCH, JOHN, Forteau, Que. Hunting wild ducks in closed season. Suspended sentence.

BUCKLE, HENRY, Forteau, Que. Hunting wild ducks in closed season. Suspended sentence.

HENCOCK, JOSEPH, Forteau, Que. Hunting wild ducks in closed season. Suspended sentence. Seizure: One 12-gauge shot-gun.

FLYNN, WILLIS, Forteau, Que. Hunting wild ducks in closed season. Suspended sentence. Seizure: One 12-gauge shot-gun.

GALLUCHON, ALBERT, Old Post Tabatiere, Que. Having a Murre in possession. Fined: $10.00 Seizure: 1 Murre.

JUVENILE, Harrington Harbour, Saguenay Co., Que. Hunting wild ducks in closed season. Suspended sentence. Seizure: One double-barrelled shot-gun.

JUVENILE, Harrington Harbour, Saguenay Co., Que. Hunting wild ducks in closed season. Suspended sentence.

BOBETT, NORMAN, Harrington Harbour, Saguenay Co., Que. Hunting wild ducks in closed season. Suspended sentence. Seizure: One double-barrelled shot-gun.

CHISLET, GEO., Harrington Harbour, Saguenay Co., Que. Hunting wild ducks in closed season. Suspended sentence. Seizure: One double-barrelled muzzle loading shot-gun.

SLYWKA, WILLIAM, Lipton, Sask. Killing and having in possession a wild duck in the closed season. Fined: $10.00.

ROCHIER, LOUIE, Island in Primrose Lake, Sask. In possession of thirty-six eggs of migratory non-game birds. Fined: $10.00.

BRADEN, JOHN, Hubbard, Sask. Having wild ducks in possession in closed season without lawful excuse. Fined: $10.00.

NOTES AND OBSERVATIONS

THE HUNGARIAN PARTRIDGE DEFENDED.—In looking through the October *Canadian Field-Naturalist*, I was surprised and not a little amused—to read Mr. L. B. Potter's "An Indictment of the Hungarian Partridge". I quite fail to understand how the idea that the Partridge is driving out the native Grouse originated.

True, Saskatchewan enjoys no monopoly of the idea, for I have been asked a dozen times during the past year, by local shooters, if the Hungarian Partridge is killing out the Prairie Chicken. To these enquiries I have always given a most emphatic "No".

In this part of Alberta, the Grey Partridge first made its appearance in 1919-20. Since that time it has multiplied and spread wonderfully fast, and this season I have killed twenty-two brace on my own half-section farm.

I have watched the little brown birds closely and have yet to observe the least sign of interference with the Sharp-tailed Grouse.

During the early Spring the males are very pugnacious and fighting goes on from daylight until dark, but the quarrelling is all among themselves.

When the birds are paired they apparently at once choose a suitable nesting site and are always to be found in about the same place. I have twice found nests of Partridge and Sharp-tails within a few feet of each other, and several times have found Mallard's and Pintail's nests quite near a Partridge's nest, but in no instance could I see any sign of interference or animosity on the part of the respective owners.

Neither have I been able to find a person who has actually seen Partidges interfere with Prairie Chicken or Ducks. They all seem to have obtained the idea from some other fellow.

The idea that the Pinnated Grouse is also a dangerous enemy of the Sharp-tail is even more ridiculous.

In this district Pinnated Grouse are fairly plentiful and their nests are always placed on the rough grass land bordering a lake or large slough.

On the other hand, the Sharp-tail prefers the edge of a bluff or a large clump of briers to nest in.

Late in the Fall, the Pinnated Grouse leaves the open prairie and comes into the shelter of the Poplar and Willow bluffs. Here it comes into contact with the Sharp-tail, but still the two species keep apart most of the time and one does not often flush a mixed flock of Grouse. I believe that one reason for the decrease in number of the Sharp-tail is that is in only too easily shot, especially by hunters travelling in cars. It does not "squat" as does the Grey Partridge and consequently is always easily seen. On the other hand, the Partridge keeps out of sight and is very fast when flushed and I rather incline to the belief that it is this "knack" of taking care of itself which makes it rather unpopular with a certain class of hunters—the kind that likes to get ducks bunched up in a small water-hole—although all real sportsmen will join with me in wishing prosperity and a large increase in numbers to the best little sporting bird in the world—the European Grey Partridge.—T. E. RANDALL.

SNOWY OWL AT GODERICH, ONTARIO.—On the morning of November 8th, 1926, I walked out to a small bare point on the shore of Lake Huron, a few miles north of Goderich, and as I was walking out to the end of the point I was very much surprised to see a Snowy Owl staring at me from the clump of driftwood on which it was perched. On nearer approach I counted six more, perched on driftwood, stumps and rocks. In colour they varied from one beautiful white bird to one very heavily barred and appearing comparatively dull alongside of one or two of the others. They were very stupid, permitting approach to within easy gunshot range, and rising heavily into the air to fly to another perch, sixty or a hundred yards away, on too near approach. Three were especially restless, among them the whitest, and after a short time rose into the air, circled round and flew straight out over the lake. The weather was very clear and the lake becalmed by an offshore wind. and I could see them flying straight out until they faded from view. I then sat down to watch the rest. One soon followed after the other three over the lake, while the two that remained soon regained their

appearance of stupor, one perched on a stump the other on a rock a short distance from the shore at the end of the point. On being again disturbed, the first one joined his fellow on the point. Before long the whitest owl of the lot appeared, dogged by a single Bonaparte Gull. After lighting for a moment on the point he again took wing, and this time the whole rabble of Bonaparte Gulls, about forty in all, took after him, much like a flock of Crows after a Great-horned Owl, and he circled back to the point, where I left the three of them. Several other reports of the occurrence of Snowy Owls in this vicinity have come to my notice, one bird being shot on a lumber pile in Goderich, and a second being seen at night on a residential street. Another was shot by a farmer in the act of tearing a Pheasant which it had killed.—DOUGLAS CLARKE.

ARCTIC THREE-TOED WOODPECKER AT GUELPH.—On November 20th, 1926, within the city limits of Guelph, Ontario, my attention was directed by a loudly repeated bird-call which I immediately recognized as that of some species of woodpecker I had never before heard. The bird approached in rapid, but deeply undulating flight, uttering its loud cry at each undulation, and alighted in typical woodpecker fashion on the bark of one of the larger branches of a White Elm (*ulmus americana*) from 15 to 20 feet from the ground and not more than 20 yards from me. It clung there, head up, for about five minutes without moving its body; nor did it tap on the bark in search of insects. Once or twice it turned its head to one side to look behind, but seemed to be resting. I made a careful examination with the aid of 8x prismatic binoculars, and its size, about that of a Hairy Woodpecker (*dryobates villosus*), shining black upper parts and white under parts, proclaimed it a female Arctic Three-toed Woodpecker (*picoides arcticus*). There was a north-westerly wind blowing, the temperatur being slightly below freezing, and about an inch of snow lay on the ground. The bird had chosen as its resting place the south-easterly side of the tree and bough.

Mr. R. E. Barber of Guelph, an ornithologist who has been observing in this locality for many years, tells me he saw a female of the same species about the end of October, 1926, and that she remained almost motionless on the sunny side of the bark of a tree, but he did not note the direction of the wind. He had never seen the species before in this locality.—HENRY HOWITT.

THE EUROPEAN STARLING AT KAMOURASKAE, QUEBEC.—I encountered the European Starling (*Sturnus vulgaris*) here for the first time at the beginning of May, 1925, when I saw two individuals. On April 27th, 1926, I observed six individuals of this species here, and collected two of them. On May 2nd, 1926, I observed another one, and early in June I noted eleven, which were the last ones seen this year. I do not think that the European Starling nested in this vicinty in the summer of 1926.—WILLIE LA BRIE.

SOME RECENT GOOSE RECORDS AT CAP TOURMENTE, QUEBEC.—*Chen cærulesdens*. BLUE GOOSE—The Cap Tourmente Fish and Game Club has property some thirty miles down the St. Lawrence River below Quebec, which is the resort of many thousand Greater Snow Geese *Chen hyperboreus nivalis*, both spring and fall. In *The Auk*, XXXVIII, 1921, p. 270, Mr. H. F. Lewis records the capture of an adult Blue Goose there, October 10, 1917, by Mr. Charles Fremont, and of a juvenile, October 16, 1920, by Mr. H. des Rivières. On May 13, 1926, I saw six adult Blue Geese there with the Greater Snow Geese, and one adult of the Blue Goose was captured in taking some live decoys about this date. I was shooting at the club with H. des Rivières in October, 1926, and a number of Blue Geese came to our bag as follows: October 15, 2; October 16, 1; October 17, 2, all being juveniles. On the 17th my notes show that five old birds and one young one were seen. In all there were seen about six old birds and six young ones that we did not shoot. C. Taschereau shot two juvenile Blue Geese at the club about October 10, 1926. Prior to the new records here given, there seem to be only two records for the southern part of the Province of Quebec, namely those reported by Lewis, and it is just possible that we are witnessing the establishment of a new flight line for the species. The five juvenile specimens taken this fall were all preserved and distributed to the following collections, one to each: Canadian National Museum, Allan Brooks, Hoyes Lloyd, J. A. Munro, G. R. White.

Branta leucopsis. BARNACLE GOOSE.—On October 26, 1925, I shot a bird of this species at the same place. It was a female and is now mounted and in my collection. Bent gives nine North American records for this species, and Batchelder reports another in *Auk*, XLIII, 1926, p. 88.

Anser albifrons, subsp. (?) WHITE-FRONTED GOOSE.—In the first week of November, 1925, a juvenile White-fronted Goose was shot at the Cap Tourmente Club by H. des Rivières. The specimen was preserved and is now mounted and in his collection. No doubt, in view of the geographical location, this example will prove referable to sub-species *labifrons*, but it has not been examined closely in this connection.

—E. G. WHITE.

BOOK REVIEW

THE RELATION OF BIRDS TO WOODLOTS IN NEW YORK STATE, *W. L. McAtee, Roosevelt Wild Life Forest Experiment Station, Syracuse, Vol. 4, No. 1, $1.*

By special arrangement with Dr. E. W. Nelson, Bureau of Biological Survey, and the Secretary of the United States Department of Agriculture, this Bulletin was prepared for the Roosevelt Station. The woodlots and birds of much of eastern Canada are comparable to those of New York State, and consequently this paper is of special interest to Canadian foresters, entomologists and ornithologists as well as to others who are concerned in the management of that important asset, the woodlot. The work gives the latest facts respecting the food habits and economic status of the birds which commonly frequent the woodlot. A section is devoted to "Some forest insect pests and their bird enemies". Work of the following Canadian entomologists is cited or quoted: A. B. Baird, Alan G. Dustan, T. D. Jarvis and John D. Tothill. Under Station notes it is said that although the wild life resources of the United States are estimated to be worth about a billion dollars, the Roosevelt Station is the only Station devoted solely to forest wild life investigations.—H. L.

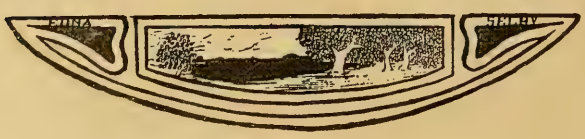
DELINEATIONS OF AMERICAN SCENERY AND CHARACTER, *by John James Audubon: G. A. Baker & Co., New York, 1926. $4.50.*

The publishers have done a good service in reprinting the "Episodes" of Audubon in one volume, for if one reads the original he must search these out in five. The idea is not new, the "Episodes" having been reprinted before under the title "Audubon and His Journals", by his granddaughter, Miss. M. R. Audubon (1897).

The book contains a brief bibliography of Audubon's works, and an introduction by Francis H. Herrick. He remarks that nothing has been known of Audubon's birth, parentage, or early life until recent years, when the veil of mystery was suddenly lifted by the discovery of letters and documents of his father, Lieutenant Jean Audubon, at Coueron in France. Fougére Jean Rabin was born at Les Cayes, Santo Domingo (now Hayti) on April 26, 1785, the son of Lieutenant Jean Audubon and a French Creole named Rabin. He was adopted at Nantes in 1794 and baptised Jean Jacques Fougére at Nantes in his sixteenth year.

Audubon's preface of December 1st, 1834, is given, and then follow, as fresh as ever, the numerous incidents that picture life in America about a hundred years ago. The changes in transport, in general conditions of life of the people, and the altered state of the wild things of our continent must become instantly apparent to anyone reading these pages. The sketches are all fascinating, and some nine of the fifty-eight relate to British North America. Ruthven Deane has the manuscript for one of the latter, which is called "Labrador". There are several items dealing with the same area; one describes a journey in New Brunswick; one, a ball in Newfoundland; and Ontario is mentioned as Upper Canada, where Audubon had his money stolen and he relates his ensuing experiences, including a walk from Meadville to "Pittsburg".

Now that the "Episodes" are so readily available no naturalist should miss reading them.



ALPHABETIC INDEX TO VOLUME XL

Affiliated Societies

NATURAL HISTORY SOCIETY OF MANITOBA
1925-26

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The meetings of this Society are held in Red Deer on the last Friday of each month except during July and August and perhaps September. The annual meeting is held in Red Deer on the last Friday in November.

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