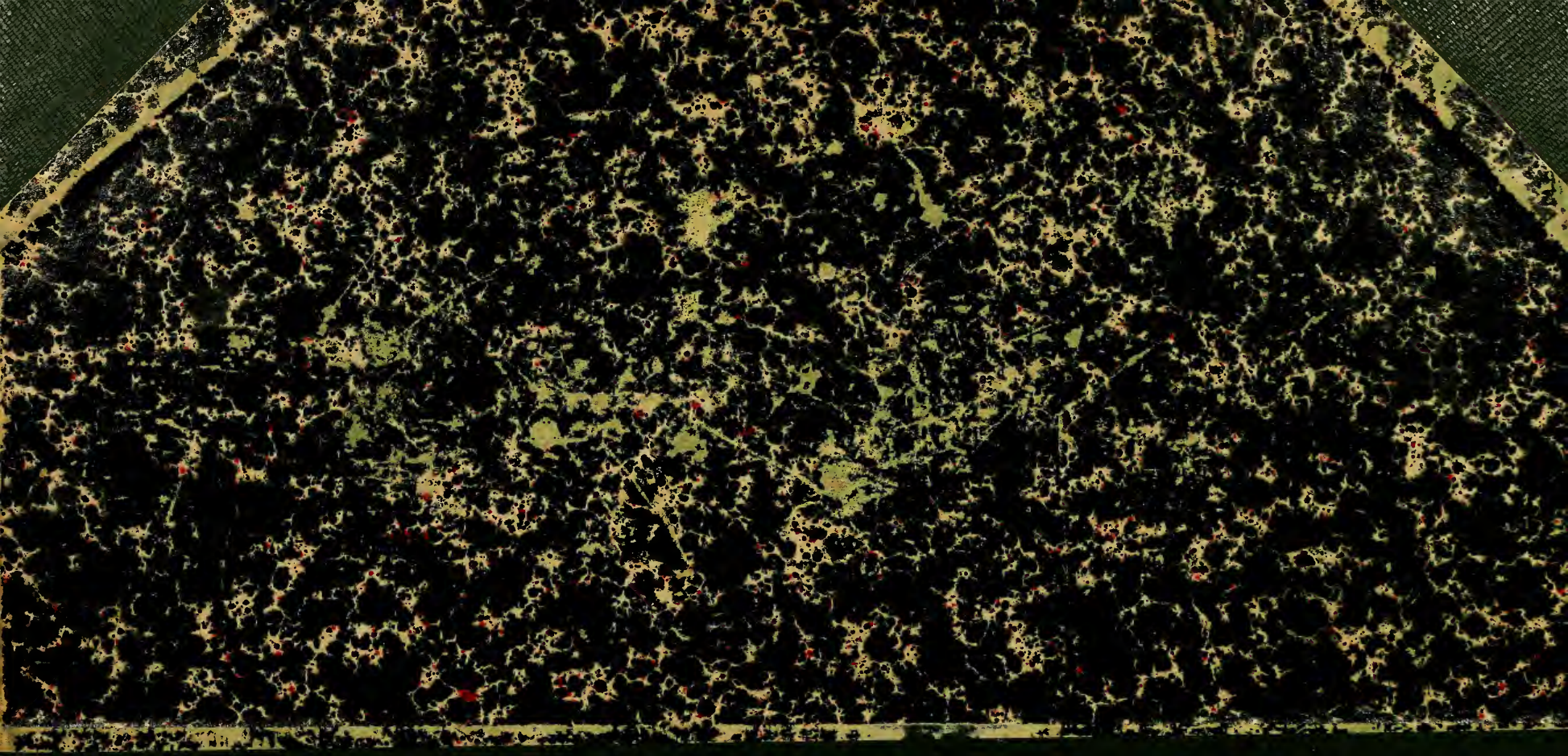

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CONTENTS

	PAGE
The Genus Amesia in North America. By Henry Mousley	1
Fall Bird Notes from the Eastern Shore of Lake Superior. By Wm. G. Fargo and Josselyn Van Tyne, Ann Arbor, Mich	7
Christmas Bird Census Returns, 1926	9
Report of Council, 1926, Ottawa Field-Naturalists' Club	15
Report of Annual Meeting	16
Statement of the Financial Standing of the Ottawa Field-Naturalsits' Club at the close of the Year 1925-26	17
Statement Reserve Fund Committee	17
Notes and Observations:	
"Freak" Ivory Gull (*Pagophlia alba*). By B. W. Cartwright	17
Bird Banding in 1798. By R. W. Tufts	17
A Correction	18
Book Reviews:	
New Physical Geography. By E.M.K	18
Frere Marie-Victorin. By M.O.M	18
Frere Marie-Victorin. By M.O.M	19
Frere Marie-Victorin. By M.O.M	20
Report of the Game Commissioner for the Province of Saskatchewan. By N.C	20
The Romance of Fossil Hunting. By E. M.K	21

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. XLI OTTAWA, ONTARIO, JANUARY, 1927 No. 1

THE Genus Amesia IN NORTH AMERICA

By HENRY MOUSLEY

POSSIBLY, a few words of explanation are necessary regarding my use of the generic name *Amesia* for this group of orchids, in place of that of *Serapias* of Gray's "New Manual of Botany," 7th edition. In Europe the more generally accepted name for the genus has been *Epipactis*, but since A. A. Eaton pointed out in the Proceedings of the Biological Society of Washington, XXI, 63 (1908), that *Epipactis* (Haller) Boehmer was published earlier than *Epipactis* Adanson, and should be used to replace *Goodyera* R. Brown; A. Nelson and J. F. Macbride in the Bot. Gaz. lvi, 472 (1913), proposed the name *Amesia* to replace *Epipactis* Adanson, which suggestion has been adopted by Prof. Oakes Ames in his latest book, "An Enumeration of the Orchids of the United States and Canada", 1924. Practically everyone admits, I think, that *Epipactis* must be used for *Goodyera*, and *Serapias* for a genus distinct from *Helleborine*, but there are eminent botanists who are by no means agreed that the new generic name *Amesia* is necessary, maintaining that *Helleborine* Hill—which Druce pointed out was the one available, and which he adopted when revising "Hayward's Botanist's Pocket Book," 17th ed., 1922—should be adopted in place of *Epipactis*, which would seem to meet the case admirably, especially, as the group in question is largely European, and has been universally known there under the generic names *Serapias*, *Epipactis* or *Helleborine*.

Nelson and Macbride, however, maintain that *Helleborine* Hill, has no status, because it had no binomial species. Nevertheless, it may be questionable whether in the International Rules any justification exists for throwing out Hill's, or any similarly published generic names, the generic characters having been definitely stated. The solution of the whole difficulty seems to rest entirely with the followers of the International Rules, to come to some agreement as to the exact method of determining the application of the generic names of the Linnæan period, seeing that different generic elements were included. Until this is done, and for the sake of uniformity, I am following the works that have been, or are about to be published—one in China apparently—the Authors of which have adopted *Amesia* as the new generic name for this group of orchids, which order of things, nevertheless, is liable to be overthrown at any moment, according to the vagaries of the game. It would seem to me, that much of the present trouble in nomenclatural matters, not only in Botany, but in all the other Natural Sciences, could have been avoided, if, in the first instance, it had been agreed that generic, or specific names, which had been in use for say, twenty-five years, or perhaps longer, and had become generally known and adopted, should have been allowed to stand, notwithstanding the fact that at any future time they may have been found to have been ante-dated.

However, reverting to the already mentioned work of Prof. Oakes Ames, I find the genus *Amesia* is represented in North America by two species only, *Amesia gigantea* Douglas (=*Epipactis gigantea* Douglas ex Hooker), and *Amesia latifolia* Hudson (=*Serapias Helleborine* L., = *Epipactis latifolia* All.), the former being a western species with which I am not acquainted, the latter, an eastern one, whose range, however, is limited to a few localities in the States of New York, and Pennsylvania in the United States, and the Provinces of Quebec and Ontario, in Canada. It is at Montreal, in the first named Province, that I have been studying the *latifolian* group of the genus, with the result that for the present, it is proposed to add one new species to our North American list, as well as three forms of *A. latifolia*, one of which, so far as I am aware, has not hitherto been described.

In order to thoroughly realize the difficulties and problems involved in the study of this critical and at the same time, most unfortunate group, every member of which is snowed under with synonyms, one should consult the various papers on the subject in the "Journal of Botany", by Colonel M. J. Godfery, and the Drs. T. and T. A. Stephenson, who during the past few years have made this group their especial study in Great Britain, with the result, that according to the latest (1925) book on British Orchids, by Mr. C. B. Tahourdin, five good species—with vars. *dunensis* and *vectensis* of *leptochila*—appear to be

recognized, viz.: *Epipactis palustris* Crantz, *E. leptochila* Godfery, *E. purpurata* Sm., *E. latifolia* All., and *E. rubiginosa* Crantz. After the perusal of the above papers, it seemed possible, that in addition to *E. latifolia*—which we already have—any of the four remaining species might be found in North America, with the exception of the first named, which is very distinctive, and cannot be mixed up with *E. latifolia* at all, and if occurring here, would have been detected long ago. As regards *E. leptochila* Godf., it is to be hoped that the creation of this new species will now do away with all the uncertainty and confusion hitherto surrounding the Continental *E. viridiflora* Reichb., which Col. Godfery, "Journal of Botany", Vol. LXIV, 1926, pp. 65-68, now clearly shows, is merely a variety of *E. latifolia*, and like it, is cross-pollinated by insects, whereas, *E. leptochila*, together with *E. dunensis*—one of the vars. of *leptochila* recently raised to the rank of a species by Col. Godfery, see above paper—are self-fertilized, the organs of reproduction being entirely different to those of *viridiflora*.

So far as my investigations have gone, neither *leptochila* nor *dunensis* occur here, and possibly not at all in North America, all the plants I have examined—and that is some thousands—having the large round prominent rostellum, with the stigma well pushed forward, making self-fertilization almost impossible, whereas, in *leptochila* and *dunensis*, the rostellum is rudimentary, with the stigma lying behind the pollen-masses, allowing them to slide down bodily from the anther cells over the sloping upper edge of the stigma, and fertilize it, see Plate No. 576 of the aforementioned paper.

Concerning the third species, *E. purpurata*, it seems doubtful at present, whether we have it or not, at all events, at Montreal, although at first, I was under the impression that some of my plants might belong here, from the fact of their having in some cases fifteen or more flowering stems to a root—a characteristic of *purpurata*—although the leaves were larger than they should have been for typical *purpurata*, which are smaller and narrower than those of *latifolia*. However, from photographs since kindly sent me by Col. Godfery, showing the very characteristic root-system of *purpurata*, a knotted rhizome, and the absence of a violet tint on the upper sides of the leaves of my plants—another characteristic of *purpurata*—and from the fact that I have since learnt of *latifolia* sometimes having many flowering stems to a root, I have come to the conclusion that my plants merely represent a form of *latifolia*, which is given to growing in clumps in a particular area—as I do not find it to be of general occurrence—where soil conditions may have something to do with the matter, a subject which I hope to further investigate another year.

Of the two remaining species of this group, the first named, *Epipactis latifolia* All. (=*Serapias Helleborine* L.), is the one, and only species, that has so far been recognized as occurring in North America, whilst the second, *Epipactis rubiginosa* Crantz (=*E. atropurpurea* Raf., =*E. ovalis* Bab., =*E. atrorubens* Sch.), is the one, that it is proposed to add to our list of native orchids, and to discuss now, leaving *latifolia* until the last.

Amesia rubiginosa (Crantz) Mousley, comb. nov.

AMESIA (EPIPACTIS) RUBIGINOSA CRANTZ.
Mt. Royal, Montreal, Que.
July 18th, 1925.

Epipactis rubiginosa Crantz., Stirp. Austr. VI, 467, (1769).

The addition of this species to the North American list, rests upon the three plants seen in

Plate No. 1, all of which I found growing on limestone on Mt. Royal, Montreal, on July 18, 1925, and which seemed to answer the descriptions given of the species in England and on the Continent of Europe. In order, however, to make doubly sure, I submitted them in the following October to the Drs. Stephenson and Col. Godfery—who as previously mentioned, have made this group their especial study for several years past—all of whom confirmed my determination.

The chief characteristics of the species consist mainly in its small size, distichous leaves, closely clasping the stem, the dark purple suffusion at the base of the latter, as well as on the back of the small lower leaves, the smallness of the bract leaves and flowers, coupled with the deep red colour of the latter, suffused with brown and greenish at their tips, upper part of stem, pedicels, and ovaries, densely glandular, early date of flowering, and last, but by no means least, in my opinion, the nature and development of the root system, a horizontal rhizome, with more wiry roots than those of *latifolia*.

Irmisch, in Plate No. 4, of his "Beiträge zur Biologie und Morphologie der Orchideen", Leipzig, 1853, figures the root-system beautifully, whilst Correvon in his "Album des Orchidées d'Europe", 2nd Ed. 1923, has an excellent coloured plate of the plant, describing the roots as in fascicles, about a horizontal or drooping rootstock, which entirely agrees with my examples, all of which happen to have the horizontal root-system as depicted by Irmisch. The average height of these three specimens is 34.5 cm., the average length of the racemes 11 cm., the number of flowers 15, and leaves—including rudimentary ones —11, the latter distichous as seen in the plate, and clasping the stem, the lower ones being very small and deeply suffused with purple, as was the base of the stem, the upper part of which, together with the pedicels and ovaries, being densely glandular. The bract leaves were light green, and very small, this latter remark applying also to the flowers, which were deep red in colour, with a suffusion of pale brownish green at their tips, epichiles broad, with rugose lip-bosses, whilst at the date of discovery, July 18, they were the only ones out, *latifolia* not blooming until about a week later. As compared with *A. latifolia*, this species is very scarce, and this seems to be the case in England, where it is classed as a rarity, being found very locally in a few limestone districts only, where it flowers about mid-July, the height being given as from 6-18 inches, with a possibility of its attaining 2 feet. My tallest example is 17 inches, or 43 cm., but this is exceptional, I think, as the few others I found, were much smaller. On the Continent of Europe, the height given by Correvon is from 20-30 cm.

Irmisch, speaking of the underground development says, "The primordial axis is sometimes long, sometimes short, sometimes slender, sometimes thick, sometimes rather curved, sometimes less so. From it, and particularly from its anterior end, one to three adventitious roots break forth, which, like the axis itself, soon become covered with papillæ. The first scale is very diminutive but a dorsal and ventral side may nevertheless be distinguished. The next scales, which are similar in shape to the first one, are separated from each other by short internodes, and have small buds in their axis. The bud producing internodes form an addition to the primordial ground-axis, and develop roots. This is repeated for several, often a great many years, until finally the plant comes into bloom. At least in nature, it takes normally quite a number of years to reach that stage. The primordial axis was still found on plants which already had produced the third stem. The number of the green leaves of the third year's stem was often three or four; the stems being almost as long as a finger. I have so far not observed the primordial axis of plants in bloom."

For easy reference, we may briefly sum up the foregoing as follows, viz.:

Amesia rubiginosa (Crantz) Mousley, comb. nov.—Plant short, horizontal rhizome, funnel shaped sheaths, distichous leaves, short bracts pubescent ovaries, small flowers dark red.—Quebec: Montreal, July 18, 1925, Mousley (two specimens in National Herbarium, Ottawa, No. 116,714) also Montreal, July 18, 1925, one specimen in Herbarium of Bro. Victorin, No. 22,019.

Owing to the apparent scarcity of *rubiginosa*, too much intensive work seemed inadvisable this year, so I devoted my energies —where no harm could be done—to the last of the group, *Amesia latifolia* (All.) Nels. and McBride (=*Epipactis latifolia* All.=*Serapias Helleborine* L.) the Broad-leaved Epipactis or Helleborine or, as I have once seen it called, Bastard Helleborine—of which no intensive work has so far been accomplished, or at all events published in North America, that I am aware of, although in, "The Orchid Review" for Jan., 1925, there appeared a short note recording my experience with it in the fall of 1924.

It is probably the best known, as well as the most plentiful member of the group, the root-system, as can be seen in Figure No. 1, Plate No. 2, consisting of a number of tuberous roots, all proceeding from the base of the flowering stem, and at the same level. I have chosen this parti-

Figure No. 1—ROOT OF AMESIA (EPIPACTIS) LATIFOLIA. *Oct. 5, 1925.*
„ „ 3—FLOWER OF ABOVE (Very Late Date.) *Oct. 5, 1925.*
„ „ 2—LIPS OF AMESIA LATIFOLIA *July 30, 1925.*

cular plant for three reasons. Firstly, because the flowers, as can be seen in Figure No. 3, were just coming into bloom at the abnormally late date of October 5, 1925, whereas all the others were over by the third week in August, with the exception of a few on September the third, and ninth, which had a few blooms left on the tops of the racemes only. Secondly, because it is fairly typical of the general arrnagement of the long tuberous roots, and Thirdly, because in addition to the two new roots or incipient tubers one usually finds at the base of the new bud, at, or about flowering time, we here have four, i.e., to the bud on the left-hand side of the flowering stem. The central root, it will be seen, is much thicker, and longer than the other three, two of which are on either side of it, whilst the tip of the third is just visible at the back of and above the bud. This is the first instance of its kind, not only in this species, but also in *Spiranthes Romanzoffiana* and *S. cernua* that I have found a plant with four new roots developed at flowering time, although, as pointed out in my paper "Further Notes on the Underground Development of *S. Romanzoffiana* and *S. cernua*", in "The Orchid Review", vol. XXXII, 1924, pp. 296-300 and plate, these two species, especially when on dry ground—which *latifolia* favours—have been found in the spring to have developed a second, and in one extreme case, a third pair of roots, presumably as extra reservoirs to draw upon in case of drought. While the present example may be taken as fairly typical of the disposition of the long roots, there are of course many deviations, nor does one generally find two new buds at the base of each flowering stem, one being perhaps, the more general rule. In some cases, these buds are not at the same level, as in the present instance, but an inch or two above one another, and sometimes on the same side of the stem. The long tuberous roots in some cases reach a length of fifteen or sixteen inches, but this is unusual, the only two instances I know of being a plant found by myself on July 30, 1925, one root of which was fifteen inches long, and the other a plant found by the Drs. Stephenson at Chamonix, in France, on August 1, 1914, the longest root of which was sixteen inches in length, or one inch longer than mine. Both of these plants were growing in very loose soil, fine gravel in my case. In rare instances, one finds the roots arranged in two whorls, as it were, one above the other, separated by internodes, similar to Figure No. 6 in my paper, "*Spiranthes Romanzoffiana*", in "The Orchid Review", Vol. XXXII, 1924, p. 77.

In another exceptional case, a plant found on August 7, 1925, had not only six stems in flower, but a new one also developed, which, at that date, of course, was not above the ground, being only 2½ inches in height, but with four rudimentary leaves in eivdence. Another interesting case is that of two flowering stems half an inch apart, but connected to one another by short horizontal internodes, which have developed new buds at different levels, the one on the left-hand

stem being two inches above that of the right-hand one, this latter bud, being at the normal level of the connecting internodes.

Besides, being the best known, *latifolia* is probably the tallest member of the group, the heights given in Gray's Manual, 25-60 cm., being far below the mark, my tallest example measuring 108.35 cm.—probably the tallest recorded so far—whilst the average of some two hundred flowering plants—taken at random—comes out as 51 cm., with an average raceme of 12.5 cm., the average number of flowers on a raceme being 26, and the number of leaves on a plant 9, exclusive of rudimentary ones.

Plants of over 100 cm. in height are rare, three, including the one above, are all that have come under my notice in the thousands I have examined. My record length for a raceme is 43.5 cm. with 53 capsules, which is exceptional, in fact, racemes of over 30 cm. are scarce, only five having been found, including the two above. The record number of leaves on a plant—including rudimentary ones—is 22, and the number of flowers or capsules on a raceme 92, and this, on a raceme of 14 cm. in length only!

On August the third, and again on the twenty-ninth, I came across two exceptional stations for the species, in the first of which eighteen of the finest plants averaged 81 cm. in height, and twelve in the second 82 cm. The average length of the racemes in the first case came out as 23 cm., and in the other as 28 cm., the number of flowers or capsules, averaging 40 and 59 respectively, whilst the number of leaves—exclusive of rudimentary ones—was 12 and 11. These latter vary greatly, not only in size, but shape also, and all kinds of combinations can be found.

I have a plant in which the lowest leaf is a small orbicular one 3.5 cm. in diameter, followed suddenly by two large ovate ones, averaging 10 cm. × 6 cm., these followed again by three large ovate-lanceolate ones 14 cm. × 6 cm., the remaining five leaves being lanceolate, ranging from 11 cm. × 2.5 cm. to 6 cm. × 0.5 cm. In another plant, the first leaf is orbicular 4.5 cm. in diameter, followed by two much larger, almost orbicular ones, averaging 8.5 cm. × 7.5 cm. The two next are broadly ovate, averaging 11 cm. × 7 cm., the remainder lanceolate, ranging from 11 cm. × 4.5 cm. to 6 cm. × 0.75 cm. In another case, the lower leaves are ovate, about 7 cm. × 5 cm., followed again by two lanceolate ones 9.5 cm. × 4 cm., these again followed very suddenly by nine narrow lanceolate ones, ranging from 8 cm. × 1.25 cm. to 5 cm. × 0.3 cm., these latter being bunched together on a portion of the stem measuring 5 cm. in length only, thus giving the plant a very distinctive look.

In another instance the lower leaves are almost orbicular, averaging about 6 cm. × 5 cm., followed by an ovate one 7 cm. × 4 cm., this again followed by a lanceolate leaf 7 cm. × 1.5 cm., and this in turn, curiously enough, by a much larger one—i.e in width—7 cm. × 2.5 cm., this kind of thing being unusual. The remaining five leaves are lanceolate, ranging from 6 cm. × 1 cm. to 3 cm. × 0.5 cm.

Another plant has a very evenly graded appearance, the first two leaves being ovate, and averaging 9 cm. × 4 cm., the remaining six being lanceolate, and ranging from 12.5 cm. × 4.25 cm. to 6 cm. × 0.5 cm.

The arrangement of the leaves on the record plant already mentioned, 108.35 cm., is as follows, viz.: the first four leaves ovate, ranging from 5 cm. × 4 cm. to 11 cm. × 6 cm., the remaining ones, six in number, being lanceolate, and ranging from 12 cm. × 6 cm. to 9 cm. × 1.5 cm. The three bottom bract leaves on this example are very large, ranging from 7 cm. × 1.5 cm. to 5 cm. × 1 cm.

As will be gathered from the foregoing examples, the variation in the leaves is extraordinary, in some cases tapering very evenly, in others the change being very abrupt, and very long ones may be found on plants with comparatively short stems. In some instances the leaves are opposite one another, instead of being alternate on the stem, as is usual. These leaves may be of equal size and shape, or very dissimilar, as in the following case, where one leaf measures 12 cm. × 4 cm. its opposite being 13 cm. × 3 cm. An even more extreme case occurs where two leaves on the same plant, averaging 9 cm. × 6 cm., have opposites only averaging 8 cm. × 1.25 cm.

The texture of the leaves is variable, in some cases being tough and strongly ribbed, in others much finer. The largest example I have measures 14 cm. × 6.75 c.m

The upper bract leaves I have always found to be very small, but the variation in the lowest ones is sometimes very great indeed, actually in a few cases exceeding that of the topmost leaf. In one instance the latter measures 6 cm. × 2.4 cm., whilst the bottom bract leaf is 8 cm. × 2.4 cm. The greatest length of the latter so far noticed is 9 cm., and the broadest 2.5 cm.

There is a curious aberration in the bract leaves which is of somewhat frequent occurrence. This consists in a fusion of two or more leaves, as can be seen in Figure No. 1, Plate No. 3,* caused

*See illustration in Feb. issue.

apparently by a shortening and thickening of the stem. In order to show this fusion to better advantage, I have removed nearly all the capsules. Taking the large central leaf on the right-hand side of the stem, it will be seen there were four capsules, the three upper ones of which have been removed—as indicated by the remaining pedicel bases—leaving the bottom one only. To this leaf there are four tips, corresponding to the four capsules, thus denoting the fusion of four small bract leaves into one large one. Above the thickened portion the stem takes a turn to the right, and again becomes normal to the tip, which is not seen in the picture. In the present instance, it might reasonably be assumed that some injury to the plant had caused the thickening of the stem and fusion of the leaves. However, I have a fine raceme 34.75 cm. in length, which is perfectly straight and regular throughout its entire length, yet, at intervals, three blooms occur with only two corresponding bract leaves, but in each case one of these bract leaves, which is wider than the other, has two tips, denoting that here again two leaves have become fused, and I have seen other examples precisely similar.

In Figure No. 5,* we again see a thickening of the stem, followed by a forking of the same to the left, the main branch again dividing higher up into four tips. This is the only instance of its kind that I have so far come across in the thousands of plants examined.

The flowers like everything else connected with this group of orchids vary considerably, being as a rule of a somewhat dingy and inconspicuous appearance, owing to the general dull character of the various green, violet and red-purple colours, that go to their general make-up, the only exception being when the flowers are white, which is by no means of common occurrence, this form being confined to a very limited area. It would be natural to suppose that plants growing in deep shade would be the lightest coloured, but this is not always so, for most, if not all, the white coloured ones, were found growing right out in the open, whilst some of the deepest tinted forms have been found under the shade of trees or hedge bottoms. As a general rule, the plants prefer shady situations, those I have found growing out in the open, never being more than fifteen feet or so from the border of a hedge, or the outskirts of a wood, and the drier and more stony the nature of the ground, the more likely one is to find them.

As regards their distribution, I thought at first that they were to be found only on Mt. Royal, but I have since discovered them at Cartierville some ten miles or more to the north of the mountain, and beyond Monkland on the west. On the mountain itself they are most abundant at the foot of the northern and western slopes, fairly plentiful on the east, but comparatively scarce on the southern slope as compared with the others. Bro. Marie-Victorin tells me that he has found them growing on Mt. St. Bruno, fifteen miles to the south of Montreal, on the other side of the St. Lawrence river, and that a friend of his, Mr. L. Fortier, also records them from St. Francois de Sales, Laval Co., and Mascouche, Terrebonne Co., ten and fifteen miles respectively to the north of Montreal. Mr. Geo. Ames also reports having found two plants near Saint Saveur, Que., and four near Morin Heights, Que., in August, 1926, these places being some fifty to sixty miles north-west of Montreal.

When examining some of the National Herbarium sheets kindly sent me from Ottawa, by Dr. M. O. Malte, in addition to the Toronto records, I noticed there were examples taken by Mr. F. Morris at Peterborough, Ont., in October 1921. I also came across the following interesting note on one of the sheets, viz.:

Epipactis Helleborine Crantz. First found in Canada in 1890 at Lambton Mills, Humber River, Ont., by W. and O. White, and more recently (1892) on Mt. Royal, Montreal, Que., by N. D. Keith. As regards the distribution of *A. latifolia* in the state of New York, one cannot do better than consult the excellent paper by Messrs. Metcalf and Griscom, entitled "Notes on Rare New York State Plants", which appeared in the February and March numbers of "Rhodora", for 1917, wherein, on page 51 of the latter issue, will be found a complete list of all the known localities for the species in the State, the first recorded instance being that of Mrs. M. P. Church from near Syracuse in 1879 (Torr. Club. Bull. 6, 329). As regards its distribution in the State of Pennsylvania, exact information seems lacking, at least I can find no definite station mentioned in any of the books I possess, so conclude it is of rare occurrence.

*See illustration in Feb. issue.

(*Concluded in February issue*).

FALL BIRD NOTES FROM THE EASTERN SHORE OF LAKE SUPERIOR

By WM. G. FARGO and JOSSELYN VAN TYNE, ANN ARBOR

THE LAKE SUPERIOR REGION of Ontario has in the past been studied but little by ornithologists. We therefore present here a few notes made during a short collecting trip to Agawa Bay on the east shore of Lake Superior.

The territory covered by these observations is a stretch of shore about eight miles long on the eastern end of Lake Superior where the Agawa River enters the Bay of that name and reaching inland from one to three miles.

This territory is a little north of the middle of the east side of the lake and was chosen for observing the fall migration as being one of the few places at this end of the lake where any beaches exist. The timber here has never been cut except in a few small tracts and consists largely of spruce and balsam, with some red and white pine and considerable maple and birch, especially in the rugged hills which rise to heights of 1,200 to 1,500 feet above Lake Superior. At the mouth of the Agawa River are small areas of mud flats and old river channels suitable for shorebirds. Near here are also several small clearings where some birds of the open country were found.

The observations covered the period from August 21 to September 13, 1926. Usually circuits of eight to sixteen miles were covered daily in the described region by each of the two observers.

Larus argentaius. HERRING GULL.—Most of the gulls seen were in the gray immature plumage. On August 31 we counted more than thirty recently used nests on the larger of the two Agawa Rocks.

Larus delawarensis. RING-BILLED GULL.—Two immature birds were seen September 10.

Phalacrocorax auritus auritus. DOUBLE-CRESTED CORMORANT.—When we visited the Agawa Rocks on August 31 we observed thirteen or more cormorants, adults and birds of the year, flying about and perching on the isolated rocks. On the smaller of the two Agawa Rocks we found ten of their very characteristic nests which had but recently been vacated. One still contained an egg shell and cormorant feathers were all about. People living on the Bay told us that the cormorants had nested there "for years". We were unable to collect any of the cormorants, but we assume that it could only be this species. This appears to be the first record of cormorants nesting on the Great Lakes.

Mergus americanus. MERGANSER.—On August 31 we collected a female at the head of a flock of seven full-grown young.

Ereunetes pusillus. SEMIPALMATED SANDPIPER.—We collected a female of this species at the cormorant colony on August 31. As indicated on the tabulation, we found only three other species of shorebirds, and but few individuals of these. This scarcity of shorebirds is difficult to understand in view of the presence here of miles of sand and gravel lake beach as well as muddy lagoons about the river's mouth. The remainder of the east shore of Lake Superior is almost entirely without suitable beaches.

Bonasa umbellus togata. RUFFED GROUSE.—In spite of fairly intensive field work, we saw but two grouse during our entire stay. A party of campers who spent the month of August traversing the Sand River, which lies north of the Agawa River, reported seeing only a brood of six Ruffed Grouse. Residents agreed that the grouse had been abundant here until about three years ago, when they disappeared rather suddenly. We saw no Spruce Grouse in the region.

Accipiter velox. SHARP-SHINNED HAWK.—We collected one on August 23 and three on September 2 and 3. All four were in the immature plumage. The stomachs of two each contained a small bird.

Buteo platypterus. BROAD-WINGED HAWK.—On September 7 we collected a male in the immature streaked plumage. In its crop was a young Red-backed Mouse (*Evotomys gapperi*).

Cerchneis s. sparveria. SPARROW HAWK.—Four were collected and all had been feeding on grasshoppers, beetles, and other small insects.

WOODPECKERS.—It is notable that we found no Hairy Woodpeckers and very few other woodpeckers.

Otocoris alpestris alpestris. HORNED LARK.—A series of Horned Larks were collected and all proved to be typical *alpestris*.

Corvus corax principalis. NORTHERN RAVEN.—Two or three ravens were constantly about, but were extremely wary and we succeeded in collecting but one. This was a bird of the year, taken about August 30. The stomach contents consisted of a small amount of carrion and a very large number of huckle-berries.

Agelaius phœniceus arctolegus. RED-WINCED BLACKBIRD.—A young male collected at the mouth of the Agawa River on August 31 we refer to this form.

BIRDS OBSERVED AT AGAWA BAY, LAKE SUPERIOR (ONTARIO), AUGUST AND SEPTEMBER, 1926

	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13
Horned Grebe											2			1	1		2						
Loon	1					3				1				1	3			1			1		
*Herring Gull	6	2	f	f						6			3		2	9	7	4	7	15	2	6	
Ring-billed Gull																				2			
Double-crested Cormorant										13							2						
*American Merganser	11									8		7			1		3	2	2	1	2	1	
Black Duck													5							1			
Great Blue Heron							1			1			1	1				1	1				
*Semi-palmated Sandpiper										1													
*Sanderling									2														
Solitary Sandpiper	1									1													
Spotted Sandpiper										1	1						1					2	
*Ruffed Grouse			1	1																	1		
*Sharp-shinned Hawk		2										f	5	1			1					1	
Cooper's Hawk															1							1	
Goshawk												1	2										
Red-tailed Hawk																							1
*Broad-winged Hawk				1													1						
*Sparrow Hawk								2			1	2	2	2	3		2			1	1		
Osprey												1											
Barred Owl								1															
Kingfisher	1						1				1											1	
*Downy Woodpecker	1		1			2								1	1						1		
Arctic Three-toed Woodpecker						2																	
*Yellow-bellied Sapsucker						2	2								2								
Pileated Woodpecker																					2		
Flicker													1					1	1			2	
Night Hawk					2					2	2												
Chimney Swift							3																
Ruby-throated Hummingbird				1				1							1						2		
*Kingbird		1																					
*Olive-sided Flycatcher	6	1		1	2			1							1								
*Yellow-bellied Flycatcher		f	1	1	1												1						
*Alder Flycatcher																						2	
*Least Flycatcher		f	f					1			1	1	2		3							2	
*Horned Lark														11	32	25	12	6	1				
Blue Jay						1	2														1		
*Canada Jay			3																				
*Northern Raven									2	2	2	3	1	2	2	2	2	2		1		2	
*Crow	10	2		1			1	1		2		2									1	2	
*Red-winged Blackbird										1													
Bronzed Grackle																						1	
*Purple Finch	c	c	c	c	c	c	c	c	c	30	cc	cc	cc	cc	c		f				f	7	
*White-winged Crossbill																	10		15				
*Savannah Sparrow												1	3	13	4	3	4				1	m	
*White-throated Sparrow	c	c	c	c	c	c	c	c	c	c	c	c	c	c	f		1		10	4	5		
*Chipping Sparrow	2	c	c	c	c	8	c	c	f			1		f	5		1		3			6	
*Slate-coloured Junco	4	c	c	c	c	c	c	c	c	c	c	c	c	f	3		c	c	8	5		2	
*Song Sparrow									1	7	f	f	f	c					1				
*Lincoln Sparrow												7	6				1		2			10	
*Cedar Waxwing	f	f	f	f	f	f	f	f	f	f	f	f	f	f	15		f		10		3	2	
*Red-eyed Vireo									1		1		1	1									
*Philadelphia Vireo													2								1		
*Blue-headed Vireo														1					1				
*Black and White Warbler	1				1			c			2	1	1	f	4						1		
Tennessee Warbler					1																		
Yellow Warbler	1																						
*Black-throated Blue Warbler	1				3		3					2	2		1							1	2
*Myrtle Warbler								3					2		3		2		3	1		4	
*Magnolia Warbler				1	1		f	c						1	5							2	
*Chestnut-sided Warbler							1																
*Blackburnian Warbler	1		1																1				
*Black-throated Green Warbler	c			c	cc	c	c	cc	cc	f	cc	cc	2	cc	c c		c	c	c		c		
Pine Warbler									1		c	c		f	6		1					3	
*Palm Warbler									c		f	f	2	f	c		f		6		1	25	
*Oven Bird	2							1											2				
*Northern Water-thrush		1																					
*Connecticut Warbler			1								1												
*Wilson Warbler				1					1		1	1	1		4								
*Canada Warbler			1						1			2	2	3								1	
*American Redstart	2	1		1		3		f			2	c	5	f	6		2	3			2	1	
*American Pipit													11		2		13	12	3			8	
*Winter Wren			1			1					1			4				1	2	1	3	3	
Brown Creeper	2				3			1					1					1					
*Red-breasted Nuthatch	2										3			3				1	1				
*Black-capped Chickadee	f	f	f	f	f	f	f	f	f	f	f	f	f	f	f		f	c	7		4		
*Hudsonian Chickadee								2			4												
Golden-crowned Kinglet	1							f											1				
Ruby-crowned Kinglet	2																						
*Hermit Thrush																		1	2				
*Robin						1	2		1				3										
*Blue Bird							3				3			3	3		3	2	2	1	1	1	

*—Collected. cc—very common. c—common. f—few.

Passerculus sandwichensis savanna. SAVANNAH SPARROW.—The migration of Savannah Sparrows began on September 2 and on September 12 the species suddenly appeared in large numbers. These migrant birds were loosely associated with the flocks of warblers, especially with the Palm Warblers, and were as likely to be seen well up in the trees as in their usual habitat near the ground.

Nannus hiemalis hiemalis. WINTER WREN.—On September 4 we found a Winter Wren feeding a young one just out of the nest.

CHRISTMAS BIRD CENSUS RETURNS, 1926

CHRISTMAS BIRD CENSUS AT OTTAWA, ONTARIO.—No less than ten distinct parties of observers co-operated in taking the Christmas Bird Census of 1926 at Ottawa, making it possible to search the surrounding country well. In spite of this, and of suitable and agreeable weather, only seventeen species of birds were discovered in the course of the census taking. These were all hardy winter birds; the various half-hardy species which often add to the numbers and the pleasurable excitement of the Christmas Census being entirely absent. It seems probable that the early and continued cold weather and snow which have marked the late autumn and early winter of this year, and which have already caused the countryside to assume the aspect of mid-winter, have also reduced the local bird-population to a midwinter minimum by killing or driving away any half-hardy birds that may have had a tendency to linger here.

It is also worthy of note that no Hawks or Owls are included in this census. The great wave of such birds which visited this region in November has passed elsewhere.

The Northern Pileated Woodpecker makes its appearance in our census records this year for the first time. It is represented there by two individuals, and every one will hope that this may indicate a permanent and continuing increase in abundance of this valuable and handsome bird in the Ottawa region.

As Ruffed Grouse are greatly reduced in numbers over much of eastern North America at the present time, it is an especial pleasure to be able to report sixteen of them in this census. Twelve of these were seen in Ontario and four in the Province of Quebec.

One hundred sixty Starlings were seen at the refuse dump in the southern part of Dow's Swamp. This is nearly twice as many as the largest number (86) heretofore recorded in a Christmas Census at Ottawa.

As in some previous years, so in 1926 it was necessary to take the Christmas Bird Census at Ottawa on two different dates. Most of the region about Ottawa was surveyed for birds by parties in the field on December 26th, but the areas north of the city, one east of the Gatineau River and one west of it, were investigated by two parties on December 23rd, and are so marked in the detailed record.

The personnel of the various parties and the routes followed are set forth below, followed by the detailed list of birds noted. The routes are represented by numbers, as explained in *The Canadian Field-Naturalist*, Vol. XXXIX, p. 24, and Vol. XL, p. 12.

FIRST PARTY: C. L. Patch, R. Finnie and W. H. Lancely, Route 1, 11 miles, 10.30 a.m. to 3.00 p.m. SECOND PARTY: C. E. Johnson and C. M. Sternberg, Route 2, 10 miles, 9.15 a.m. to 3.00 p.m. THIRD PARTY: D. B. Delury and R. E. DeLury, Route 3, 16 miles, 8.30 a.m. to 3. 00 p.m. FOURTH PARTY: C. B. Hutchings, Route 4, 6 miles, 7.30 a.m. to 12.25 p.m. FIFTH PARTY: B. A. Fauvel, R. Lockwood and Harlow Wright, Route 5, 12 miles, 9.00 a.m. to 3.00 p.m. SIXTH PARTY: A. G. Kingston, Route 6, 8 miles on foot, 3 by street-car, 9.00 a.m. to 2.45 p.m. SEVENTH PARTY (Dec. 23): Harrison F. Lewis, Route 7, 21 miles on foot, 8 by sleigh, and 8 by street-car, 7.40 a.m. to 6.25 p.m. EIGHTH PARTY: D. Blakely, Route 8, 12 miles on foot, 3 by bus, 10.00 a.m. to 4.00 p.m. NINTH PARTY (Dec. 23): Hoyes Lloyd, Route 9, Ottawa to Chelsea, Quebec, by bus, arriving at sunrise, then on foot to Tenaga, Old Chelsea, Kingsmere, and back to Chelsea, returning to Ottawa by bus, 12 miles

SPECIES	ROUTE NUMBERS										TOTAL
	1	2	3	4	5	6	7	8	9	10	
American Merganser			6								6
American Golden-eye			9		24						33
Canada Ruffed Grouse		5	1					4		6	16
Hairy Woodpecker	3	3					2	2	2		12
Downy Woodpecker			2	3	1			1	1		8
Northern Pileated Woodpecker								1		1	2
Blue Jay		1	1		1		6		3		12
Crow		112	110	9	2	1	20				254
Starling		160									160
Pine Grosbeak			2								2
House Sparrow	22	396+	14	20	5	200	2	100	62		821
Redpoll			1	18			13				32
Pine Siskin			1						32		33
Snow Bunting	50							150	20		220
Northern Shrike							1				1
White-breasted Nuthatch	2	2	2	5	2		2	3	4		22
Black-capped Chickadee	17	21	5	9	42	20	23	14	21		172
Total Individuals	94	700	154	64	77	221	69	275	145	7	1806
Number of Species	5	8	12	6	7	3	8	8	8	2	17

on foot, 18 by bus, 5.45 a.m. to 1.45 p.m. TENTH PARTY: F. H. Ostrom, Route 10, vicinity of Hog's Back, Ontario, throughout the day.

On December 23rd, the weather was clear; with 10 inches of snow on the ground, wind variable, light; temp., —10° at 8.00 a.m., +14° at 4.00 p.m.

On December 26th the weather was overcast most of the day, with about 8 inches of snow on the ground, wind changing from light north to moderately strong west; temp., 8° at 8.30 a.m., 12° at 3.00 p.m.—HARRISON F. LEWIS.

CHRISTMAS BIRD CENSUS AT LAKE COWICHAN, B.C.—Observer: G. Buchanan Simpson; Date: Monday, December 27, 1926; Locality: Lake Cowichan, B.C.; Hours of Observation: 10 a.m. to 4 p.m.; Weather: Dull, raw, light snow on ground; temperature about 40° F., calm.

Western Grebe, 10; Horned Grebe, 6; Pied-billed Grebe, 10; Marbled Murrelet, 30; Glaucous-winged Gull, 100; American Merganser, 6; Hooded Merganser, 4; Mallard, 10; Greater Scaup, 50; Ring-necked Duck, 45; Goldeneye (?2 species), 20; Buffle-head, 20; Surf Scoter, 4; N.W. Coast Heron, 2; American Coot, 30; Oregon Ruffed Grouse, 12; Western Goshawk, 1; Northern Bald Eagle, 6; Western Belted Kingfisher, 2; Steller Jay, 1; Gray Jay, 7; N.W. Redwinged Blackbird, 6; Oregon Junco, 10; Rusty Song Sparrow, 6; Oregon Towhee, 6; Chestnut-backed Chickadee, 100; Western Golden-crowned Kinglet, 15; Varied Thrush, 8.

28 species; 527 individuals.—G. BUCHANAN SIMPSON.

CHRISTMAS BIRD CENSUS AT PANGNIRTUNG FIORD, BAFFIN ISLAND, 1924 AND 1925.—December 24, 1924; 10 am. to 12 noon. Clear with light southwest wind; 30 degrees below zero; deep snow. A short period of murky daylight at noon. Eight miles on skees north of Duval mountain and return. Northern Raven, 2.

December 31, 1925; 10 a.m. to 11.45 a.m. Clear and calm; temperature minus 24 degrees On snowshoes to Ptarmigan mountain. Northern raven, 3; Rock ptarmigan, 2.—J. DEWEY SOPER.

CHRISTMAS BIRD CENSUS AT COURTENAY, B.C. —Courtenay to Comox, Vancouver Island, B.C. Monday, December 27th, from 10.00 a.m. to 4.00 p.m. Six to seven miles along river bank and sea front mainly. Weather very dull, temp. about 40°, in afternoon strong East wind; the weather had been cold for previous two weeks and snow lying about. Observer on foot and alone.

Holboell's Grebe, 1; Horned Grebe, 3; Loon, 1; Pacific Loon, 9 (plus); Red-throated Loon, 3; California Murre, 1; Glaucous-winged Gull, 300 (plus); Herring Gull, 3; Short-billed Gull, 37; American Merganser, 30; Red-breasted Merganser, 3; Mallard, 500 (plus); Widgeon, 500 (plus); Scaup, 500 (plus); American Golden-eye, 500 (plus); Buffle-head, 100 (plus); American Scoter, 2 (plus); White-winged Scoter, 500 (plus); Surf Scoter, 500 (plus); Heron, 3; Coot, 23; Red-backed Sandpiper, 200; Killdeer, 1; Pheasant (Chinese), 16; Hawk (Goshawk ?), 1; Bald Eagle, 1; Duck Hawk, 2; Kingfisher, 4; Harris' Woodpecker, 4; Flicker, 4; Crow, 191 (plus); Western Meadowlark, 15; Brewer's Blackbird, 60 (plus); English Sparrow, 6; Oregon Junco, 48; Rusty Song Sparrow, 14; Fox Sparrow, 7; Towhee, 9; Vigors Wren, 3; Winter Wren, 11; Chestnut-backed Chickadee, 16; Golden-crowned Kinglet, 13; Ruby-crowned Kinglet, 1 (plus); Robin, 76; Varied Thrush, 3. Total species, 45. Total number, impossible to specify, in the case of the different ducks shewn as 500, in all probability there were double this number, the total number of ducks on Comox Bay was estimated at at least 4000.—THEED PEARSE, Courtenay, B.C.

CHRISTMAS BIRD CENSUS FROM LONDON, ONTARIO, 1926.—Christmas Day coming on Saturday this year necessitated taking the census rather earlier than usual, earlier perhaps than we should, but quite a few of our members wished to spend the day with their families, so rather than make a half job of it, we decided to go out on the 18th when a full corps of observers was available. From the standpoint of weather this turned out all that could be desired, clear and cold, bright sky, practically no wind, the ground barely covered with snow. The temperature at 8 a.m. was 2 above zero, rising to 22° at 2 p.m. and falling again to 6° at 9 p.m., when the last party returned.

As usual a number of parties went out, eight all told, four in the morning and a like number in the afternoon. The territory most thoroughly combed was the Thames River valley westward from the city through Springbank as far as Hyde Park. One party in the morning touched the river at a point some few miles west of Hyde Park, and in the afternoon scoured the country to the north looking for snowy owls. This latter group went prepared to wind up the day with a "winter picnic". So when the sinking sun hushed the smaller birds, the car was driven into a nearby woods and soon the crackling of a camp fire divided interest with two great-horned owls that were calling to each other not far away. A grid, a frying pan and the contents of a well-filled lunch basket held the attention of the party for some time, although from time to time one of the group would wander away a short distance to get the inspiration of the scene, the campers silhouetted against the glowing fire, the rising moon flooding the woods with light, the shadows of the trees, the tracks of squirrels and rabbits showing as plainly as at noon day on the freshly fallen snow of the night before—a perfect night, a perfect picture. A screech owl gave its quavering call and a skunk came over to see what it was all about as we could tell by the perfume on the air. The moon rose higher and higher as did the pile of logs on the fire, until the night, which had been close to zero when we pitched camp, became so warm that hats, coats and gloves were discarded with abandon.

On totalling up the list we were delighted to find that we had equalled our 1922 high record of 33 species (34 including the English sparrow). All parties found birds numerous, the abundance of bluejays, purple finches, goldfinches and waxwings being especially noteworthy, as was too, perhaps, the comparative scarcity of tree sparrows, juncos, song sparrows and cardinals. Two species which had been seen recently but missed census day were kingfisher and red-headed woodpecker.

The following is the list:—Herring Gull, 11; American Merganser, 6; American Goldeneye, 11; Great Blue Heron, 1; Ruffed Grouse (track of), 1; Pheasant, 2; Mourning Dove, 3; Red-tailed Hawk, 2; Screech Owl, 3; Great-horned Owl, 3; Snowy Owl, 1; Hairy Woodpecker, 5; Downy Woodpecker, 16; Flicker, 4; Bluejay, 91; Crow, 879; Starling, 6; Bronzed Grackle, 1; Purple Finch, 179; American Crossbill, 5; Goldfinch, 54; Snow Bunting (flock flying over), 100; Tree Sparrow, 8; Junco, 16; Song Sparrow, 1; Cardinal, 3; Cedar Waxwing, 125; Northern Shrike, 1; Brown Creeper, 3; White-breasted Nuthatch, 20; Chickadee, 51; Golden-crowned Kinglet, 14; Robin, 1. Plus English Sparrows of 1000 or more. Total: 34 species; 1627 individuals, plus English Sparrows.

Observers: J. F. Calvert, Mr. and Mrs. E. M. S. Dale, Vernon Franks, R. T. Hedley, J. C. Higgins, Mr. and Mrs. E. H. McKone, J. R. McLeod, T. D. Patterson, W. E. Saunders and C. G. Watson. —McILWRAITH ORNITHOLOGICAL CLUB, E. M. S. DALE, *Secretary*.

CHRISTMAS BIRD CENSUS OF THE WINNIPEG AREA, 1926.—WINNIPEG, MANITOBA, AND ADJOINING MUNICIPALITIES.—December 19; a mild day after a spell of severely cold weather; temperature at start 12° F., rising to 20° during day. Deep snow; light south wind. Birds observed at six feeding stations and a refuse dump totalled 79 (8 species); birds observed by three field parties during 20 hours of observation and over a distance of approximately 60 miles, totalled 245 (14 species).

Canvas-back, 1; Scaup Duck, 1; Goshawk, 2; Ruffed Grouse, 3; Sharp-tailed Grouse, 8; Snowy Owl, 1; Hawk Owl, 1; Hairy Woodpecker, 3; Downy Woodpecker, 6; Blue Jay, 42; Canada Jay, 2; Evening Grosbeak, 11; Pine Grosbeak, 28; Snowflake, 142; Slate-coloured Junco, 1; Northern Shrike, 1; White-breasted Nuthatch, 13; Black-capped Chickadee, 38. Total, 18 species, 324 birds. Three Redpolls were noted on the 18th, and 20 Bohemian Waxwings on the 20th, by other observers.—Mrs. C. P. Anderson, C. L. Broley, B. W. Cartwright, G. Champion, A. B. Gresham, C. Hutchinson, A. G. Lawrence, N. Lowe, Dr. T. H. McCarthy, A. A. McCoubrey, A. A. McCoubrey, Jr., K. G. McDougall, J. R. Morton, H. C. Pearce. (Natural History Society of Manitoba).

Comment.—Redpolls, usually abundant, almost completely absent. Bohemian Waxwings, common last winter, apparently scarce. Hawk Owl, rarely seen in winter; a large flight passed through southern Manitoba this fall. Canada Jays have re-appeared in the city after several years' absence. Evening Grosbeaks are apparently scarcer than during last year. The two ducks are wintering on the Red River near sewer outlets, where there is open water. The Slate-coloured Junco is wintering at one of the feeding stations and appears to be in good health in spite of the severe cold.

Birds unusually scarce; only 324 seen as against 680 during the last Christmas census. Winter set in early, with unusually low temperatures and much deep snow.—A. G. LAWRENCE.

CHRISTMAS BIRD CENSUS FROM MCCREARY, MANITOBA.—December 19; four-mile walk on the Forest Reserve. Sharp-tailed Grouse, 6; Goshawk, 1; Pileated Woodpecker, 1; Blue Jay, 10; Canada Jay, 1; Evening Grosbeak, 8; White-breasted Nuthatch, 1; Black-capped Chickadee, 6. Totals: 8 species, 34 birds.—VERNON HARPER.

CHRISTMAS BIRD CENSUSES FROM EAST BAY, MANITOBA.—December 24; temperature 7° below zero in the morning, rising to 7° above in the afternoon; sky mostly overcast. Around the farm yard in the morning were seen: Sharp-tailed Grouse, 4; Hairy Woodpecker, 1; Redpoll, 17; Snowflake, a flock of approximately 100; Black-capped Chickadee, 1. During a four-mile tramp in the afternoon were noted: Goshawk, 3; Black-capped Chickadee, 3. Totals: 6 species, 129 birds. A Magpie has been seen several times since the beginning of the winter.—E. ROBINSON.

CHRISTMAS BIRD CENSUS FROM NINETTE, MANITOBA,—December 18. At feeding station. Ruffed Grouse, covey of 7; Hairy Woodpecker, 2; Downy Woodpecker, 2; Blue Jay, 9 at once; Bohemian Waxwings, flock of over 100; White-breasted Nuthatch, 1; Black-capped Chickadee, many. The Bohemian Waxwings are feeding on Virginia creeper berries on the house; the Ruffed Grouse also feed on these in addition to the wheat we put out.—R. C. SCOTT.

CHRISTMAS BIRD CENSUS OF THE BRODIE CLUB, AT TORONTO, ONTARIO, 1926.—Sunday, December 26, was the day set aside by the club for the purpose of holding its second annual Christmas census of the birds of the Toronto region. Three parties set out, each with a definite area assigned to them, so that, in this way, as much ground as possible could be covered and consequently, as many birds as possible seen.

A first party, consisting of L. L. Snyder and S. L. Thompson, worked the region along the east-center lake front of the city, known as Ashbridges Bay, commencing at the foot of Carlaw Avenue and tramping west to the Eastern Gap and return, about two square miles being thoroughly covered. The character of this area, mostly open waste-land, with a small extent of woods, is such that mice abound, their tunnels and runways, in some places, forming a network through the grass. These mice afford food for hawks, owls and shrikes and it was hoped that these birds would be encountered there, if anywhere. Also, in the water of the cement-walled turning basin and channels connecting the same with Toronto Bay, certain species of ducks and gulls were expected, and possibly some land species in the wooded patches along the shore or in the dry marshes. This party was afield from 7.45 a.m. to 1.30 p.m. 11 species, represented by approximately 754 individuals, were seen. In the rather small extent of open water in the turning basin, ducks abounded, about 23 American Mergansers, about 46 Old Squaws, a large mass of about 230 Scaup Ducks and 9 American Goldeneyes rewarding the observers, who could watch these birds at close range from the edge of the basin. One lone Northern Shrike (in the same place as one was seen on last census and on other occasions) was the only other bird seen, worthy of special mention. The entire absence of hawks and owls proved a disappointment, although these birds were sought for intently.

A second party, R. V. Lindsay, confined its attention to the region known as High Park, at the west end of the city. In this wooded area of about one square mile, with its open fields, dry marshy areas, sheltered ravines and winding streams, the bulk of the winter land birds were expected and, along the adjoining shore of Lake Beach, certain species of waterfowl were almost sure to be found feeding not far off shore. The party was observing from 8 a.m. to 12.45 p.m., and succeeded in compiling a list of 143 birds of 16 species, of which might be mentioned as of interest, one Loon and one Northern Shrike. Most of the commoner, or rather expected species were met with, and the list of 16 species observed attests to the keenness and alertness of the observer and his companion, Arnott Patterson.

A third party, which consisted of P. Harrington and J. L. Baillie, was assigned to the waterfront. A great proportion of the birds to be seen about Toronto at his season, is made up of waterfowl, due to the close proximity of Lake Ontario, and this party, endeavouring to cover as much of the lake shore as possible, commenced at Toronto Bay, (foot of Yonge Street) and, by motor, drove west following the shore to Port Credit, a distance of about 13 miles. Frequent stops were made to observe the ducks and gulls off shore, and it is the belief of the party that a fair estimate of the number of water-fowl present along the shore, was obtained. From Port Credit they drove north 2½ miles to Cooksville and east and north through Dixie, Islington and Lambton Mills to Toronto, completing a wide "circle", the total distance covered being approximately 35 miles. Frequent stops were made, of course, at spots where birds were most apt to be found. This party, afield from 8.15 to 10.45 a.m. noted but 7 species of birds, all but one of which were seen along the 13 miles of lake shore traversed. It was a pleasure to find ducks and gulls so numerous (the lake being almost entirely open water), about 95 American Golden-eyes, 17 American Mergansers, about 203 Old Squaws, no less than 13 Great Black-backed Gulls, Herring Gulls in abundance and at least 3 Ring-billed Gulls being seen as a result. After leaving the lake shore at Port Credit, the 22-mile drive leading back to the city through farm-land, etc., revealed but one flock of 30 Starlings at Islington. The scarcity, one might say, the almost entire absence of birds on this long drive through the country, intercepted as it was by frequent stops, was appalling.

The weather was dull for the most part, but bright intervals during which the sun shone were of more or less frequent occurrence, and the air was cool and very good for observing. About one to two inches of snow covered the dry ground, a light fall of same during the early morning being of no consequence. What little wind there was came from the north. The temperature at 7.45 a.m. was 18° and at noon 28°.

The total list of birds observed by the three parties is as follows, including one species seen by Wallace P. Young and one noted by J. H. Fleming and omitting the omni-present *Passer domesticus:* Loon, 1; Great Black-backed Gull, 19; Herring Gull, 962 (approx.); Ring-billed Gull, 16 (approx.); American Merganser, 45 (approx.); Scaup Duck, 230 (approx.); American Golden-eye, 104 (approx.); Old Squaw, 249 (approx.); Screech Owl, 1 (J. H. Fleming); Hairy Woodpecker, 1; Downy Woodpecker, 3; Blue Jay, 2; Starling, 30; Purple Finch, 1; Goldfinch, 9; Snow Bunting, 3 (W. P. Young); Tree Sparrow, 20; Song Sparrow, 1; Northern Shrike, 2; Brown Creeper, 1; White-breasted Nuthatch, 6; Chickadee, 6. Total: 21 species, about 1311 individuals. 6 species not noted on the above census, but which have been seen at Toronto recently are: Snowy Owl, Pine Siskin, Robin, Flicker, Arctic Three-toed Woodpecker and Pine Grosbeak. PAUL HARRINGTON, ROBERT V. LINDSAY, LESTER L. SNYDER, STUART L. THOMPSON, JAMES L. BAILLIE, JR. (*Members of the Brodie Club*), ARNOTT M. PATTERSON and WM. G. BAILLIE.

A most surprising record for December was the finding of a dead Savannah Sparrow on the beach at Sunnyside on December 21, by R. V. Lindsay. Stuart Thompson brought this bird in the flesh to the Museum on December 28, and the writer made a skin of it. Although it had been frozen the feathers were perfectly dry and had certainly never been soaked; also, the bird was not on the ground but in the snow, which attests to its having died since December 6, because prior to that date the ground at Sunnyside Beach was perfectly dry. The specimen was not slipping when skinned on December 28, was in fine condition, fat, and with full stomach, and showed no signs of having suffered any injury. The writer, after much thought, would be inclined to place the approximate date of death at about December 10, certainly not before. October 16, is the previous latest date for the species at Toronto, that I can find. This record, of course, has nothing to do with the census, but is mentioned to you as being possibly of interest.—JAS. L. BAILLIE, JR.

CHRISTMAS BIRD CENSUS AT CAMROSE, ALBERTA.—(To Battle River and return). December 20, 11 a.m. to 4 p.m. Clear, 1 foot of snow, no wind, temperature 10° above at start, 25° above at return. 14 miles by auto, 3 miles on foot, observers together.

Hairy Woodpecker, 1; Downy Woodpecker, 2; Blue Jay, 6; Magpie, 7; Pine Grosbeak, 25; Redpoll, 10; Snowflake, 25; Brown Creeper, 1; Black-capped Chickadee, 15; Hudsonian Chickadee, 20. Total: 10 species; 112 individuals. Four days previous to this it was 42° below zero, and this no doubt had its effect on the birds. It is significant that the Hudsonian Chickadees outnumbered common Black-cap.—FRANK L. FARLEY, ARTHUR TWOMEY, FRANK CROSSLEY.

CHRISTMAS BIRD CENSUS AT HAMILTON, ONTARIO, 1926.—December 26. Clear; 1 inch of snow, calm to light west wind; temperature 24° at start, 26° at return. Six parties on foot, 19 miles; one party 25 miles by auto, five miles on foot. First party, 10 a.m. to 3 p.m., second party, 10.30 a.m. to 12 noon, third party 9 a.m. to 1.15 p.m., along southeast, south and southwest limits of city, among trees and in open, parks, gardens, and waste land; fourth party, 10 a.m. to 1.30 p.m., west city limits, open fields, woods and ravines; fifth party, 10 a.m. to 12 noon, and 1 p.m. to 3 p.m., south shore of Dundas Marsh; sixth party, 11 a.m. to 1 p.m., east limits

of town of Dundas; seventh party, 10.30 a.m. to 4.30 p.m., wooded ravines and open water of Dundas Marsh, parts of north shore of Hamilton Bay as far east as open water of Lake Ontario at Burlington.

Herring Gull, 359; American Merganser, 7; American Golden-eye, 66; Ruffed Grouse, 1; English Pheasant, 1; Hawk, (sp. ?) 1; Hairy Woodpecker, 3; Downy Woodpecker, 27; Red-headed Woodpecker, 2; Flicker, 2; Blue Jay, 8; Crow, 4; European Starling, 264 in flocks of 2, 2, 60 and 200 (est. G.O.McM.); Redpoll, 3; Goldfinch, 33; Pine Siskin, 5; Tree Sparrow, 107; Slate-coloured Junco, 12; Song Sparrow, 1; Cedar Waxwing, 55; White-breasted Nuthatch, 18; Black-capped Chickadee, 26; Golden-crowned Kinglet, 11; Robin, 3; Total: 24 species, 1019 individuals; plus uncounted English Sparrows, 25 species. Recently reported: Meadowlark, 1; (Mrs. F. E. MacL. and Miss R. R. M.); Red-breasted Merganser (G. O. McM.)—DR. D. H ARNOTT, DR. H. G. ARNOTT, MISS G. BAUER, C. D. COOK, MISS H. E. DOWNEY, M. JOHNSTONE, MRS. F. E. MACLOGHLIN, DR. and MRS. G. O. MCMILLAN, MISS RUBY R. MILLS. MISS E. SMITH, MR. and MRS. B. F. TURNER (*The Hamilton Bird Protection Society, Inc.*)

CHRISTMAS BIRD CENSUS FROM ARNPRIOR, ONTARIO, 1926.—December 25, 1926; 9.30 a.m. to 4.30 p.m. Clear and fine; 9 inches of snow; fresh north-west wind during the morning and early afternoon, becoming calm towards evening; temperature, 23° at start, 17° at return. Distance covered twenty miles, one observer, on snowshoes, travelling south-east from Arnprior through Nopiming Sanctuary to Marshall's Bay and return, the other, on foot, working north-west from Arnprior along the shore of Lac des Chats to the village of Braeside, returning about a mile inland.

American Golden-eye, 3; Canada Ruffed Grouse, 8; Snowy Owl, 1; Northern Hairy Woodpecker, 7; Northern Downy Woodpecker, 4; American Three-toed Woodpecker, 1; Northern Pileated Woodpecker, 1; Blue Jay 4; European Starling, 32; Purple Finch, 3; Redpoll, 30 (est.); Snow Bunting, 4; English Sparrow, 1+; Northern Shrike, 1; Brown Creeper, 4; White-breasted Nuthatch, 5; Black-capped Chickadee, 39. Total: 17 species, 148+ individuals.

The Snowy Owl included in the above list was shot to-day by a farmer three miles east of Arnprior. The species was common during November but very few birds have been reported this month. With the exception of four birds that are wintering at the writer's feeding station, no Downy Woodpeckers were observed during the day, which is unusual. Our records of the American Three-toed Woodpecker are far from numerous and it was with considerable pleasure that a single female was found feeding on some dead spruce boughs this morning. The bird was observed at close range for fifteen minutes. The Arctic Three-toed Woodpecker was observed on three occasions, during the month of October, but was not common.

While the Europrean Starling has been present for a number of years, this is the first time we have been able to include it in our census and as the number observed indicates, the species has become firmly established. The almost complete absence of cones on all the coniferous trees no doubt accounts for the fact that many of the *Fringillidæ* have avoided this district this winter. A flock of birds heard at some distance to-day is thought to have been made up of Evening Grosbeaks, but as the species has not been observed previously this autumn, we refrain from including it in our list. The Pine Siskin is entirely absent and the Pine Grosbeak was seen on only two occasions in October. The complete absence of the Red-breasted Nuthatch is also noteworthy.

Seen recently: December 16, American Goshawk, 1.—CHARLES MACNAMARA, LIGUORI GORMLEY.

CHRISTMAS BIRD CENSUS FROM TRENT RIVER REGION, ONTARIO, 1926—CAMPBELLFORD TO STIRLING, ONTARIO.—December 23; 7.40 a.m. to 5 p.m.; clear a.m., overcast p.m.; 5 inches of snow; wind east, moderate (none a.m.); temperature 0° at start, 20° in afternoon. About 25 miles on foot. American Golden-eye, 9 (2♂); Ruffed Grouse, 2 (also many tracks); Great Horned Owl, 1; Hairy Woodpecker, 5; Downy Woodpecker, 1; Blackbird (species not determined), 4; Blue Jay, 3; Pine Grosbeak, 3; Purple Finch, 13; House Sparrow (no estimate made); Goldfinch, 7; White-breasted Nuthatch, 8; Chickadee, 37; Golden-crowned Kinglet, 1. Total: 14 species, 94 individuals (exclusive of *P. domesticus*). Other species noted this winter: Nov. 29, Lapland Longspur; Dec. 3, Snowy Owl; Dec. 19, Accipiter sp.; Dec. 21, Snow Bunting; Dec. 22, Northern Shrike; Dec. 27, Starling, Tree Sparrow.—E. W. CALVERT.

TORONTO FIELD-NATURALIST CLUB CHRISTMAS BIRD CENSUS, 1926.—Christmas Day at Toronto was one of those cold still days, when the sun seems to be trying hard to shine. The month of December had been a changeable one throughout. Blizzards, hard frosts and long thaws came in turn. Long continued mild weather means open water here, and consequently more promising for both duck and gull observations. Two parties went out, one west from Sunnyside along the lake shore and northward through High Park, the other devoted its attention to Don Valley at the northern end of the city.

The lake shore party succeeded in noting such water-birds as might be expected. But, of course, there is always that chance that a rare straggler might have been tempted inland from the coast. The birds observed here were Black-backed Gull, Herring Gull, Ring-billed Gull, American Merganser, Golden-eye, and Long-tailed Ducks. These six species are always to be found here in winter. Among the shrubbery of the rough beach was seen a solitary Northern Shrike which had evidently been in the vicinity for some time previously judging from the mangled remains of Meadow Voles found. Lying half-buried in the sand, we found a dead Savannah Sparrow. The plumage was clean and dry, having none of the bedraggled appearance of a bird which had been wet. Recalling the weather of the past month, it seems safe to say that the bird had survived the various changes up till the recent thaw or later. On subsequent examination it was found to be in good condition and stomach full of such seeds as could easily be found on the weedy beach.

For some time the woods of High Park proved quite deserted of bird life. Then suddenly the party came upon several Tree Sparrows, a flock of Goldfinches, a pair of Chickadees and one White-breasted Nuthatch in the space of a few minutes. After this ensued another long period of inactivity in observations, followed by a second burst of life. Down a sheltered ravine, we came upon two Blue Jays, several more Chickadees and Goldfinches, and a small flock of Purple Finches of both rosy males and dull striped females. Then finally, the party had a splendid view of a solitary male White-breasted Nuthatch, which was foraging for peanuts on the ground, evidently scattered for the numerous black squirrels here. Every nut found was transported to the nearby red oak tree where it was wedged in the rough bark to be picked to pieces.

This made a total of 13 species noted by the lake shore party—not including the dead Savannah Sparrow. The Don Valley party, although denied the advantage of the water front, noted almost as many as this and three additional species, namely, Downy and Hairy Woodpeckers and Pine Siskins. A summary of the day's observations appear as follows:—

Date: December 25, 1926. Locality: Toronto. *Northern Section*, Wooded valley; *Western Section*, Lake Shore, Wooded valley and frozen marshes. Weather: Temperature 10° of frost. Light west wind, slightly clouded.

Lake shore and High Park observations: Great Black-backed Gull, 3; Herring Gull, 25; Ring-billed Gull, 5; American Merganser, 10; American Golden-eye, 20; Long-tailed Duck, 100; Blue Jay, 3; Purple Finch, 15-20; American Goldfinch, 15; Tree Sparrow, 6; Northern Shrike, 1; White-breasted Nuthatch, 2; Chickadee, 6. Observed by the Don Valley party: Hairy Woodpecker, 1; Downy Woodpecker, 1; Pine Siskin, 50-100; (Savannah Sparrow).—STUART L. THOMPSON.

CHRISTMAS BIRD CENSUS FROM GUELPH, ONTARIO, 1926.—December 26th, 1926 18° above zero at 9.25 a.m., when two observers started on foot, returning at 2 p.m. when 24° above zero. Brilliant sunshine with light westerly wind, shifting at times to northwesterly. Route through Guelph Township via Wellington Place to Eramosa Road by road and thence across fields and skirting two woods to York Road and Ontario Reformatory grounds, through latter and across River Speed and returning to Guelph City by Victoria Bridge. About ten miles, observers together and route mostly through open fields. Hard crusted snow on ground varying from eight inches to over a foot in depth.

Identified: Ruffed Grouse, 3: Northern Downy Woodpecker, 1: Blue Jay, 2: Starlings, 8: Cedar Waxwings, 14; Black-capped Chickadee, 5. Total: 6 species, 33 individuals.—R. E. BARBER and H. HOWITT, *for Wellington Field-Naturalists' Club.*

CHRISTMAS BIRD CENSUS AT PAKENHAM, ONTARIO, 1926.—December 23, 8.30 a.m. to 12 noon, and 1 p.m. to 4 p.m. Fair, bright sunshine, keen frosty air, no wind; 12 inches of snow; temperature 3° below zero at start, 17° above zero at return. Observers drove together 6 miles with horse and cutter; observers walked 10 miles on snowshoes.

Ruffed Grouse, 4; Hairy Woodpecker, 1; Downy Woodpecker, 1; Pileated Woodpecker (heard); Blue Jay, 5; Starling, 8; Pine Grosbeak, 5; Redpoll, 5; English Sparrow, 8; Black-capped Chickadee, 16. Total: 10 species, 53 individuals.

Our count on Pine Grosbeaks was much smaller than that recorded last year. Larger flocks of Redpolls were seen during the week, but only five could be found on Census Day. Flocks of forty or more Snow Buntings have been about almost daily. Four Evening Grosbeaks were seen Dec. 21, and a Screech Owl Dec. 24 and Dec. 27. Starlings were fairly common this summer, as many as eleven birds were seen on different occasions. During the fall they have fed at the feed store and at garbage about the village. The eight birds recorded in this census were perched on telegraph wires behind the feed store. Two Snowy Owls were captured within this census district during December. Nuthatches were conspicuous by their absence. No White-breasted Nuthatches have been at our feeding station this year and no Red-breasted Nuthatches have appeared in our records since October, 1925.—EDNA G. ROSS, VERNA M. ROSS.

CHRISTMAS BIRD CENSUS FROM EASTEND, SASKATCHEWAN, 1926.—December 26, 9.15 a.m. to 5 p.m. Walked along valley of the Frenchman River and climbed 600 feet to the open prairie on the south side. Visited a farm where I had been informed a flock of some 100 Rosy Finches had been seen about Dec. 1st; but saw nothing of these birds. Had expected to find the Hungarian Partridge, which was there in large numbers during the fall; but they also disappointed me, nor did I see any elsewhere that day. Snow in drifts and hard crusted, exposed spots blown bare. About 11 miles on foot. Wind at start N.E., overcast; wind changed 11 a.m. to S.W., with driving fog; cleared at 3 p.m. and fine at sunset. Temperature at start 12°, at return 6°.

Sharp-tailed Grouse, 40; Golden Eagle, 1; Horned Owl, 2; Downy Woodpecker, 1; Horned Lark, 1; Magpie, 25; Redpoll, 16; Snow Bunting, 32; Bohemian Waxwing, 50 (estimated, in one flock); Chickadee, 1. Total: 10 species, about 170 individuals. December 14: Sage Grouse, 1. Three or four Sage Grouse are wintering nearby, seen by other observers from time to time. Dec. 21, American Rough-legged Hawk, 1. Dec. 24, Golden Eagle, 3. The latter were seen circling just above the house, close together, a most unusual and interesting sight.—LAURENCE B. POTTER.

CHRISTMAS BIRD CENSUS FROM BRANTFORD, ONTARIO, 1926.—Mr. Buchanan of the local Y.M.C.A. staff and I took a number of the boys of our Junior Nature Club out on Jan. 3rd, to make a survey for this district. The day proved rather notorious for the absence of birds. The following is from my field notes: Weather, dull and cloudy, the average temperature of the day being around 22°F. We left the Y.M.C.A. at 9 a.m., going up Darling St. to West St., up West to Brant Ave., up Brant Ave. to the city limits and out the Ava Road to the Old Tollgate, then we turned in a north-easterly direction and struck out, up hill and down dale, to the St. George

Road when we swung east and after going half a mile we came to a sheltered ravine with a fine spring creek running through it. where we stopped for lunch. After lunch we continued on swinging now a little to the south and eventually came out on the London Road, about half a mile above the White Schoolhouse. We then struck due south until we came to the Hamilton Highway and approached the city from almost the opposite direction from which we had started, arriving at the Y. at 6.10 p.m. We covered in all about 20 miles within a radius of 5 miles. Eleven species of birds in all were observed. Tree Sparrow, 10; Black-capped Chickadee, 30+; American Crow, 100+; English Sparrow, 150+; Blue Jay, 10; White-breasted Nuthatches, 15; Snowy Owl, 1; Downy Woodpecker, 2; Goldfinch, 25+; Starling, 5; Screech Owl, 3.—W. G. NEFF, Brantford.

CHRISTMAS BIRD CENSUS AT VINELAND, ONTARIO, 1926.—December 24. Three observers set out at 9.30 a.m. to see what birds could be found. We motored about 21 miles in all—getting out to look about in likely spots and covering about 2½ miles on foot—mostly through wood lots and in the afternoon visited a swamp beside the twenty mile creek near Jordan. The day was overcast with the temperature about 40°, a drizzling rain falling, and very little snow on the ground. Our list is as follows:

Herring Gull, 3; Ring-necked Pheasant, 2 Hawk (sp. ?), 1; Hairy Woodpecker, 1; Blue Jay, 2; Crow, 2; Purple Finch, 3; House Sparrow, 50 (approx.); Goldfinches or Siskins, 10 (approx.); Tree Sparrow, 12 (approx.); Slate-coloured Junco, 4; Waxwing, 1; Long-billed Marsh Wren, 1; White-breasted Nuthatch, 3; Black-capped Chickadee, 8.

In regard to the Long-billed Marsh Wren seen on our Christmas Bird Census, the bird was seen in a clump of willows situated in a reedy marsh along the banks of twenty mile creek near Jordan, but we were attracted by its chatter and approached within 6 feet of it. I thought it a winter wren, but Mr. Dickson identified it as a Marsh Wren. I have seen neither species for several years, but he has. It had a dark line over the eyes and darkish markings on the back. Anyhow it was not a House Wren. I think the Long-billed Marsh Wren the correct species.

Our Waxwing, I believe, was a Bohemian, as it was larger than any I have seen before. We were watching some Purple Finches in a Red Cedar tree when this Waxwing came flying up. After a good look at us, it left quickly. Who could blame it?

This makes a total of 15 species and approximately 103 individuals seen in four and a half hours' observation.—G. H. DICKSON, W. E. HURLBURT, E. F. PALMER.

CHRISTMAS BIRD CENSUS AT OKANAGAN LANDING, B.C., 1926.—Okanagan Landing District, British Columbia, December 27th, 1926. 10 a.m. to 1.00 p.m.; 2.00 p.m. to 4.00 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, eight miles on foot. Temperature 34° at 1.00 p.m.; three inches of dry snow on the level; sky overcast—a line of blue along the northern horizon and sunlight on the mountains on west side of lake.

Horned Grebe, 4; Herring Gull, 6; Green-winged Teal, 2; Redhead, 2; Golden-eye, 4; Buffle-head, 1; Coot, 2800; Ring-necked Pheasant, 31; European Grey Partridge, 33; Pigmy Owl, 1; Red-shafted Flicker, 2; Rocky Mountain Hairy Woodpecker, 1; Crossbill, 10; Cassin's Purple Finch, 8; Magpie, 10; Rusty Song Sparrow, 4; Shufeldt's Junco, 43; Bohemian Waxwing, 50×; Western Winter Wren, 1; Western Golden-crowned Kinglet, 4; Rocky Mountain Creeper, 1; Red-breasted Nuthatch, 14; Slender-billed Nuthatch, 5; Long-tailed Chickadee, 12; Mountain Chickadee, 40; Townsend's Solitaire, 1. Total: 26 species, 3090 individulas.

Additional species seen during Christmas week: Holboell's Grebe, Loon, Merganser, Red-breasted Merganser, Balpdate, Canvas-back, Grey Ruffed Grouse, Pileated Woodpecker, Pale Goldfinch, Western Evening Grosbeak, Slate-coloured Junco, and Western Robin. A Pileated Woodpecker has been in the neighborhood for the past month feeding on Virginia Creeper berries.—J. A. MUNRO.

REPORT OF COUNCIL, 1926, OTTAWA FIELD-NATURALISTS' CLUB

THE ACTIVITIES of Council of the past year were many and varied. The meetings, though not as well attended as we would like, were pleasant, and those present showed great enthusiasm in the work, which is the keynote of the success of the various activities of the Club.

Early in the year the original charter of the Club, dated 1884, came again into the possession of the Council. This is a handwritten document of considerable historical interest. The legal status of the Club in respect to recent legislation relating to incorporated companies was investigated and it was found that certain returns, regarding the organization of the corporation, have to be furnished the Provincial Secretary, Toronto, each February. These returns have been furnished for the past years as required. With the original charter, a large scrap book was also returned, and this latter document covers the activities of the Club between 1879 and 1887. This scrap book is at present of great historical value and Council invites the cooperation of all Members of the Club in an effort to bring our records to date.

During the second week of last October the 44th stated Annual Meeting of the American Ornithologists' Union was held in Ottawa under the joint invitation of the Ottawa Field-Naturalists' Club and the Minister of the Interior

An important social function of these meetings was the conversazione held in the Victoria Memorial Museum under the auspices of this Club. This is the first Annual Meeting of the A.O.U. held outside the United States, and it is pleasing to know that the meeting was a marked success and that the strangers enjoyed their visit to Ottawa and to Canada. The Committee of Council cooperating with the local A.O.U. Committee did considerable hard work in arranging the details of these meetings, and is to be congratulated on the success of their endeavours.

A future event of great interest to all Members of the Club is the celebration of our 50th Anniversary in 1928. Council in the past year has discussed a few features that might be a suitable memorial of this anniversary, and undoubtedly this coming year definite plans will be formulated.

Volume XL of *The Canadian Field-Naturalist*, the official publication of the Ottawa Field-Naturalists' Club, is an interesting and valuable contribution to Canadian Natural History. Lack of funds this year, as in the past, handicapped the work of the Editors and Publication Committee. Council feels, however, that the contributions published are of great interest to all Naturalists, and, therefore, has no hesitation in appealing to Members for continued and greater support of *The Canadian Field-Naturalist* for this coming year.—J. F. WRIGHT, *Secretary*.

REPORT OF ANNUAL MEETING

THE 48th Annual Meeting of the Ottawa Field-Naturalists' Club was held in the Lecture Hall of the Victoria Memorial Museum, Tuesday evening, December 14th, 1926, at 8.15 P.M. President Norman Criddle occupied the chair. The minutes of the previous Annual Meeting were read and approved. The Secretary presented the report of Council for the year 1926 and the Treasurer gave the financial statement of the Club. The motion to amend the Constitution of the Ottawa Field-Naturalists Club, notice of which was given at the last Annual Meeting and published in the November, 1925, *Canadian Field-Naturalist*, was passed unanimously. This motion is as follows:

> "Be it resolved that the words 'one "dollar and fifty cents' be deleted from "Article IV of the Constitution, and the "words 'two dollars' be substituted there- "for."

The question of the advisability of removing the Club's oil painting of the late Dr. James Fletcher from the Carnegie Public Library to the Victoria Memorial Museum was considered and a Committee was appointed to investigate this matter and report to Council.

The following officers and additional Members of Council were elected for the year 1927:

President, Norman Criddle; 1st Vice-President, Dr. E. M. Kindle; 2nd Vice-President, C. L Patch; Secretary, Dr. J. F. Wright; Treasurer, B. A. Fauvel; Councillors, Dr. H. M. Ami, Dr. R. M. Anderson, Miss M. E. Cowan, Dr. R. E. DeLury, Miss Faith Fyles, Arthur Gibson, Herbert Groh, C. B. Hutchings, Andrew Halkett, D. Jenness, C. E. Johnson, Frits Johansen, A. G. Kingston, Hoyes Lloyd, H. F. Lewis, Norman J. Leach, Dr. M. O. Malte, G. A. Miller, W. T. Macoun, Rev. G. A. MacDonald, Dr. M. G. McElhinney, Prof. E. E. Prince, H. I. Smith, C. M. Sternberg, P. A. Taverner, E. G. White, G. W. White, W. J. Wintemberg, and the Presidents of the Affiliated Societies.

Following the business session, Dr. R. E. DeLury gave a very interesting and educational address on Bird Banding. Over 50 lantern slides of excellent photographs depicting the various habits of birds were shown. During the past four years, Dr. DeLury has personally banded 1,600 birds. These birds were captured in his garden or on the grounds of the Central Experimental Farm and many of the banded birds have returned three and four years in succession. The photography of birds and a study of their habits and migration are hobbies of Dr. DeLury, and many personal observations and experiences were told in an interesting manner.—J. F. WRIGHT, *Secretary*.

STATEMENT OF THE FINANCIAL STANDING OF THE OTTAWA FIELD-NATURALISTS' CLUB AT THE CLOSE OF THE YEAR 1925-26.

ASSETS.		LIABILITIES.	
Cash in Bank	$22.54	The Graphic Publishers (printers)	$403.61
Cash on hand	3.57	Editor	50.00
Unpaid membership dues for 1925	9.00		
Unpaid membership dues for 1926	123.00		
Bills receivable	84.59		
Deficit	210.91		
	$453.61		$453.61

RECEIPTS.		DISBURSEMENTS.	
By Balance on hand	$31.93	Graphic Publishers (printers)	$1,047.15
MEMBERSHIP DUES:—		Graphic Publishers—Reprints and Illustrations	99.85
Current	825.83	Postage	15.66
Arrears	25.50	Exchange	22.05
Advances	17.00	Sundries	17.25
Affiliated Societies	45.10	Editor	22.20
Advertisements	82.00	Balance in Bank	22.54
Back numbers and Separates	83.29	Balance on Hand	3.57
Reprints and Illustrations	79.77		
Donations	60.15		
Interest on Bond	27.50		
	$1,250.27		$1,250.27

STATEMENT RESERVE FUND COMMITTEE

RECEIPTS.		DISBURSEMENTS.	
Cash on hand, Jan. 1, 1926	$174.41	Interest Payment to General Club Fund, 1925-26	$27.50
Received from the R. B. Whyte Estate	100.00	Cash Balance	281.66
Interest from Bank	7.25		
Interest on Bond	27.50		
	$309.16		$309.16

ASSETS.

Bank Balance	$281.66
Victory Bond, 1934	520.00
	$801.66

AUDITED AND FOUND CORRECT:
(Signed) A. E. BATEMAN, *Auditor.*
January 7th, 1927.

NOTES AND OBSERVATIONS

"FREAK" IVORY GULL (*Pagophila alba*).—On December 24th, 1926, I received from Mr. T. H. P. Lamb, of Moose Lake, Man., a bird in the flesh, together with the following data: Date, Shot: Dec. 11, 1926; Place, Egg Lake, north of Moose Lake; Specimen: apparently Freak Gull; Name of Sender, Wm. McKenzie per T. H. P. Lamb.

The "Freak" was a beautiful adult female Ivory Gull (*Pagophila alba*) and constitutes the second record of the species in Manitoba. There was nothing in the stomach and the bird appeared to be somewhat emaciated. Measurements as follows: Length, 17.00; spread, 40.00; Folded wing, 12.50; tail, 5.10; bill, 1.25; tarsus, 1.375.

The first record, now a mounted specimen in the collection of the late E. W. Darbey, is a juvenile in the mottled gray and white plumage and bears the following date on the base of the mount: "December 27th, 1915, Woodlands, Man."—B. W. CARTWRIGHT.

BIRD BANDING IN 1798.—In a book by Lt. Col. P. Hawker, edited by Eric Parker, entitled *Instructions to Young Sportsmen in all That Relates to Guns and Shooting* (published by J. B. Lippincott Company, Philadelphia, 1922) the following reference to an early bird banding record is noted in a chapter devoted to woodcock hunting:

". . . . To prove that woodcocks, on having migrated into the country (England) will repair to the same haunts for a succession of winters, I shall mention a circumstance, not as having

pilfered it from Mr. Bewick or Mr. Daniel, but because it was related to me by the late Mr. Pleydell himself, when I was at Whatcombe House, where the bird is now preserved.

"In Clenston Wood (a covert belonging to the above place, in Dorsetshire) a woodcock was taken alive in one of the rabbit nets, in the month of February, 1798. Mr. Pleydell, after having a piece of brass marked, and put around its left leg allowed the bird to be set at liberty; and in the month of December following, he shot *this woodcock*, in the very same coppice where it had been first caught by his gamekeeper. . . ."—R. W. TUFTS.

A CORRECTION.—In the review of Taverner's *Birds of Western Canada* in the November *Canadian Field-Naturalist*, the outline drawings in the key (pages 23-34) are referred to as the work of the author. This is an error as most of them first appeared in Taverner's *Birds of Eastern Canada*, and are duly credited to Mr. Claude E. Johnson in the introduction to that work. Those scattered through the text are by the author. The Swainson's Hawk plate is also by Mr. Johnson.—J. H. F.

BOOK REVIEW

NEW PHYSICAL GEOGRAPHY. *By Ralph S. Tarr and O. D. Von Engeln. Revised Edition; The MacMillan Company, 1926.*

A geographical guide book written many years ago by the genial Bill Nye and James Whitcombe Riley commended itself to the reader with the statement that it was not "Cursed by a plethora of facts or poisoned with information". If measured by the standards of the famous humorist and the Hoosier poet, the 689 pages of the New Physical Geography by Professors Tarr and Von Engeln contain enough geographical data to merit utter condemnation.

The comprehensive view which this admirable volume gives of the development of the physical features of the earth depends in no small degree upon the large number of significant diagrams, maps, and photographs which are so lavishly distributed throughout the text. The late Prof. Tarr, author of the original edition, was a great teacher and a geographer of wide experience. He was deeply interested in problems of glacial geography and the volume is especially strong on this side of the subject. Tarr's direct and clear style gave the original edition wide popularity. Prof. Von Engeln has revised and brought the old edition up to date without losing any of the features which made the first edition popular both with students and their parents. The publishers have given this volume a handsome cover adorned with an embossed figure of one of the great natural bridges of Utah. The student is introduced first to the earth in its relations to the solar system, then in succession to the major physical features —rivers, mountains, plateaus, the ocean, etc. The distribution of plants and animals is dealt with in two chapters.

The final chapter in the volume, which deals with Man and Nature is followed by a sixty-page appendix This includes the discussion of a variety of subjects, among which are the International date line, meteorological instruments, the use of a watch for determining directions and a method of establishing a true north and south line without the use of a compass.

Our recent entrance into the automobile era of universal travel should result in a new and greatly increased demand for such a book as this. No auto tourist can properly or adequately enjoy his excursions without knowing the physical history which lies behind the scenery of the landscape.—E.M.K.

FRERE MARIE-VICTORIN—*Les Lycopodinées du Quebec et leur formes mineures. (Contributions du Laboratoire de Botanique de l'Universite de Montreal. No. 3, Montreal, 1925.)*

This interesting contribution—117 pages with 11 figures—which deals with the families of *Lycopociaceæ*, *Isoetaceæ*, and *Selaginellaceæ*, as represented in the Province of Quebec, is divided into two parts.

In the first part the author discourses critically and in fascinating detail the various species, varieties and forms from historical, geographical, taxonomical, and phylogenetical points of view.

In the case of those sections of *Lycopodium* in which the largest amount of variation is found i.e., *Clavata* and *Complanata*, the relationship of the species, varieties, and forms is illustrated by diagrams portraying the author's conception of their probable ancestral development. No less than twenty new varieties, forms and combinations are proposed, as follows:—

L. clavatum L., var. *subremotum* Vict.

L. clavatum L., var. *megastachyon* Fern. & Bissell, forma *furcatum* (Luerss.) Vict.

L. clavatum L., var. *laurentianum* Vict., forma *furcatum* (Luerss.) Vict.

L. clavatum L., var. *subremotum* Vict., forma *frondosum* Vict.

L. clavatum L., var. *subremotum* Vict., forma *furcatum* (Luersss.) Vict.

L. clavatum L., var. *subremotum* Vict., forma *frondescens* (Luersss.) Vict.

L. obscurum L., var. *dendroideum* (Michx.) D. C. Eaton, forma *proliferum* Vict.

L. obscurum L., var. *dendroideum* (Michx.) D. C. Eaton, forma *exsertum* Vict.

L. obscurum L., var. *dendroideum* (Michx.) D. C. Eaton, forma *exsertum-furcatum* Vict.

L. obscurum L., var. *dendroideum* (Michx.) D. C. Eaton, forma *monostachyon* Vict.

L. sabinæfolium Willd., var. *patens* Vict.

L. sabinæfolium Willd., var. *superfertile* Vict.

L. tristachyum Pursh, var. *laurentianum* Vict.

L. tristachyum Pursh, var. *Habereri* (House) Vict.

L. flabelliforme (Fern.) Blanchard, var. *ambiguum* Vict.

L. flabelliforme (Fern.) Blanchard, forma *proliferum* Vict.

L. complanatum L., var. *canadense* Vict.

L. complanatum L., var. *elongatum* Vict.

L. complanatum L., var. *elongatum* Vict., forma *simplex* Vict.

The second part deals with the *Lycopodineæ* systematically. It contains, besides descriptions of the species, varieties, and forms, detail information regarding their geographical distribution, as well as notes pertaining to morphology and ontogeny. Analytical keys to the species, varieties and forms are also provided.—M.O.M.

FRERE MARIE-VICTORIN—*Sur quelques Composées nouqelles rares ou critiques du Québec oriental (Memoires de la Société Royale du Canada, Sér. III, Tome XIX, Section I, pp. 79-96, 1925). With four plates and three figures in the text.*

The results of recent years' botanical explorations in the region of the Gulf of St. Lawrence have brought to light many facts which make this are a one of the most interesting ones in eastern North America. Instead of being, from a floristic point of view, rather uniform and homogenous, as the region up to quite recently has generally been supposed to be, it has been found to be an important centre for endemic plants, a museum for antiques sheltering relicts of old floras which have either disappeared or are now found in far distant regions.

Among the elements of this relict and endemic flora the *Compositæ* play an important part, and several species are particularly interesting on account of the phytogeographical problems which they present.

Cirsium minganense Vict., a new species discovered by Bros. Victorin and Rolland-Germain on ile Quin in the Mingan archipelago, is a beautiful example of the strange types which are found in the Gulf of St. Lawrence region. It has no near affinities in eastern North America, its closest relative being *C. foliosum* (Hook). DC., a western species ranging from Saskatchewan and British Columbia to Colorado.

Other species with a peculiar geographical distribution discussed by Brother Victorin are:—

Senecio resedifolius Less., originally described from the Altai mountains, recorded from various points in Siberia, Alaska and Yukon, and discovered by Fernald in Newfoundland and in the Gaspé peninsula in the Province of Quebec.

Senecio pauciflorus Pursh, ranging from Yukon to Wyoming and California, and in eastern North America from Labrador and Newfoundland to the Gaspé peninsula.

Senecio indecorus Greene, distributed from British Columbia to Idaho and California, and in eastern North America from the Gaspé peninsula to Lake Superior.

Erigeron compositus Pursh. var. *multifidus* (Rydb.) McBride & Payson. recorded from Greenland, Grinnel land, Ellesmere land, Melville island, Banks island, Wollaston land, the arctic coast from Bernard Harbour to the Mackenzie River delta, and in the high mountains from Alaska to California. Its discovery in the Gaspé peninsula, by Bro. Victorin and associated botanists, is obviously of great botanical interest.

Reference is also made to a statement by Sir William Hooker saying that *Erigeron uniflorus* has been collected by Goldie on a river bank near Quebec, a statement which the author is inclined to believe as correct.

In explanation of the peculiar distribution of the above plants and particularly of their occurrence in the Province of Quebec, the author contends that certain sections of Labrador and Newfoundland, the higher parts of the Gaspé peninsula, and even certain low-lying land along the Gulf of St. Lawrence, unlike the rest of eastern Canada, escaped glaciation. In these sections, veritable Noah's Arks, as the author expresses it, the Cordilleran and endemic plants have presisted, and have sometimes spread slightly into surrounding territory.

Other species and varieties discussed by the author are *Senecio pseudo—Arnica* Less, of which a new variety, *Rollandii* Vict., from the Mingan archipelago, is described; *Solidago puberula* Nutt., with two new varieties, *expansa* Vict., and *borealis* Vict., twelve species of *Antennaria*, and seven of *Arnica*.—M.O.M.

FRERE MARIE-VICTORIN—*Etudes floristiques sur la region de la Saint-John (Contributions du Laboratoire de Botanique de l'Université de Montréal, No. 4, Montréal, 1925), 174 pages with 28 figures in the text.*

This memoir embodies the botanical results from two journeys to Lake St. John, Que., one in 1921, and the other in 1922. After a brief but comprehensive summary of the geological, physiographical, and metereological factors which particularly influence the character of the vegetation, the author devotes a chapter to previous botanical explorations in the Lake St. John district. He recalls that Michaux, who passed through in 1792, was the first botanist to visit the region, and gives rather extensive and interesting extracts from the Journal of this distinguished explorer. He further relates how about three-quarters of a century lapsed before the Lake St. John district was again botanically investigated, and that since then only about half a dozen botanists have visited the region. No wonder, then, that the Lake St. John region, being so far almost entirely neglected, attracted the interest of Brother Victorin and botanists associated with him, viz.: Bro. Leopold and Mr. Jules B. Brunel who accompanied him on the first journey, and Bro. Rolland-Germain and Mr. Edouard Laruin who joined him on the second.

In Chapter IV the author gives an exceedingly interesting account of the plant associations found in various localities and of the more outstanding botanical discoveries. It would require too much space to refer to all of them; a few, however, may be briefly mentioned.

Thus, *Empetrum atropurpureum*, previously known only from Maine, Vermont, New Hampshire, Prince Edward Island, and Magdalene Islands, was discovered near Chicoutimi. *Ulmus americana*, erroneously determined *U. fulva* by Saint-Cyr, reaches its northern limit at Lake St. John which also forms part of the northern border line of *Pteretis nodulosa*, *Juncus subtilis*, and *Juncus Vaseyi*. *Rosa Johannensis*, previously known only from the St. John river basin in Maine and New Brunswick, but later found in the vicinity of Quebec city and Ottawa, also reaches its northern limit at Lake St. John. It is also interesting to note that homogenous colonies of distinct forms of *Sagittaria latifolia* were found growing side by side under absolutely identical conditions, a fact that strongly indicates that the different variations of this polymorphous species, generally considered as modifications due to varying conditions of the habitat, may in reality represent varieties of a hereditary nature. The most important discovery, however, was that of halophytic asscoiations, including *Lathyrus maritimus*, *Triglochin maritima*, and *Juncus balticus* var. *littoralis* which, in the author's opinion, are relicts of an old maritime, littoral flora probably dating back to the Champlain period.

In Chapter V the author gives an annotated list of the species and varities actually collected, omitting those that were merely observed. This list includes 6 Hepatics, 39 Mosses, 34 Pteridophytes, and 266 Phanerogams.

Finally, in Chapter VI the author discusses a number of special questions, mostly pertaining to different noteworthy plant associations.—M.O.M

REPORT OF THE GAME COMMISSIONER FOR THE YEAR ENDING APRIL 30TH, 1926. *Department of Agriculture, Regina, Sask.*

The task of preserving our wild life becomes increasingly difficult as the years roll on. Cultivation of the land, rapid transit of hunters by motor cars, more efficient fire arms and a greater demand for furs, have all added immeasurably to the difficulty. Indeed it now requires all the ingenuity of our conservationists and the hearty cooperation of the community at large to prevent many of our most important game and fur-bearing animals from being exterminated. Realizing this, it is interesting to turn to the report before us and note what the Saskatchewan authorities are doing towards this end.

The report begins with a resume of the staff which, we note, consists of 10 permanent and 413 voluntary game guardians. Under the heading of "Convictions" the Commissioner remarks "Game laws are made for the guidance of sportsmen and for the restraint, or if they will not be restrained, for the punishment of hunters who are not true sportsmen, and who will not play the game fairly." A general statement follows showing the prevalence of various game birds, big game and fur bearing animals. It is interesting to note here that the Whooping Crane, which has for a number of years been on the verge of extinction, was reported by a number of observers, and that it may, with care, still be permanently preserved.

Under the heading of: "Statement Showing Estimated Number and Kind of Game Birds Killed", we find the following interesting table:

	1925	1924
Ducks	536,000	618,000
Geese	14,400	22,000
Prairie Chicken (mostly Sharptails)	112,000	180,000
Ruffed Grouse	28,000	54,000

An equally important table is furnished under: "Statement Showing the Number and Kind of Big Game Animals Killed." This covers a period of 10 years and it indicates that the animals

involved have apparently maintained their original numbers despite a yearly toll of approximately 1320 individuals.

To the reviewer one of the most interesting items in the report is that dealing with coyotes. It is evident from this that there are a number of farmers and trappers who look upon the animal as an asset. Strong condemnation is voiced by correspondents for the use of snares as being wasteful because of the number of coyotes that escape, and dangerous to domestic animals. Several writers also ask to have the coyote protected in order that it may assist to cope with the plague of jack rabbits now doing considerable damage to crops in certain parts of the province. Following the discussion on coyotes we reach a table giving the estimated value of furs bought from Saskatchewan trappers which are said to total more than $1,880,000. Of this amount coyote skins brought in approximately $310,090 and weasels $87,816. In other words, more than 31,000 coyotes and 87,800 weasels were killed during the year. Of the other fur animals taken, muskrats easily head the list with 856,829 pelts, providing an estimated value of $899,670.

The report for 1925 makes equally interesting reading and we feel that Mr. Bradshaw, the Game Commissioner, is to be heartily congratulated on the splendid work his department is doing to perpetuate the wild life of Saskatchewan. —N.C.

THE ROMANCE OF FOSSIL HUNTING. Natural History, *The Journal of the American Museum* Volume XXVI, No. 5, September-October, 1926.

The title of the September-October number of the American Museum Journal affords an index to its character which needs but little elaboration by the reviewer. Contributions from 17 Palæontologists make this a notable number. It presents a large variety of judiciously chosen information about the methods, results and adventures of those engaged in disclosing the history of ancient life which should appeal to every kind of palæontologist from the youngest amateur to the hardest-boiled specialist, and to the general public as well. Probably no other magazine has ever marshalled in a single number contributions from so many distinguished palæontologists. The field covered ranges in latitude from Canada to Patagonia and in longitude from New York to Mongolia.

The historical perspective reaches back to the heroic days of fossil collecting in the Western States when pick and hammer must be supplemented by the rifle and a good eye for hostile Indians. Western conditions of life in the seventies are brought vividly before the reader by photographs of Marsh's early expeditions. Professor Lull drops into his account of western collecting a bit of novel synonomy indicating that the Indians "Big horse struck by lightning" is *Marsh's Brontotherium* or thunder beast. The beginner in geology who thinks Palæontology a dull class-room subject will doubtless be surprised to learn from these articles that the collector's life in the field still has plenty of spice and novelty although the red man has ceased to be a factor in it. We are informed that in Arkansas the collector is sometimes considered to be a person of unsound mind, while in Oklahoma he may be taken for a horse thief. What is thought of him in the fundamentalist districts of Tennessee we are not advised.

This fascinating symposium on fossil hunting is likely to make the geologist who is still in the plastic stage feel the lure of the unfathomed history of life with a force that may last a life time. Riggs tells us in it how the sage brush plains of Wyoming and the inspiration of a great teacher lead him to spend a series of years in Patagonia. In another part of the symposium, Professor Berry in recounting his experiences in the Andes records the nearest reported approach of a palæontologist to heaven. Such a mosaic picture of the fossil hunter's life afield should go far towards capturing the fancy of the young geologist before he has fallen for the gold of the oil kings and in keeping him in the straight and hungry path of palæontology where the harvest is so large and the workers so few. The editor, Dr. Chester Reeds, is to be congratulated on its assemblage as well as for his own contribution to it.—E.M.K.

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Sets of the publications of the Ottawa Field Nataralists' Club are not numerous, and the most important libraries are taking pains to complete their files. The Club cannot guarantee to fill orders for all back volumes, but enquiries from librarians and others will receive every attention. Address the Secretary, Dr. J. F. Wright, Geological Survey, Ottawa, or the Treasurer, B. A. Fauvel, 321 McLeod Street, Ottawa.

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CONTENTS

	PAGE
Two New Species of Oenothera. By Prof. R. Ruggles Gates	23
The Genus Amesia in North America. By Henry Mousley (*Concluded*)	28
Production of Eider-Down in Canada. By Harrison F. Lewis	31
The Earliest Recorded Observations on American Birds. By T. L. Thacker	38
Habits of the Mountain Bluebird in Manitoba. By Norman Criddle	40

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. XLI. OTTAWA, ONTARIO, FEBRUARY, 1927 No. 2

TWO NEW SPECIES OF OENOTHERA

By PROF. R. RUGGLES GATES

King's College, University of London

AMONG *Oenotheras* obtained from various parts or the world are two species whicl. it is necessary to describe, because they are being used in genetical and cytological studies which will be published later. One or these was introduced into Tasmania from an unknown source. The other was collected wild on the northern shore of Lake Erie. The history and descriptions of these species are as follows:—

In January, 1924, Professor W. E. Agar of the University or Melbourne, collected and sent to me seeds of an *Oenothera* which he found growing within a few yards of the shore at Burnie, Tasmania. Its long, straggling stems and small leaves were characteristic. I have no means of knowing whence or when it was introduced into Tasmania. The seeds were sown in sterilized soil in the greenhouses of the Royal Botanic Gardens, Regents Park, and germinated abundantly. producing about 200 plants which were very uniform in all their characters. Fig. 1 shows a rosette of one of these plants. The following year two cultures (Nos. 18 and 19) were grown, each from selfing a different plant of the previous generation. They numbered respectively 228 and 87 plants, and were again

Fig. 1—ROSETTE OF *Oenothera Agari.*

strikingly uniform except for one mutant (Fig. 4) with much narrower linear leaves which appeared in culture No. 19. In 1926 a small culture of 11 plants was grown from one selfed flower of culture No. 18. They were again very uniform and were chiefly used in making up the description below. Figure 2 represents one of these plants in the flowering stage, and Fig. 3 a flowering shoot showing the bracts, a wilting flower and the "sprung" sepal tips.

Extensive measurements of petal-length were made in a study of fluctuation in the flower-size of pure races, and its relation to climatic conditions. In 1924 100 petal measurements made on five plants gave a modal length of 33 mm., while in 1925 the modal length from 3529 measurements on 26 plants was 27 mm., with a range of fluctuation from 21-33 mm., only three petals reaching the length of 33 mm. This decrease in petal-size in the second generation might be due to a seasonal difference in the climatic conditions, but it is more probably due to a genetic difference in the flower-size of the parent plant. These observations are a part of an extensive study which is being made of size-inheritance, and they are only referred to here to show how widely the flower size of an otherwise relatively constant species may vary. Type specimens are preserved in the Herbarium of the Botanical Department, King's College, London.

Fig. 2—*Oe. Agari* IN FLOWER.

Description. *Oe. Agari* n. sp.

Leaves of mature rosette: Length 12-18 cms. width 10-18 mm. (mostly 13-16 mm.), nearly linear, slightly lanceolate, acute, glabrous, narrowing very gradually to a slightly winged plano-convex petiole, midrib whitish above and below, margin distantly and evenly repand-denticulate. From this rosette of narrow leaves a central stem and a ring of 6-8 basal branches or side shoots arise simultaneously, which are as tall or taller than the central stem, 60-80 cm. high. The stems are slender and wiry, at first upright, the basal branches later becoming long and straggling. Stems diffuse pale red, fine pubescent, terete, redder towards the top.

Basal stem leaves sessile, resembling the rosette leaves, 13 cm. long, sessile, widest at base, linear, width 10-13 mm., finely pubescent only on margin, apex acute. Bracts pubescent below when young and slightly pubescent above, midribs and lateral veins red below green above, resembling in shape the cauline leaves, lowermost bracts 5-6 cm. long.

Flowers: The flowers are scented and fade quickly in hot sun. The inflorescence is lax and elongated after flowering. Petals mostly 24-32 mm. long, 27-35 mm. wide, deeply obcordate, somewhat reduplicate and concave, deep yellow with a brownish orange spot at base, petals turning orange when faded and deep orange-red when dying. Stigma surrounded by the anthers, style 40-42 mm., stigma lobes 9 mm., opening out flat. Ovary terete, 16-18 mm. by 2-2.5 mm., slightly quadrangular, hypanthium 28-30 mm. long, 1 mm. in diameter at base, broadening out above to 5-6 mm. Bud cone 20 mm. long, 5-6 mm. broad at base, slightly quadrangular and conical. Sepals, hypanthium and ovary reddish, especially along the veins, with long and short patent hairs intermixed with red papillæ bearing long hairs. Sepal tips subterminal with small red glandular apex and red inner face. Capsules: Reaching 30 mm. in length, about 5 mm. diameter, and gradually tapering to the base, green, glabrous but with scattered patches of long hairs arising from light green papillæ. Seeds

smaller, paler brown and less angular than in the *Lamarckiana-biennis* group.

The species stands apart from the *Lamarckiana-biennis* group of species in a number of features, notably the sub-terminal sepal tips, the wilting and colour-changes of the petals, and the habit with numerous wiry lateral shoots equalling in length the central stem. Many attempts have been made to cross it with species of the *Lamarckiana* group, but without success. Within this group, as is well known, the species can be readily intercrossed, although in nature many of the species are self-pollinated.

The most distinctive features of this species are (1) the long and narrow rosette leaves gradually passing into cauline leaves and bracts of similar form; (2) the habit, with a ring of basal wiry reddish branches as long as the slender central stem; (3) the petals of medium size, deep yellow with a basal brownish orange spot, fading quickly to orange-red, (4) the sub-terminal sepal tips separated at base, arcuate and reddish on the inner face.

Oe. Agari resembles *Oe. argillicola* in certain respects, such as the nearly linear

Fig. 3—A Flowering Shoot of *Oe. Agari.*

Fig. 4—Narrow-leaved Mutant from *Oe. Agari*

leaves and the more or less suppressed central stem and the somewhat decumbent branches. But the latter species has much larger leaves and flowers, while the buds differ conspicuously in being rounded (like *Oe. grandiflora*) and in having the usual terminal sepal tips.

Diagnosis: Herba biennis. Folia radicalia 12-18 cm. longa, 10-18 mm. lata, pæne linearia, acuta, glabra, costa utrinque albula, margine sparse et pariter repando-denticulato. Caulis medius gracilis cinctus annulo ramorum pari altitudine ex imo caule surgentium, 60-80 cm. alta, aliquantum ad summum rubro et caule et ramis. Folia caulina gradatim breviora. Spica laxa, petala circa 25 mm. × 28 mm., maxime crocea, (1) cum flavo-lutea (1) macula ad imum maturius in rubescentem colorem marcescentia. Antheres stigma attingentes. Alabastræ subrufæ, obsolete quadrangulares, longis et brevibus patentibus capillis pubescentes cum rubris papillis quæ longos capillos ferunt, apices sepalorum præcipue

(1) The colours can only be approximated in Latin.

Fig. 5—SEEDLING ROSETTES OF *Oe. eriensis.*

subterminales, arcuata, interiore facie rufa.

Oenothera eriensis n. sp.

The seeds of this species were collected by me on August 24th, 1924, from one or two plants growing at a place called Colchester, on the northern shore of Lake Erie, Ontario. The plants had strikingly small flowers and very narrow leaves, and only a few plants were seen growing along the shore of the Lake. I have no means of knowing how wide its distribution may be, but such a distinct form obviously requires description. This form is very different from such small-flowered species as *Oe. muricata* or *Oe. parviflora*, and as cytological and genetical studies are now being made with it, the species must be described. The great variety of undescribed Oenothera species is not yet appreciated. Although this species, for instance, is very narrow-leaved, yet it is totally different in every character from such a narrow-leaved small-flowered species as *Oe. angustissima*, which I described (1) from Ithaca, New York.

The seeds of *Oe. eriensis* were sown in 1925; 123 plants germinated and were pricked out into flats. Fig. 5 shows the seedling rosettes. They were quite uniform and only 29 plants were grown on to maturity. One of these plants self-pollinated, yielded in 1926 a large number of seedlings, of which 46 were planted out and grown to maturity. Fig. 6 represents one of these in flower and fig. 7 a flowering shoot on a larger scale to show the stem, bract, bud and flower characters.

(1) Rhodora. 15 : 45, pls. 2. 1913.

Herbarium specimens of the small and evanescent rosette stage as well as the mature plant were collected from the culture in 1925 and are preserved as type specimens in the herbarium of the Botanical Department, King's College, London. The following description, with the exception of the rosette stage, is made chiefly from the living plants:

Leaves of mature rosette: Length 6-8 cm., greatest width 5-8 mm., very narrow oblanceolate tapering to a margined petiole, blade distinctly denticulate, both surfaces bearing fine pubescence. The evanescent rosette contains less than a dozen small leaves before elongation of the stem begins. Mature plant: Main stem 8-10 cm. high, no rosette, stem rather slender, terete except where a low ridge runs up to each leaf, green with a few patches of diffuse red near the base. The brownish bark exfoliates in strips near the base, but higher up the green stem has a harsh fine appressed pubescence. The upper part of the stem is bent over nearly horizontal. This appears to be a response to light and to be intermittent, resulting in a stem which is erect below but with various irregular bends in its upper part. Lateral branches arise some distance above the base and are also bent at the tips. They have no basal collar. The upper 15 cm. of stem and branch tips bears scattered hairs arising from red papillæ.

Stem leaves sessile, or with short, winged, plano-convex petiole, lanceolate, 9-13 cm. long, about 12 mm. wide, dark green above, paler below, without any red, margin distantly and irregularly repand-denticulate, scattered fine appressed pubescence on both surfaces, more closely grouped on midrib below, midrib whitish. Lower bracts 12 cm. long, 20 mm. broad, lanceolate, acuminate, narrower at the base, sessile, with distinctly glandular callosities at the margin, and short thin appressed pubescence on the surface.

Flowers: In the English climate at least, the early axillary buds (July) turn yellow and abort when very small. Inflorescence dense, elongating in fruit.

Petals: 9-15 mm. long, 8-12 mm. broad, obovate

cuneate with a wide shallow sinus, yellow, fading not rapidly to a pale orange. Style short, stigma lobes spreading only to 45°, style 26-30 mm. long, stigma lobes 4-4.5 mm. long. Ovary with four grooves, somewhat quadrangular, about 15 mm. long, 3-3.5 mm. in diameter at the base and 2.5-3 mm. at the top. Hypanthium 24-27 mm. long, 2-2.5 mm broad, slightly swollen at the base, quadrangular, broadening out to 5 mm. diameter above. Bud cone 10-22 mm. long, distinctly pyramidal, 5 mm. diameter at base. Sepal tips 4-4.5 mm. long, slightly subterminal, parallel, green except the apex which is red and glandular. Apex of sepals warted, yellowish. Ovary, hypanthium and sepals green, with fine appressed pubescence, the long hairs of the ovary arising from red papillæ. Capsules reaching nearly 40 mm. in length, 8 mm. in diameter, considerably broader at base, tapering to the tip, green, nearly glabrous but with a few short scattered hairs arising from green papillæ.

The evanescent rosette of small narrow leaves, the irregularly nutated stems and

Fig. 6—*Oe. Eriensis* in Flower.

branches, the latter arising high above ground, the small flowers and nearly glabrous capsules are characteristic features of this species.

Diagnosis: Folia radicalia parva evanescentia, angustissime oblanceolata, circa 7 cm. longa, 6 mm. lata, utrinque subtiliter pubescentia. Caulis teres sed non qua jugulum ad folium tendet, viridis, cortex leviter nigrescens, prope ad imum caulem exfoliatus, superiore parte asper tenuis appressa pubescens, apex non regularis horizontalis nutatus, supra basi ramis cum apicibus etiam nutatis instructus. Folia caulina sessilia lanceolata, circa 10 cm. longa, 22 mm. lata, sparse repando-denticulata, utrinque sparse tenuibus capillis appressis pubescentia, et densius sub inferiore parte costi. Spica densa; alabastræ virides, tenues appressæ pubescentes; petala flava, 9-15 mm. longa, 8-12 mm. lata. Stylus brevis, stigma inferius antheribus. Capsulæ circa 40 mm. longæ, 8 mm. latæ, virides, pæne glabræ.

Fig. 7—A Flowering Shoot of *Oe. Eriensis*.

THE Genus Amesia IN NORTH AMERICA

By HENRY MOUSLEY

NOT only is the range of colour in the flowers very great, but the shape of the lip-bosses varies enormously, and in a lesser degree that of the raised moulding and hypochiles also, as can be seen in Figure No. 2, Plate No. 2. In every case there are two lip-bosses, and in many three. Some of these are very rugose, others comparatively smooth, and little raised above the surface of the lip, in fact if it was not for the central moulding, some lips might possibly be called smooth. Such a case can be seen in Figure No. 10, in which the central-boss is wanting, the two side ones being very insignificant, and the central moulding not perceptible.

Figure No. 2 is an example in which the side-bosses are fairly well apart, the central boss appearing between them as a mere dot.

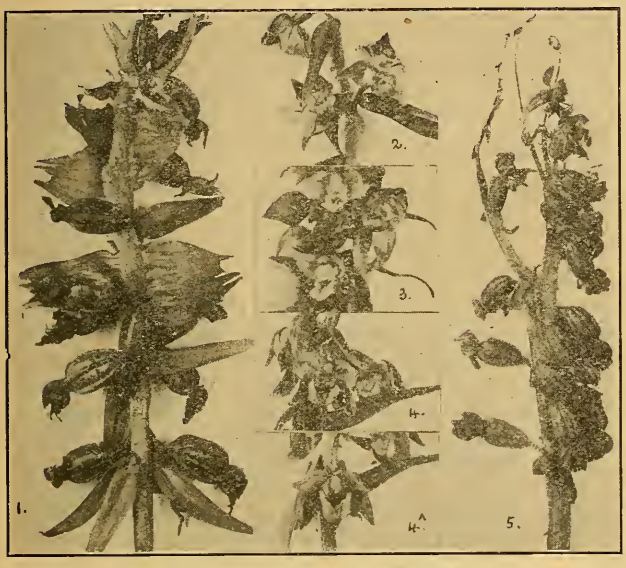
Figure No. 9 represents an almost rotund epichile, with the two side-bosses somewhat apart. As will be noticed, many of the lips curl under as in Figures Nos. 4 and 8, in extreme cases, the tip reaching to the centre of the hypochile, or even beyond.

In Figure No. 4, the greater part of the lip consists of a much raised triangular moulding with no distinct rugose or separate bosses. In some cases, this moulding has a very distinct central ridge, thus giving the central-boss—when there is one—the effect of extending right down to the extremity of the lip, as in Figure No. 7.

In other cases, the central-boss is very large, and when confluent with the side ones, a very distinctive lip is produced, such as that in Figure No. 12. In an extreme case I once came across the side-bosses were very large and prominent, extending right down to the tip of the lip, where they became confluent. The hollow space in between was devoid of any central-boss, thereby giving the side ones a very elongated appearance.

Another extreme case consisted of two fairly well raised side-bosses, somewhat long and pointed and wide apart, with a very long thin central-boss in between, extending almost to the tip of the lip, the open spaces between giving them the appearance of three long pendants. Possibly, enough has been said to give the reader an idea of the futility of trying to describe every kind of combination that one is likely to find in these lips, which, I may observe, were photographed natural size and then enlarged to about double, to give a better idea of the small details, and this same remark applies to Figure No. 3, Plate No. 3, showing the reproductive organs of the two species *latifolia* and *rubiginosa*. These are well portrayed in the central bloom (*A. latifolia*), which shows the large, round, and prominent rostellum directly in the centre of the upper edge of the stigma. Immediately to the right and left of the rostellum are the two staminodes, forming the shoulders of the stigma. Above them, and directly over the rostellum, are the two bundles of pollinia, and above these again comes the anther cap, which in this case is slightly raised above the pollinia but in the bloom above it is fitting tight down on the latter. The slightest touch of the rostellum, with an outward pull, is sufficient to detach the pollinia, and along with the latter comes the rostellum as well. At each end of the lower edge or lip of the stigmatic cavity, and corresponding to the staminodes or auricles on the upper edge appear two other auricles, or as I prefer to call them, papillæ, for they really look more like little nipples, whereas the staminodes above more nearly resemble auricles or ears. These two papillæ are typical of what one usuallly finds, and are clearly visible in Figure No. 3, but on July 26, 1925, out of 112 plants examined, two blooms had a third papilla, exactly halfway between the other two, thus bringing it directly below the rostellum. This matter puzzled me at first, until one day I happened to be reading the chapter on the homologies of the flowers of orchids in Darwin's book, "The various contrivances by which orchids are fertilized by Insects," 2nd Ed., 1888, pp. 232-246, and looking at the diagram on page 236, it suddenly struck me that probably this third papilla corresponded to the a3—of the diagram, i.e., the third rudimentary anther of the inner whorl, for later on (page 242) we find the following, viz.: "Finally, then, with respect to the six stamens which ought to be represented in every Orchid: the three belonging to the outer whorl are always present, the upper one being fertile (except in *Cypripedium*), and the two lower ones invariably petaloid and forming part of the labellum. The three stamens of the inner whorl are less plainly developed, especially the lower one, a3, which, when it can be detected, serves only to strengthen the column, running up the centre to the lower edge, or lip of the stigmatic cavity, and in some rare cases, according to Brown, forms a separate projection or filament; the two upper anthers of this inner

whorl are fertile in Cypripedium, and in other cases are generally represented either by membranous expansions, or by minute auricles without spiral vessels. These auricles, however, are sometimes quite absent as in some species of Ophrys." I regret now that I did not collect these two blooms, although I was fortunate enough in finding another on July 28, 1926, which is seen in Figure No. 2, Plate No. 3, the central nipple or auricle (right-hand bloom) being very distinct, while the two side ones are not nearly as pronounced as those in Figure No. 3. Another curious aberration consisted in a bloom having two perfect anthers with pollinia, as can be seen in the two views, Figures Nos. 4 and 4A, Plate No. 3. The second anther, although quite perfect, was very much smaller than the normal one, which latter, however, was a trifle on the skew, and not dead true over the rostellum. No other example of the kind has since been met with, the one in question being found on July 20, 1925. The year following, however, saw still one other curious aberration, in the shape of a plant the stem of which forked some few inches above the ground, both forks bearing a raceme of flowers which were in full bloom at the time of discovery, August 12, 1926.



AMESIA (EPIPACTIS) LATIFOLIA.
Montreal, Que.
July-September, 1925.

Fig. No. 1—Fusion of bract leaves. *Sept. 2, 1925*
„ „ 2—Central nipple on base of stigma.
„ „ 4 *and* 4a—Two views of bloom with two perfect anthers with pollen masses. *July 20, 1925.*
„ „ 3—Blooms showing large round rostellum, anthers and pollina.
„ „ 5—Forking stem. *Sept. 2, 1925.* *Aug. 13, 1925.*

The gathering of large bunches of the flowers —for purposes presently to be related—first drew my attention to the pleasant perfume they give off, which in the case of *A. rubiginosa* has been likened to vanilla by Correvon in his "Album des Orchidées d'Europe". As a contrast to this, the roots give off a most disagreeable odour. On one of the stations for these plants there is a large. Apiary, consisting of some two hundred hives, and my reason for gathering bunches of the flowers was for the purpose of determining whether honey bees had anything to do with the cross-fertilizing of these orchids, in view of the diverse experiences of several authors in the matter. Darwin distinctly states that he never saw a bee of any kind frequent the flowers, but that wasps were the great agents in removing the pollinia. Mr. A. D. Webster, in his "British Orchids", 1898, pp. 110-115, speaks of *E. latifolia* as being very imperfectly fertilized, that although visited by insects, cross-fertilization seldom takes place, and that self-fertilization by the pollen falling spontaneously on the stigma is not uncommon, three statements, two of which are quite at variance with my experiences in this country where of all the forty or fifty native orchids I am familiar with, it would be hard to find one that sets more capsules than *latifolia*. It is rarely self-fertilized, owing to the position of the stigma and the large rostellum, which prevents this, and moreover, almost as soon as the flowers open, they appear to be visited, and the rostellums together with the pollinia carried away. In many cases, I have found three and even four sets of pollinia on one stigma, and often one on the dorsal sepal as well, as described by Mr. Webster. I certainly have seen cases of self-fertilization where, owing to the lifting of the anther, the pollinia has twisted round from some cause or another, and has fallen over the top edge of the stigma, and on to the latter, thus causing self-fertilization to take place. It sometimes happens also, that the flowers fail to be visited by insects, in which case the pollinia often becomes swollen and friable, the anther cap lifts, and little pieces break away, and as in the other case get pushed over the edge of the stigma, and cause self-fertilization to take place, as before. These cases, however, I have found, are not of very frequent occurrence. Undoubtedly, the chief agents of cross-fertilization in this country are two species of wasp, the

Yellow Jacket (*Vespa germanica*) and the Black Wasp (*Vespa maculata*), both of which have visited the flowers in numbers—more especially the former—as I held a bunch of them in my hand, whilst sitting quietly in the sun. Owing to their short proboscis, they were obliged to push well into the flower to obtain the nectar, and it was seldom they went away without pollinia attached to their heads. Honey Bees—Italian strain— also visited the flowers freely, but in their case, owing to their longer proboscis, they were able to obtain the nectar without having to push so deeply into the flowers, and more often than not, in my case, went away without any pollinia. Still, they do a certain amount of cross-fertilization, for a friend of mine obtained better results than I did, during an hour's careful watching, when he saw a number of bees go off with the yellow pollinia attached to their heads. The larvæ of the Yellow Bear moth (*Spilosoma virginica*) feed freely on the leaves of *latifolia*, and no doubt on *rubiginosa* also, and I once found a larva of the Tiger moth (*Isia Isabella*) on one of the plants, but this was no doubt a mere coincidence, as this larva will eat anything that comes in its way.

As previously mentioned, I have come across three interesting forms of *A. latifolia* as follows, viz.:

Amesia latifolia (All.) Nels. and McBride forma **monotropoides** Mousley, f. nov.

Found growing at Monkland, Montreal, on August 19, 1925. Characterized by a total absence of chlorophyll, thus giving the plants the white appearance of the Indian Pipe (*Monotropa uniflora*). My first discovery of this form—for which I propose the varietal name *monotropoides*—consisted of four young plants growing under a thick hedge at Monkland, on July 29, 1925, none of which, however, flowered. Later on, also under a thick hedge, bordering a large wood about two miles from the first site, I again came upon two immature examples, but it was not until August the 19th, that I found my first flowering example, under the same hedge that had harboured the previous four small ones. This plant was 36 cm. in height, and with its ghost-like appearance under the shade of this thick hedge, gave one quite a thrill. The only colouring in the whole plant consisted of a very pale rose-mauve suffusion to the lower part of the stem, this same suffusion being found also in the petals and sepals of the eight blooms, the inside of the hypochiles being of a darker shade. The two side-bosses were somewhat prominent, pale rose-mauve in colour, and confluent with the smaller central-boss, corresponding exactly to lip No. 3, of Plate No. 3. I never saw the slightest sign of this form on Mt. Royal, in fact the district of Monkland—which is only five minutes' walk from my house—with its small woods and long fields, bordered by thick hedges, has yielded me most of the interesting forms described in this paper, but alas! owing to building operations, it will not be many years before all of them will be things of the past, so far as the district of Monkland is concerned. However, I am pleased to learn from Bro. Victorin that Mr. L. Fortier has a sterile specimen of low size, which he took at St. Francois de Sales, Laval Co., some fourteen miles to the north of Monkland. Col. Godfery writes me that he has never seen anything of the sort in *Epipactis* (*Amesia*), either in England, or on the continent of Europe, but that he found both *Serapias longipetala* (=*Serapias laxiflora*, *Helleborine longipetala*) and *S. lingua* (=*Orchis lingua*, *Serapias hirsuta*), with the whole plant a yellowish cream colour.

For easy reference, we may briefly sum up the foregoing as follows, viz.)—

Amesia latifolia (All.) Nels. and McBride forma *monotropoides* Mousley, f. nov.—Plants solitary, growing in deep shade, snow-white, pale rose-mauve suffusion to petals, sepals and lower part of stem only. Quebec: Monkland nr. Montreal, Aug. 19, 1925, Mousley (Type in National Herbarium, Ottawa, No. 116,715); St. Francois de Sales, Laval Co., Herbarium of L. Fortier; Monkland, Herbarium of Bro. Victorin, No. 22,018.

Amesia latifolia (All.) Nels. and McBride forma **alba** (Webster) Mousley comb. nov. *Epipactis latifolia* All. f. *alba* Webster Brit. Orchids, p. 21 (1898).

Found growing at Monkland, Montreal, on July 27, 1925. Characterized by its white flowers. This is a very beautiful and distinct form—sometimes attaining a height of 79 cm., which is my record so far—in which the petals and lips in some cases are pure white, whilst in others there is a faint suspicion of lilac or pale yellowish green in all cases. The bosses and raised portion of the epichiles are either very pale green or pale lilac. I have never found the form anywhere except at Monkland, and there the area is a very limited one, and the plants scarce. Mr. A. D. Webster, in his "British Orchids", 1898, p. 21, speaks of having found a very beautiful white form of the species growing on the railway embankment near Bangor, in North Wales, to which he gave the name *alba*, the white-flowered *Helleborine*, whilst the Drs. Stephenson speak of having found flowers of the same species which

apparently had white lips only. Briefly for easy reference, we may sum up as follows, viz.:—

Amesia latifolia (All.) Nels. and McBride f. *alba* (Webster) Mousley, comb. nov.—Plants solitary, growing in the open, flowers white. Quebec: Monkland, July 27, 1925, Mousley (specimen in National Herbarium, Ottawa, No. 116,716), also Herbarium of Bro. Victorin, No. 22,017.

Amesia latifolia (All.) Nels. and McBride forma **variegata** (Webster) Mousley, comb. nov. *Epipactis latifolia* All. f. *variegata* Webster, Brit. Orchids, p. 22 (1898).

Found growing at Monkland, Montreal, on June 27, 1925. Characterized by long streaks or patches of yellow in the leaves, their shape being governed by the venation, thus giving the leaf a variegated appearance. So far, I have only met with three plants, two sterile and one fertile, but the Drs. Stephenson seem to have come across similar ones in England, see "The Journal of Botany" for February, 1925, p. 35, whilst Mr. A. D. Webster, on page 22 of his work "British Orchids", speaks of a variety of which the leaves were conspicuously marked with creamy yellow bands, and which he named *variegata*, remarking also that it was perfectly constant under cultivation. Briefly, for easy reference, we may sum up as follows, viz.:—

Amesia latifolia (All.) Nels. and McBride f. *variegata* (Webster) Mousley, comb. nov.—Plants solitary, leaves variegated by yellow streaks or patches governed by the venation. Quebec Monkland, nr. Montreal, June 27, 1925, Mousley (specimen in National Herbarium, Ottawa, No. 116,717), also Herbarium of Bro. Victroin, No. 22,030.

Before concluding, it may be interesting to mention some of the principal plants I have found associated with *A. latifolia* and *A. rubiginosa*, which are as follows, viz.:—Staghorn Sumach (*Rhus typhina*), Choke Cherry (*Prunus virginiana*), Poison Ivy (*Rhus Toxicodendron*) Climbing Bittersweet (*Celastrus scandens*), Red Osier (*Cornus stolonifera*), Fox Grape (*Vitis riparia* ?), Hawthorn (*Cratægus punctata* and others), Viburnum (*Viburnum Lentago*), Tall Anemone (*Anemone virginiana*), Wild Columbine (*Aquilegia canadensis*), Bloodroot (*Sanguinaria canadensis*), Bracken Fern (*Pteridium latiusculum*), Tall Meadow Rue (*Thalictrum polygamum*), Purple Flowering Raspberry (*Rubus odoratus*), Hog Peanut (*Amphicarpa monoica*), Spanish Buttons (*Centaurea nigra*), Chicory (*Cichorium Intybus*), Large Coral Root (*Coral lorrhiza maculata*), Showy Orchis (*Orchis spectabilis*), Wood Betony (*Pedicularis canadensis*), Yarrow (*Achillea Millefolium*), Self-heal (*Prunella vulgaris*), and several species of Asters and Goldenrods.

In conclusion, I wish to extend my very best thanks to all those kind friends who have in any way helped me in the preparation of this paper. Especially am I indebted to the Drs. T. and T. A. Stephenson, Col. M. J. Godfery, Bro. Marie-Victorin, and Dr. M. O. Malte, the latter of whom, as on previous occasions, has made it possible for me to obtain the excellent photographs from which the plates have been made, these photographs having been taken by the Geological Survey, Ottawa, from plants supplied by myself, all of which, together with the rest of the material described in this paper, have been presented to the National Herbarium at Ottawa.

PRODUCTION OF EIDER-DOWN IN CANADA

By HARRISON F. LEWIS

THE EIDER-DOWN TRADE

EIDER-DOWN is the natural downy growth found among and beneath the feathers of the underparts of the female Eider Duck. Its stem or quill is not stiff. It possesses in a very high degree the qualities of softness, lightness, elasticity, and cohesiveness, and is a very poor conductor of heat. It is thus an ideal material for the filling of quilts, comforters and similar articles of bedding, and is used in small amounts in the lining of the backs of coats. From one and one-half to two pounds of cleaned eider-down is sufficient to make a large comforter.

The excellence and usefulness of eider-down for the manufacture of such articles has long been realized and a considerable quantity of it has been marketed annually, principally by the Scandinavian countries. Iceland's export of cleaned eider-down in 1902 was 5896 pounds; in 1919 it was 6,310 pounds. In 1920 the total amount produced in Iceland was 7,467 pounds, of which 5,610 pounds were exported. From Greenland 984 pounds were exported in 1890 and 1980 pounds, including some skins, in 1920. In Norway, also, there is a large trade in this commodity. While large numbers of Eiders are found in Canada the production of eider-down in this country has not

been efficiently carried on and has always been on a comparatively small scale.

Pearson and Bidwell* estimate the value of one pound of cleaned eider-down at 15s. 7d. to 16s. 8d., or $3.81 to $4.07. Quotations obtained by the Canadian National Parks Service in 1924 vary a good deal, but in general are from $3.00 to $5.00 per pound. Millais† states that the Icelandic companies in the eider-down business generally make a profit of 100 per cent from it.

At present the demand for eider-down in Canada and the United States is small, but this is undoubtedly due to the fact that in these countries the demand for this article has not been stimulated by advertising, and the average consumer has no knowledge whatever of true eider-down. In the past the annual world production of eider-down has been marketed almost altogether in Europe and has been absorbed by the European demand. There is no doubt that judicious publicity given to a product which combines so many desirable and inimitable qualities would soon create a considerable demand for it on this continent, and, since a regular production of Canadian eider-down can be assured by proper and inexpensive methods, a valuable trade in this commodity is capable of being developed in this country in a few years' time.

CANADIAN EIDER DUCKS

Four different kinds of Eider Ducks nest in numbers in Canada.

THE PACIFIC EIDER (*Somateria v-nigra*) breeds in the western part of Arctic Canada, as far east as the Coppermine River. It is common in many parts of this breeding range. It winters in Bering Sea and about the Aleutian Islands. Its down is similar to that of the American Eider, described below, but is lighter in colour.

THE KING EIDER (*Somateria spectabilis*) is a bird of far northern breeding range. In Canada it is found nesting on the Arctic coast and among the Arctic islands, as well as southward as far as northwestern Hudson Bay and northern Ungava. In winter it occurs as far south as the Aleutian Islands and Kadiak Island, Alaska; the Great Lakes; and Long Island, New York. Its down is darker than that of the American Eider, described below.

THE NORTHERN EIDER (*Somateria mollissima borealis*) is also a bird of the Arctic regions. In Canada it breeds on the Arctic coasts and islands from Ellesemere Land south to northwestern Hudson Bay and the Atlantic coast of Labrador north of Hamilton Inlet. In winter it is found from southern Greenland southward, rarely as far as Massachusetts. Its down is similar in colour to that of the American Eider.

THE AMERICAN EIDER (*Somateria mollissima dresseri*) is closely related to the Northern Eider, being another race of the same species. Its breeding range lies south of that of the Northern Eider. It nests in the southern half of Hudson Bay and from the vicinity of Hamilton Inlet on the Labrador coast south to southeastern Maine and southern Nova Scotia. It is especially abundant as a nesting bird on the north shore of the Gulf of St. Lawrence, and is found nesting on islands in the St. Lawrence River at least as far westward as the Pilgrim Islands and possibly as far as the Kamouraska Islands. In winter it still occurs on open water in the Gulf of St. Lawrence and about Newfoundland and is found from there southward regularly to the coast of Massachusetts. Its down is brownish-gray or mouse colour, but with a whitish area about the root of each separate piece, so that a mass of down appears brownish-gray with numerous flecks of lighter colour.

There are two other kinds of Eider Ducks, namely, Steller's Eider (*Polysticta stelleri*) and the Spectacled Eider (*Arctonetta fischeri*), that are found in North America in the vicinity of Bering Sea, but they are not known to nest in Canada.

Eiders have a variety of common names in various parts of their range. Some of the more common of these are: Sea Duck, Moyac, Moynak, Ducks and Drakes, Laying Duck, Shoreyer, Eskimo Duck, and Metic. On the north shore of the Gulf of St. Lawrence the Northern Eiders and King Eiders migrating along the coast are generally known as "Passing Birds". The King Eider is sometimes called "King Bird" or "King Duck".

Our Eiders are large Ducks, about 23 inches in length. During the greater part of the year the drakes are very conspicuously dressed in white and black, tinged about the head with greenish and, in the King Eider, with bluish gray. Shortly after the mating season they molt into a dark plumage, which they wear for three or four months. The female Eiders are grayish-brown and buffy, with fine markings of black and with two narrow lines of white across each wing, but without conspicuous coloured areas. Eiders bear little resemblance to other Ducks and are recognized immediately by residents of those regions where they commonly occur.

The sea is the natural home of the Eiders. They often remain at sea in large flocks if food is available there, especially in winter, when inshore waters are frequently ice-covered. They are expert swimmers and even the downy young have no fear of rough and breaking water. In

Ibis, 1894, p. 233.
†*British Diving Ducks*, Vol. II, London, 1913, p. 28.

the nesting season they are obliged to seek the vicinity of land, and then they may often be seen resting in groups on rocks or beaches. Favourite sandy beaches may become completely covered with their broad tracks. Though alert, they are not excessively wary and one may approach within gun-shot of them without great difficulty. When they are incubating, the females are occasionally so tame that they may be caught by hand on the nest.

The flight of Eiders is low and steady and is usually over the surface of the sea. On the spring migration they fly in flocks containing generally from fifty to three hundred birds of both sexes, indiscriminately intermingled. These move forward in long irregular lines which are extended at right angles to the direction of progress and are only a few feet above the surface of the water. When passing projecting points of land while on migration or while flying around the islands on which they intend to nest, Eiders often cut corners and pass over the land, and they are frequently shot from blinds at such times. In flying to and from their nesting sites or to and from ponds and lakes Eiders must also pass over the land.

Eiders feed chiefly upon mussels, sea-cucumbers, star-fish, and similar food, although small fish are sometimes eaten. They customarily obtain their food by diving for it to the sea-bottom. It has been proved that they reach at least a depth of thirty-five feet and it appears probable that they sometimes go even deeper than that.

Mating of the American Eiders usually takes place in May and June. During the mating season various courtship antics are indulged in, especially by the drakes. These have been well described by Dr. C. W. Townsend.* At such times is heard the wooing note of the drake, a gentle, dovelike *ah-ooo, ah-ooo,* many times repeated. A lower, softer note, which may be written *k-dooo, k-dooo,* is also used at times. The note of the female is guite different, a low, guttural *wawk-wawk-wawk-wawk-wawk,* uttered rather rapidly. Those species of Eider which nest in colder regions naturally tend to mate somewhat later than the comparatively southern American Eider.

The nesting date is chiefly determined by the time when open salt water appears near the nesting site, thus permitting food to be obtained readily, and by the time when suitable nesting sites become bare of snow. In 1923 the first nests which I saw among the Mingan Islands, Saguenay Co., Quebec, were three found on May 29, on which date two of them already contained four eggs each. In 1924 spring was very early on the north shore of the Gulf of St. Lawrence, and the Eiders nested correspondingly early in that region, so that on June 19 Mr. S. Oliver found 238 downy young in Aylmer Sound, near Harrington, and it was even reported to me that a brood of young had been seen near Wolf Bay about May 29. Farther north the Eiders of various species nest somewhat later, as would be expected

The nest of the American Eider is generally placed on the ground on some small island in the salt water. Some of this species, however, nest on large islands in salt water, some on small islands in rivers, lakes, and ponds near the sea, and some on the mainland itself. Where the American Eider nests on islands which are wooded in the ordinary sense the nest is generally placed in the shelter of low branches of some spruce or fir tree near the shore. Occasionally the place selected is far from the water and in the heart of thick woods, where the duck cannot fly, but must walk long distances in passing to and from the nest. On islands where there are no trees, or none more than two or three feet high, the Eiders' nests are apt to be scattered about wherever local conditions happen to please the nesting birds. On islands of sufficient size nests may be a mile or more from the sea and are then often near fresh water ponds where the ducks wash and take exercise. A favourite nesting site is under the shelter of low horizontal branches of stunted fir trees, about two feet high, which fill the shallow ravines and gullies on many islands. In other cases, the nest is placed close beside a rock, a small cliff, or a log of driftwood, from which it receives some shelter, but a few nests may always be found quite shelterless, either on the mossy hillsides or among the pebbles and low herbage of the beach. Nests sometimes are found in fairly dense groups, but this appears to be due not so much to a sociable nature, as to the attraction of especially favourable conditions in a small area. The nest itself is a slight hollow in the surface of the ground, lined with down and feathers from the duck's own body, more or less mingled with whatever foreign materials occur at the nest site

The nesting of the Northern, Pacific, and King Eiders resembles that of the American Eider, except that the shelter of vegetable growth is seldom available for Eiders nesting near the sea in the Arctic regions, with the result that the nests are more exposed, and except, also, that the King Eider, as I am informed by Dr. R. M. Anderson, prefers to nest about ponds at some distance from the sea, on large bodies of land, and is seldom found nesting in groups.

The lining of down and feathers usually appears at about the time the eggs are laid, but I have never been able to observe that there is any exact regularity as to the time when it is placed. Sometimes

A Labrador Spring, Boston, 1910, pp. 86-89.

the nest is well lined when it contains only the first egg of the set, and sometimes a complete set will be incubated in a nest containing very little down.

Incubating Eider Ducks often permit the close approach of an unconcealed human being, and occasionally a duck may be lifted from the eggs and banded. In June, 1924, Mr. S. Oliver and Mr. F. W. Osborne found one incubating American Eider on St. Mary's Islands, Saguenay Co., Quebec, that was so tame that she continued quietly to incubate after they had lifted her from the nest, examined her eggs, and replaced her on the nest. In most cases, however, the sitting Eider will fly from the nest, or from as near the nest as conditions will permit, when a human being or a dog appraoches her, and as she flies she usually discharges copious greenish, oily, evil-odoured excrements, very different from the ordinary excrements of the Eider. This discharge usually falls on the nest and eggs, although, in the bird's excitement, it sometimes fails to do so. It is supposed to be discharged for a protective purpose, as it is said that a dog or a fox will not take an egg which has been fouled by it. This habit is important in relation to the production of eider-down, as down which has been soiled in this way cannot be cleaned and must be rejected. Evidently, therefore, it is desirable that Eiders on nests from which the down is to be gathered should be disturbed as little as possible.

In most cases, at least, incubating American Eiders leave the nest occasionally, though probably not normally oftener than once a day, and spend an hour or two in feeding and washing before returning to the nest. During such periods of absence on the part of the duck, the down around the edge of the nest is usually turned inward, and, when sufficiently abundant, covers the eggs completely, thus keeping them warm and hiding them from enemies. If the down is taken away and the eggs are left in the nest, the owner of the nest will soon return to the duties of incubation and will furnish a new lining of down as far as her supply of that substance will permit.

The drake generally abandons the duck at about the time when the last egg of the set is laid. The drakes then gather together on good feeding grounds among the outer reefs and have no further care for their mates or their offspring. Sometimes they migrate to distant regions. On June 22, 1924, however, I saw, near Yankee Harbor, Saguenay Co., Quebec, a drake American Eider accompanying a duck and her brood. On no other occasion have I seen a drake with the downy young.

Eiders' eggs are usually of a pale greenish olive colour. Those of the American, Northern, and Pacific Eiders are about 3.00 in. by 2.00 in. Those of the King Eider are usually smaller, being about 2.75 in. by 1.95 in. The most common numbers of eggs in a set of any of these species are four and five, but sets of three, six, seven and eight eggs are sometimes found. Nests with more than eight eggs are sometimes reported, but it is believed that in these cases two or more ducks have laid in one nest.

Incubation lasts about twenty-eight days. The young dry rapidly after hatching, and leave the nest very soon after they are dry. They are then clad in various shades of brown and are very attractive little creatures. As soon as possible they take to the water, where they swim and dive with ease. They are cared for by their mother until they are nearly as large as she is. Often several mother Eiders will join forces and group their young. Thus the ducklings can be protected better against Great Black-backed Gulls and other enemies. Many of the young do not gain ability to fly until September or even later.

Young Eiders do not attain fully adult plumage until they reach an age of 26 to 29 months. In most instances, at least, they probably do not breed until the spring following the attainment of full plumage, or when they are nearly three years old. Young birds which have not reached breeding age generally keep by themselves, at least during the breeding season.

TREATMENT OF THE EIDERS IN NORTH AMERICA

Before the ratification of the Migratory Birds Convention between Canada and the United States, which took place in 1916, Eider Ducks received very harsh treatment in North America.

The American Eiders, nesting nearest to the settlements of the white man and the Indian, were especially persecuted. They were shot extensively along the New England coast and the number nesting in Maine was reduced until Knight* estimated in 1908 that not more than twenty pairs then nested within that state. E. H. Forbush stated in 1916† that reports from Maine and Nova Scotia placed their decrease at fifty per cent within the memory of the observers, and that the few pairs still breeding in Maine were protected from extinction during the breeding season by the wardens of the National Association of Audubon Societies. The number of Eiders which still nest about Grand Manan, New Brunswick, and on islands along the Nova Scotia coast is pitifully small.

Many writers have testified to the severe way in which American Eiders were long harassed on

*_The Birds of Maine_, Bangor, 1908, p. 108.
†_Game Birds, Wild-Fowl and Shore Birds_, 2nd ed., Boston, 1916, p. 149.

the north shore of the Gulf of St. Lawrence and on the eastern Labrador coast south of Hamilton Inlet. Both white residents and Indians sought the nests and nesting birds, often with the aid of dogs. The eggs were collected in large quantities, in pails or baskets, and many of the sitting birds were killed with guns or poles. At all seasons when they could be reached the adults of both sexes were shot without stint and even young birds in the down were killed, skinned, cooked and eaten. In Newfoundland, also, many Eiders and their eggs were destroyed. When such treament was meted out to them, it was no wonder that the American Eiders decreased greatly in number; indeed, the wonder is that they maintained their numbers as well as they did.

In the Arctic regions and in Hudson Bay and on the Labrador coast north of Hamilton Inlet the various species of Eiders have always been very important, if not essential, to the natives, providing them with with food and raiment. While the natives in those areas took freely of the Eiders, yet the number of human beings resident in the vast territory concerned was relatively so small that the Eiders in general were not severely affected in total numbers. With an increase in settlement and in the supply of other foods in those regions different conditions may obtain, and by the prompt application of adequate measures of conservation Canada's largest eider-down industry may eventually be built up there, to the great benefit of the human population.

Eider eggs are undoubtedly good human food, but to attack so valuable a species at the period of reproduction is to kill the goose that lays the golden egg and should be prohibited wherever possible. The flesh of Eiders is generally not desirable as food, when better meat is to be had, for it is apt to be tough, oily, and fishy, although Audubon* states that certain sterile females obtained in Labrador by his party in 1833 tasted as well as the Mallard. In many cases the desire to eat Eiders and Eider eggs is due to life-long habit rather than to any pressure of necessity. The great value of the Eider Ducks is their down and a large production of down is inconsistent with hunting the Eiders themselves. The revenue which residents of regions preferred by the Eiders for nesting purposes can derive from a thriving eider-down industry will be far more valuable to them in most cases than the quantity of flesh and eggs of these birds which they might secure.

Since the ratification of the Migratory Birds Convention and the passage of the Migratory Birds Convention Act, Eiders have enjoyed several years of complete protection in Canada and the United States. This protection still continues over large areas, although an annual hunting season for these birds, extending from September 1st to December 14th in the North-West Territories and Yukon Territory and from September 1st to December 15th in that part of the Province of Ontario lying north of the Quebec-Cochrane-Winnipeg line of the Canadian National Railways, is now authorized.* As a result of the protection given them in accordance with the Migratory Birds Convention, quite apart from the proposed development of eider-down production, the Eiders have increased in numbers, especially, perhaps, about the Gulf of St. Lawrence and Nova Scotia.

The following data serve to give some idea of the present degree of abundance of the American Eider on the north shore of the Gulf of St. Lawrence, as well as to indicate the increase in numbers that has taken place there in recent years. In that region in the spring and summer of 1923 I saw, altogether, 4,624 American Eiders during the 77 days on which this species was observed the average number seen in one day being 60. In the same region in 1926, three years later, I saw, altogether, 5857 of these birds during the 53 days on which the species was observed, the average number seen in one day being 111. The average number seen in one day has, therefore, increased by 85% in three years. The number of days on which Eiders were seen is larger in 1923 than in 1926 because I made a longer visit to the north shore of the Gulf in the former year. Of course, the total number actually seen by me in either year is only a fraction (probably not more than one-fifth and not less than one-tenth) of the total number of American Eiders nesting on the thousands of islands of this long and intricate coast-line.

The recent establishment of ten bird sanctuaries at favourable points on this coast by the Canadian Government will undoubtedly assist Eiders to become still more abundant there.

TREATMENT OF THE EIDERS IN ICELAND

In Iceland, where the eider-down industry has long been well-established, the treatment accorded the Eiders is very different from that which they have received in North America.

The Icelanders, because of the value to them of the harvest of eider-down, look upon it as an act of sacrilege to interfere with the Eiders in the breeding season. They rigidly protect them and severe penalties are provided for killing them or even for discharging a gun in their vicinity. The

*_The Birds of America_, Vol. VII, New York, 1839, p. 65.

*November, 1926. The Regulations may change from time to time, but the most recent information concerning them will be furnished gladly by the Canadian National Parks Service, upon request.

birds are also offered every encouragement, as each land-owner wishes to induce as many Eiders as possible to nest on his premises and thus increase his crop of eider-down. To this end various devices are practised. Alternate stones are left out of the bottom courses of stones in a stone wall, thus providing snug compartments in which the Ducks nest. The turf is cut into squares like great checkerboards and rocks are carefully arranged to form as many sheltered hollows, suitable for nesting, as possible. Leafy branches are stuck into the ground and are said to attract more birds than those which they actually shelter.

As a result of years of such treatment the Eiders in Iceland are very abundant and very tame. On some islands it is difficult to avoid treading on their nests. Ducks make their nests on the roofs of the houses and on the window-sills. The sitting Eiders are little disturbed as their special guardian, the farmer or fisherman who owns the land, moves quietly among them on regular daily rounds of inspection and collects the precious down. Indeed, they are almost like domestic ducks, except that the person who controls them and profits by them has no need to feed or shelter them. All conditions affecting the Eiders and their nests are noted with care and everything possible is done to increase the numbers and the safety of the birds and to obtain the largest possible crop of down. When an exceptional number of eggs is found in a nest, those considered surplus are removed and in some cases are eaten, but the truly thrifty Eider-farmer does not eat such eggs, but places them in other nests where the original sets are smaller than normal. If the downy young have difficulty in travelling to the water over rough ground, their troubles are soon observed and human assistance is given them.

Under years of such fostering care, Eiders have become so abundant that the single island of Vigr is reported to produce nearly a hundred pounds of eider-down annually.*

METHOD OF GATHERING AND CLEANING EIDER-DOWN

The following is a description of methods of gathering and cleaning eider-down which have been developed in Iceland through many years of practical experience, together with some remarks on their application to Canadian conditions.

Most of the eider-down is collected from the nest before incubation has ended, but some is left directly beneath the eggs and is collected immediately after the young leave the nest. The average yield of down per nest is about one ounce. It is best to collect the down on bright, sunny days, when it is dry and warm. Care exercised by the collector to ensure that no unnecessary dirt is gathered will simplify greatly the process of cleaning the down. The foreign substances most difficult to remove from down gathered on the north shore of the Gulf of St. Lawrence are small twigs of fir, willow, dwarf birch and the like, which are quite common in down from that region because so many of the Eiders there nest among stunted trees or bushes. The collector should therefore take special care to collect as few as possible of these twigs with the down. Possibly it might be worth while to remove all stunted trees and shrubs from the islands on which it was intended to collect down and to provide some other type of shelter there for the nesting birds. In the Arctic regions there will probably be little trouble with twigs on account of the scarcity or absence of shrubbery of any kind in the areas where the Eiders chiefly nest. As stated previously, down which has been at all soiled by the excrements of the Eider must be rejected. In most places the gathering of the down can be completed before the summer fishing begins.

If the down is not gathered soon after the young leave the nest, it is in danger of being drenched by rain, which spoils it entirely. In any case, after a nest has been abandoned, the down usually disappears within a few days. In some cases it is doubtless blown away, but there are many cases where it must be removed by some other agency, probably by birds or small mammals.

According to Townsend*, down plucked from the breasts of Eiders which have been killed, soon loses its elasticity and is of little value.

After the down is gathered it may be cleaned immediately or may be stored in a dry place, out of reach of rodents, until such time as may be most convenient for the collector and his family to clean it. There is no danger of bird parasites developing in it. A good place in which to store the down in the usual fisherman's home is behind the kitchen stove, where it will dry a great deal, especially if it is spread out more or less.

When the time selected for cleaning the down draws near, it is best to dry the down as much as possible by exposing it for a day or two to the direct action of the sun's rays, in some place out-of-doors. If the down can be placed on a bright metal surface when it is exposed to the sun, that

*C. W. Townsend, *A Plea for the Conservation of the Eider, The Auk*, Vol. XXXI, No. 1, January, 1914, p. 17.

A Plea for the Conservation of the Eider, The Auk, Vol. XXXI, No. 1, January, 1914, p. 20.

will assist in drying it. It should not be allowed to become wet or damp.

Whether or not the down has been dried by the sun, it is necessary to complete the drying by artificial heat immediately prior to cleaning it. In Iceland artificial heat is applied for this purpose by placing the down on a large, flat tray of cast-iron, about half an inch thick, which is in turn placed on a stove or range containing a fire. In experimental work at Ottawa an electrical heater has been used for the same purpose with fair success. The down, while being heated, should be turned and stirred constantly by one person, to keep it from scorching. As long as a man can keep his bare hands in the down it is not scorching. One person usually heats down for four or five cleaners, and thus several members of one family work efficiently together to clean the down which the family possesses. The cleaning is best done in a building with a doorway or other opening on each side, so that dirt and dust will be continuously removed by the draft of air passing through. With one person heating the down and four or five persons cleaning it, the rate of cleaning is sometimes as high as five pounds per person per day.

Heating and drying the down will cause it to become very elastic and expansive, while at the same time the moss, straw, leaves and similar "dirt" in the down become brittle and crumbly.

The person attending to the heating keeps each cleaner supplied with a ball of heated down, about a foot in diameter. This is worked by the cleaner upon a cleaning frame.

The cleaning frame is a stout wooden frame, made of 2″x 3″ material, with mortised joints. It measures about 3 feet in length and 2½ feet in width. Back and forth across it is stretched very tightly a cord about ⅛″ in diameter, in such a way that the parallel lines of the cord across the frame are about 1″ apart. The cord passes back and forth through small holes bored through the side-pieces of the frame. In order to prevent it from becoming slack through cutting into the wood it is made to pass over a bent nail, or other metal, fastened in the outside of the sidepiece, between every alternate pair of adjacent holes. The cord may be a piece of cod-line, but a strip of sealskin is the best material for it. The frame is secured solidly in position about 2½ to 3 feet from the floor, nearly horizontal, but inclining slightly towards the operator, who may sit or stand. The lines of the cord are parallel to a line from side to side of the operator.

The operator places a ball of hot down on the part of the frame farthest from him and then strokes it rapidly and repeatedly toward him pressing down upon it with considerable force during the strokes. The down is thus pressed upon the taut cords and at the same time drawn across them. As often as necessary the ball of down is lifted and replaced at the far end of the frame, in position for further stroking, which is at once administered. There is no need to handle the down gently; in fact, it is treated quite roughly. The ball of down holds together, but dirt and feathers fall in quantities between the cords. The down soon cools, and when it has cooled it must be re-heated and reworked, and this alternation of processes is continued until the down is clean of everything except a few small feathers.

The stroking is often done with the tips of the fingers, the two hands being held side by side and fully extended, but, if preferred, it may be done with a wide "knife" or "spade" of wood, with a very dull edge. A piece of inch board, about four inches wide and a foot long, with one long edge well rounded, will do for this purpose. In using wooden implements, care must be exercised not to exert so much force as to break up the down.

Most of the small breast-feathers which are mixed with the down will be removed, together with the foreign material, by the process described above, but some of the feathers will remain in the down, until extracted by hand. The ball of down should not be pulled to pieces to find them, but should be worked with the fingers for this purpose. The feathers, even when hidden in the heart of the ball, can be felt readily because of the comparative stiffness of their shafts. When a feather is found, it should be worked to the exterior of the ball of down and then pulled out. This can be done quite rapidly. When all the feathers have been removed, the down is clean and ready for use or for sale.

The fishermen and farmers who gather and clean the down usually dispose of it to local merchants or trading companies through whom it reaches the large markets. It may be packed conveniently in cloth bales for shipment.

CONCLUSION

It will be seen that a very important feature of the successful exploitation of the Eider in Iceland for the sake of its down is the fact of private control over islands or other limited areas where the Ducks nest. This leads each private owner of Eider nesting-grounds to try to attract as many Eiders as possible to nest on his property, in order to increase his income from eider-down. The most important attraction offered is absolute safety and freedom from harmful molestation. All owners of land on which Eiders nest have very strong reasons to be ever zealous in protecting the birds. This ensures enforcement of the protec-

tion afforded the Eiders by legal enactment and the result is an astonishing abundance of these Ducks and a thriving and profitable industry.

The establishment of a flourishing Canadian eider-down industry, similar to that in Icleand, is within measurable distance of realization. Since Eider Ducks and their plumage are protected in Canada by Dominion law, as well as by the game laws of various provinces, the industry will be under government control, and those engaging in it will require government permits. Such an industry would furnish additional income to many Canadians, would give real value to much bare and rocky land that is now economically worthless, and would help to bring about in this country an increase to the point of abundance of the numbers of those valuable, interesting and beautiful wild Ducks, the Eiders.

THE EARLIEST RECORDED OBSERVATIONS ON AMERICAN BIRDS

(Extracted from "The Library of Original Sources")

By T. L. THACKER, Little Mountain, Hope, B.C.

A KNOWLEDGE of birds and their habits has been of use to mankind from the earliest times. All are familiar with the experiences of the first navigator, Noah, in the Biblical record and the value of some species to him; but it will come as a surprise to many readers that the discovery of America by Columbus was partly due to his ornithological knowledge.

According to the journal of his first voyage, as given in The Library of Original Sources, Admiral Don Cristobal Colon set sail from Palos, a seaport on the south-east of the Spanish Peninsula, on 3rd August, 1492, with three small ships, intending to cross the "Ocean Sea" to the Indies by way of the Canary Islands and thence westwards.

After some trouble with the rudder of one of his caravels, the sails of which he had also to change from a lateen to a square rig, he started across the ocean on 6th September from Gomera in the Canaries, ever sailing westward.

Very shortly some of his sailors appear to have become disheartened, and the admiral was forced to complain of their bad steering, for they often changed the course of the ship to the North-east, thereby delaying the voyage greatly.

That his men might not realise how far away from land they were getting, Columbus deliberately understated the distance sailed; so that if the voyage proved to be of long duration, they "would not be so terrified and disheartened." This plan was put into execution for the first time on the 9th of September; and it is probable that the grumblings of some of his men had reached the admiral's ears at that time.

It was not till 14th September, however, after the ships had been away from Spain for six weeks that the first bird record appears in the log, summarised as follows:—

"That day they navigated, on their westerly course, day and night, 20 leagues, counting a little less. Here those of the caravel *Nina* reported that they had seen a tern and a boatswain bird*, and these birds never go more than 25 legaues from the land."

Here it is interesting to note that the daily record of the voyage appears to include, whenever possible, an ornithological feature, but the scientific accuracy of some of the deductions made from these observations, regarding the proximity of land, seems open to question. With dissatisfaction growing among his men, Columbus foresaw that his condition might become desperate. It was a case of grasping at straws; and the intense belief of Columbus in the correctness of his theory sufficiently excuses whatever exaggeration he may have been guilty of.

Many tufts of very green grass were seen a day or two later, and the sailors judged they were near some island, but not the main land, according to the admiral, "because," as he said, "I make the main-land to be more distant."

On the 17th.

"At dawn, they saw much more weed appearing like herbs from rivers, in which they found a live crab, which the Admiral kept. He says that these crabs are certain signs of land. . . . A white bird was seen, of a kind which was not in the habit of sleeping on the sea, called 'rabo de junco' (boatswain bird)."

The next day one of the other ships, a swift sailer, went ahead of the admiral; her captain, who had seen "a great multitude of birds flying westward," expecting to see land before night.

On the 19th.

"at ten o'clock, a booby† came to the ship, and in the afternoon another arrived, these birds

*"Boatswain-bird." A name given in earlier times to skuas, but later applied to the Linnæan genus *Phæthon*, the Tropic-bird. The species referred to may have been *P. americanus*, the Yellow-billed Tropic-bird.

†"Booby." Prof. Newton quotes Prof. Skeat as deriving this name from Spanish or Portuguese. "Bobo," a fool—Latin "Balbus." These birds, closely allied to the Gannets, differ in being chiefly inhabitants of warmer climates, and breed generally in high trees rather than on rocky ledges. The bird seen by Columbus may have been *Sula cyanops*, the Blue-face Booby.

not generally going more than 20 leagues from the land."

The admiral was convinced there were islands near by, but did not delay by changing his course to find them. In this opinion he was later proved to be correct.

The following day they sailed but a short distance owing to calms. Three more boobies were seen—two at one time came to the ship, and another later, which was again said to be

"a sign of the proximity of land. . . . They caught a bird with the hand, which was like a tern. But it was a river-bird, not a sea-bird, the feet being like those of a gull. At dawn two or three land-birds came singing to the ship, and they disappeared before sunset. Afterwards a booby came from W.N.W., and flew to the S.W., which was a sign that it left land in the W.N.W.; for these birds sleep on shore, and go to sea in the mornings in search of food, not extending their flight more than 20 leagues from the land."

Friday, 21st of September. "At dawn they saw so much weed that the sea appeared to be covered with it, and it came from the west. A booby was seen. The sea was very smooth, like a river, and the air the best in the world. They saw a whale, which is a sign that they were near land, because they always keep near the shore."

Saturday, 22nd of September. "They shaped a course W.N.W. more or less, her head turning from one to the other point, and made 30 leagues. Scarcely any weed was seen. They saw some sandpipers and another bird. Here the Admiral says: "This contrary wind was very necessary for me, because my people were much excited at the thought that in these seas no wind ever blew in the direction of Spain.'"

Sunday, 23rd of September. "They saw a dove and a booby, another river-bird, and some white birds. There was a great deal of weed, and they found crabs in it. The sea being smooth and calm, the crew began to murmur, . . ."

Monday, 24th of September. "A booby came to the ship, and many sandpipers."

In the excitement caused on the two following days by the belief that land was visible to the S.W., which "land" turned out to be only clouds, no bird records appear in this summary; but the next day, the 27th, an entry was made. "A boatswain bird came." Plainly it was again necessary to keep up the spirits of the sailors. Again two days later a new species is recorded.

"They saw a bird called rabiforcado (man-o'-war bird)*, which makes the boobies vomit what they have swallowed, and eats it, maintaining itself on nothing else. It is a sea-bird, but does not sleep on the sea and does not go more than 20 leagues from the land. There are many of them at the Cape Verde Islands. Afterwards they saw two boobies. The air was very mild and agreeable, and the Admiral says that nothing was wanting but to hear the nightingale. The sea smooth as a river. Later, three boobies, and a man-o'-war bird were seen three times. There was much weed."

Sunday, 30th of September. "Four boatswain-birds came to the ship, which is a great sign of land, for so many birds of this kind together is a sign that they are not straying or lost. They also twice saw four boobies."

Tuesday, 2nd of October. "Many fish were seen, and one was killed. A white bird was also seen that appeared to be a gull."

Wednesday, 3rd of October. "Sandpipers appeared, and much weed, some of it very old and some quite fresh and having fruit. They saw no birds. The Admiral, therefore, thought that they had left the islands behind them which were depicted on the charts."

Thursday, 4th of October. "More than forty sandpipers came to the ship in a flock, and two boobies, and a ship's boy hit one with a stone. There also came a man-o'-war bird and a white bird like a gull."

Friday, 5th of October. "To God," said the Admiral, "be many thanks given, the air being pleasant and temperate, with no weed, many sandpipers, and flying-fish coming on the deck in numbers."

The next bird entry is of special interest:—

"No land was seen during the afternoon, as reported by the caravel *Nina*, and they passed a great number of birds flying from N. to S.W. This gave rise to belief that the birds were either going to sleep on land, or were flying from the winter which might be supposed to be near in the land whence they were coming. The Admiral was aware that most of the islands held by the Portuguese were discovered by the flight of birds. For this reason he resolved to give up the west course, and to shape a course W.S.W. for the two following days."

Here we have the first actual bird-migration record of the New World—made in fact on Sunday, 7th October, 1492, four days before the Western Hemisphere was dicovered.

On the 8th. "There were many land-birds, and they took one that was flying to the S.W. Terns, ducks, and a booby were also seen."

The record of the 9th contains the words "Throughout the night birds were heard passing."

*"Man-o'-war bird." Frigate-bird, *Fregata aquila*. (Span. rabihorcado.) This species has a wide range all round the world within the tropics, and at times passes their limits.

Complaints of the length of the voyage were again heard the next day, but on the 11th, "They saw sandpipers", and many signs of their immediate nearness to land; and "Everyone breathed afresh and rejoiced at these signs." "At two hours after midnight the land was sighted at a distance of two leagues."

Later on the natives brought various articles out to the boats; in the words of the Admiral they were "swimming and bringing us parrots cotton threads in skeins, darts, and many other things."

In conclusion it may be suggested that had Columbus not proved himself capable of reading aright the message of the birds—had he in short been ignorant of ornithology, it is quite probable that his crews would have mutinied, perhaps dealing out to him a fate similar to that of Hudson, and would have returned to Spain long before they had sighted land.

The epoch-making discovery might thus have been indefinitely postponed.

From these records of his, made near the island which he named "San Salvador," Columbus perhaps may be justly termed the earliest ornithologist of America.

HABITS OF THE MOUNTAIN BLUEBIRD IN MANITOBA

By NORMAN CRIDDLE, Treesbank, Manitoba

THE BLUEBIRD of the East is beloved by all who know it and its praise has been sung in verse and proclaimed in prose. The Mountain Bluebird is equally beautiful and in habits it seems fully as worthy of regard. It should, indeed, become to the West what the common Bluebird is to the East. Both occur in Manitoba but we are on the border line between the two species and to the westward the eastern bird is almost entirely replaced by its western relative.

More than thirty years have elapsed since my brothers and I originally found the Mountain Bluebird breeding in what is now known as the Spruce Woods Timber Reserve. Its haunts at that time were not among the heavier timbers but on the outskirts of it where scrub oak and stunted poplar grew sparingly and the sandy, undulating land provided a higher percentage of grasshoppers than could be found on the richer soil elsewhere. The trees, too, were frequently hollow or they had been excavated by woodpeckers; hence nesting sites and food were there in combination making the locality an ideal one for the birds.

The Mountain Bluebird was slow in making its way into the settlements, perhaps due to the absence of nesting places, but two factors eventually altered these conditions; some of us erected nesting boxes, and that inveterate hole-driller, the Flicker, made accommodating holes in telephone poles and fence posts. The bluebird, therefore, has been able to spread out from its original haunts and it may now be found nesting in various places where previously it was unknown.

One pair of Mountain Bluebirds came to us about the year 1912 when they successfully fought for possession of a box with a pair of eastern Blue birds. The two species continued as neighbours, however, for several years but as the western birds increased the eastern ones diminished in numbers, until in 1925 our boxes were occupied by Mountain Bluebirds alone. Three pairs were in residence during that year, two within close view of the Entomological Laboratory and the third in a box on the garden fence. It is these birds that have furnished most of the informaton upon which this paper is based.

The Mountain Bluebird moves northward but a short distance behind the melting snow and it leaves us when the shortened days, and approaching cold, threaten to cut off the food supply. Our earliest record from the south, is March 17, 1921, and the average first, for 12 years, is April 14. A closer association with the birds during the last seven years indicates a still earlier average, namely, March 29. The birds begin to move southward in late September, our average for the last observed being October 8, the latest October 16, 1926.

The male bluebirds always arrive a few days in advance of the females, but it is not long before the latter appear upon the scene and in an astonishingly short time pairs have taken possession of a nesting site and the females are taking nesting material into boxes. This haste in constructing a nest is difficult to appreciate because the birds do not, as a rule, actually start domestic duties for some time afterwards. For instance, our closest pair in 1925, began nest building on April 9 but soon afterwards moved to another box, returning on May 1 to the first one. It was the middle of the month before they finally became established. The second couple were equally undecided and they oscillated, for a long time, between three boxes, first building in one and then in another. Each of the three pairs began brooding at about the same time but the females were so frequently

off the nest that it was difficult to ascertain exactly when this was. Judging from the fact that the males commenced to feed their mates on May 22, I believe it was on this date that incubation actually began.

In 1926 one pair started nest construction on April 6 but had not proceeded far in the work before they became dissatisfied and sought another residence. On May 14 they took possession of a box close to the laboratory where nest making was almost completed before these birds again moved; this time to a box on the opposite side of the building where, on May 25, they finally settled down to domestic duties. The young birds left this nest on July 1, but three days previous to their departure, the female was busy, some 20 feet away, building in another box and from that time forward she left her mate to attend to the young unaided. This he continued to do until his charges were able to provide for themselves, when he returned to the female. The second brood left their nest on August 8.

Hunting a nesting place is no small matter in the life of the bluebirds and it reminds one of the search for a house by a soon-to-be-wedded couple in which innumerable places are inspected before one is finally chosen. The male bird is an extreme optimist and nearly any hole meets with his approval, but his mate is not so easily satisfied and many of his selections are discarded as worthless. It is interesting to watch this home seeking, to see the male put his head into a hole followed by the female; should she enter it, he flutters his wings in the height of enthusiasm, but should she turn away unsatisfied, as she does nine times out of ten, then he appears dejected for a few moments, but speedily recovering, endeavours to entice her into other holes the whereabouts of which he appears to have discovered before hand.

Both birds are much quieter than their eastern relatives and in singing the male so confines his efforts to the early morning that his song is apt to be quite overlooked by late risers. It is commenced soon after the first suffusion of light indicates returning day and it is at its height as the rising sun appears over the eastern landscape. The song consists of a repetition of the usual call notes to which are added double syllable notes in a somewhat higher key. It may be brought to mind as follows:—Chow, chow, chow, poly-chow, poly-chow; or: Dear cher, poly-cher, or again: Per, per poly-per poly-per, etc. The notes are uttered quickly and there is a ring of exultation about them as if the singer gloried in his supremacy and challenged all rivals to dispute it. There is considerable variation in the number of notes uttered and the song often continues for several minutes without intermission. Singing is also indulged in towards evening but with less enthusiasm and for a shorter time than in the morning. The much quieter call notes of this species at once distinguish it from the eastern bird. They souud like che-r as compared with the louder Chee-re of *sialis*.

There is some doubt as to whether the same pair of bluebirds return each spring to the breeding grounds of the previous year, a question that can only be definitely settled by banding; the evidence, however, indicates that they do so. If we accept this, the next question that arises is do the birds mate for life or is pairing only seasonal? I believe that all the survivors from the previous year return to the vicinity of their old homes and from there scatter out in search of new breeding places. Old pairs probably remain united providing the male is able to overcome his rivals in battle but not, I suspect, otherwise. The males have been observed to fight vigorously and these combats have continued intermittently for weeks before one bird finally admitted defeat. The female is always a witness to these encounters, in fact she often follows the fighters from place to place, but I have not been able to discover that she takes any part in them and she apparently accepts the victor as a matter of course. It is hard to reconcile the idea that efficiency in fighting alone guides the female in her choice of a mate and that beauty in plumage does not play a part in it, but the evidence is all in favour of the victor in battle.

Having thus become united in a matter of fact way, the pair now set to work to definitely locate a nesting place. If there is but one box available they usually take possession of it without further delay, but if there are several it may be a considerable time before they finally choose one of them.

Nest building may be a task of leisure or one of haste, depending on whether the birds have been in possession of a hole for a long or short time. Building is done by the female alone, though the male is nearly always in attendance and he quite frequently follows his mate to the nest, perhaps looking in while she arranges the material. He also drives away intruders. Bark, grass and feathers are used in nest construction. The bark consisting of the stringy inner layer of dead aspen poplars which is frequently stripped from fence rails. Feathers are used when available. Most of those gathered near the Laboratory had previously belonged to a House Sparrow which a wren scattered about when house cleaning.

The eggs are pale blue, resembling closely those of the eastern Bluebird, though a trifle larger.

They vary in number from four to eight, six being an average clutch.

It is when the female begins to brood that the male shows his true worth and from then forward he not only guards the nest but also, to a large extent, feeds his mate.

Brooding is not the arduous task one might expect and it is astonishing how frequently the eggs are left to take care of themselves. This, however, is more during the heat of the day when the nesting box, with the sun's rays beating directly upon it, becomes very warm. The female's repeated absence from the nest prevented me from definitely ascertaining the length of the incubation period, though I judged it to be about 14 days.

The young, when first born, are of the usual helpless type and it is a considerable time before their eyes are open and they learn to distinguish between a stranger and their parents. With sight, however, they become more wary and immediately crouch from view when a stranger approaches. The parents are both active in feeding and otherwise attending to their offspring. Food is collected either from the ground or in the air, a favourite method of hunting being for the birds to hover like a Sparrow Hawk, from which elevated point of vantage they are able to distinguish an insect at an astonishingly long distance. They are also experts at catching insects on the wing and have been known to rise more than a hundred feet to capture a desired specimen. Indeed, their hunting methods are extremely interesting and their actions while thus engaged, are very beautiful. Insects are the chief article in the juvenile diet and of these grasshoppers form the largest item, the balance being made up of cutworms, various caterpillars, beetles, bugs and other soft-bodied creatures. A few Saskatoon berries (*Amelanchier*) were fed to the second brood just before they left the nest, but it was cold at the time and insects were difficult to find.

The following records will give an idea of the activities of the parents in feeding their young:—

June 3, 8.30 to 9.30 A.M.—Male brought food to young 13 times, female 10 times. 11.30 to 12 noon. Both brought food 5 times. 4.30 to 5 P.M. Each brought food 4 times, but during this period the birds were interrupted by the presence of a crow.

June 4, 7.10 to 7.40 A.M.—Male arrived with food 7 times, female 6 times. 3.35 to 4.05 P.M. Male came in twice, female three times. The weather was cloudy and cool.

June 7, 4.30 to 5.30 P.M.—Rain falling steadily, accompanied by a cold north-east wind, the dullness was very marked as the time ended. Male brought food 5 times, the female 4 times.

June 28.—Bright, warm. 5.30 to 6 P.M. The male, which was attending to the young unaided, brought food 9 times.

July 18.—Bright, warm. 7.30 to 8 A.M. Male returned with food 9 times, the female 3 times. The latter did considerable brooding during this period.

The search for food is much prolonged on cold, rainy days and the number of times it is brought to the young is then greatly reduced. A prolonged period of unfavourable weather is, therefore, a very serious one to the young and it undoubtedly results in a high rate of mortality among them. The task of taking in food to the young is combined with that of removing dirt from the nest, in which latter occupation an equal share is borne by both parents and the matter thus taken out is usually carried some distance away.

Great solicitation is shown for the safety of the young when they first leave the nest and the adults, at this time, keep up an almost perpetual cry of warning. They soon lead their charges away amid the neighbouring trees, though generally remaining in the vicinity until the juveniles are able to take care of themselves. Our nearest pair in 1925, after disappearing for more than a week, were followed back to the nest by their offspring, and for a time the male took turns in feeding his mate and the now almost fully-grown young. New duties, however, soon engrossed all his attention and the juveniles were then obliged to seek food for themselves. They soon afterwards left the district and we saw them no more until they ultimately united with the second brood and came back to visit their old home before finally departing for the south.

Mountain Bluebirds, under normal conditions, rear two broods during the year, egg laying for the first beginning in May. Our nearest nest contained young by June 1 and these had taken wing twelve days later. Re-nesting was under way on June 21 and the female had apparently begun to brood by June 30. Two pairs had young by July 12, all of which were safely reared and left their nests during my absence.

As soon as the breeding season is over the bluebird families wander off in various directions, at times gathering into small flocks as they meet with other families, and it is not an uncommon event, as the time for departure draws near, to meet twenty or more in a single band. It would seem that there is always a tendency for the families to return to their nesting grounds. Thus one may find a large gathering of them some fine day having a regular gambol around the old home or, perhaps, taking a bath at the drinking place

during which they seem to vie with each other in seeing how much they can splash the water about.

As the season advances, insect food becomes scarce and fruit is collected to make up the deficiency. This consists of the wild berries met with round about or such others as have been developed in the cultivated shrubberies. There is no doubt, however, that insects are much preferred, and on one occasion I witnessed a male bluebird having quite a feast by catching and eating the water beetles that were flying in and out of a small pond.

Male Mountain Bluebirds are able to defend their nests against all intruders of their own size, this includes the House Sparrow which has somewhat of a reputation for ousting other species. The sparrow, however, is no match for the bluebird in open fight and despite its persistency, it has never been observed to get possession of a nesting box occupied by the latter.

In protecting their eggs or young, both male and female cooperate, though the former is much more active in the task. I have, on several occasions, seen these birds drive away Kingbirds, though the tables were reversed when a bluebird ventured too near a Kingbird's nest. Crows are only attacked when they actually threaten the inmates of the nest and even then with fear. At such time both defenders utter a loud "chuck", a note always associated with alarm or actual danger.

On one occasion we witnessed a pair of Mountain Bluebirds attempting to drive away a Flicker which was inspecting their nesting box. Both repeatedly darted at their enemy, but without avail; the Flicker defended himself with both beak and wings, either being dangerous weapons which the bluebirds did well to avoid. I eventually went to the rescue. On another occasion a squirrel got alarmingly near the nest, my attention being drawn to it by the usual notes of warning. The birds attacked it with their usual energy, though avoiding actual contact, but the rodent was not to be discouraged from investigating until I finally drove it away.

The enemies of bluebirds are many, among the most notorious of them being the Cooper and Sharp-shinned hawks. When these hunters appear the bluebirds vanish amid the under-brush and they do not re-appear until all danger is past. I have related elsewhere* how a Cooper Hawk took the male of a pair of Mountain Bluebirds nesting in our garden and how the female brought up the nestling unaided. Such tragedies are not uncommon and the male birds are equally devout when necessity arises.

Birds of a Manitoba Garden. Parks Branch Circular, Ottawa.

Weasels are occasional destroyers of bluebird families, though we have had the two living close together without witnessing any ill effect. It is probable that they are not as destructive, in this respect, as squirrels owing to the latter's greater climbing ability.

Flickers are quite important factors in the survival of young bluebirds, even though they often provide the adults with nesting holes. Two instances came to my attention of the parents being driven from their nests by Flickers, in both cases resulting in the death of the young by starvation. Much of the trouble is due to the fact that the Flickers are seeking nesting places at the same time as the bluebirds are rearing their first families. Moreover the male is as much an optimist as the bluebird is and he spends most of his time in attempting to attract others by either drumming or uttering his shrill cries, quite indifferent as to whether he has taken his stand on a box already inhabited or not. Another pastime of his is to drill holes into any available object, or to enlarge those already prepared and for this work he is just as likely to choose a bluebird box as any other. Meanwhile the eggs or young may be perishing within.

The hue and cry against the House Wren, so popular at present, has led to a close scrutiny of this bird's habits. Are they—I will not say immoral, as some writers have proclaimed—but do they insidiously creep in and destroy their neighbours' eggs, or is this habit one of individuals only? Perhaps I shall have more to say on this subject at another time. Meanwhile it is enough to state what actually occurred. The area upon which the Entomological Laboratory is built approximates 80 by 82 feet. On the south-east corner of the fence one pair of bluebirds reared two families, while a pair of wrens, 47 feet away, also brought up a second brood. It is true the the first bluebird youngsters were too far advanced when the wrens arrived to be in danger but the second lot of eggs were laid after the wrens took up their residence and there were innumerable chances to destroy these had the wrens desired to do so. On the opposite side of the fence was another wren's nest, and beyond that again, some 70 feet away, another pair of Mountain Bluebirds reared their young. In a box bordering a garden was a third pair of bluebirds with a wren family house-keeping 32 feet distant. I could cite numerous other examples from experience in previous years but the wren was not under such direct suspicion then, and it may have done more harm that it was credited with. In answer to the question are wrens and bluebirds neighbourly? I have no hesitation in answering no. But what birds can be when Mountain

Bluebirds are concerned? It was a common sight to see the male bluebird sitting on the wrens' box and to observe him persistently chase the owner away, but if the wren was driven from its house it settled upon a fence rail and if chased from there flew to a nearby wood pile and so back to the nest again, always defying the bluebird with its bubbling song. Most birds, under the circumstances, would have sought more congenial surroundings, but the wrens were indomitable. Perhaps, had there been but one nesting box, a keener competition might have arisen, indeed I can visualize a battle in which the wren's persistency eventually conquered, but we had provided homes for all and in consequence no unpleasant incidents occurred.

Weather is one of the most important factors in bluebird survival during the period when young are being reared. Adults also frequently suffer severely in spring and autumn by being overtaken by snowstorms and cold. Of our three bluebird couples in 1925, two lost their original brood through cold and rain. In the first instance a leaky box was responsible. There had been a heavy rain storm, and the next day I noticed that the parents were not taking in food, though they frequently inspected the nest. An examination revealed four dead young about a week old and a bad egg. Two days afterwards the old birds were at work renovating the nest preparatory to rearing a fresh brood.

The second disaster occurred immediately after the young left the nest, a time that is always a critical one. They were met by a cold rain which, in combination with lack of food, soon put an end to their existence. The parents within a few days, were busy re-nesting, showing how quickly the sorrows of yesterday are forgotten in the task of preparing for the morrow.

Such, in brief, are the habits of the Mountain Bluebird in Manitoba. From this account it will be seen that the species is attractive in many ways, apart from the beauty of its plumage. It is already spreading out from its original breeding grounds and there seems no reason why it should not do so to a much greater extent, providing suitable structures are erected for its accommodation. These include nesting boxes with a moderately large opening, and a watering place for the birds to drink and wash at; surely a small undertaking when the results are so alluring.

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We would ask the Officers, and more particularly the Secretaries, of all the Affiliated Societies to assist us in our task of building up the circulation of this magazine. By securing every member as a subscriber we can truly make this magazine into one of the leading Natural History publications of America.

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CONTENTS

	PAGE
A Fossil Bison Skull from Yukon Territory. By T. H. Clark	45
A Calendar of Flowers. By Norman Criddle	48
Destruction of Birds by Lighthouses in the Provinces of Ontario and Quebec. By Harrison F. Lewis	55
Molluscs from the Lake Brereton District, Manitoba. By Alan Mozley	59
Gull Colonies on Lake Newell, Alberta By J. A. Munro	61
Some Rare Birds at Strathroy, Ontario. By A. A. Wood	62
Do Birds Practice their Songs? By Anna E. MacLoghlin	63
Notes and Observations:—	
The Kildeer in Winter. By W. E. Saunders	64
The Clay-coloured Sparrow at London, Ontario. By E. M. S. Dale	64
Turkey Vultures in Nova Scotia. By R. W. Tufts	65
A Wrangel Island Fish By J. R. Dymond	65
Unusual Nesting of the Western Kingbird. By J. A. Munro	65
Receipts for Canadian Field-Naturalist Publication Fund	65
Official Canadian Record of Bird-Banding Returns	66

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. XLI OTTAWA, ONTARIO, MARCH, 1927 No. 3

A FOSSIL BISON SKULL FROM YUKON TERRITORY

By T. H. CLARK

FOSSIL BISON remains are among the rarest of North American fossils. So rare are they in fact that it behooves every collector of them to publish descriptions of new specimens, or if that is not possible to submit the specimens to recognized authorities for expert examination. Those who have given the subject of the classification of our North American extinct bison the closest study are tolerably well convinced that a sound basis for subdivision into several species exists, but the material as yet available is not extensive enough for the average non-specialist to appreciate the generalizations. This is due partly to the inconveniences attendant upon the erection of species from scanty material, namely, the necessarily incomplete definition of a species resulting from too few specimens to generalize from, and also the inevitable later discovery of variants not conforming exactly to the already established definitions. Both these conditions have operated in the past to retard the clarification of our views concerning not only the subdivision of the fossil bison into species but also the interrelationships of those species. It is a tribute to the pioneers in this field that so much has been accomplished when one considers that the specimens of fossil bison known from the whole continent are to be reckoned at the most as a few dozen. A second reason for the publication of all material is the curious fact that the bison skulls, although large and robust, are exceedingly rarely preserved in complete or even nearly complete condition, and other portions of the skeleton are actually of extreme rarity.

The purpose of this paper is to publish the description of a fossil bison skull recently acquired by the Peter Redpath Museum of McGill University. For the benefit of those who have not had the opportunity to consult the literature on the subject it does not seem amiss to bring together some of the information regarding the bison as a fossil and a living animal. The genus Bison belongs to a sub-family of even-toed ungulate mammals called the *Bovinæ* to which also belong the buffalo, zebu, yak, and domestic cattle. These are all Asiatic in origin, but are now found widely distributed over Asia, Europe and Africa. The bison is the only member of this sub-family (sometimes called the "oxen") to have reached North America. It differs from true oxen in being short-headed, whereas the domestic cattle are relatively long-headed, and in being much more slender and agile, though here too these terms must be understood in a relative sense. Moreover there are important anatomical differences in the skull and in the shoulder hump, and the growth of long shaggy hair on the head and neck are quite characteristic.

In time, the earliest bison recorded in the fossil state is *Bison sivalensis* from Pliocene strata of Northern India. Throughout the next geological epoch, the Pleistocene, or Glacial Period, the descendants of this bison spread both east and west over Asia and Europe, one branch of the tribe being successful in crossing over to Alaska at a time of lowered sea level when the Behring Sea was dry and in populating North America. The spread of the bison in both Old and New Worlds was by no means a simple one for they found the lands well occupied by grazers (bison being preëminently meadow and open country dwellers, although their ability to live in woodlands is attested by a variety in North America which has gained the varietal name of Wood Buffalo), and they were forced to compete with horses, the progenitors of the modern domestic cattle (the *urus* or *aurochs* of antiquity), and hosts of others. Not only that, but they had chosen a very unseasonable time for their wandering, since during the Pleistocene both Europe and North America suffered, at least four times, the advance of continental glaciers, whose presence was inimical to the continued residence of warm-blooded mammals, except for such types as the caribou which are especially adapted to withstand cold. These numerous changes of climate, the four glacial phases and their warm interglacial episodes made continent-wide migrations of animals essential to their survival. Many types were unable to withstand more than one such radical change in their environment, but from all these vicissitudes the bison emerged triumphantly, perhaps because of its original vigor and stamina. Contemporaneous with the bison in North America during these fluctuations of climate

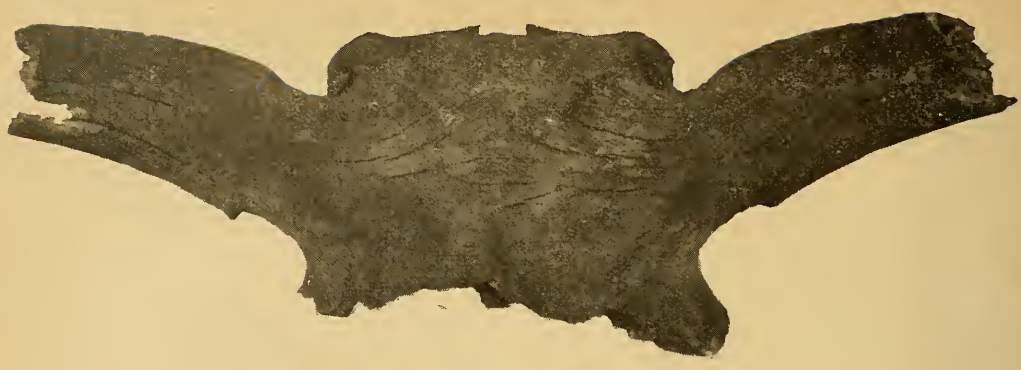

FIGURE 1

were such large mammals as the mammoth, mastodon, sabre-tooth tiger, giant sloth, and horse, all of which succumbed sooner or later to the inconstant conditions. The countless number of bison encountered by the early white pioneers may have been due to the fact that, on account of the extinction of these other grazers and browsers, a vast untenanted field lay before any group of mammals which could take advantage of it. The bison had survived the glacial period and took immediate advantage of the open fields spread before them. With no competition in feeding and a lack of carnivorous enemies it is not to be wondered at that they increased beyond all counting.

In Europe the bison was one of the large mammals encountered by Palæolithic man. That primitive man hunted and slew the bison is beyond question. The hunting grounds of the Neanderthal man doubtless contained vast herds of bison, as did the North American plains before the advent of the whites. The later, more highly cultivated, Palæolithic man delighted in making polychrome drawings of the bison on his cave walls, some examples of which for force and delicacy of toning could scarcely be bettered today. Statuettes and bas-reliefs of bison attest the importance of that animal in the economic life of early European man. The later increase in human population, as well as less risky and less fallible means at man's disposal for killing them contributed to the bison's near extinction. Though mentioned as abundant by Julius Cæsar, there has remained for the past few centuries but a pitiful remnant, which has been kept from total extinction only by the most stringent protection. Similarly on the North American continent, where, at the close of the glacial period, bison roamed the plains and prairies in untold millions, they became virtually extinguished in a few decades through the ruthless slaughter by white pioneers.

Fossil bison remains from North America are scattered over the continent south of latitude 43° N. from coast to coast, and also in Alaska and adjacent parts of Yukon Territory, although specimens from Canada are very few in number. They are divisible into seven species. These were not all contemporaneous, but occurred in irregular succession, the last to be evolved and to survive being known as *Bison bison*, the "American Buffalo" of recent times. The earliest species so far discovered was a gigantic one, *Bison latifrons*, which had a spread of horns from tip to tip of more than six feet, and roamed over the southern part of the United States. It was without doubt the largest of all the American bison. Osborn summarizes the remaining species of bison as follows:—"Remains of another ancient form, *Bison antiquus*, have been found in Kentucky and California associated with remains of elephants, mastodons, horses and camels. . . . It is considerably larger than *B. bison*, and is readily distinguished by the position of the horns, which are placed almost at right angles to the long axis of the skull. The horns of another species (*B. ferox*), resembling those of *B. latifrons*, have been found in the Pleistocene of Nebraska. The Pleistocene of Idaho and Kansas has yielded the horn cores of a fifth species (*B. alleni*). The giant northwestern bison found in Alaska, which may have existed also in eastern Siberia, is *B. crassicornis*. There also lived in Alaska, probably in late Pleistocene times, and ranged down into Kansas, the species *B. occidentalis*. This animal most closely resembles the living bison, with which it was probably contemporaneous for a time." (*The Age of Mammals*, 1910, p. 482.)

The specimen that has recently come into the collections of the Peter Redpath Museum is a skull of *Bison crassicornis* Richardson. Of this species no complete skull is known; our specimen consists of the posterior part of the skull with the horn cores, although neither of these is complete. Views of the upper and rear aspects of the skull are shown in the accompanying figures. Our speci-

men represents the average state of preservation of skulls of this species. Such measurements as could be made are as follows:—

	mm.
Width between bases of horn-cores	300
Width at the rear of the temporal fossæ	215
Width across mastoids	301
Width at rear of orbits	307
Height of occipital crest above lower lip of foramen magnum	163
Height of occipital crest above upper lip of foramen magnum	111
Circumference of zone-core	354
Greatest diameter (horizontal) of horn-core	118
Least diameter (vertical) of horn-core	101

One remarkable feature about this individual is the great size of the horn-cores, their diameters being proportionally greater than those of other specimens, in spite of the fact that this specimen is by no means a large individual of this species. The characteristic forward curve of the horns is well indicated by the remaining bases of the horn-cores.

Our specimen was recovered some sixty feet below the surface in gold-bearing gravel near Dawson, Yukon Territory, several years ago by Mr. J. Dudley Bell, who presented it to the Medical Faculty of McGill, whence it has recently come to this museum. Two other specimens of this species from the same region are preserved in the National Museum at Ottawa. It is at present very difficult to indicate to which part of the Pleistocene epoch such deposits belong, as Alaska and Yukon were free from glaciers, except in the high mountains. This is unfortunate, because parts of that region abound in fossil bearing deposits. These are chiefly the black muck of stream valleys, beds of clay, and also river gravel deposits. The chief mammals preserved as fossils are the mammoth, bison, horse and caribou, in their order of abundance.

Further and detailed information regarding the distribution of fossil bison, their identification etc., can be obtained from the works of Allen[1], Lucas[2], and Hay[3], where there are presented illustrations and measurements of practically every important known specimen of fossil bison. A more general account of the habits and habitat of extinct bison may be culled from the comprehensive treatises upon the subject of former mammalian life by Scott[4] and Osborn[5], which retain their readability in spite of the wealth of technical and scientific detail they present.

A short four page pamphlet entitled "*Bringing Back the Buffalo*", published by the Canadian National Parks Branch, Department of the Interior, Ottawa, 1926, gives an interesting account of the successful re-establishment of the buffalo in the Canadian National Parks.

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[1]Allan, J. A., *The American Bisons, Living and Extinct*, Mem. Mus. Comp. Zool., Cambridge, Mass., vol. 4, No. 10, 1876. 246 pp.

[2]Lucas, F. A., *The Fossil Bison of North America*, Proc. U.S. Nat. Mus., vol. 21, pp 755-771, 1899.

[3]Hay, O. P., *The Extinct Bisons of North America*. Proc. U.S. Nat. Mus., vol. 46, pp. 161-200, 1914. (Paper published in 1913.)

[4]Scott, W. B., *A History of the Land Mammals in the Western Hemisphere*. 693 pp., MacMillan Co., 1913.

[5]Osborn, H. F., *The Age of Mammals*. 635 pp., MacMillan Co., 1910.

FIGURE 2

Figures 1 and 2. *Bison crassicornis*. Upper and rear views of a skull from Dawson City, now in the Redpath Museum, McGill University. × $\frac{1}{6}$.

A CALENDAR OF FLOWERS

By NORMAN CRIDDLE, Treesbank, Manitoba

SOME twenty odd years ago, being encouraged by the late Dr. James Fletcher, I began to take notes of the time of flowering and seeding of local plants. The work was continued somewhat enthusiastically while I was in the employ of the Dominion Seed Branch but it had eventually to give way to entomological problems, though observations were still made when opportunity offered. The records thus accumulated are admittedly incomplete, but as there is now little chance to make them less so it has been decided to publish them as they are.

Not being a systematic botanist I have been obliged to rely very largely upon the kindness of others for the identification of my specimens and in this respect I owe a lasting debt of gratitude to the late Dr. Fletcher, Prof. John and J. M. Macoun. I am also under great obligation to Dr. M. O. Malte who has not only determined many specimens for me but he has also kindly looked over the manuscript and corrected numerous errors.

The classification followed is that of the International Code as presented in Gray's New Manual of Botany, 1908. I have followed this chiefly because it is used in the Canadian National Herbarium and because a majority of my specimens have been identified by the authorities connected with that museum.

The plants listed in this calendar have all been observed within ten miles of my home at Aweme, which is approximately six miles north of Treesbank, Manitoba. The list is obviously an incomplete one because it was next to impossible, with the time at my disposal, to discover the date of flowering of every species within the area chosen.

With reference to the column giving the average time required for ripening seed, it must be pointed out that this represents an approximate period between the first flower and the first ripe seed found. In many plants, such as violets for instance, the first flowers frequently fail to produce seeds; while in others, of which the Compositæ are examples, there is seldom a failure to do so. In a few instances flowers were actually marked so that the time taken to ripen seed is exact; these are preceded by an asterisk.

It frequently happens that plants produce adventitious flowers, that is to say abnormally early or late ones. These are not listed in the calendar because to include them would be misleading.

Finally it should be borne in mind that seasons vary enormously and that the influences of an early or late spring are frequently felt throughout the entire flowering period of the year.

NAME OF PLANT	No. of Years Observed	Average First Flowering	Earliest First Flowering	Latest First Flowering	No. of Days to Ripen Seed
Anemone patens Wolfgangiana	21	April 13	Mar. 23, 1910	April 28, 1923	45
Salix discolor	20	April 19	Mar. 28, 1910	April 30, 1907	35
Populus tremuloides	21	April 19	Mar. 28, 1910	May 15, 1907	40
Corylus americana	14	April 20	April 3, 1910	May 5, 1909	126
Ranunculus rhomboideus	19	April 20	April 8, 1910	May 14, 1907	53
Draba nemorosa	20	April 20	April 13, 1910	May 14, 1909	33
Juniperus horizontalis	13	April 24	April 9, 1918	May 24, 1907	131
Draba caroliniana	19	April 24	April 14, 1910	May 21, 1907	40
Androsace occidentalis	16	April 24	April 15, 1910	May 16, 1907	38
Alnus incana	12	April 26	April 7, 1910	May 20, 1907	122
Lomatium orientale	2	April 26	April 22, 1914	April 29, 1910	40
Salix petiolaris	11	April 27	April 13, 1910	May 11, 1917	33
Croylus rostrata	8	April 28	April 3, 1910	May 21, 1907	131
Ulmus americana	14	April 28	April 7, 1910	May 15, 1909	35
Salix cordata	12	April 29	April 18, 1915	May 11, 1917	39
Populus balsamifera	8	April 29	April 13, 1910	May 12, 1917	44
Shepherdia canadensis	16	April 29	April 16, 1918	May 26, 1907	58
Cymopterus acaulis	4	April 30	April 24, 1913	May 21, 1924	
Salix uva-ursi	2	May 1	April 21, 1913	May 11, 1914	
Potentilla concinna	13	May 1	April 21, 1910	May 24, 1907	38

NAME of PLANT	No. of Years Observed	Average First Flowering	Earliest First Flowering	Latest First Flowering	No. of Days to Ripen Seed
Acer Negundo	18	May 1	April 13, 1910	May 27, 1907	102
Taraxacum erythrospermum	14	May 2	April 29, 1910	May 25, 1907	*12
Capsella Bursa-pastoris	6	May 3	April 20, 1911	May 11, 1917	48
Phlox Hoodii	5	May 3	April 25, 1915	May 7, 1914	
Geum triflorum	21	May 4	April 15, 1918	May 24, 1907	46
Shepherdia argentea	10	May 4	April 5, 1910	May 24, 1908	107
Salix rostrata	9	May 6	April 26, 1915	May 16, 1912	37
Populus tremuloides (leafing)	18	May 6	April 20, 1910	May 31, 1907	
Viola conspersa	21	May 6	April 20, 1910	May 28, 1924	61
Caltha palustris	17	May 7	April 18, 1915	May 20, 1907	52
Lesquerella arenosa	2	May 7	May 7		
Petasites sagittatus	2	May 8	May 7		
Corydalis aurea	16	May 8	April 30, 1910	June 7, 1909	46
Lesquerella argentea	13	May 9	April 17, 1910	June 2, 1907	41
Habenaria hyperborea	1	May 10			
Arctostaphylos uva-ursi	18	May 10	April 29, 1910	May 29, 1907	93
Townsendia exscapa	10	May 10	April 27, 1915	May 26, 1907	22
Populus deltoides	4	May 11	April 29, 1910	May 18, 1915	
Cerastium arvense	19	May 11	April 29, 1910	May 31, 1907	39
Betula glandulosa	11	May 12	April 30, 1910	May 26, 1924	122
Fragaria glauca	17	May 12	April 27, 1910	May 29, 1924	33
Betula papyrifera	11	May 13	April 24, 1911	June 4, 1907	124
Ribes setosum	8	May 13	May 5, 1922	May 19, 1916	57
Viola nephrophylla	6	May 13	May 6, 1910	May 18, 1916	45
Antennaria campestris	15	May 13	April 29, 1910	May 28, 1924	20
Arabis Holboellii	15	May 14	April 29, 1910	May 26, 1909	44
Viola renifolia	6	May 14	April 26, 1906	May 31, 1907	
Fragaria virginiana	2	May 14	May 11, 1926		*32
Astragalus caryocarpus	16	May 15	May 5, 1911	June 2, 1924	67
Ribes triste	3	May 15	May 14, 1916	May 18, 1919	51
Ribes oxyacanthoides	12	May 16	April 28, 1911	May 21, 1923	60
Amelanchier spicata	20	May 16	May 4, 1915	June 9, 1907	48
Prunus nigra	15	May 16	May 5, 1910	June 7, 1907	108
Primula mistassinica	4	May 16	May 14, 1926	June 8, 1924	
Prunus pumila	17	May 17	April 28, 1910	June 4, 1907	88
Prunus pennsylvanica	20	May 17	May 4, 1910	June 7, 1907	60
Thlaspi arvense (main crop)	2	May 17	May 12, 1914		28
Salix lucida	8	May 17	May 8, 1915	May 19, 1913	36
Viola canadensis	16	May 17	May 5, 1910	June 2, 1924	57
Salix serissima	8	May 18	May 8, 1915	May 23, 1916	133
Betula fontinalis	2	May 18	May 10, 1912		
Arabis brachycarpa	10	May 18	May 6, 1910	June 6, 1907	59
Lepidium apetalum	3	May 18	May 18, 1926		50
Viola Nuttallii	3	May 18	May 17, 1911	May 19, 1913	
Lithospermum canescens	20	May 18	May 4, 1910	June 3, 1907	53
Ranunculus delphinifolius	2	May 19	May 11, 1916	May 28, 1915	
Viola sororia	10	May 19	May 6, 1910	June 6, 1907	22
Antennaria aprica	8	May 19	May 12, 1915	May 25, 1912	
Taraxacum officinale	8	May 19	May 11, 1910	June 7, 1907	*71
Juniperus sabina	1	May 20			
Ribes hudsonianum	4	May 20	May 16, 1913	May 27, 1909	
Veronica peregrina	1	May 20			
Picea canadensis	9	May 21	May 11, 1926	May 24, 1912	90
Astragalus hypoglottis	16	May 21	May 7, 1910	June 13, 1907	60
Viola pedatifida	15	May 21	May 7, 1910	June 6, 1907	22
Fraxinus pennsylvanica lanceolata	3	May 21	May 11, 1926	June 4, 1906	105
Houstonia longifolia	15	May 22	May 11, 1926	June 7, 1907	65
Salix amygdaloides	4	May 23	May 17, 1911	May 27, 1912	33
Chenopodium capitatum	5	May 23	May 15, 1913	May 27, 1910	27
Polygala paucifolia	4	May 24	May 19, 1915	May 27, 1909	
Comandra Richardsiana	16	May 24	May 10, 1911	June 6, 1917	55
Senecio manitobensis	9	May 24	May 13, 1910	June 13, 1924	27
Sisyrinchium angustifolium	11	May 25	May 15, 1911	June 9, 1907	68

NAME OF PLANT	No. of Years Observed	Average First Flowering	Earliest First Flowering	Latest First Flowering	No. of Days to Ripen Seed
Ribes floridum	13	May 25	May 13, 1915	June 7, 1924	36
Lithospermum angustifolium	11	May 25	May 19, 1923	June 9, 1907	37
Smilacina stellata	16	May 26	May 18, 1911	June 8, 1916	85
Corallorrhiza trifida	6	May 26	May 23, 1906	June 8, 1909	55
Rumex venosus	3	May 26	May 20, 1926	June 4, 1907	
Vicia sparsifolia	9	May 26	May 20, 1915	June 9, 1924	42
Quercus macrocarpa	19	May 27	May 19, 1911	June 10, 1907	91
Arenaria lateriflora	14	May 27	May 14, 1915	June 4, 1907	35
Camelina microcarpa	4	May 27	May 16, 1922	June 6, 1911	*41
Rubus arcticus	2	May 27	May 27, 1912	May 27, 1911	
Rubus triflorus	11	May 27	May 16, 1910	June 2, 1911	26
Salix longifolia	8	May 28	May 22, 1911	June 3, 1910	31
Crataegus coccinea ?	10	May 28	May 12, 1911	June 2, 1907	92
Prunus virginiana	16	May 28	May 16, 1926	June 10, 1924	72
Viola blanda	1	May 28			
Allium reticulatum	7	May 29	May 19, 1915	June 11, 1907	
Aralia nudicaulis	18	May 29	May 20, 1911	June 13, 1907	57
Zizia cordata	9	May 29	May 21, 1915	June 20, 1907	57
Stellaria longipes	7	May 30	May 24, 1906	June 8, 1924	19
Physalis grandiflora	7	May 30	May 24, 1919	June 10, 1913	59
Veronica americana	2	May 30	May 29, 1918	June 1, 1907	
Viola pubescens	10	May 30	May 16, 1926	June 3, 1913	57
Trillium cernuum	13	May 31	May 22, 1911	June 20, 1907	89
Disporum lanuginosum	2	May 31	May 28, 1910	June 4, 1907	
Thaspium aureum	13	May 31	May 22, 1911	June 15, 1907	77
Menyanthes trifoliata	7	June 1	May 23, 1922	June 22, 1924	41
Cerastium nutans	5	June 1	May 25, 1906	June 8, 1916	40
Anemone multifida	8	June 1	May 29, 1911	June 10, 1908	33
Thalictrum dioicum	15	June 1	May 23, 1919	June 13, 1924	50
Cardamine pratensis	1	June 1			
Potentilla Anserina	18	June 1	May 21, 1911	June 20, 1907	37
Lathyrus ochroleucus	18	June 1	May 21, 1911	June 13, 1924	49
Euphorbia virgata	1	June 1			
Rhamnus alnifolia	8	June 1	May 23, 1914	June 8, 1912	52
Elaeagnus argentea	9	June 1	May 27, 1911	June 12, 1916	89
Castilleja sessiliflora	14	June 1	May 22, 1911	June 14, 1907	37
Senecio vulgaris	1	June 1			*13
Arabis hirsuta	8	June 2	May 26, 1926	June 7, 1918	35
Camelina dentata	1	June 2			34
Sisymbrium incisum	6	June 2	May 28, 1911	June 9, 1915	36
Actaea rubra	6	June 2	May 21, 1911	June 7, 1917	70
Erigeron asper	14	June 2	May 22, 1911	June 16, 1907	29
Senecio integerrimus	7	June 2	May 26, 1910	June 6, 1909	23
Habenaria bracteata	14	June 3	May 26, 1911	June 17, 1907	74
Ranunculus sceleratus	3	June 3	May 24, 1913	June 18, 1907	38
Erysimum asperum	15	June 3	May 17, 1915	June 17, 1907	60
Mitella nuda	8	June 3	May 25, 1915	June 14, 1923	38
Ellisia Nyctelea	4	June 3	May 19, 1915	June 7, 1910	35
Castilleja coccinea	9	June 3	May 23, 1911	June 8, 1915	35
Cornus stolonifera	15	June 3	May 22, 1910	June 17, 1907	36
Trientalis americana	2	June 4	May 30, 1904	June 9, 1907	
Camelina sativa	2	June 4	June 2, 1914	June 7, 1918	44
Astragalus bisulcatus	2	June 4	June 3, 1926		
Vicia americana	16	June 4	May 27, 1911	June 16, 1907	37
Ledum groenlandicum	1	June 4			
Dodecatheon Meadia	1	June 4			
Lonicera glaucescens	18	June 4	May 26 1911	June 17, 1924	61
Senecio plattensis	15	June 4	May 20, 1911	June 15, 1907	23
Senecio pseudaureus	10	June 4	May 28, 1919	June 9, 1916	21
Senecio canus	7	June 4	May 30, 1919	June 11, 1909	23
Senecio palustris	6	June 4	May 30, 1915	June 12, 1907	14
Maianthemum canadense	9	June 5	May 30, 1912	June 17, 1907	90
Hypoxis hirsuta	3	June 5	June 3, 1908	June 9, 1912	

NAME OF PLANT	No. of Years Observed	Average First Flowering	Earliest First Flowering	Latest First Flowering	No. of Days to Ripen Seed
Cypripedium parviflorum	16	June 5	May 27, 1911	June 15, 1907	89
Aquilegia canadensis	11	June 5	May 22, 1911	June 18, 1907	36
Ranunculus Cymbalaria	6	June 5	May 23, 1910	June 10, 1907	
Cypripedium pubescens	14	June 6	May 31, 1911	June 16, 1907	91
Habenaria clavellata	1	June 6			
Corallorrhiza striata	5	June 6	May 26, 1911	June 27, 1908	28
Conringia orientalis	3	June 6	June 2, 1914	June 11, 1913	*152
Brassica arvensis	2	June 6	June 2, 1914	June 9, 1917	35
Oxalis stricta	5	June 6	May 27, 1915	June 13, 1909	
Rosa acicularis	14	June 7	May 27, 1915	June 18, 1924	75
Oxytropis Lamberti	12	June 7	May 27, 1915	June 13, 1909	50
Malvastrum coccineum	4	June 7	May 28, 1910	June 14, 1912	36
Pentstemon albidus	15	June 7	May 28, 1919	June 19, 1907	52
Erysimum parviflorum	16	June 8	May 24, 1911	June 24, 1924	60
Heuchera hispida	14	June 8	June 1, 1915	June 21, 1924	32
Linum Lewisii	12	June 8	June 1, 1922	June 19, 1907	33
Anemone canadensis	12	June 9	May 30, 1922	June 26, 1924	53
Comandra livida	1	June 9			
Chamaerhodos erecta	10	June 9	May 30, 1910	June 22, 1909	33
Viburnum Opulus americanum	11	June 9	May 27, 1926	June 22, 1907	79
Viburnum Lentago	12	June 9	May 27, 1926	June 22, 1907	91
Achillea Millefolium	12	June 9	June 4, 1915	June 19, 1907	37
Lychnis Drummondi	8	June 10	June 4, 1911	June 18, 1910	22
Astragalus neglectus	1	June 10			
Astragalus flexuosus	8	June 10	May 24, 1911	June 16, 1915	32
Gaura coccinea	4	June 10	June 1, 1911	June 20, 1906	36
Lonicera oblongifolia	6	June 10	June 5, 1914	June 14, 1910	35
Agoseris glauca	10	June 10	May 25, 1910	June 11, 1907	27
Erigeron philadelphicus	12	June 10	June 3, 1912	June 18, 1907	25
Corallorrhiza maculata	1	June 11			
Arabis glabra	6	June 11	June 3, 1926	June 15, 1910	38
Rubus idaeus aculeatissimus	11	June 11	June 5, 1911	June 23, 1907	33
Thermopsis rhombifiloa	4	June 11	May 28, 1910	June 17, 1915	
Geranium Bicknellii	1	June 11			
Osmorhiza longistylis	2	June 11	June 3, 191J	une 20, 1907	80
Heracleum lanatum	3	June 11	June 2, 1911	June 28, 1907	38
Primula farinosa	1	June 11			
Verbena hastata	1	June 11			
Dracocephalum parviflorum	10	June 11	May 30, 1915	June 18, 1907	38
Calla palustris	3	June 12	May 31, 1913	June 25, 1924	70
Smilax herbacea	19	June 12	May 31, 1911	June 17, 1907	85
Orchis rotundifolia	2	June 12	June 11, 1926		
Monolepis Nuttalliana	1	June 12			
Neslia paniculata	2	June 12	June 12, 1916	June 13, 1915	43
Polygala senega	7	June 12	June 3, 1911	June 29, 1907	35
Cornus canadensis	3	June 12	June 4, 1911	June 19, 1913	50
Cypripedium candidum	2	June 13	June 8, 1906	June 18, 1907	
Anemone cylindrica	10	June 13	June 5, 1908	June 25, 1907	59
Cardamine pennsylvanica	1	June 13			
Brassica nigra	1	June 13			*47
Rosa blanda	15	June 13	June 3, 1921	June 28, 1924	75
Lappula echinata	7	June 13	May 30, 1915	June 20, 1907	37
Galium boreale	18	June 13	June 6, 1915	June 26, 1924	41
Agoseris cuspidata	4	June 13	June 11, 1909	June 18, 1910	11
Tragopogon pratensis	1	June 13			18
Antennaria microphylla	9	June 13	June 8, 1918	June 29, 1908	33
Triglochin palustre	1	June 14			
Acerates viridiflora lanceolata	1	June 14			
Convolvulus spithamaeus	1	June 14			
Orobanche fasciculata	2	June 14	June 11, 1913	June 17, 1911	23
Linnaea borealis	3	June 14	June 13, 1912	June 15, 1913	
Ranunculus Macounii	2	June 15	June 9, 1910	June 20, 1909	
Chrysopsis villosa	13	June 15	June 9, 1911	June 27, 1907	27

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Gaillardia aristata	11	June 15	May 30, 1910	June 30, 1924	31
Lathyrus venosus	13	June 16	June 5, 1909	June 30, 1924	48
Linum sulcatum	1	June 16			
Rhus Toxicodendron radicans	8	June 16	June 3, 1909	June 21, 1907	77
Asclepias ovalifolia	11	June 16	June 8, 1926	June 27, 1915	68
Physalis lanceolata	12	June 16	June 10, 1911	June 26, 1907	60
Utricularia vulgaris americana	2	June 16	June 12, 1911	June 20, 1910	
Mimulus glabratus	2	June 16	June 13, 1926		
Erigeron pumilus	2	June 16	June 12, 1915	June 20, 1912	
Potentilla fruticosa	10	June 17	June 11, 1913	June 28, 1908	51
Pentstemon gracilis	10	June 17	June 6, 1911	July 1, 1924	54
Sanicula marilandica	8	June 17	June 10, 1910	June 22,1912	50
Prunella vulgaris	1	June 17			28
Tofieldia glutinosa	1	June 18			
Oxybaphus nyctagineus	5	June 18	June 10, 1911	June 24, 1912	*12
Potentilla arguta	8	June 18	June 8, 1911	June 30, 1924	33
Potentilla strigosa	10	June 18	June 8, 1910	July 4, 1907	33
Potentilla monspeliensis	6	June 18	June 15, 1911	June 23, 1915	30
Lathyrus palsutris	5	June 18	June 5, 1909	July 5, 1908	47
Astragalus adsurgens	13	June 18	June 14, 1926	July 2, 1924	41
Oxytropis deflexus	1	June 18			
Pyrola incarnata	10	June 18	June 11, 1911	June 28, 1907	68
Acerates lanuginosa	3	June 18	June 15, 1914	June 24, 1912	69
Crepis biennis	2	June 18	June 7, 1926		20
Rosa pratincola	13	June 19	June 13, 1911	July 9, 1907	76
Potentilla pulcherrima	2	June 19	June 16, 1912	June 22, 1915	34
Potentilla palustris	1	June 19			
Psoralea esculenta	10	June 19	June 4, 1926	June 20, 1909	41
Lysimachia thyrsiflora	5	June 19	June 12, 1911	June 28, 1907	35
Heliopsis scabra	10	June 19	June 17, 1911	July 8, 1924	44
Polygonatum commutatum	11	June 20	June 9, 1909	June 26, 1915	81
Iris versicolor (introduced)	1	June 20			
Sarracenia purpurea	6	June 20	June 14, 1910	June 27, 1924	67
Asclepias verticillata	1	June 20			
Campanula rotundifolia	13	June 20	June 14, 1911	June 28, 1907	36
Galium trifidum	1	June 20			
Rumex crispus	2	June 21	June 18, 1911	June 24, 1909	41
Ranunculus acris	1	June 21			
Silene antirrhina	10	June 21	June 11, 1912	July 2, 1923	19
Symphoricarpus racemosus	8	June 21	June 9, 1911	July 7, 1924	46
Crepis runcinata	7	June 21	June 14, 1910	June 28, 1908	18
Lilium philadelphicum andinum	11	June 22	June 15, 1911	July 1, 1907	73
Amorpha macrophylla	6	June 22	June 16, 1924	June 30, 1908	60
Apocynum androsaemifolium	9	June 22	June 7, 1911	July 6, 1907	74
Onosmodium hispidissimum	7	June 22	June 9, 1911	July 5, 1907	45
Galium triflorum	2	June 22	June 19, 1909	June 24, 1911	
Erigeron ramosus	6	June 22	June 20, 1913	June 25, 1915	17
Thalictrum polygamum	4	June 23	June 22, 1910	June 24, 1911	51
Oenothera serrulata	12	June 23	June 13, 1911	July 6, 1916	46
Plantago major	4	June 23	June 18, 1926	June 27, 1908	38
Cirsium Drummondi	9	June 23	June 20, 1911	July 13, 1908	19
Saponaria Vaccaria	6	June 24	June 17, 1911	July 2, 1909	42
Silene noctiflora	4	June 24	June 22, 1907	June 26, 1914	24
Lappula deflexa americana	5	June 24	June 20, 1910	June 28, 1913	33
Pyrola secunda	8	June 24	June 17, 1911	July 5, 1907	61
Urtica gracilis	2	June 25	June 23, 1912	June 27, 1911	
Nymphaea advena	1	June 25			
Sisymbrium Hartwegianum	2	June 25	June 25, 1913	June 26, 1912	57
Geum macrophyllum	9	June 25	June 15, 1911	July 6, 1907	51
Apocynum cannabinum	3	June 25	June 24, 1914	June 26, 1912	79
Solanum triflorum	2	June 25	June 24, 1911	June 26, 1909	57
Symphoricarpus occidentalis	10	June 25	June 15, 1906	July 8, 1924	71
Oxytropis gracilis	2	June 26	June 24, 1911	June 29, 1910	

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Cicuta maculata	2	June 26	June 19, 1911	July 4, 1908	70
Habenaria obtusata	2	June 27	June 20, 1926		
Cypripedium hirsutum	10	June 27	June 21, 1926	July 5, 1908	72
Steironema ciliatum	9	June 27	June 22, 1910	July 7, 1917	66
Gilea linearis	1	June 27			15
Scutellaria galericulata	6	June 27	June 19, 1911	July 10, 1907	27
Polygonum Convolvulus	1	June 28			*33
Spiraea salicifolia	10	June 28	June 19, 1911	July 9, 1907	68
Agastache Foeniculum	10	June 28	June 21, 1911	July 14, 1907	35
Pyrola chlorantha	5	June 28	June 26, 1911	July 5, 1907	65
Rudbeckia hirta	9	June 28	June 18, 1911	July 8, 1097	46
Parnassia palustris	8	June 29	June 24, 1910	July 12, 1907	434
Petalostemum candidum	9	June 29	June 23, 1913	July 10, 1915	50
Convolvulus sepium	8	June 29	June 24, 1912	July 9, 1907	44
Stachys palustris	8	June 29	June 22, 1911	July 9, 1907	26
Alisma plantago-aquatica	1	June 30			
Oxybaphus hirsutus	2	June 30	June 23, 1911	July 8, 1914	*14
Agrostemma Githago	3	June 30	June 22, 1913	July 19, 1914	*41
Glycyrrhiza lepidota	10	June 30	June 24, 1911	July 11, 1907	58
Epilobium angusticolium	11	June 30	June 24, 1911	July 10, 1907	42
Oenothera biennis	9	June 30	June 18, 1911	July 12, 1907	58
Lycopus americanus	1	June 30			
Viburnum pubescens	1	June 30			
Astragalus canadensis	7	July 1	June 24, 1913	July 9, 1907	48
Steironema quadriflorum	1	July 1			
Psoralea argophylla	7	July 2	June 29, 1910	July 8, 1909	53
Erigeron canadensis	5	July 2	July 27, 1913	July 6, 1912	24
Sonchus arvensis	3	July 2	June 24, 1926		*18
Lepachys columnaris	9	July 2	June 25, 1926	July 8, 1909	43
Zygadenus chloranthus	9	July 3	June 23, 1911	July 14, 1907	62
Vitis vulpina	1	July 3			
Psedera vitacea	3	July 3	June 30, 1911	July 7, 1914	66
Hedysarum boreale	1	July 3			
Monarda mollis	9	July 3	June 24, 1910	July 13, 1907	46
Mimulus ringens	3	July 3	June 30, 1911	July 10, 1908	63
Lactuca campestris	1	July 3			
Solidago missouriensis	5	July 3	June 28, 1926	July 9, 1914	62
Linum rigidum	1	July 4			
Oenothera pallida	8	July 4	June 15, 1911	July 7, 1914	60
Pyrola elliptica	6	July 4	June 25, 1911	July 12, 1907	61
Lactuca pulchella	7	July 4	June 22, 1910	July 12, 1907	20
Petalostemum purpureum	8	July 5	June 30, 1910	July 9, 1906	55
Oxytropis splendens	1	July 5			
Brauneria angustifolia	10	July 5	June 26, 1911	July 21, 1907	48
Cirsium arvense	1	July 5			26
Laportea canadensis	1	July 6			
Polanisia graveolens	2	July 6	July 2, 1909	July 9, 1915	
Scrophularia marilandica	1	July 6			
Orthocarpus luteus	10	July 7	July 3, 1911	July 15, 1909	34
Echinocystis lobata	3	July 7	June 23, 1916	July 13, 1913	44
Lactuca canadensis	5	July 7	July 4, 1911	July 9, 1910	15
Mentha canadensis	2	July 8	July 6, 1911	July 11, 1910	44
Lobelia Kalmii	5	July 8	June 30, 1911	July 14, 1912	38
Lobelia spicata	4	July 8	July 6, 1911	July 12, 1909	29
Lygodesmia juncea	4	July 8	June 30, 1911	July 19, 1906	18
Polygonum Muhlenbergii	2	July 9	July 8, 1913	July 11, 1909	59
Helianthemum canadense	4	July 9	June 27, 1911	July 24, 1907	35
Scutellaria lateriflora	1	July 9			
Aster angustus	1	July 9			
Achillea lanulosa	4	July 9	July 2, 1913	July 12, 1908	51
Chimaphila umbellata	2	July 10	July 6, 1911	July 13, 1909	51
Cirsium undulatum	7	July 10	June 10, 1913	July 12, 1907	30
Epilobium adenocaulon	3	July 11	July 8, 1909	July 16, 1908	37

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Erigeron glabellus	12	July 11	July 5, 1909	July 15, 1907	38
Opuntia polyacantha	3	July 12	June 18, 1911	July 14, 1912	
Asclepias speciosa	2	July 12	July 11, 1911	July 12, 1909	52
Verbena bracteosa	1	July 12			
Orobanche ludoviciana	1	July 12			
Helianthus Maximilani	8	July 12	July 2, 1911	Aug. 1, 1907	46
Epipactis repens ophioides	2	July 13	July 4, 1926		
Aster ptarmicoides	10	July 13	July 1, 1926	July 21, 1907	57
Tilia americana	1	July 13			
Petalostemum villosum	4	July 13	July 10, 1910	July 18, 1906	
Circaea alpina	1	July 13			
Rudbeckia laciniata	6	July 13	July 7, 1911	July 13, 1910	45
Sagittaria latifolia	4	July 14	July 8, 1910	July 15, 1913	70
Spiranthes Romanzoffiana	1	July 14			
Drosera rotundifolia	1	July 14			
Helenia deflexa	2	July 14	July 10, 1907	July 18, 1906	
Humulus Lupulus	1	July 15			
Solidago decumbens	4	July 15	July 14, 1911	July 17, 1908	46
Helianthus scaberrimus	10	July 15	July 8, 1910	July 20, 1907	44
Habenaria dilatata	1	July 16			
Teucrium occidentale	1	July 16			
Campanula aparinoides	1	July 16			
Cuscuta Gronovii	2	July 17	July 15, 1907	July 19, 1909	26
Solidago canadensis	11	July 17	July 13, 1914	July 24, 1910	39
Allium stellatum	12	July 18	July 11, 1910	Aug. 4, 1907	48
Helianthus petiolaris	5	July 18	July 11, 1911	July 28, 1914	41
Impatiens pallida	1	July 19			
Physostegia virginiana	3	July 19	July 15, 1912	July 22, 1908	42
Solidago graminifolia	9	July 19	July 10, 1913	July 31, 1907	42
Helenium autumnale	5	July 19	July 8, 1906	Aug. 9, 1907	
Rumex persicarioides	1	July 20			
Parnassia caroliniana	1	July 20			
Solidago rigida	13	July 20	July 17, 1911	Aug. 1, 1907	45
Pedicularis lanceolata	4	July 21	July 12, 1911	Aug. 2, 1912	53
Bidens frondosa	4	July 21	July 19, 1909	July 26, 1911	33
Genitana affinis	1	July 22			40
Aplopappus spinulosus	2	July 22	July 16, 1911	July 29, 1910	52
Aster laevis	12	July 22	July 10, 1926	Aug. 4, 1907	33
Cirsium discolor	2	July 22	July 19, 1912	July 24, 1910	34
Liatris punctata	12	July 23	July 20, 1911	Aug. 4, 1907	46
Cycloloma atriplicifolium	1	July 24			
Monotropa uniflora	5	July 24	July 17, 1913	Aug. 5, 1910	39
Liatris scariosa	10	July 24	July 15, 1911	Aug. 7, 1907	39
Helianthus giganteus	4	July 24	July 15, 1911	Aug. 3, 1912	47
Grindelia squarrosa	8	July 25	July 17, 1914	Aug. 9, 1907	
Eupatorium purpureum	6	July 25	July 13, 1913	Aug. 8, 1911	38
Aster Lindleyanus	8	July 25	July 14, 1911	Aug. 5, 1912	44
Solidago memoralis	6	July 26	July 17, 1909	Aug. 7, 1912	41
Hieracium canadense	11	July 27	July 19, 1910	Aug. 3, 1907	27
Aster paniculatus	4	July 28	July 18, 1911	Aug. 2, 1913	45
Solidago rugosa	2	July 30	July 29, 1910	Aug. 1, 1913	32
Aster umbellatus	7	July 30	July 24, 1911	Aug. 5, 1908	47
Aster commutatus	9	July 31	July 13, 1911	Aug. 10, 1907	45
Gentiana Amarella acuta	6	Aug. 1	July 24, 1906	Aug. 9, 1907	25
Prenanthes alba	9	Aug. 1	July 25, 1912	Aug. 9, 1907	34
Helianthus pumilus ?	2	Aug. 1	July 28, 1911	Aug. 4, 1912	
Lactuca spicata	1	Aug. 2			
Boltonia asteroides	3	Aug. 2	July 24, 1911	Aug. 9, 1912	
Gentiana procera	7	Aug. 3	July 24, 1913	Aug. 9, 1907	28
Prenanthes racemosa	8	Aug. 3	July 28, 1906	Aug. 12, 1913	26
Amaranthus retroflexus	1	Aug. 4			
Aster puniceus	6	Aug. 4	Aug. 2, 1912	Aug. 7, 1907	38
Artemisia caudata	3	Aug. 4	Aug. 1, 1913	Aug. 8, 1912	40

NAME OF PLANT	No. of Years Observed	Average First Flowering	Earliest First Flowering	Latest First Flowering	No. of Days to Ripen Seed
Bidens cernua	5	Aug. 6	July 31, 1908	Aug. 15, 1909	41
Artemisa ludoviciana	3	Aug. 7	Aug. 1, 1911	Aug. 19, 1912	45
Artemisia dracunculoides	1	Aug. 7			42
Aster novae-angliae	9	Aug. 8	Aug. 1, 1914	Aug. 16, 1909	36
Artemisia anaphalodes	1	Aug. 8			
Lycopus lucidus	1	Aug. 10			
Gentiana Andrewsii	2	Aug. 11	Aug. 4, 1909	Aug. 19, 1912	
Artemisia frigida	4	Aug. 11	Aug. 10, 1910	Aug. 12, 1911	
Gentiana crinita	1	Aug. 12			
Polygala verticillata	1	Aug. 14			
Gentiana puberula	1	Aug. 17			
Artemisia biennis	1	Aug. 19			37

DESTRUCTION OF BIRDS BY LIGHTHOUSES IN THE PROVINCES OF ONTARIO AND QUEBEC

By HARRISON F. LEWIS

UNDER instructions received from the Commissioner of Canadian National Parks, an investigation of the destruction of birds by lighthouses in the provinces of Ontario and Quebec was begun in the autumn of 1924.

Questionnaires on the subject were sent through the Agents of the Department of Marine and Fisheries to 135 lightkeepers in these two provinces. Replies were received from 68 of these.

In tabulating and considering some of the information received, it has appeared desirable to separate the lights into two classes, namely, (1) the red lights and the fixed white lights, and (2) the flashing, revolving, and occulting white lights. There are 28 reports from keepers of lights of class (1), and 40 reports from keepers of lights of class (2). Tabulations showing the number, name, height, and type of each light, and the amount of destruction of bird life and the conditions of weather under which it chiefly occurs are as follows:

RED LIGHTS AND FIXED WHITE LIGHTS

No. of Light	Name of light	Height of light above water	Amount of destruction	Weather Conditions	Remarks.
874	Oak Point	45′	None.		No railing. Fixed white.
963.7	Carleton Wharf	20′	Very slight.		Fixed red.
969	Port Daniel West	100′	None.		Fixed white.
1045	West Point, Anticosti	106′	Small numbers.	Snowstorm.	Fixed white.
1050	Little Natashkwan Harb.	33′	12 birds in 14 years.	Foggy nights.	Fixed white.
1051.9	Ile au Marteau	45′	10 per year.	Dark, calm nights in Aug.	Fixed white.
1147	Brandy Pots	71′	2 birds in 4 years.	Fog or snow.	Fixed white.
1150	Long Pilgrim	136′	About 100 in 27 years.	Foggy, & especially smoky.	Fixed white.
1264	Barre a Boulard	40′	None.		Fixed white.
1328	Pointe du Lac, back	137′	6 or 7 per year.	Foggy nights.	Fixed white.
1428	Ile Ste. Therese	22′	None.		Fixed white.
1544	Oka	144′	Slight.	Fog & high wind in Aug.	Fixed white.
1627	Lancaster	33′	From 0 to 5 per year.	Stor my and foggy nights.	Fixed white.
1754	False Ducks	68′	500 birds in a length of time not stated.	of Thick, foggy nights at migration time.	Fixed white.
1760	Point Pleasant	52′	None.		Fixed white.

RED LIGHTS AND FIXED WHITE LIGHTS—*Continued*

No. of Light	Name of light	Height of light above water	Amount of destruction	Weather Conditions	Remarks.
1760	Point Pleasant	52′	None.		
1813	Toronto, East Entrance	43′	None.		Occulting red.
1827	Burlington Bay	40′	None.		Fixed red.
1831	Port Dalhousie	42′	None.		Fixed red.
2046	Gereaux Island	49′	3 birds in 1924.	May night with S. wind.	Fixed white.
2051	Bustard Rocks	30′	50 in a length of time not stated.	Calm, foggy nights.	Fixed white.
2070	Strawberry Island	40′	None.		Fixed white.
2086	Gore Bay	43′	6 or 7 in 11 years.	Foggy nights late in fall.	Fixed white.
2089	Cape Robert	46′	None.		Fixed white.
2166	Gargantua	85′	2 in 12 years.		Fixed white.
2169	Michipicoten Harbor	70′	2 in 3 years.		Fixed white.
2187	Porphyry Point	56′	Up to 40 per year?.	Storm or fog in fall or spring.	Fixed white.
2199	Port Arthur	43′	None.		Occulting red.
2204	Victoria Island	45′	15 in 1924.	Windy weather in fall, also on foggy nights.	Fixed white.

FLASHING, REVOLVING AND OCCULTING WHITE LIGHTS

No. of Light	Name of light	Height of light above water	Amount of destruction	Weather Conditions	Remarks.
972	Maquereau Point	62′	20 in 1923; 12 in 1924.	Fog or rain with high wind at night.	3 flashes every 15 seconds
977	Cap d'Espoir	90′	None.		4 flashes every 25 seconds (15,000 c.p.).
979	Perce	154′	50 in a length of time not stated.	Dark, foggy nights in spring and fall.	2 flashes every 20 seconds (25,000 c.p.).
981	Point Peter	77′	None.		1 flash every 7 seconds.
1030	Brion Island	126′	200 per year.	Foggy nights in October.	4 flashes every 30 seconds
1032	Etang du Nord	93′	400 in a length of time not stated.	Fine, dark nights in fall.	2 flashes every 20 seconds
1036	Entry Island	303′	None.		Occulting, visible 6 secs. out of every 10.
1046	Flat Island	72′	20 a month.	Foggy nights in summer.	3 flashes every 15 seconds
1047	St. Mary Island	114′	75 to 150 per year.	Rainy or foggy nights, June to November.	2 flashes every 15 seconds
1054.2	Charleton Point	126′	None.		4 flashes every 32 seconds (30,000 c.p.).
1054.4	Cap de Rabast	78′	Slight.	At night.	3 flashes every 24 seconds (40,000 c.p.).
1055	Perroquet Island	87′	Up to 10 per night; on one occasion, 32 in one night.	Cloudy nights, foggy or rainy in fall.	2 flashes every 24 seconds (50,000 c.p.).
1061	Fame Point	190′	3 or 4 per year	Rainy nights in November	2 flashes every 10 seconds
1063	Cape Magdalen	146′	3 or 4 in 1924.	Summer nights with S. wind.	3 flashes every 30 seconds
1065	Riviere a la Martre	130′	Hundreds are killed.	Foggy nights in May and June.	4 flashes every 30 seconds
1071	Cap Chat	120′	None killed in 22 years.		1 flash every 3 seconds.
1074	Egg Island	74′	20 or 25 in a length of time not stated.	At night in fall, in fog or in storms of rain or snow.	2 flashes every 24 seconds (50,000 c.p.).
1108	Red Islet	65′	5-6-7-8-10 per night.	Fall and spring nights, with fog or high wind.	4 flashes every 24 seconds (15,000 c.p.).
1151	Cape Dogs	207′	10 per year.	Foggy, & especially smoky nights in summer.	2 flashes every 5 seconds.

FLASHING, REVOLVING AND OCCULTING WHITE LIGHTS—*Continued*

No. of Light	Name of light	Height of light above water	Amount of destruction	Weather Conditions	Remarks.
1153	Cape Salmon.....	82′	Some, amount uncertain.	Smoky or foggy nights either calm or windy.	3 flashes every 20 secs. (20,000 c.p.).
1156	Grande Ile, Kamouraska	105′	None.		1 flash every 7 seconds.
1177	Upper Traverse.....	47′	Many killed.	Dark fall nights, with storm or fog.	1 flash every 5 seconds.
1181	Stone Pillar.....	83′	5 killed in a length of time not stated.	Dark nights in spring.	1 flash every 7 seconds.
1753	Main Duck Island.....	74′	In 1923 several hundred, in 1924 a few.	Foggy nights in spring.	1 flash every 6 seconds.
1786	Point Peter.....	62′	10 to 12 in a length of time not stated.	Stormy and foggy nights in fall.	Revolving, every 35 seconds.
1837	Point Abino.....	87′	Very few birds killed.	Any spring night.	3 flashes every 12 seconds
1849	Long Point.....	17′	519 birds in 1925.	Foggy nights in spring and fall; a few in snow-storms.	1 flash every 8 seconds (100,000 c.p.).
1863	Pelee Passage.....	75′	From 10 to 100 in length of time not stated.	On foggy and rainy nights, or any dark night, in spring and fall.	2 flashes every 7½ seconds.
1947	Lyal Island.....	51′	None.		2 flashes every 20 seconds (25,000 c.p.).
1953	Cove Island.....	90′	200 per year.	Rainy and foggy spring nights.	1 flash every 15 seconds.
2002	Hope Island.....	54′	7 in 7 years.	Dark rainy spring night with S. wind.	The 7 birds all killed in one night. 3 flashes every 24 seconds (20,000 c.p.).
2004	Giants Tomb.....	40′	8 in length of time not stated.	Rainy spring evenings.	2 flashes every 15 seconds (25,000 c.p.).
2018	Western Island.....	74′	Large numbers.	Calm, foggy spring nights.	1 flash every 15 seconds.
2024	Red Rock.....	60′	About 25 on an average foggy night.	Foggy nights in spring and fall.	Occulting; visible 8 seconds in every 12.
2159	Ile Parisienne.....	54′	None.		Occulting; visible 4 seconds out of every 6.
2170	Caribou Island.....	99′	160 per year.	Dark, foggy nights in spring and fall.	3 flashes every 10 seconds
2177	Otter Island.....	97′	None.		1 flash every 8 seconds.
2179	Peninsula Harbour.....	105′	None.		4 flashes every 25 seconds (15,000 c.p.).
2181	Slate Islands.....	224′	300 birds in 1924.	Spring and fall nights without regard to weather.	2 flashes every 15 seconds
2182	Battle Island.....	118′	Very few killed.	Hot nights, smoky or hazy, July 1st to Aug. 15th.	3 flashes every 24 seconds (20,000 c.p.).

The following generalizations may be obtained from the foregoing tabulations.

1. Serious destruction of bird life by lights is usually associated with poor atmospheric visibility, caused by fog, smoke, rain or snow especially when such poor visibility occurs at a season of heavy migration. More destruction appears to be due to fog than to any other one cause, although the worst individual nights are some of the very smoky ones.

2. Very little destruction is caused by fixed lights or red lights. The only fixed light reporting destruction of any moment is No. 1754, the False Ducks, at the lower end of Lake Ontario.

3. There is extreme variation in the amount of destruction caused by flashing white lights, ranging from none at all to several hundred birds each season. This variation does not appear to be correlated with the height of the light the strength of its light-beams or the time-formula of its flashes.

4. Only 12 flashing lights, or 30% of the flashing lights heard from, report serious destruction of bird life.

Possible causes of the variation in amount of destruction having been restricted in number by the above findings, the probability that the situation of the individual light is the chief determining factor is thereby strengthened. "Situation", as

here used, includes (*a*) the relation of the position of the light to the position of major bodies of land and water in northeastern North America and, hence, to chief routes of bird-migration, and (*b*) the relation of the position of the light to local topographical features in its immediate neighbourhood. Until more detailed and certain information concerning important routes of bird-migration in this area is available, it is idle to speculate on the relative influence of the general and the local situation of a light.

Attention may be called, however, to the interesting condition presented by three neighbouring lights, namely, No. 1063, Cape Magdalen; No. 1065, Riviere a la Martre; and No. 1071, Cap Chat. These are three similar flashing white lights on the north shore of the Gaspe Peninsula; Cape Magdalen is the most easterly and Cap Chat the most westerly of the three, but even Cap Chat is well to the eastward of the longitude of Point des Monts, at which point the opposite (north) shore of the St. Lawrence turns sharply northeastward. Destruction of bird life is reported to be very light at Cape Magdalen, very heavy at Riviere a la Martre, and entirely non-existent at Cap Chat. Possibly Riviere a la Martre light lies on an important migration-route, which passes between the lights of Cape Magdalen and Cap Chat, on either hand, but it is difficult to see from an examination of the map why this should be so. The *a priori* expectation would naturally be that the chief migration-route in this region would cross the north shore of the Gaspe Peninsula at a point about opposite Point des Monts, which would be some distance west of all three of these lights. It is possible that the differences in the amount of destruction caused by these three lights are due entirely to the local topography surrounding each of them.

Many lightkeepers report that there are cats or dogs at liberty about their stations, but it is believed that their presence would not prevent the lightkeepers from knowing if serious destruction of birds took place at their lights, because, where destruction does take place, it is usually observed by the lightkeepers while it is actually in progress, owing to the fact that these officers must frequently visit the lanterns of their lights during the night. Other animals that are reported by various lightkeepers as consuming some of the dead birds after destruction had taken place are: minks, weasels, skunks, mice, raccoons, woodchucks, and Gulls.

Thirty-two lightkeepers report that the death of the birds is due only to their striking against some part of the lantern or the lighthouse, three report such death to be due only to exhaustion which the birds cause by flying around and around in the rays of light, and ten report death of the birds to be due to both of these causes (exhaustion and striking).

In most cases the dead birds are evenly distributed about the light, unless disturbed by the wind, but in some cases it is reported that the number of dead birds is greater on one side than on another. In cases of the latter type, the side on which the accumulation of dead birds is greatest varies, and is probably determined in each such case by the situation of the light.

The following injuries are reported to have been observed on birds killed by striking some part of the lighthouse or the lantern:

Crushed head—1 report;
Skin torn from head—1 report;
Bruised head—1 report;
Broken bill—3 reports;
Blood oozing from mouth—3 reports;
Bleeding from nostrils—1 report;
Broken neck—7 reports;
Breast bruised—2 reports;
Breast broken—2 reports;
Chest split open (on large birds)—1 report;
Broken wings—5 reports;
Broken legs—1 report;
Broken to pieces—1 report.

It is only an exceptional light, such as range lights of some types, which lacks a railing around the lantern, as it is the general practice to provide such a railing, below the level of the rays of light, for the safety of persons walking on the platform about the lantern.

(*Concluded in April Issue.*)

MOLLUSCS FROM THE LAKE BRERETON DISTRICT, MANITOBA

By ALAN MOZLEY, University of Manitoba

DURING the latter part of May, 1926, several days were spent in collecting molluscs in the vicinity of Brereton, Manitoba, which is situated on the main line of the Canadian National Railways 70 miles east of Winnipeg. This district is situated within the Canadian Zone, and near the western boundary of the area of Archean rock outcrops, known to geologists as the Laurentian Shield, and some of which salient features of this region have been mentioned in a previous paper.* Lake Brereton, in which most of the collecting was done is a small shallow lake, about three miles long and one and a half miles wide. The greatest depth observed in the course of this examination was fourteen feet, but greater depths are reported. In common with many small lakes in this region the water shows a distinct brown tint; the hydrogen ion concentration at the time of examination was 7.7. The bottom is mostly of fine, oozy mud, and there are many sandy and rocky habitats near the shores. The shore development, when the meaning of this term is extended to include the shores of islands, is probably rather low in comparison with that of some lakes and bays of western Ontario, but high as compared with that of the prairie lakes, which usually have gently curving shores. This factor of shore development is an important one, directly and indirectly, in determining the productivity of a lake in regard to aquatic organisms. The shores of Lake Brereton are, in the main, somewhat exposed to wave action. The lake is well known for its fish; Pike, Pickerel, Perch and Suckers being numerous and of large size. A smaller species *Notropis* sp. was also found to be common. Aquatic and semi-aquatic plants found in the lake include: *Utricularia macrorhiza* LeC., *Zizania aquatica* L., *Elodea canadensis* Michx., three species of *Potamogeton*, *Typha latifolia* and *Scirpus* sp. Water-lilies are also found. The Rennie River, a small slow-flowing stream which drains a considerable area of muskeg and tamarack swamp, flows into the lake on the southern shore. There is an outlet stream at the northern end also known as the Rennie River, the waters of which eventually reach the Winnipeg River. The seventeen species of aquatic molluscs here recorded from Lake Brereton doubtless do not constitute the entire mollusc fauna of the lake, but from the information so far collected it seems that about one-third of these are species which in Western Canada at least, may be considered characteristic of the "Canadian Zone". I desire to express my thanks to my hosts at Brereton, the members of the Winnipeg Angling Club particularly Mr. H. C. Pearce and to Dr. Victor Sterki for the identification of the Sphæriidæ. Dr. Bryant Walker also very kindly examined several shells about the names of which I was in doubt.

*Mozley, Alan, Molluscs from the Manitoba-Ontario Boundary, *Nautilus*, XXXIX, p. 121-125, 1926.

LIST OF SPECIES

GASTROPODA

Family PUPILLIDAE

Strobilops affinis Pilsbry.

This was one of the most abundant of the terrestrial species and was the dominant mollusc in the mixed coniferous-deciduous forest.

Family COCHLIOPIDAE

Cochliopa lubrica (Muller).

This and the terrestrial species listed below were found near the shores of the lake and on the large island at the southern end of the lake.

Family ZONITIDAE

Polita hammonis (Strom)

Euconulus chersinus polygyratus Pilsbry.

Zonitoides arborea (Say).

Family ENDODONTIDAE

Gonyodiscus cronkhitei anthonyi (Pilsbry).

Family SUCCINEIDAE

Succinea ovalis Say.

Family LYMNAEIDAE

Lymnæa stagnalis appressa (Say).

This variety of *stagnalis* was not collected in Lake Brereton, but only in Mud Turtle Lake which is situated about one mile west of the former. In this lake a single very large individual was found on an exposed rocky shore, a station very similar to that occupied by *sanctæmariæ* in Lake Brereton. It is probable that this individual had been carried from some other habitat. *Lymnæa stagnalis sanctæmariæ* (Walker).

This variety was common in Lake Brereton, on exposed rocky shores, both on the rock faces and in the rock pools. In most cases the shells were very much worn, where they came in contact with the rock, on the body whorl just above the parietal wall of the aperture. Some were perforated at this point. As the proportions of the Lake Brereton shells differ slightly from those

described by Baker*, a series of measurements is given below.

Length	Greater Diameter	Lesser Diameter	Aperture Length	Aperture Width
33.7 mm.	22.2 mm.	17.0 mm.	23.5 m.m	15.3 mm.
34.2	23.0	16.9	24.4	16.1
34.2	23.0	16.9	24.4	16.1
35.9	23.3	16.6	25.5	15.0
36.3	22.8	17.8	25.3	15.5
37.6	24.0	16.5	25.7	17.0
39.5	25.1	18.3	27.3	17.4
43.7	The largest individual collected, aperture broken.			

Lymnæa megasoma (Say).

This species was found to be common in Lake Brereton. It inhabits the *Typha* marsh, and is also found among *Scirpus* in sheltered bays. The shells are rather smaller than those described by Baker*, but the porportions are very similar *Lymnæa lanceata* (Gould).

Common in the *Typha* marsh in Brereton Lake. Previously reported from mile 95, G.W.W.D. Ry. Measurements of more or less typical shells from these localities are as follows:

Length	Greater Dia.	Lesser Dia.	Aperture Length	Aperture Width	Locality
19.4 mm.	6.9 mm.	6.2 mm.	10.2 mm.	4.8. mm.	Mile 95, G.W. W.D. Ry.
18.5	6.7	6.0	9.1	4.3	Lake Brereton.
19.0	7.3	6.1	9.0	4.9	Lake Brereton
The largest shell from the G.W.W.D. Ry measured 21.7 mm. in length					

Lymnæa columella casta (Lea).

On exposed shores in Lake Brereton, those protected to some extent by a narrow belt *scirpus*. This variety has not been previously reported from the Hudson Bay drainage. Dr. Bryant Walker very kindly confirmed my determination of these shells.

Family PLANORBIDAE

Planorbis parvus Say. *Typha* marsh, Lake Brereton.

Planorbis exacuous Say. Lake Brereton, *Typha* marsh; exposed sandy shore, among *Scirpus*, 1-3 feet; also on water lily leaves.

Planorbis antrosus striatus Baker.

Typha habitat, Lake Brereton; exposed rocky shore, Mud Turtle Lake. This species was also found in a small boggy lake, rather less than a quarter of a mile in diameter, at mile 55½ C.N.R. (from Redditt, Ont.) which is between Brereton and Decimal, Man. This lake was surrounded by Tamarack and Black Spruce, which were growing in a luxuriant bed of *Spaghnum*. The Pitcher Plant (*Sarracenia purpurea* L.), a characteristic bog plant was also found among the *Sphagnum* within a few feet of the edge of the lake. The hydrogen ion concentration of the water in this lake was 6.6. Measurements of shells from this lake are, height, 4.9 mm.; greater diameter 9.1 mm.; lesser diameter 7.4 mm.; aperture height 5.1 mm.; aperture width 5.1 mm. The carina is less developed in these shells than in those from Lake Brereton.

Planorbis hirsutus Gould. *Typha-Zizania* habitat on south-esatern shore of Lake Brereton and on water lily leaves.

Planorbis campanulatus variety. Brereton and Mud Turtle Lakes on exposed shores. To be reported on in a later paper.

Planorbis umbilicatellus Cockerell.

This species was found in a small pond, surrounded by willows and alders, on the shores of Mud Turtle Lake, from which it was separated by a small sand bar. Accompanying this snail was a species of *Eubranchipus*.

Segmentina crassilabris Walker.

Abundant in a sheltered bay in Lake Brereton, among *Scirpus*, etc.

Family PHYSIDAE

Physa gyrina Say.

Common on exposed shores in Brereton and Mud Turtle Lakes.

Aplexa hypnorum Linne.

Small pond on the mainland between Brereton and Mud Turtle Lakes. These shells do not appear to belong to the variety *tryoni* Currier.

Family ANCYLIDAE

Ferrissia parallela Hald.

Rennie River, on water lily leaves.

Family AMNICOLIDAE

Amnicola limosa? Say

Abundant on sand bottom and on plants at the southern end of the lake, in water 2-6 feet deep.

PELECYPODA

Family UNIONIDAE

Anodonta grandis footiana Lea.

This was the only mussel collected during my short stay. Small individuals are quite common.

Family SPHAERIIDAE

Musculium securis Prime. *Typha* habitat, Lake Brereton.

Pisidium roperi Sterki. Pond near Mud Turtle Lake with *Planorbis umbilicatellus* as above.

Pisidium adamsi Prime.

NOTES ON THE MOLLUSCAN HABITATS.

It may be worth while to summarize the habitat preferences of the various species by listing those found in a number of the collecting stations. Due to the short time spent in collecting in the lake these records are undoubtedly incomplete.

Species Inhabiting Exposed Rocky Shores: *Lymnæa stagnalis appressa, Lymnæa stagnalis sanctæmariæ, Planorbis antrosus striatus*, Baker *Planorbis campanulatus* variety.

Species Living in *Typha* Marsh at Mouth of the Rennie River: *Lymnæa lanceata, Lymnæa megasoma, Planorbis parvus, Planorbis exacuous, Planorbis antrosus straiatus, Planorbis hirsutus, Physa gyrina, Ferrissia parallela, Musculium Securis.*

Species Living in Scirpus Habitats. On somewhat exposed shores: *Lymnæa columella casta, Planorbis exacuous, Amnicola limosa.**

In protected situations: *Lynmæa megasoma, Segmentina crassilabris.*

Species Living on Water Lily Leaves: *Planorbis exacuous, Planorbis hirsutus, Ferrissia parallela.*

Species Living in Small Ponds: *Planorbis umbilicatellus, Apelxa hypnorum, Pisidium roperi.*

*Baker, F. C., The Lymnæidæ of North and Middle America, Recent and Fossil, Chic. Acad. Sc., Spec. Pub. No. 3,1911.

GULL COLONIES ON LAKE NEWELL, ALBERTA

By J. A. MUNRO

ON JULY 6th, 1926, accompanied by Mr. W. F. Grafton of the Canadian Pacific Land Department, I visited the islands on Lake Newell, Alberta, for the purpose of obtaining information regarding their bird-life. It was found that two of the larger islands were colonised by Gulls and a description of nesting conditions is presented in the following notes.

Goose Island, so called because Canada Geese usually nest there, is a low flat island of about two acres with a recently exposed fore-shore of sand and pebbles; the main or older portion being thickly covered with Canada Thistle and other weeds. Approaching the island we were met by a clamorous flock of Ring-billed Gulls that, circling over the boat, followed its course inshore, later to gather in a compact flock on the water a hundred yards from shore. These proved to be the only species of gull breeding on the island. The colony, consisting of approximately one hundred pairs had nested on a dry grassy flat that occupied most of the south end of the island; at this time, however, the nests, long unoccupied, had practically disappeared—blown by the wind or trampled into the soil and dry vegetation. The whole area, worn smooth by the trampling of many birds, was littered with a debris of feathers, droppings, dry grasses from old nests, and gopher remains carried from the mainland. Only one nest was found intact and this contained three eggs.

Young gulls were in various stages of growth, from an estimated age of two weeks to those capable of flight. Younger birds still in the downy stage were found hidden in holes in the bank, huddled against stones or under weeds where, flattened out and inanimate, they showed no sign of life save in the bright, watchful eye.

Nests of Gadwall, Lesser Scaup and White-winged Scoter, all containing eggs, were found on this island. One of the latter species was built under a huge weather-bleached, tumble-weed that, overturned and anchored securely along the edges with drifted earth and weeds, looked for all the world like a wicker cage or a lobster-pot.

After this island was throughly explored we headed for a smaller island about one mile due south which was colonised by an estimated 150 pairs of California Gulls. Unlike the last, this island of one acre or less, had steep, eroded cut-banks on three sides, and a rounded top sloping from the bank's edge to a stony beach, which, at this time of low water, surrounded the entire island for a depth of ten feet. Ordinarily the water comes to the foot of the cut banks.

As compared with the Ring-billed Gulls a greater percentage of young birds were in an advanced stage of growth and the majority of these swam out on the lake as we landed. As was the case in the Ring-billed Gull colony few vestiges of nests remained.

No ducks nested on this island but a large colony of Rough-winged Swallows had taken possession of the cut banks.

On both islands a number of dead and dying gulls, both young and adults, were found. Some of these were in a wasted condition and showed a similar diarrhoeic condition to that symptomatic of the so-called "duck disease", but, as the lake this year showed a clean sheet in respect to disease amongst the more plentiful ducks, it was considered that some other trouble was affecting the gulls.

SOME RARE BIRDS AT STRATHROY, ONTARIO

By A. A. WOOD

THE FIRST snow storms of late fall are always closely watched for rare birds which may be driven to cover or to the fields for food, in their southward movement. The night of November 10, 1926, a heavy fall of snow came, continuing throughout the night, in the morning becoming a blinding storm, making it difficult to see clearly across a twenty-acre field. In this morning's (November 11) trip, the first bird observed was a Marsh Hawk, which on closer approach was seen to be hovering over a flock of Snow Buntings. These flocks are always given close scrutiny, when encountered, for Lapland Longspurs; but before reaching these a flock of about thirty horned larks was found feeding on a little knoll near the edge of the field. The first shot secured two Eastern Horned Larks (*Otocoris alpestris alpestris*), two Hoyt's Horned Larks (*O. a. hoyti*) and one Lapland Longspur (*Calcarius lapponicus*), three birds I had never, in all my field work, seen alive before.

The flock, on being carefully looked over appeared to contain about 200 Snow Buntings, 30 Horned Larks, 5 Lapland Longspurs and 2 Vesper Sparrows, with the Marsh Hawk hovering about. After being disturbed the Horned Larks and Longspurs left the Snow Buntings, the Longspurs being most restless of all, circling the field four or five times before alighting, although many false landings were made by coming down to a few inches from the snow and rising again.

The Longspurs on the ground could never be seen feeding, even at twenty-five yards; the snow was very light and loose, about eight inches deep, and the birds seemed to be feeding at the base of the weeds under the snow; their location could be told by the movements of the weed tops. The notes had similar qualities to some of the Bunting flock notes, but were quite distinctive, uttered only while on the wing. This morning 2 male *hoyti*, 3 male *alpestris*, and a male and female *lapponicus* (in immature plumage) were taken. The next morning a few larks were located picking sand from a wind-blown knoll; 4 male *praticola* and one male *alpestris* were collected; the flock contained one longspur. Close watch was kept in the locality, but no more larks appeared until the 23rd, when two males and one female *alpestris* were secured.

Immediately after getting the large larks on November 11, I wrote Roger T. Hedley, Duncrief (fifteen miles north of here) who is always untiring in his efforts to record new local birds, to be on the lookout for Horned Larks. On November 23 he fired one shot into a flock, securing 2 male *hoyli* and 2 male *alpestris*. These he gave to Mr. W. E. Saunders, London, who sent them, together with some of my skins, to Dr. H. C. Oberholser, Washington, D.C., for positive identification.

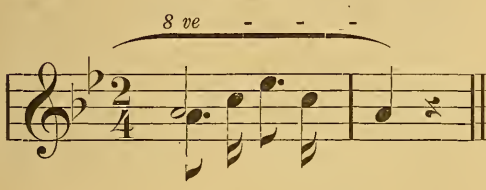
In view of the extreme difficulty of finding the large larks in Southwestern Ontario a few short notes on the locality of these captures may be of interest. Strathroy, near the west side of Middlesex County, is midway between Lakes Huron and Erie, nearly straight south of the eastern shore of Lake Huron, a distinct migratory route particularly in the fall. One mile east of the town are the fields where the larks were found. The locality is very clear and open, the woodlots being small and widely separated. The soil being all blow sand, most of the plowing is left until spring, with the result that rank weeds are left in profusion—ideal feeding grounds for winter seed-eating birds. Besides the weeds there is always an abundance of sweet clover and alfalfa left in the fields. The favourite foods of the larks appear to be (in order of preference): Ragweed (*Ambrosia artemisiæfolia*), Pigweed (*Amarantus retroflexus*), Green Foxtail (*Setaria viridis*), and Lamb's-quarters (*Chenopodium album*). The suitability of this particluar group of fields to larks is shown by the abundance of *praticola* here every spring, particularly during Frbruary and March.

DO BIRDS PRACTICE THEIR SONGS ?

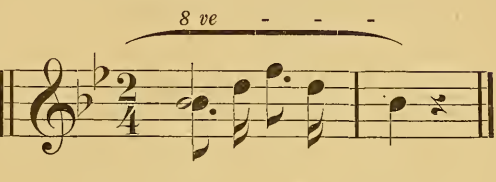
By ANNA E. MacLOGHLIN

WHILE going through the woods in Northern Muskoka on June 30, 1925, I heard a Hermit Thrush apparently practising his song. He kept continually repeating these two arpeggios from four p.m. until almost dark:

Ex. I. *Leisurely and Flute-like.*

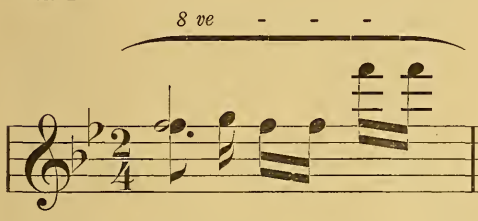


Ex. II.

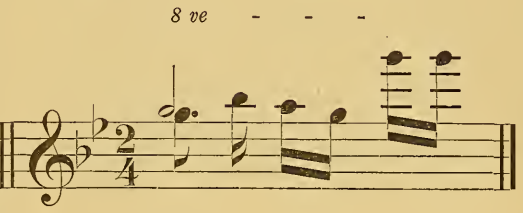


Occasionally he would sing these other phrases:—

Ex. III.

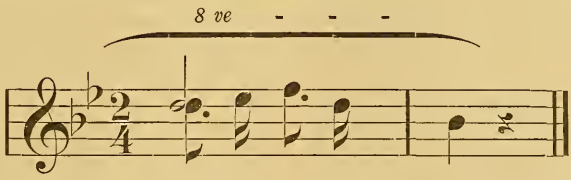


Ex. IV.



but after each variation, he returned to his original two phrases.

Sometimes he would commence with this beautiful strain:



then resume the one commencing on A, and end with the one commencing on B flat. Ex 1 and 2 No singer trying to perfect a difficult passage could have shown more perseverance. I have noticed frequently that each individual Hermit Thrush seems to have a pet phrase, which he sings more often than any other, but this bird had two, which were consecutive. Most often he commenced with the arpeggio beginning on the leading note Ex 1 resolving, according to the rules of Harmony, into the Tonic chord (chord of B flat). Ex 2 the high notes in example III and IV were almost like an echo. Owing to some peculiar quality in the bird's voice, he seems to sustain the sound of the first note throughout the bar. Hence the half-note at the beginning of each phrase.

I might add that out of a great many other records of this Thrush's songs, these given here are the most unusual, and the only ones that I have heard him practise continuously.

NOTES AND OBSERVATIONS

THE KILDEER IN WINTER.—The present winter has been an exceedingly poor one for London ornithologists. The ordinary slab feeding birds of winter have been almost entirely absent, not a single native bird having been observed at the writer's food shelves. No Siskins, Redpolls or Grosbeaks have been noted and only one occurrence of the Crossbill. One Chewink has been found and a few Robins and Song Sparrows, as usual, but our observers have once more failed to sight the Swamp Sparrow which has been several times recorded from Toronto.

When I visited Jack Miner in January he told me that he saw a Kildeer at very close range—twenty-five feet— at his back pond on the 13th of January, when the country was well covered with snow and there was no water in the back pond. This is perhaps the first winter record of this bird in Ontario, as we never succeeded in finding it at Point Pelee during the winter months. On the night of the 18th of February, when the weather was cold, but following a mild spell, Mr. Edward Daly heard a Kildeer flying over London, but as he heard it through an open window he could not tell which way the bird was travelling although it must surely have been towards the South. Two winter records of the Kildeer are certainly extraordinary, considering that none were recorded previously.—W. E. SAUNDERS.

THE CLAY-COLOURED SPARROW AT LONDON, ONTARIO.—Bird study in any given locality over a period of many years, is almost certain to produce a number of interesting records. Some perhaps might be classed as purely accidental, while others can hardly be called accidental and yet are very difficult to explain. One such record from the London district is the Clay-coloured Sparrow, *Spizella pallida*.

This is a species of the western plains, Chapman's "Handbook of the Birds of Eastern North America" giving the eastern limit of its range as Isle Royal, Mich., and north-western Illinois: "Michigan Bird Life" (Barrows, 1912) reports two specimens from that state, one taken by P. A. Taverner at Port Huron, May 2nd, 1901, and one taken at Isle Royale by W. A. McLean, August 25th, 1904. Another was seen at Isle Royal on August 26th and one each on August 28th and 31st of the same year.* Possibly these records gave rise to the inclusion of this locality in the range as above noted. What Michigan records there may be since the publication of Barrow's book we do not know. It is evident, however, that the bird is at least not common in the territory immediately to the west of us, the nearest point in the breeding range being some 450 or 500 miles away.

The first specimen taken near here might, therefore, be very well termed accidental. This bird was shot by W. E. Saunders on May 8th, 1894. Macoun's "Catalogue of Canadian Birds" gives the following account of this incident:—"While hunting in a field of small shrubs about 15 miles west of London, I saw a small sparrow sitting on the top twig of a shrub after the manner of the field sparrow and heard him give the note whose author I was looking for. It proved to be *Spizella pallida*, the first record, I believe, in our Province, though they may yet be found inhabiting the north-western extremity next to Manitoba". (Saunders.)

The Clay-colour was not again heard from for 28 years but in May, 1922, it once more paid a visit to London and the most interesting chapter in its history began to be written.

On the afternoon of May 28th of that year, W. E. Saunders and the writer were driving about two miles east of the place where the specimen was taken in 1894 when a song by the roadside rivetted our attention. Heads were thrust out of each side of the car, the brakes applied, and as soon as the car stopped, with field glasses in hand, we began to search for the singer. It was not difficult to find, as sitting on the top twig of a little bush, it sang repeatedly a three, or occasionally a four note song, bzzz, bzzz, bzzz. Mr. Saunders had named it a Clay-colour when the song was first heard, and such, of course, it proved to be. The bird remained for at least a day or two until other members of the club had visited the locality, and then, taking it to be simply a stray migrant, nothing more was thought of the matter.

Early on the morning of May 30th of the following year (1923) a party from the bird club were out in the same direction. As they were passing the field one started to remark that this was the spot sacred of the memory of the Clay-colour, but the sentence hardly more than begun was finished by the now familiar song of the bird itself. Again we thought it to be but a migrant, the same bird no doubt, though we wondered greatly at the strange route it followed to its supposed breeding grounds in the far west.

In 1924 we were on the look-out for it and on May 28th found it once more in the same field. This year we determined, if possible, to learn

something more about the bird, and to that end visited the spot every week or ten days. We found that it remained and kept singing well on into July, at least, though diligent search failed to disclose either mate or nest.

In 1925 as the end of May approached we had a feeling that we would see our little friend once more, and although we went to its accustomed haunt several times during late May and early June, our efforts to again find it were fruitless.

The field it favoured for three summers was poor sandy soil grown up to hazel bushes and young scrubby oaks, where numerous field sparrows sang away the summer days and raised their broods in peace.

As we now think over the matter a number of questions come to mind. as it the same bird each year? Did it stay all summer in 1922 and 1923 as it did in 1924? Did it have a mate during any of these seasons, or was it perchance a jilted lover or may be the woman-hater of the tribe that it wished to spend the summer so far from any of its kindred? Did it have a similarly solitary existence in its winter home, or where did it spend the winter anyway? But while we may guess the answer to some of these questions perhaps quite accurately, the others will, we fear, have to go for all time unknown.—E. M. S. DALE.

TURKEY VULTURES IN NOVA SCOTIA.—On January 1st, 1926, a Turkey Vulture (*Cathartes aura septentrionalis*) was shot near Upper Canard, Kings County, by Mr. Gordon Pineo of that place. The bird, an immature female, constitutes the fourth record of the species for the Province. The specimen was preserved and placed in the Natural History Museum of Acadia University at Wolfville, N.S.

Concerning the other three records I am able to submit the following information which has been furnished me by Mr. Harry Piers, Curator of the Provincial Museum at Halifax:

> One specimen, adult plumage, taken at Clark's Harbor, Shelburne County, during the fall of 1892. The name of the collector and the exact date not recorded. (Museum Acc. No. 2196.)
>
> Adult bird taken at Middleboro near Pugwash, Cumberland County, about 1899, following a heavy gale. No further particulars available.
>
> On November 8th, 1913, Mr. Joseph N. McPhee shot an immature specimen at Meadow's Road about ten miles from Sydney, Cape Breton County, but the disposition of this one is not stated.—R. W. TUFTS.

A WRANGEL ISLAND FISH.—Among the effects of the late Allan Crawford found on Wrangel Island were a number of zoological specimens of considerable interest. Snyder has already reported on the birds (Univ. of Toronto Studies, Biol. Series No. 28, 1926) and Curran and Alexander on the Diptera (Canadian Entomologist, 58: 289-293. 1926). The collection contained a small fish which Prof. C. L. Hubbs has identified as a young Arctic Cod (*Boreogadus saida* [Lepechin] This record extends the range of the species some hundreds of miles beyond any previously known.—J. R. DYMOND.

UNUSUAL NESTING OF THE WESTERN KINGBIRD.—In early May of last year a pair of Robins built their nest on one of the main crotches of an apple tree which stands beside my house at Okanagan Landing. To one sitting close to the veranda rail the nest would be in plain view, distant an approximate six feet and at a height which permitted visual examination of the interior. Four eggs were laid and shortly afterwards some enemy unknown removed them; whereupon the robins moved elsewhere. Ten days later a pair of Western Kingbirds took possession of the nest, lined it with feathers and other material, and, in due course the female laid four eggs therein. Some time before, the male had pre-empted a lookout perch on a telephone wire close to where it is attached to the house, and, by this sign it was known that the birds were nesting in the vicinity. No one thought, however, of the robins' nest in this connection, so, only by accident was the site discovered after the full complement of eggs had been laid.

This seemed an oological treasure that demanded preservation, but, not being a hardened oologist, I refrained—to my subsequent disgust—for, just after incubation started, these eggs also were removed. As to the enemy responsible, by a process of elimination the white-footed mouse is suggested, and yet, one can hardly imagine this small rodent worsting a pair of Western Kingbirds which are, above all things, courageous.—J. A. MUNRO.

CANADIAN FIELD-NATURALIST PUBLICATION FUND

STATEMENT OF RECEIPTS

Previously acknowledged	$402.20
Chas. H. O'Donoghue, Winnipeg	1.00
	$403.20

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 1924.

BLACK DUCK, No. 321,826, banded by H. S. Osler, at Lake Scugog, Ontario, on November 4, 1924, was killed at Terry, Mississippi, on November 25, 1924.

BLACK DUCK, No. 321,828, banded by H. S. Osler, at Lake Scugog, Ontario, on November 4, 1924, was killed in the same locality, during the same fall before November 26, 1924.

BLACK DUCK, No. 321,835, banded by H. S. Osler, at Lake Scugog, Ontario, on November 4, 1924, was killed in Crawford County, Kansas, on November 20, 1924.

BLACK DUCK, No. 321,841, banded by H. S. Osler, at Lake Scugog, Ontario, on November 4, 1924, was killed in Hardin County, Tennessee, on December 31, 1924.

BLACK DUCK, No. 321,846, banded by H. S. Osler, at Lake Scugog, Ontario, on November 5, 1924, was shot on the Tennessee River, at Muscle Shoals, Alabama, on December 9, 1924.

BLACK DUCK, No. 321,850, banded by H. S. Osler, at Lake Scugog, Ontario, on November 5, 1924, was killed on the Catawba River, one and one-half miles from Van Wyck, South Carolina, on November 24, 1924.

BLACK DUCK, No. 323,602, banded by H. S. Osler, at Lake Scugog, Ontario, on November 5, 1924, was killed at the Aberdeen Proving Ground Military Reservation, mouth of Chesapeake Bay, Maryland, on December 31, 1924.

BLACK DUCK, No. 323,603, banded by H. S. Osler, at Lake Scugog, Ontario, on November 5, 1924, was killed at a place near Huntsville, Alabama, on November 18, 1924.

BLACK DUCK, No. 323,615, banded by H. S. Osler, at Lake Scugog, Ontario, on November 6, 1924, was caught in a wire trap on the Patuxent River, about three miles from Aquasco Post Office, Maryland, on February 24, 1925.

BLACK DUCK, No. 323,619, banded by H. S. Osler, at Lake Scugog, Ontario, on November 7, 1924, was shot at the Dardenne Shooting Club, Peruque, Missouri, on November 29, 1924.

BLACK DUCK, No. 323,634, banded by H. S. Osler, at Lake Scugog, Ontario, on November 12, 1924, was killed on the Holston River, Hamblin County, near Russellville, Tennessee, on December 4, 1924.

GREEN-WINGED TEAL, No. 301,713, banded by S. M. Batterson, at Mohler, Oregon, on November 24, 1924, was caught in a muskrat trap at Big Meadow Ranch, fifteen miles south of Grande Prairie, Alberta, about April 15, 1925.

PINTAIL, No. 323,511, banded by H. S. Osler, at Lake Scugog, Ontario, on October 17, 1924, was shot in the same locality—no date given, but reported on October 27, 1924.

SCAUP DUCK, No. 323,637, banded by H. S. Osler, at Lake Scugog, Ontario, on November 16, 1924, was killed on the Patapsco River, Maryland, near Bodkin Point, on January 5, 1925.

RING-NECKED DUCK, No. 323,593, 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.

RING-NECKED DUCK, No. 321,779, banded by H. S. Osler, at Lake Scugog, Ontario, on November 1, 1924, was killed in the same locality, during the same fall before November 26, 1924.

RING-NECKED DUCK, No. 321,788, banded by H. S. Osler, at Lake Scugog, Ontario, on November 2, 1924, was killed at a place one-half mile north of Chessahowitzka River, on the west coast of Florida, on November 30, 1924.

COOT (?) No. 323,525, banded by H. S. Osler, at Lake Scugog, Ontario, on October 19, 1924, was shot in the same locality, on October 23, 1924.

WILSON'S SNIPE, No. 241,722, banded by J. A. Munro, at Colquitz, Vancouver Island, British Columbia, on December 23, 1924, repeated on December 24, 1924, and was killed in the net by a dog when it was again repeating, on December 27, 1924.

STELLER'S JAY, No. 108,853, banded by J. A. Munro, at Cedar Hill, Vancouver Island, British Columbia, on December 9, 1924, was shot at a place one mile from where it was banded, on or about January 28, 1925.

FOX SPARROW, No. 241,741, banded by J. A. Munro, at Cedar Hill, Vancouver Island, British Columbia, on December 9, 1924, was killed in the trap by a Screech Owl, when it was repeating on December 23, 1924.

FOX SPARROW, No. 103,057, banded by J. A. Munro, at Cedar Hill, Vancouver Island, British Columbia, on December 18, 1924, repeated on December 23, 1924, and was found dead in the trap, having been killed by an Owl when it was repeating, on February 5, 1925.

FOX SPARROW, No. 241,750, banded by J. A. Munro, at Cedar Hill, Vancouver Island, British Columbia, on December 18, 1924, repeated on December 20, 1924, and was killed in the trap by a Screech Owl, when it was again repeating, on December 23, 1924.

OREGON TOWHEE, No. 103,054, banded by J. A. Munro, at Cedar Hill, Vancouver Island, British Columbia, on December 18, 1924, was killed in the trap by a Screech Owl, when it was repeating, on December 20, 1924.

VARIED THRUSH, No. 241,745, banded by J. A. Munro, at Cedar Hill, Vancouver Island, British Columbia, on December 17, 1924, was found dead in a trap in the same locality, on December 18, 1924. The bird had had its head damaged and its body was frozen.

*Published by authority of the Canadian National Parks Branch, Department of the Interior, Canada.

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CONTENTS

	PAGE
Horned Dinosaur Group in the National Museum of Canada. By Charles M. Sternberg	67
Some Random Notes on Our Club and its Publications. By Hoyes Lloyd	73
Destruction of Birds by Lighthouses in the Provinces of Ontario and Quebec. (*Concluded*). By Harrison F. Lewis	75
The Waterfowl Sickness at Lake Newell, Alberta, 1925-1926. By J. A. Munro	77
Some Plancton Organisms from Lake Brereton, Manitoba. By Alexander Bajkov and Alan Mozley	84
The History of Our Humming Bird. By Its Young Mistress	85
Notes and Observations:—	
Crow Trapping with Jack Miner. By W. E. Saunders	86
A Word for the European Grey Partridge. By T. E. Randall	86
The Long-billed Marsh Wren in Winter. By W. E. Saunders	87
Recent Finds of Arctic Spiders. By J. H. Emerton	88
Occurrence of Grasshopper Sparrow at Toronto, Ontario. By Stuart L. Thompson	88
Point Pelee Should Have a Bird Banding Station. By Hoyes Lloyd	89
Recent Introduction of European Grey Partridge in New Brunswick. By R. W. Tufts	90
The Prairie Chicken in Western Ontario. By W. E. Saunders	90
The King Eider at Little Lake, Barrie, Ontario. By L. L. Snyder	90
Recent Introduction of European Grey Partridge in Nova Scotia. By R. W. Tufts	90
A Chickadee's Memory. By Mina P. Cole	90
The Horned Larks. By W. E. Saunders	91
Whistling Swans at Hamilton, Ontario. By R. Owen Merriman	92
Greater Redpoll (*Acanthis linaria rostrata*) at Strathroy, Ontario. By A. A. Wood	92

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. XLI OTTAWA, ONTARIO, APRIL, 1927 No. 4

HORNED DINOSAUR GROUP IN THE NATIONAL MUSEUM OF CANADA[1]

By CHARLES M. STERNBERG

Introduction.

THE FIRST specimen of horned dinosaur to be reported was a tooth, collected by Dr. F. V. Haden from the Judith River beds of Montana in 1855. Dr. Leidy associated this specimen with the type of *Trachodon mirabilis* in his description of that species the next year. During the succeeding thirty years a great many specimens of horned dinosaurs were discovered both in Canada and the United States. Many of these were fragmentary and their true relationship remained unknown till a later period.

In 1887 Prof. Marsh described two horn cores of a large horned dinosaur under the name of *Bison alticornis*.[2] The next year he secured, from the Judith River formation of Montana, portions of the skull of a horned dinosaur on which he based the genus and species *Ceratops montanus* and at the same time proposed the family name *Ceratopsidæ* to include this and other related genera. This later discovery and others, made in Wyoming, convinced Marsh that he had made a mistake in referring the previously described horn cores to the genus *Bison* and that they belonged to a reptile and should be placed in the newly established family *Ceratopsidæ*.

Since that time the horned dinosaurs have ranked among the most interesting of fossils to students of vertebrate palæontology and today a great many different forms are known. They have become fairly well known to the public since most of the large museums of the world have at least a skull of some member of the family. Skeletons on the other hand, are rare, and very few museums have attempted to make a skeleton mount of a horned dinosaur. The great disproportion in the number of skulls, as compared with the number of skeletons known, is probably due to the fact that the skulls were usually firmly co-ossified and so solidly constructed as to withstand a great deal of weathering and water transportation while the skeleton was less durable

During the past summer a group of two skeletons of *Chasmosaurus belli*, Lambe, were placed on exhibition in the National Museum of Canada at Ottawa. This, I believe, is the first attempt to make a group mount of horned dinosaurs.

The skeletons are approximately the same length but the bones of one (Cat. No. 2245, Geol. Surv. of Can.) are much lighter in construction than those of the other (Cat. No. 2280) and it is thought that they represent male and female as it is common, among reptiles, for the female to be larger than the male.

Both skeletons were collected by C. H. Sternberg from the pale beds of the Belly River series, below the mouth of Berry Creek, Red Deer river, Alta. The lighter skeleton (Cat. No. 2245) was discovered by its collector in 1913 and the other was discovered by G. F. Sternberg in 1914.

Preservation of Specimens

The 1913 specimen was preserved in a sandy clay in the N.E., ¼ of Sec. 16 T. 21, R. 12, W. of the 4 th. principal meridian, about 3½ miles south of Steveville, Alberta. The nose was exposed when discovered and erosion had destroyed part of the face. A sink hole or underground wash had destroyed part of the caudal vertebrae and limb and foot bones. The skull and column back to the tail were articulated as were also the pelvic arch and part of the ribs.

This specimen consists of skull and jaws except left side of face, anterior half of maxillae, nasals, premaxillae, rostrum and predentary, complete series of presacral vertebrae, sacrum, twenty-four caudal vertebrae, complete series of ribs, except six cervicals, three dorsals and portions of some others; pectoral arch except Rt. coracoid and distal end of Rt. scapula, sternal bones, pelvic arch, both humeri, left ulna, both femora, Rt. tibia and fibula, six metatarsals, thirteen phalanges and five chevrons. The skull was somewhat crushed making the crest fairly flat instead of sloping down on either side of the neck and rising posteriorly as it did in life. Many

[1]Published with permission of the Director of the Geological Survey.

[2]Marsh, O. C., Amer. Jour. of Sci., Bol. XXXIV, Oct., pp. 323-4, 1887.

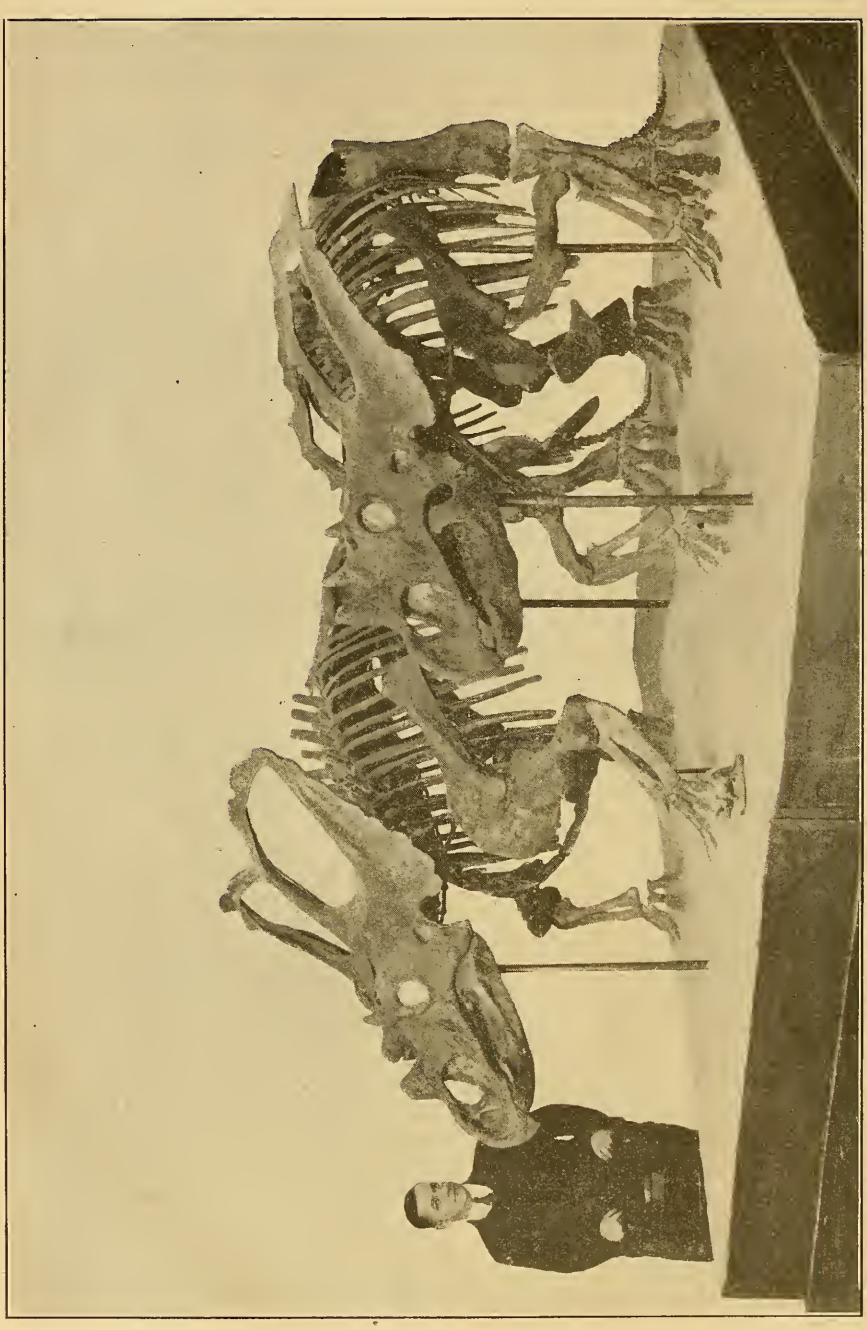


FIG. 1

Horned dinosaur group (*Chasmosaurus belli*, Lambe) in the National Museum of Canada

of the ribs are uncrushed and splendidly preserved.

The second specimen (Cat. No. 2280) was preserved in a siliceous sandstone two and one half miles southeast of the mouth of Little Sand Hill creek about 160 ft. above the river level. Though there is some crushing to the right side of the skull and some of the vertebrae and ribs, the bone as a whole, is in a splendid state of preservation. This skeleton consists of skull and jaws complete, column complete and articulated to the fourth sacral, complete series of ribs except five cervicals and two dorsals and parts of some others, both scapulae, Rt. coracoid, both sternal bones, anterior portion of Rt. illium, anterior two-thirds of left illium, both pubes, both humeri and the proximal portion of the left femur.

There have been no bones of other individuals used in the mounts but the missing parts have been restored in plaster which has been left sufficiently lighter in colour than the bone that a careful observer can easily distinguish the original from the restored. The mounts were executed by the writer and Mr. J. Skillen

DISCUSSION

Before the task of posing the skeletons had gone far it was found necessary to depart from the pose of earlier mounts if the evidence furnished by our specimens was to be followed. One puzzling feature was the presence of the head of the humerus on the external side of the proximal end of the bone instead of on the end as is the case with most dinosaurs. Consequently the only way the limb could be posed, so the head of the humerus fitted into the glenoid cavity was to place the humerus at almost right angles to the perpendicular. This made the animal very low in front and extremely bow-legged. The humerus placed in this position made a very much better articulation with the ulna and radius than could be gained otherwise.[3] The uncrushed ribs indicated a much broader backed animal than had previously been pictured. On the second to last rib in each skeleton was a well pronounced rugosity which showed evidence of articulation with some other bone; since it was too far down to articulate with the anterior end of the ilium, around which it arched with a pronounced curve, this articulating surface remained a puzzle until my friends in the palæontological division of the American Museum pointed out that this was for articulation with the anterior end of the pubis. Thus the work progressed and after gathering all the information possible from the mounted skeletons of horned dinosaurs in the American Museum and U.S. National Museum as well as from the published descriptions and the various specimens of horned dinosaurs in the collections of the Geological Survey of Canada, the present pose was chosen. (Plates 1 and 2.)

The skeletons, as mounted, show an animal with a low-set body and a very broad back, and are more reptilian in appearance than any other upper Cretaceous horned dinosaur mount known to the writer. It is possible that the pelvic region should be lower and the posterior part of the body still broader. Such a pose does not suggest speed but rather an animal which waddled along with a swaying motion. Though *Chasmosaurus* was very low-set and the under portion of the body quite close to the ground no doubt the body was always carried free. The tail curves gently down from the posterior end of the sacrum and the tip drags on the ground, thus giving the tail a graceful and natural appearance. In the restoration of the tip of the tail the specimen figured and described ,by Brown, as *Monoclonius nasicornus* was followed.

In one specimen (No. 2280) the nose is slightly lowered and the crest accordingly raised as if the animal was preparing to charge. In the other skeleton the head is held well up and turned slightly toward the side from which the enemy is supposed to be approaching.

Chasmosaurus, as well as other upper Cretaceous *Ceratopsia*, probably spent the greater part of its time in low swampy regions and there is evidence to show that they were gregarious for the writer has observed, in the Belly River formation of Alberta, a number of "bone beds" in which nothing but ceratopsian remains are preserved. Usually, only one species appear to be represented in a given locality and this would suggest that members of one species congregated in certain swampy areas from which other animals were excluded. Other "bone beds", in which numerous forms are represented, are common in the same region but in these the bones appear to have been washed up on a beach or mud flat by flood or wave action.

In the monograph on the *Ceratopsia* Hatcher refers *Chasmosaurus* (*Monoclonius*) *belli* to the genus *Ceratops* of Marsh. He was very firm in his conviction that *Eoceratops* (*Monoclonius*) *canadensis* should also be referred to *Ceratops*. Some later writers have considered *Chasmosaurus* and *Ceratops* as synonyms; but since *Chasmosaurus* and *Eoceratops* are apparently quite distinct and as the occipital condyle and pair of

[3]The American Museum of Nat. Hist., New York, had mounted a skeleton of *Triceratops* in this pose but it was not known to the writer at the time work was begun on the *Chasmosaurus* group.

brow horns in the type of *Ceratops* are quite unlike the same elements of the specimens here discussed, it would seem unwise to refer the present species to any other genus than that to which Lambe referred it in his later descriptions of the species, e.g. *Chasmosaurus*. In discussing the type of the genus and species *Ceratops montanus*[4] Lull says: "The supraorbital horn cores were of moderate length, subtriangular in section at the base, but nearly circular in the upper half. They are not compressed but curve strongly outward and slightly forward". In the better of our two specimens (No. 2280) the right supraorbital horn core apparently was injured during life, but the other one is well developed and well preserved. It is much smaller than in the type of *Ceratops montanus*, is oval in cross section at the base, and curves backward and inward. In the other specimen (No. 2245) the brow horns are not so well preserved but they are much smaller than in the above-mentioned specimen and stand virtually erect.

The genus *Torosaurus* from the Lance formation is usually considered as the descendant of *Chasmosaurus* but *Anchiceratops* from the intermediate Edmonton formation has been referred to another group. A good skull of *Anchiceratops* sp. collected from the Edmonton formation of Alberta, by the writer, shows that *Anchiceratops* should be placed in the *Chasmosaurus-Torosaurus* group. Though *Anchiceratops* shows greater advance in the closing of the fontanelles in the crest, than does *Torosaurus* there seems little doubt but that it is a descendant of *Chasmosaurus*, for as in that genus the squamosals are very long and narrow and carry epoccipitals, the intermediate bone (fused parietals[5]) is broad and somewhat flattened behind making the crest rectangular in shape. The face is low and long particularly in front of the nasal horn core which is small. In members of this group the crest is greatly extended backward and appears out of all proportion to the slender face. While the total length of the skull of *Chasmosaurus belli* is about equal to that of an average sized *Centrosaurus apertus* or a small *Triceratops* skull, the facial portion is lower and of much lighter construction. This is equally true of *Anchiceratops*.

DESCRIPTION

In 1914 Lambe figured and described the skull and integument of the 1913 specimen[6] and the writer more fully described and figured the integument of the same specimen at a later date.[7] The skull of the other specimen was also figured by Lambe in 1915.[8]

When viewed from the front the skull is wedge-shaped and was provided with a large parrot-like beak, three horns, and a great crest or shield which covered the neck, shoulders, and part of the back. There is a marked increase in the height of the neural spines beyond the extremity of the crest, e.g., that of the tenth presacral vertebra. The spines in front of this one (those under the crest) are inclined backward thus indicating considerable freedom of movement for the crest.

The nasal horn core is rather massive but of moderate length. It is laterally compressed and curves slightly backwards. The brow horns vary in length and it is questionable whether their size or length has any generic or specific significance. The horn itself was probably much longer than the bony core.

The fontanelles in the crest are very large with their greatest diameter fore and aft. There is probably no other member of the *Ceratopsia* in which the crest is so open. It was very surprising to find that in the primitive *Ceratopsia* (*Protoceratops*) the frill was not so open as in *Chasmosaurus*. This may be explained by the fact that *Protoceratops* probably was not the direct ancestor of *Chasmosaurus*. It is believed that there was considerable freedom of motion in the crest and that when attacked the animal could put the nose down to the ground and thus raise the crest, at the back, to form a great shield which would almost completely hide the body from the front view. When the head was held in this position the horns would point forward and the animal was probably comparatively safe if he could prevent a flank attack. It is evident, however, that his sole protection lay in the crest, horns and beak for an examination of the impressions of the integument, which was quite thin and lacked bony scutes, shows that it could not have withstood the attack of any of the numerous carnivorous enemies and the animal certainly could not depend on speed for protection.

As in the other upper Cretaceous *Ceratopsia* there are twenty-one presacral vertebrae all of which were preserved and articulated in both specimens. Of these seven are regarded as cervicals and fourteen as dorsals. All the presacral vertebrae bear double-headed ribs except the atlas which carries no rib and shows no sign

[4]The Ceratopsia U.S.G.S. Monograph No. XLIX p. 172—1907.

[5]Gilmore has shown in *Brachyceratops*, U.S.G.S. Prof. paper 103, that this element is not parietal but Gregory and Mook in a later study of Protoceratops A.M.N.H. Novitates 156 conclude that it is.

[6]Lambe, L. M., *Ottawa Field-Naturalist*, Jan., 1914, and Feb., 1914.

[7]Sternberg, C. M., *Can. Field-Naturalist*, May, 1925, pp. 108-110.

[8]Lambe., L. M., Museum Bulletin No. 12, Geol. Survey of Canada.

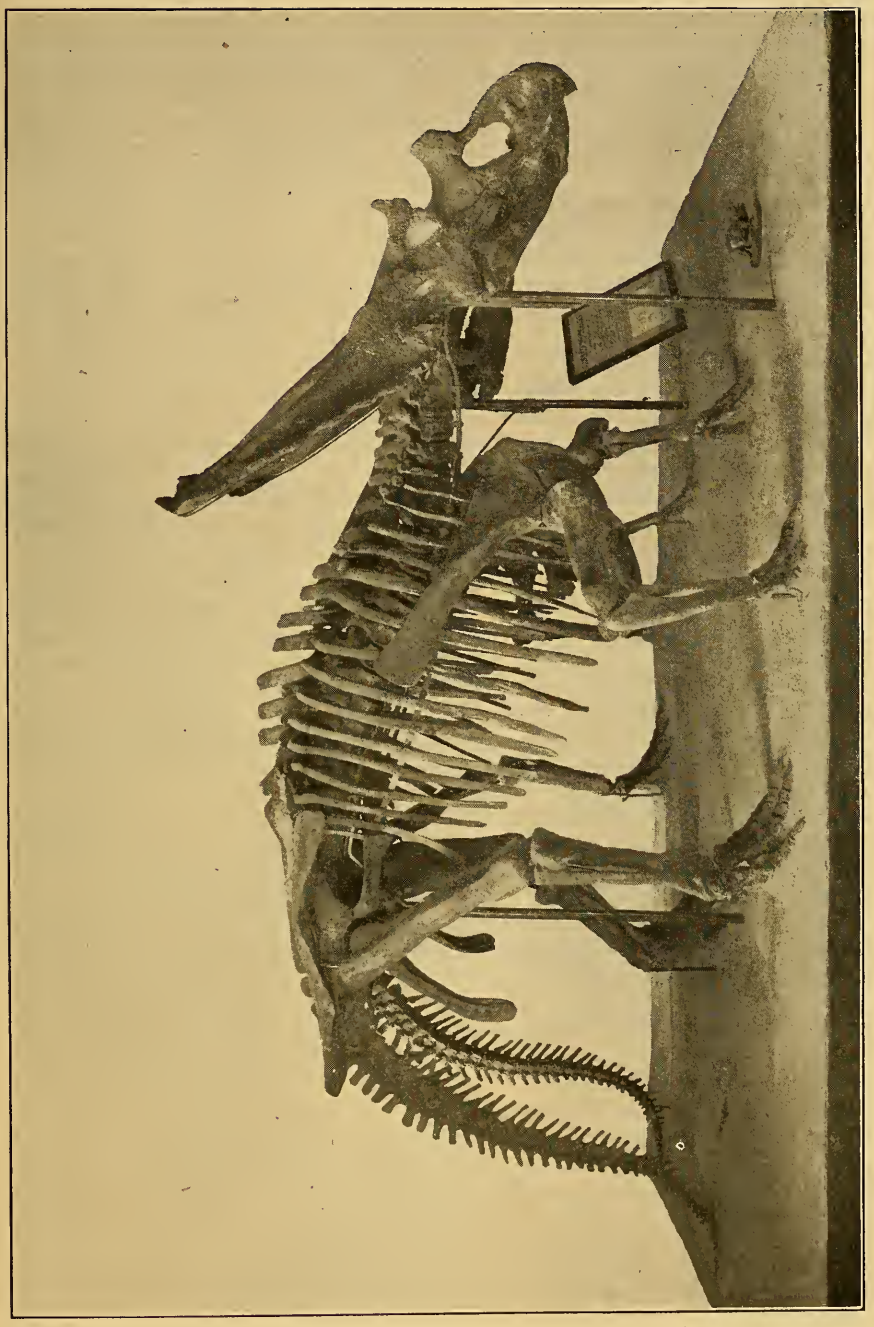


FIG. 2

Horned dinosaur group in the National Museum of Canada. Side view. Catalogue No. 2280 in foreground.

of facet for rib attachment. The first three cervical vertebrae are firmly coalesced as in all the more advanced members of the family. As the vertebrae of *Chasmosaurus* differ little from those elements of other members of upper Cretaceous *Ceratopsia* ,which have been well described and figured, it seems unnecessary to describe them fully here. There are, however, a few details, not previously described, in certain of the ribs which are worthy of note.

As Gilmore has shown in *Brachiceratops* the shafts of the anterior dorsal ribs are quite straight and the tuberculum is elevated well above the capitular process which is given off at nearly right angles to the shaft. The posterior ribs are of very different shape. They are slender, well arched, and the capitular process does not form a sharp angle with the shaft, as is the case in the anterior ribs, but is a continuation of the gentle, rounded, curve of the upper part of the rib. This throws the ribs, when articulated with the very high lateral processes, well up and gives a flat back and a broad body cavity. Thus we see that *Chasmosaurus* had a narrow, flattened chest but was very broad in the abdominal region.

The last dorsal rib is quite slender and of moderate length. It curves outward and downward, but extends beneath the anterior end of the ilium instead of curving forward and outward and passing in front of that bone as described by Brown in *Monoclonius nacicornus*[9]. The rib next in advance of the last dorsal is much longer and heavier than the last and curves forward and outward, to clear the anterior end of the ilium, and then downward, backward and slightly inward. At about midlength this rib thickens considerably and carries a posteriorly flattened rugosity for attachment with the anterior end of the pubis. The pubis points strongly outward instead of almost straight forward or forward and downward as in most dinosaurs. The anterior extremities of the pubes are 640 mm. apart while at the pubis-ilium contact they are but 360 mm. apart

As the skeletons are mounted the sternal bones are some distance apart and the anterior points of the scapulae are separated by 290 mm. Other specimens, of nearly related forms, in the collections of the Geological Survey, which were preserved naturally articulated, make it quite certain that these bones are too far apart in the mounted skeletons but, because of crushing, it was not possible to place them in what is considered the correct position. It is evident that the sternal bones should almost touch in the midline and that the anterior ends of the coracoids should not be far apart. Proceeding backward, the scapulae flare out at a wide angle due to the broadening of the body posteriorly.

The humerus, radius and ulna are of moderate length but very massive. Great strength was needed in the fore limbs to carry the weight of the very large head. In neither specimen was a complete fore or hind foot preserved but from what bones are present there seems to have been little difference between those elements in *Chasmosaurus* and *Centrosaurus* (*Monoclonius*). The fore feet are composed of five functional digits of which the three inner ones bear hoofs. Both the metacarpals and phalanges of the fore foot are shorter and smaller than the metatarsals and phalanges of the hind foot. Gregory and Mook[10] draw attention to the great difference in length in the digits in the fore and hind feet of *Protoceratops* and state that in typical Certopsians the middle digit of the manus is as large or larger than the same element of the pes. In no Ceratopsian, known to the writer is the middle digit of the manus as large as the same element of the pes, though in none of the later forms does the difference appear to be as great as it is in *Protoceratops*.

The femur, tibia and fibula are not proportionately as massive as the bones of the fore limbs but the four functional metatarsals are considerably larger than the metacarpals.

Following are some of the more important measurements of the skeletons as they are mounted:

	No. 2245	No. 2280
Total length of skeleton	16′ 2″	16′ 3″
Greatest length of skull	5′ 6″	5′ 5″
Length, occipital condyle to back of crest	2′10″	2′ 9″
Greatest breadth of crest	3′ 6″	3′ 3″
Greatest length of fontanelles	1′ 6″	1′ 8½″
Greatest breadth of fontanelles (at centre)	11¼″	1′ 1¼″
From anterior end of rostrum to centre of skull between orbits	2′ 1″	2′ ½″
Depth of skull taken just back of nasal horn core (including dentary)	1′ 3″	1′ 2″
Length of mandible including predentary		2′ 2″
From base of orbit to distal end of quadrate	10″	10½″
Length of brow horn from upper rimb of orbit		5″
Length of nasal horn from upper edge of nasal vacuity		6″
Length of column measured along tops of spines	13′ 6″	13′ 5″
Length of presacral vertebrae measured along centre of centra	5′	5′ 1½″
Length of sacrum	2′ 4½″	

[9]Brown, Barnum, Bull. American Museum of Nat. Hist., Vol. XXXVII, p. 294.

[10]Amer. Museum of Nat. Hist. Novitates, 156, p. 2 1925.

Length of tail measured along centra	5′ 5″	
Length of rib No. 10	3′	3′1½″
Length of rib No. 20	2′ 6″	
Height of skeleton at pelvis	4′11″	4′ 9″
Height of skeleton at first dorasl	3′11″	4′
Greatest breadth of body, at 16th. presacral	3′	2′10″
Length of ilium	3′ 2″	3′ 2″
Length of pubis not including post-pubis	1′ 3″	
Greatest breadth of blade of pubis	3½″	
Length of ischium	2′ 3½″	
Length of femur	2′ 5½″	
Length of tibia	1′ 9″	
Length of fibula	1′ 7″	
Length of central digit of hind foot	1′ 3½″	
Length of scapula	2′2¾″	2′ 5″
Greatest length of coracoid		1′ 1″
Breadth of blade of scapula at centre	4½″	4½″
Greatest breadth of scapula	9½″	9¾″
Breadth of coracoid at junction with scapula	5½″	5¾″
Length of sternum	1′ ¼″	1′
Breadth of sternum at centre	5¼″	5¼″
Height of sternum above floor of base	1′ 4″	1′ 3″
Height of glenoid cavity above floor of base	2′3½″	2′ 4″
Length of humerus	1′ 8″	1′9½″
Length of ulna	1′ 5″	
Length of radius	1′ ½″	
Length of central digit of front foot	9¼″	
Greatest breadth of humerus		9″

SOME RANDOM NOTES ON OUR CLUB AND ITS PUBLICATIONS

By HOYES LLOYD

OUR COUNCIL once asked me to prepare a list of the officers of the Club and the dates of the Annual Meetings. I have a secret idea that this was a short cut on the part of the Secretary, so that he might always know the number of any one Annual Meeting, and announce it correctly in consequence After a few Annual Meetings of any organization have been held, the officers are very apt to become confused as to the proper designation for the next meeting. Our friends of the American Ornithologists' Union dodge this difficulty by numbering their organization meeting as "1", and calling all subsequent meetings "stated meetings", prefixed with the appropriate number. The practice in our Club has always been to use the term Annual Meeting, and when this term is used the organization meeting does not receive a number, and the first Annual Meeting was the one which was held when the Club attained the age of one year.

Librarians who have been busy lately in completing their files of our publications have been confused, I am sure, by the fact that our publications have been issued under three different titles. The table, which I have prepared to show the chief officers of the Club during its history can be used as a guide by librarians in completing their sets of the paper. For example, in the first eight years of the Club's existence seven numbers, approximately one per year, of the *Transactions of the Ottawa Field-Naturalists' Club* were published. These comprise two volumes which were followed by thirty-two volumes of *The Ottawa Naturalist*, beginning in the year 1887, and ending in the year 1919, as shown in the table. The time of the change to the title *Canadian Field-Naturalist* is shown in the table as well, and the time of the change of the Club year so that it coincided with the calendar year. This information has necessarily been condensed very much, but practically all that will be required is there. It is hoped that its publication will be of value to many of our members.

A former Secretary of the Club once said that it was a very difficult task to select from our files back numbers of *The Naturalist* to fill the orders of our members, his reason being that after he had taken two or three numbers from the files for the order he was filling, he found some article that was so interesting that he had to sit down and read it. This was exactly my experience in gathing data for the table I have prepared from my own forty-inch shelf of our publications. Incidentally, I am rather proud of that set, because I have bound it myself, and because I think it is perfect from the bibliophile's standpoint, each number having its original cover bound in place. In searching for facts, relating to officers and Annual Meetings, many items scattered through our publications happened to come to my attention.

Here is one that tells of an address on museum education by Mr. H. Beaumont Small, dated January 16, 1880. He credited Dr. Grant for his unremitting exertions to have the Geological museum move to Ottawa, and strongly expressed a wish for the establishment of a National Museum, which, as an adjunct to Government, he said, might be eventually anticipated. This suggestion, made at one of the Club's meetings of forty-seven years ago, ultimately bore fruit this year when a National Museum of Canada was formally created by Order-in-Council. On March 31, 1881, Professor Macoun delivered his great address on "The Capacities of the Prairie Lands of the Great North-West".

All through our lengthening history we find a continued urge for more scientific works and records. There has recently been a good deal of publicity given to the question of wild flower preservation. This subject was discussed by our Botanical Division of the year 1887.

The coming of our fiftieth anniversary arouses attention for the account of the celebration of the twenty-fifth anniversary of the Club which was held on December 15th, 1903. At the twenty-fifth anniversary, the first President of the Club spoke, and five members of the original Council were in attendance.

In scanning the pages, I noticed a long series of lectures on the teaching of nature study which should be available and useful for very many people who have to deal with this subject.

When the table of officers had been finished, I counted a few totals, and found that the Club had been served by twenty-seven Presidents, fourteen Secretaries, sixteen Treasurers, and two Secretary-Treasurers. The outstanding officer in length of service was Arthur Gibson, and the Club of to-day owes him a debt of gratitude for his work for twelve years as Editor. The next longest term of service as Editor was that of James M. Macoun, who acted in this capacity for nine years. Of course this table names only a few of the officers who have laboured for the Club because they loved this service to natural history in Canada. Devoted service of naturalists in the past as in the present makes our paper possible.

In case any naturalist or any librarian may have followed me this far, I should like to ask that any one knowing of the existence of a complete set of the publications of the Club, send me the following information for record purposes:—

1. The owner of the set;
2. Is it bound or unbound?

NOTE.—Please check the set in question with the table published herewith, so that you may be sure that it is really complete.

The Club will not be able to sell many more complete sets, and our ability to make them up will be dependent upon the receipt of old runs from members. Probably the Club can fill gaps in sets which are nearly complete, and for many periods of its existence it can furnish long and perfect runs. Our officers are always pleased to give information in this connection. When we have compiled a list of the complete sets of our papers, it is proposed to publish it.

While dealing with the general question of our ancient history, attention might be called to the fact that some of the early minutes of the Club are missing. If any minute books, or other records of our Club, should be in the possession of any one who may read these lines, the Club would appreciate having these records returned.

OTTAWA FIELD-NATURALISTS' CLUB
FOUNDED MARCH 19, 1879

Year	Volume	President	Secretary	Treasurer	Editor	No. and date of annual meeting
1879-80	— Trans. No. 1	Lt. Col. Wm. White.		R. B. Whyte		1. March 23, 1880
1880-81	— Trans. No. 2	James Fletcher.		W. H. Harrington		2. March 15, 1881.
1881-82	— Trans. No. 3	James Fletcher.		W. H. Harrington		3. March 21, 1882.
1882-83	— Trans. No. 4	James Fletcher.	W. H. Harrington.	W. P. Anderson		4. March 20, 1883.
1883-84	— Trans. No. 5	H. Beaumont Small.	W. H. Harrington.	W. P. Anderson		5. March 18, 1884.
1884-85	— Trans. No. 6	H. Beaumont Small.	W. H. Harrington.	W. P. Anderson		6. March 20, 1885.
1885-86	— Trans. No. 7	W. H. Harrington.	James Fletcher.	T. J. MacLaughlin.		7. March 16, 1886.
1886-87	—	John Macoun	W. H. Harrington.	T. J. MacLaughlin.		8. March 15, 1887.
1887-88	*"Ottawa Naturalist"*, Vol. I.	R. B. Whyte	W. H. Harrington.	James Fletcher.	W. H. Harrington.	9. March 20, 1888.
1888-89	Vol. II.	R. B. Whyte	J .T. MacLaughlin.	James Fletcher.	W. H. Harrington.	10. March 19, 1889.
1889-90	Vol. III.	R. W. Ells	T. J. MacLaughlin.	James Fletcher.	James Fletcher.	11. March 18, 1890.
1890-91	Vol. IV.	R. W. Ells	T. J. MacLaughlin.	James Fletcher.	James Fletcher.	12. March 17, 1891.
1891-92	Vol. V.	R. W. Ells	W. H. Harrington	A. G. Kingston	James Fletcher.	13. March, 1892.
1892-93	Vol. VI.	George M. Dawson.	Henry M. Ami.	A. G. Kingston	James Fletcher.	14. March 21, 1893.
1893-94	Vol. VII.	George M. Dawson.	Henry M. Ami.	A. G. Kingston.	W. H. Harrington.	15. March 20, 1894.
1894-95	Vol. VIII.	George M. Dawson.	Henry M. Ami.	A. G. Kingston.	W. H. Harrington.	16. March 19, 1895.
1895-96	Vol. IX.	F. T. Shutt	Andrew Halkett	D. B. Dowling.	Henry M. Ami.	17. March 17, 1896.
1896-97	Vol. X.	F. T. Shutt	Andrew Halkett	D. B. Dowling.	Henry M. Ami.	18. March 18, 1897.
1897-98	Vol. XI.	Edward E. Prince.	Andrew Halkett	John Craig	Henry M. Ami.	19. March 10, 1898.

OTTAWA FIELD-NATURALISTS' CLUB
FOUNDED MARCH 19, 1879

Year	Volume	President	Secretary	Treasurer	Editor	No. and date of annual meeting
1898-99	Vol. XII.	Edward E. Prince.	W. J. Wilson...	James Fletcher.	Henry M. Ami.	20. March 14, 1899.
1899-00	Vol. XIII.	Henry M. Ami..	W. J. Wilson. .	James Fletcher.	James M. Macoun.	21. March 20, 1900.
1900-01	Vol. XIV.	Henry M. Ami.	W. J. Wilson...	James Fletcher.	JamesFletcher.	22. March 19, 1901.
1901-02	Vol. XV.	Robert Bell....	W. J. Wilson...	James Fletcher.	James M. Macoun.	23. March 18, 1902.
1902-03	Vol. XVI.	Robert Bell....	W. J. Wilson...	Arthur Gibson..	James M. Macoun.	24. March 17, 1903.
1903-04	Vol. XVII.	W. T. Macoun.	W. J. Wilson...	Arthur Gibson..	James M. Macoun.	25. March 15, 1904.
1904-05	Vol. XVIII.	W. T. Macoun.	T. E. Clarke...	Arthur Gibson..	James M. Macoun.	26. March 19, 1905.
1905-06	Vol. XIX.	S. B. Sinclair...	T. E. Clarke...	Arthur Gibson..	James M. Macoun.	27. March 20, 1906.
1906-07	Vol. XX.	W. J. Wilson...	T. E. Clarke...	Arthur Gibson..	James M. Macoun.	28. March 19, 1907.
1907-08	Vol. XXI.	W. J. Wilson...	T. E. Clarke...	Arthur Gibson..	James M. Macoun.	29. March 17, 1908.
1908-09	Vol. XXII.	A. E. Attwood.	T. E. Clarke...	Arthur Gibson..	James M. Macoun.	30. March 16, 1909.
1909-10	Vol. XXIII.	A. E. Attwood.	T. E. Clarke...	Arthur Gibson..	Arthur Gibson..	31. March 15, 1910.
1910-11	Vol. XXIV.	Andrew Halkett	J. J. Carter....	Herbert Groh..	Arthur Gibson..	32. March 21, 1911.
1911-12	Vol. XXV.	Alex. McNeill..	E. H. Blackader	W. T. Macoun.	Arthur Gibson..	33. March 19, 1912.
1912-13	Vol. XXVI.	L. H. Newman.	E. H. Blackader	W. T. Macoun.	Arthur Gibson..	34. March 18, 1913.
1913-14	Vol. XXVII.	L. H. Newman.	E. D. Eddy....	W. T. Macoun.	Arthur Gibson..	35. March 24, 1914.
1914-15	Vol. XXVIII.	Arthur Gibson..	E. D. Eddy....	J. F. Watson...	Arthur Gibson..	36. March 23, 1915.
1915-16	Vol. XXIX.	Arthur Gibson..	G. O. McMillan	G. LeLacheur..	Arthur Gibson..	37. March 21, 1916.
1916-17	Vol. XXX.	Harlan I. Smith	L. D. Burling..	G. LeLacheur..	Arthur Gibson..	38. March 20, 1917.
1917-18	Vol. XXXI.	Harlan I. Smith	L. D. Burling..	J. R. Dymond..	Arthur Gibson..	39. March 19, 1918.
1918-19	Vol. XXXII.	C. Gordon Hewitt.	Clyde L. Patch	J. R. Dymond..	Arthur Gibson..	40. March 18, 1919.
1919	*Canadian Field-Naturalist* Vol. XXXIII.	M. Y. Williams	Clyde L. Patch	F. W. Waugh...	Arthur Gibson..	41. December 2, 1919.
1920	Vol. XXXIV.	M. Y. Williams	Clyde L. Patch	Miss E. B. Crampe.	Arthur Gibson..	42. December 7, 1920.
1921	Vol. XXXV.	R. M. Anderson	Clyde L. Patch	C. B. Hutchings	D. Jenness....	43. December 20, 1921.
1922	Vol. XXXVI.	R. M. Anderson	Clyde L. Patch	C. B. Hutchings	Harrison F. Lewis.	44. December 5, 1922.
1923	Vol. XXXVII.	Hoyes Lloyd...	Clyde L. Patch	C. B. Hutchings	Harrison F. Lewis.	45. December 8, 1923.
1924	Vol. XXXVIII.	Hoyes Lloyd...	J. F. Wright...	B. A. Fauvel...	Harrison F. Lewis.	46. December 2, 1924.
1925	Vol. XXXIX.	Hoyes Lloyd to April 11th, G. A. Miller.	J. F. Wright...	B. A. Fauvel...	Harrison F. Lewis to April 11th, G. A. Miller.	47. December 1, 1925.
1926	Vol. XL.	Norman Criddle	J. F. Wright...	B. A. Fauvel...	G. A. Miller...	48. December 14, 1926.
1927	Vol. XLI.	Norman Criddle	J. F. Wright...	B. A. Fauvel...	G. A. Miller...	

DESTRUCTION OF BIRDS BY LIGHTHOUSES IN THE PROVINCES OF ONTARIO AND QUEBEC

By HARRISON F. LEWIS

(*Concluded from March issue*)

The kinds of birds which have been reported as killed by the lights are listed below. The number after each name indicates the number of *reports* in which it has been found, and has no direct relation to the number of *individuals* that have been observed to be killed by the lights.

"Sea Birds", 1; "Land Birds", 31; Razor-billed Auk, 1; Sea Gull, 1; Small Gull, 1; Petrels, 1; Duck, 4; Black Duck, 2; Wood Duck, 1; Old Squaw, 3; Eider, 1; Brant, 1; Heron, 1; Virginia Rail, 1; Snipe, 1; Yellow-legs, 1; Plover, 1; Grouse, 1; Black-billed Cuckoo, 1; Belted Kingfisher, 1; Woodpeckers, 2; Flicker, 1; Flycatchers, 1; Kingbird, 1; Phoebe, 1; Wood Pewee, 2; Yellow-bellied Flycatcher, 1; Acadian Flycatcher, 1; Alder Flycatcher, 1; Least Flycatcher, 1; Larks, 1; Blue Jay, 1; Canada Jay, 1; Blackbird, 1; Baltimore Oriole, 1; Finches, 2; Sparrows, 4; Snow Bunting, 2; Vesper Sparrow, 1; Grasshopper Sparrow, 1; Chipping Sparrow, 2; Slate-coloured Junco, 1; Song Sparrow, 2; Lincoln's Sparrow, 1; Scarlet Tanager, 3; Swallows, 3; Red-eyed Vireo, 2; Philadelphia Vireo, 1; Blue-headed Vireo, 1; Warbler, 1; Tennessee Warbler, 1; Cape May Warbler, 1; Yellow Warbler, 3; Black-throated Blue Warbler, 1; Magnolia Warbler, 2; Chestnut-sided Warbler, 1; Bay-breasted Warbler, 1; Black-poll Warbler, 1;

Blackburnian Warbler, 2; Black-throated Green Warbler, 1; Oven-bird, 1; Northern Water-Thrush, 1; Connecticut Warbler, 1; Mourning Warbler, 1; Maryland Yellow-throat, 2; Wilson's Warbler, 1; Canadian Warbler, 1; Redstart, 1; Catbird, 1; Brown Thrasher, 1; Wren, 1; Chickadee, 2; Thrushes, 3; Veery, 1; Gray-cheeked Thrush, 2; Olive-backed Thrush, 1; Hermit Thrush, 1; Robin, 2.

Mr. W. E. Saunders, of London, Ontario, has kindly furnished a list of birds killed by Long Point light, on the north shore of Lake Erie, which were examined and identified by him in the spring of 1925. They were said by the lightkeeper to be the results of a single night's disaster. This list has been included in the compilation of the general list presented above, but it is so interesting that it is shown separately below, with the number of *individuals* of each species killed at this light on the one night in question:

Wood Pewee, 7; Yellow-bellied Flycatcher, 9; Acadian Flycatcher, 2; Alder Flycatcher, 2; Least Flycatcher, 5; Grasshopper Sparrow, 1; Lincoln's Sparrow, 2; Scarlet Tanager, 15; Red-eyed Vireo, 32; Philadelphia Vireo, 7; Blue-headed Vireo, 1; Warbler (sp. ?), 1; Tennessee Warbler, 22; Cape May Warbler, 2; Black-throated Blue Warbler, 5; Magnolia Warbler, 11; Chestnut-sided Warbler, 1; Bay-breasted Warbler, 27; Black-poll Warbler, 18; Blackburnian Warbler, 10; Oven-bird, 16; Northern Water-Thrush, 2; Connecticut Warbler, 1; Mourning Warbler, 23; Maryland Yellow-throat, 4; Wilson's Warbler, 15; Canadian Warbler, 31; Redstart, 9; Gray-cheeked Thrush, 13; Olive-backed Thrush, 83; Robin, 1.

The total number of species is 30. The total number of individuals is 378.

Twenty-four lightkeepers report that, in their opinion, the destruction of birds at their lights is decreasing; twelve report that, in their opinion, the destruction is stationary; and two report that they consider that it is increasing.

Several passages of description and comment which various lightkeepers have included in their respective reports are thought to be of such interest that they deserve to be quoted here.

"There are also the White-crowned Sparrows, which come in great numbers two or three times in the fall, in storms, and perch on the railings around the lantern; none of them are killed."—Gustave Fournier, Keeper of Upper Traverse Light, No. 1177. (Translated from the French by H.F.L.) It will be observed that White-crowned Sparrows are not included among the birds reported killed at any station.

"When the moon is strong or full during the time when winds are favourable to migration, as has been the case this season, there is apparently very little loss of life. Last season the southerly winds prevailed at times when the moon was practically dark and when fog was bad, resulting in great loss of bird life during the spring.

"During the fall period the northerly winds prevailed during the dark of the moon with the same result as during the spring.

"I have picked up numbers and placed them in a dark place to recover. Many did so, but the greater number died.

". . . I have often picked up birds at night, partly stunned, brought them in the house for a time, and, with the help of some water, started them on their way again quite recovered by daylight.

"As to the light, if it was covered with netting, the birds would fly in a circle until exhausted. Some perch on the railing for a time, but eventually join the others in their useless circling through the beams of the light."—J. W. Kennedy, Keeper of Caribou Island Light, No. 2170.

"During the spring migration, and on a close, murky, foggy night, with little or no wind, as soon as it is dark, the spring birds fly around the lantern of this Light Station in great numbers. On such a night there are great numbers of gnats and moths; whether it is in quest of the food which certain of those moths supply or not, I am not prepared to say, but those are the nights on which the bird mortality is greatest, up to midnight, when it is very much less from then until daylight. I can sit in the dwelling, which is immediately beneath the lantern, and on such a night you can plainly hear the fairly steady thump, thump, of the birds striking the heavy plate glass. Those are the ones which are very often only stunned or lightly wounded, and many of those I have gathered up in a basket, brought down into the dwelling, and, after fixing them up as well as I can, and giving them a nice, comfortable box to remain in until morning, I would then liberate them and very many would resume their flight. Of those that fall to the Rock beneath, there are very few that escape death. The fall is about 70 feet, and, even if stunned, they are very quickly picked up by the large Gulls, who swallow them wholesale on such a night as I have mentioned, or rather on the following morning. I have gathered up as many as two large pailfuls, dead, not to mention those which are able to hop around. Thank goodness those are exceptional occasions, but, to get back to the average loss, I would think that 25 would perhaps be a fair estimate for a foggy night.

"This station is built of reinforced concrete,

elliptical in shape, about 32 feet in greatest width, with a 2-inch pipe railing around the top of the building. In the centre of the top is the lantern, polygonal in shape, 12 panes of glass, 30 inches by 48 inches; width of lantern 10 feet. Each pane of glass has a ledge of about 4 inches at the foot. Many of the birds sit on those ledges when stunned, others sit at foot of lantern on the concrete, flat top of building. The lantern is all steel, with sharp corners and angles, and when the birds strike the corners it is usually sure death. This station appears to be situated in the direct line of flight during spring and fall migations, but more particularly that of the spring flight, as that is the time of our greatest mortality.

". . . This is a question (the possibility of reducing the mortality by any means) to which I have given much thought and study for very many years, and at this Station in particular I cannot see how any means can be taken to reduce the mortality, the main reason being that we cannot erect anything which would be a means of prevention without interfering with the brilliancy of the light. This is a very important Light Station as it is situated at the entrance of the long channel which leads into Depot Harbour and Parry Sound, and has to be kept at its greatest degree of brilliancy throughout the night and anything which might be erected in the way of netting would necessarily have to be of sufficient solidity to withstand the dashing of the water, which in heavy winds is driven over top of the station in vast quantities, and such an article would interfere with the light, so that, as far as this station is concerned, we simply can do nothing."—Adam Brown, Keeper of Red Rock Light, No. 2024.

SUMMARY

In Ontario and Quebec, it is very exceptional for fixed white lights, or red lights of any type, to kill more than a small number of birds in a year. Many lights of these kinds kill no birds at all.

About 70% of the flashing, revolving, and occulting white lights are not seriously destructive to bird life, but the remaining 30% cause the death of from 100 to more than 500 birds at each light each year. The destructiveness of a given flashing light does not appear to be correlated with its height or its power or the time-formula of its flashes. It may be chiefly dependent on its situation.

Serious destruction of bird life by any light usally takes place only when visibility is poor, on account of the presence of fog, smoke, rain, or snow, and is especially heavy when this condition occurs in the season of migration.

Many birds are killed by striking the lighthouse or the lantern, sometimes repeatedly, and many are killed by flying about in the rays of light until they are overcome by exhaustion.

The birds killed are chiefly species which are of economic value. The majority of them are small, insectivorous song birds. The total number killed annually by lighthouses in Ontario and Quebec is actually large, and serious effort to save them is fully justified.

Means of reducing the mortality are under consideration.

THE WATERFOWL SICKNESS AT LAKE NEWELL, ALBERTA, 1925-1926

By J. A. MUNRO

DURING the summers of 1924 and 1925 considerable losses, apparently from disease, occurred amongst the waterfowl at Lake Newell, Alberta, both nesting species and migrants being affected. This matter being brought to the attention of the Commissioner of Canadian National Parks, Ottawa, late in July, 1925, it was decided to conduct an investigation. Accordingly headquarters was made at the village of Brooks, five miles from the north end of the lake, where the writer remained from August 12th to August 20th. Owing to a press of other duties it was not possible to devote more than a week to this work and in this time only a preliminary survey of the situation was possible. Lake Newell was visited at different points each day, specimens of sick birds were collected for examination and investigations were made into all local conditions which were thought might have any bearing on the question. Specimens of blood of affected birds were prepared as microscope slides and these, together with the visceras, livers, hearts, and kidneys from sick birds of various species were preserved for laboratory examination. Samples of Lake Newell water, of the soil on the beaches, and faeces from sick birds were also collected and examined later by experts.

During the course of this work every courtesy was shown by the officials of the Canadian Pacific Railway Land Department. Mr. W. F. Grafton who acted as guide, assisted in every possible way.

Lake Newell is an artificial reservoir of fresh water taken from the Bow river, forming part of the Canadian Pacific Railway Company's irrigation project, and is surrounded by treeless, rolling prairie of the desert type characteristic of parts of Southern Alberta. Its area approximates 12,000 acres although this varies considerably with the

rise and fall of the lake. Definite information regarding the depth of water is not at present available, but it is reported that 60 feet has been found in several places. Because of numerous long arms and backwaters the shore line is extensive for the size of the lake and probably exceeds 40 miles.

Being one of the few large bodies of fresh water in a naturally semi-arid country and well stocked with plant-food, fish, mollusca, crustaceæ and insects, large numbers of water birds, both summer visitants and migrants, are attracted; indeed lake Newell is one of the most important breeding grounds in southern Alberta. The aquatic bird-life has previously been described.* Excellent duck and goose shooting is to be had on the stubble of the irrigated lands in the district, mallard and geese using the lake chiefly as a resting place during the autumn season.

Owing to the interest of residents in wildfowl shooting, the duck sickness caused much alarm and was reported to the Game Commissioner of Alberta when first discovered early in August, 1924. That year it lasted well into the hunting season which opened on September 15th, and sportsmen told of seeing sick ducks drop, as if winged, out of a passing flock. One informant mentioned that while hunting a grassy slough near the lakes there was sometimes difficulty in finding the ducks that had been shot amongst the dozens of dead birds scattered about the marsh. Various theories were advanced as to the cause of the sickness, the one most in vogue being picturesquely described as "bloodsuckers on the brain". As a matter of fact it was noted in dissecting sick ducks that leeches were sometimes present in the mouth and in some cases had worked their way some distance into the upper mandible entering by way of the nostrils. Needless to say the leeches had become attached while the bird floated helpless on the water.

Since my last visit to Lake Newell in 1921 a considerable change had taken place in the condition of the water due to a phenomenal increase of algae flora along the margin of the lake. At that time the abundance of such water plants as the Potamogetons was considered worthy of note as being favourable to an increase of water-fowl. These vigorous water plants absorb organic impurities in the water and help to keep it sweet—this is well illustrated in the purifying action of water weeds in aquaria—the seasonal growth breaks off and drifts ashore where it is dried out by sun and wind. On the other hand algae of certain species, notably Blue-green Algae, disintegrate and decompose during the hot weather and foul the water. This has happened at lake Newell to an alarming degree. Decomposition produces a greenish, paint-like material which discolours the water, and, accumulating on the shallows and sheltered portions of the lake gives forth a strong disagreeable smell. When washed up on the beach and dried by the sun the colour intensifies to a deep bluish green the shade of copper-sulphate. During July and August all the shallows about the lake were polluted with this material while deeper water and the canals were rela tively clean.

Besides patrolling the shores of lake Newell we visited Johnson's slough, 4 miles north-east of Brooks; a line of open alkaline sloughs three miles east of Lake Newell; an artificial marshy slough formed by irrigation water in S.E. 26.16.13 W.4, and a long marshy slough of similar origin lying five miles east of Lake Newell. In the last mentioned slough dead ducks were found in large numbers during the hunting season of the previous year, but we found none, and if any were present they were effectually concealed by the thick growth of aquatic vegetation in and about the slough. In one of the open alkaline sloughs referred to, which contained only a little water and much sticky mud with an alkaline efflorescence near high water mark, were found 17 ducks and 1 Eared Grebe all too far decomposed for critical examination; indeed it was impossible to reach them through the deep mud. The question arises whether these birds became affected at this slough or at Lake Newell but it is considered probable that they alighted on the slough after contracting the trouble at the lake. The fact of finding several dead downy ducks at Lake Newell is sufficient evidence that the trouble is to be looked for about the lake itself.

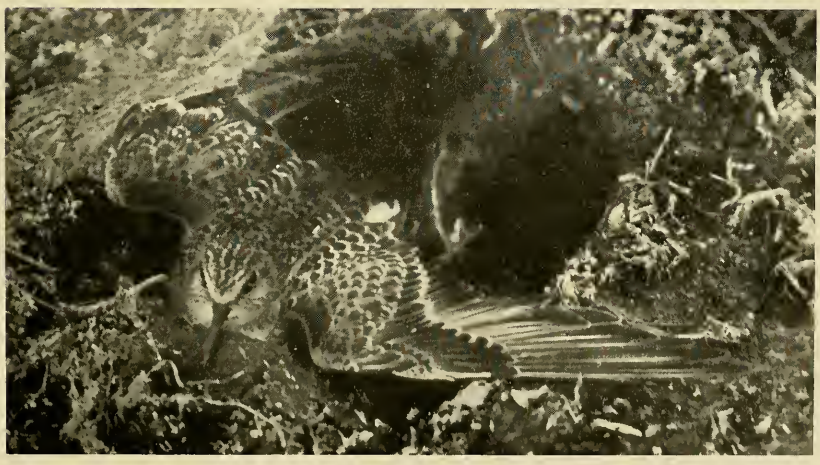
LIST OF BIRDS FOUND DEAD OR DYING.

Eared Grebe 71, California Gull 2, Ring-billed Gull 3, Franklin's Gull 44, Black Tern 1, Mallard 35, Pintail 78, Baldpate 33, Gadwall 11, Shoveller 3, Blue-winged Teal 13, Green-winged Teal 21, Lesser Scaup 2, Canada Goose 12, Avocet 7, Marbled Godwit 32, Western Willet 2, Baird's Sandpiper 85, Stilt Sandpiper 2, Lesser Yellowlegs 4, Knot 1, Sanderling 1, Black-bellied Plover 2, Killdeer 21, Ruddy Turnstone 2. Total 513.

Only a portion of the shore line was carefully worked and none of the large islands were visited so it is probable a much greater loss occurred than is shown by these figures. The majority of the birds were too much decomposed to permit examination, the condition of some suggesting that the disease had first made its appearance

*J. A. Munro, *The Canadian Field-Naturalist*, Vol. XXXVI, p. 89.

Sick Avocet resting on tarsus



Baird's Sandpiper in last stages of disease

early in July. Above high water mark were found dried-up carcasses of many species of birds which had died the previous year; in many cases identification of these was impossible. For the most part sick ducks were lying at the edge of the water or floating amongst the weeds on the lake itself, while waders were observed some distance inland as well as on the beaches—on several occasions Baird's Sandpiper were seen fluttering down to the ground a mile or so inland from the lake.

Ninety per cent of the dead ducks were males in eclipse and it was observed that the large bands of ducks frequenting the shores and shallows were composed entirely of drakes. Only three young ducks were found and perhaps this may be explained by the fact that breeding ducks chiefly frequent the vicinity of the islands well out in the lake where they are safe from attack by predatory animals—on no occasion was a brood of young ducks sighted from the shore. Neither were diving-ducks affected to any extent, only two specimens (Lesser Scaups) being found, although it is known that this species and White-winged Scoters nest commonly on the islands. The relative immunity of large Gulls and Common Terns is also noteworthy when it is considered that a large colony of Ring-billed Gulls and another of California Gulls nest on the islands as also does one colony at least of Common Terns.

Actions of Sick Birds

The following sick birds were studied in the field and afterwards captured and dissected, viz: Mallard 2, Baldpate 1, Shoveller 1, Pintail 3, Avocet 1, Knot 1, Baird's Sandpiper 11, Least Sandpiper 2, Marbled Godwit 1.

With one exception dying ducks were found at the edge of the water as if they had paddled ashore before the leg muscles became entirely paralyzed. No doubt the greater number die while on the water and are later washed ashore. The two Mallard were lying outstretched with no apparent sign of life except in the eyes from which exuded a clear thick liquid. Other ducks were found resting on the chest and belly with wings slightly drooped and tarsi extended. Usually the head moved from side to side or up and down, and, in the case of the Shoveller, the mouth was opened and shut at intervals of five seconds, as if the bird was gasping for air. One Pintail spread her wings and struggled to rise when approached but could not move her body, and the wings remained spread out on the mud. In a few cases only was a discharge from the eye present and in one instance this had entirely gummed the eye lids together. Greenish-white excreta was present in every case.

Nearly half of the birds in the early stages of the affection were Baird's Sandpiper. These were all birds of the year, there had probably been a flight a few days earlier. Some could still fly a short distance but were easily captured; others could not rise in the air and used their wings only to flutter along the beach. In a later stage the wings were incapable of being elevated while the leg muscles remained unaffected; after this stage a condition was reached where the wings drooped on the ground and the legs barely served to support the body. In the final stage preceding death the birds remained motionless on the ground, usually close to a stone or clod of earth and in several cases lying in the hoof-print of a horse, with wings sometimes folded and held in position by the overlapping flank feathers but more often drooping or outspread. One bird was fluffed out in the usual position assumed by a brooding female. Birds in this stage were unable to rise, the only movement being a turning of the head from side to side. Later the neck muscles relaxed and the head drooped, usually forward on the mud, but occasionally on to the bird's back in a sleeping pose. The eyes were invariably bright with no indication of a discharge, on being handled the birds voided a greenish-white excreta, in advanced cases this material was present in a hardened form on the feathers about the anal region.

Least Sandpipers were in exactly the same condition, and the Knot, a bird of the year, was lying with neck outstretched apparently just about to die.

Avocets were seldom seen, although this species is a common breeder on the islands, and only one affected bird was encountered. When first seen this bird stood upright in the water but after being handled and released again it relaxed on the full length of the tarsus, with wings partially spread on the surface of the water.

Marbled Godwits were found chiefly on the west shore of the lake and on a small island, roughly 350′ x 50′, which was reached by wading. Here were found sixteen dead Marbled Godwits, besides other waders and ducks. Four Godwits which had flown from the mainland to the island were unusually tame and upon walking towards them it was seen that the apparent tameness was due to sickness for the birds flew very slowly and with apparent effort. One of these which decoyed to a fifth bird in a more advanced stage of the complaint was photographed. The latter crouched in the water a few yards from shore with wings outspread but made no struggle to escape.

Baldpate in last stages of disease—dead Pintail in background

Marbled Godwit in last stages of disease

SUMMARY OF GENERAL SYMPTOMS

All living specimens on being handled void excreta of a greenish-white, pale green, yellowish, or white streaked with green. In some cases this hardens to a limelike consistency, becomes encrusted on the feathers of the anal region and sometimes clogs the rectum. In ducks there is frequently a colourless discharge from the eye which eventually gums the eyelids together. This was not noted in any of the waders examined. It would seem that the wing muscles are first affected, then the leg muscles and finally the condition extends to the whole muscular system. Wetmore* states "The birds affected first lose the power of flight and are unable to rise in the air, though in some cases they can flutter across the water, and in others can fly for a few rods before dropping back. The legs next become affected and the power of diving is lost. As the birds grow weaker, they crawl out on the mud bars, if able to do so, or hide in growths of grass or rushes. In a later stage of the affection they are unable to rise. Finally the neck relaxes and the head lies prostrate. . . . If in the water, death comes by drowning, but on land birds may live for two days or more in this condition." This description exactly fits the conditions observed at lake Newell.

Dissection showed all specimens, with the exception of the Marbled Godwit and the Avocet to be normally fat which is evidence that the disease is acute and death occurs before there is time for wastage of fatty tissues. The two exceptions noted were without trace of fat and the muscles were emaciated. Evidently in some cases the disease may become chronic and perhaps such birds might naturally recover. Some specimens emit a strong disagreeable odour on being opened, this being caused by an accumulation of liquid in the gut as a result of the rectum being clogged. Generally the stomach is empty but in that of a Shoveller a few seeds of an unidentified water plant were present. With the exception of a Baldpate and a Pintail, the lungs, heart, liver and kidneys appeared normal. In the exceptions noted the lungs appeared dark and slightly shrunken and the gall bladder somewhat enlarged, but not flooding as is usual in cases of lead-poisoning.

POSSIBILITY OF AN ALKALINE POISON AS THE CAUSE

These symptoms in every way coincide with Wetmore's description of the duck sickness in Utah* which he discovered was caused by the toxic action of certain solu ble salts found in alkali*.

The following quotation from his paper explains the manner in which birds obtain these salts in the region where his investigations were carried out.

> "The Salt Lake valley is well cultivated and productive and owes its fertility almost entirely to irrigation. In the last 35 years the amount of arable land actually under water has greatly increased, and the stream flow at the river mouths has correspondingly decreased. In midsummer of ordinary years little or no water now passes the irrigation dams on Bear river. The water found at that sesaon in the lower channels comes from such small tributaries as enter below the dams and from seepage from water used in irrigation. Practically the same condition holds in the other streams that flow into Great Salt lake. Thus irrigation has decreased the amount of water supplying the marshes on the lake front, and the resulting slow drainage induces stagnation over large areas. After June 35, as the spring waters in Bear river recede, great expanses of mud flat are laid bare in the sunl Surface evaporation and capillary atttraction rapidly draw the salts held in solution in the mud to the surface and there concentrate them. As the mud becomes drier these concentrates are visible as a white deposit or scale (efflorescence). This in many cases is exposed only an inch or so above the surrounding water level. In the large bays strong winds bank up the water and blow it in across these drying flats. As it advances it takes rapidly into solution the soluble salts, largely sodium chloride, but containing calcium and magnesium chloride also. This inflow of water carries with it quantities of seeds and myriads of beetles, bugs, and spiders, washed out of crevices and holes in the dried and cracking soil. The ducks come in eagerly to feed on this easily secured food and work rapidly along at the front of the advancing water, each bird hurrying to get his fill. Many individuals in this way secure a sufficient quantity of these poisons to render them helpless. As the water recedes again small pools are left in shallow depressions, and other ducks and shore-birds feeding in these are affected."

At first the writer was inclined to assume that Wetmore's diagnosis of the Utah trouble would be applicable to Lake Newell, but the causative alkaline condition he describes was not discovered. Lake Newell normally is not high in June and its subsequent rising in July may, in some of the backwaters, take into solution sufficient salts to cause alkali poisoning in birds. However it was impossible to identify any particular part of the lake as being affected in this way, and it is believed that the origin of the malady must be sought in some other cause. More ducks were found on the east side than on the west side, but this was accounted for by the prevailing westerly

*Alexander Wetmore, "Mortality Among Waterfowl Around Great Salt Lake Utah". No. 217, United States Department of Agriculture.

*Alexander Wetmore. *The Duck Sickness in Utah.* Bulletin No. 672, United States Department of Agriculture.

winds which would carry dead and sick ducks to the east shore.

Samples of water from the lake were chemically analysed by Dr. Allan C. Rankin, Director of the Provincial Laboratory at the University of Alberta and the results are as follows:

CHEMICAL	Results expressed in parts per million	
	No. 6	No. 357
Total solids	274	320
Ignition loss	154	184
Hardness	low	low
Sulphates	30	45
Chlorides	3	2.5
Alkalinity	136	137
Nitrates	Not done	Not done
Nitrites	"	"
Free Ammonia	6.0	
Albuminoid Ammonia	2.0	

THE POSSIBILITY OF A PROTOZOAN INFECTION

A large number of waterfowl died at Lake Johnstone, Saskatchewan, in the summers of 1920 and 1921, and the symptoms as described* are identical with those observed in the Lake Newell birds. It was suggested that the trouble at Lake Johnstone was due to an intestinal coccidiosis, this being the opinion expressed by Dr. Charlton, Provincial Biologist, while Dr. R. J. Walsh, of St. Boswells, refers to septicæmia (Pasteurellosis anserina) as the source of the trouble. Mr. Bradshaw (Chief Game Guardian) states (loc. cit.) "While our investigations were more or less spasmodic we are of the opinion that the sickness was due either to the alkaline water which was more concentrated than usual, or to the pollution of the water caused by the putrefaction of the vegetable food growing in the lake, or a combination of both circumstances, brought about by the abnormal evaporation caused by the unusual and continued hot, dry weather that was experienced in the southwest part of the province last summer."

Samples of excreta from several species of ducks collected at Lake Newell were forwarded to Dr. C. H. Weaver, Ottawa, who found "some indication of intestinal parasitism, but this alone could not be taken as an indication of the cause of death in these birds." On the other hand, Dr. A. E. Bruce, Agassiz, B.C., examined the visceras and organs of a number of specimens with negative results insofar as bacteria or protozoa were concerned.

It has been stated that Lake Newell contains an excessive amount of algæ which disintegrate and decompose during the hot weather. It is understood that coccidiea multiply enormously in such decaying organic matter and it may be that the feeding grounds along the shores of lake Newell become infected with these parasites; or again, the trouble may be due to the direct action of toxic matter in the decomposed vegetation.

CONCLUSION.

It seems clear that the cause of the trouble, whether of protozoan origin, or due to poisoning by toxic matter in decayed algæ lies along the shores where the water is shallow. This is indicated by the prevalence of the sickness amongst the shore-loving species of birds and the relative immunity of those species which frequent the islands and the deeper portions of the lake. For example, the shore-loving Franklin's Gull suffered severely while no cases were observed amongst the less terrestial, but equally abundant, Common Tern. Amongst the ducks, the chief sufferers were males of surface-feeding species which frequent the shores of the lake while diving ducks which keep well out on the lake were affected hardly at all. The heavy loss amongst the Eared Grebe perhaps does not fit this theory, but further investigation may reveal an entirely different cause for the mortality in this species for it is well known that grebe of all species die in large numbers each year on many western lakes from some complaint which apparently awaits diagnosis.

1926

The "duck sickness" did not develop in the summer of 1926. Investigations conducted during the early part of July and again in September were unproductive so far as the finding of sick or dead birds was concerned. During a patrol by boat on July 6th, particular attention was paid to the areas where affected birds were most abundant the previous year and here were large mixed flocks of Pintails, Baldpate and Green-winged Teal, with smaller gatherings of White-winged Scoter, Lesser Scaup and Canvasback, all, apparently, in good condition.

Flocks of Pintail drakes in eclipse plumage, many of them flightless, were disturbed from various points on the lake; one of the main gatherings being on a small stony island and the adjacent shallows. As the boat approached, the entire flock—estimated at 4,000 individuals—moved off; some flying, others flapping over the water with occasional dives below the surface. About one-third of the flock appeared to be flightless. Here, if anywhere, it was thought, sick birds might be discovered, but, none were found during a careful search over the island.

*Reports of Chief Game Guardian, Department of Agriculture, Saskatchewan, 1920-21.

In the early spring the lake had been lowered four feet, for the purpose of making possible certain repairs to the irrigation canals, and this level was maintained during the entire summer. A scarcity of algæ was observed and the water pollution due to the decomposition of this growth, so apparent the previous year, had not developed. It is not understood whether the scarcity of algæ was due to the lowering of the lake or to natural causes. Possibly the development of algæ may follow a cycle and the peak had been reached in the summer of 1925. At any rate the beaches and shallows remained clean all summer and to this condition, it is believed, can be atributed the healthy condition of the water-fowl.

Okanagan Landing, B.C., January 5, 1927.

SOME PLANCTON ORGANISMS FROM LAKE BRERETON, MANITOBA

By ALEXANDER BAJKOV AND ALAN MOZLEY, University of Manitoba

LAKE BRERETON, which is some seventy miles east of the city of Winnipeg is situated at the edge of a vast unexplored region so the records of plancton organisms given here may be of interest. The present list is based upon two collections, one made during the month of October, 1922, indicated by the figure 1 in the list; and the other made on May 24, 1926, at the northern end of the lake, and indicated by the figure 2. The first collection was examined by Mr. C. W. Lowe, and we are indebted to the collector, Professor C. H. O'Donoghue for permission to include this in the present paper.

The plancton of Lake Brereton is very rich. The diatom flora is particularly so, these forms comprising ninety per cent of the plancton. The most abundant species is *Asterionella formosa* which forms about seventy per cent of the total plancton. The next most important species are *Melosira* and *Stephanodiscus*, which together comprise about ten per cent of the collection. Other algæ occurring in our material are, *Clathrocystis aeruginosa*, *Nostoc commune*, and *Crococcus limnetreus* which form only about five per cent of plancton. The remaining ten per cent is composed of zooplancton, only two species of *Cyclops* and one of *Diaptomus* occurring in our collections. *Daphnia pulex* and D. *longispina* also occur in the plancton, and are probably the dominant species during the autumn season.

That these plancton organisms are well suited to the needs of young fish is shown by the stomach contents given below.

Pickerel (*Stizostedion vitreum* Mitch) Length 30 mm.
Stomach Contents. *Cyclops bicolor*, *Asterionella formosa*, *Stephanodiscus niagarae*.

Pickerel (*Stizostedion viterum* Mitch) Length 35 mm.
Stomach Contents. *Diaptomus sp.*, *Cyclops sp.*, *Asterionella formosa*.

Pickerel (*Stizostedion vitreum* Mitch) Length 30 m.
Stomach Contents. *Melosira* sp., *Stephanodiscus niagarae*, *Asterionella formosa*.

Minnow (*Notropis* sp.) Length 37 mm.
Stomach Contents. Remains of *Daphnia* and *Cyclops*.

Minnow (*Notropis* sp.) Length 30 mm.
Stomach Contents. *Daphnia* sp., *Anurea codhlearis*.

LIST OF SPECIES.

PHYTOPLANCTON.

Diatomaceæ.
- *Asterionella formosa*. 1, 2.
- *Fragilaria crotonensis* Kitton. 2.
- *Tabellaria fenestrata* Kutz. 1, 2.
- *Melosira varians* Agardh. 2.
- *Melosira granulata* (Ehrbg.). 1, 2.
- *Stephanodiscus niagareæ* Ehrbg. 1, 2.
- *Surirella elegans* Ehrbg. 2.

Myxophyceæ
- *Coelosphaerium kutzingianum* Nag. 1, 2.
- *Claihrocystis* (*Microcystis*) *aeruginosa* Henfrey. 1, 2.
- *Clathrocystis* (*Microcystis*) *ochraea* (Brand) Forti. 1.
- *Chroococcus limneticus* Lemm. 1, 2.
- *Anabaena flos-aquae* Brebisson. 1, 2.
- *Nostoc commune* Vausher. 2.
- *Aphanizomenon flos-aquae* Ralfs. 2.

Flagellata
- *Dinobrion stipitatum* Stein. 2.

Chlorophyceae
- *Botryococcus brauni* Kutz. 1, 2.
- *Pediastrum boryanum* Menegh. 2.
- *Staurastrum leptocladum* Nordst variety. 1.

ZOOPLANCTON.

Rotatoria
- *Anuraea cochlearis* Gosse var. *macrocantha* Lauterb. 2.
- *Anuraea cochlearis* Gosse. 1, 2.
- *Notholca longispina* Kellic. 1, 2.
- *Polyarthra platyptera* Ehrbg. 2.

Copepoda
- *Cyclops bicolor* Sars. 2.
- *Cyclops viridis* var. *americanus* Marsh. 2.
- *Diaptomus oregonensis* Lilljeb. 2.

Phyllopoda

Daphnia pulex (de Geer). 2, with summer eggs.

Daphnia longispina var. *hyalina* form *mendotæ* 2.

Bosmina longirostris (O. F. Muller). 2.

Protozoa.

Tintinopsis sp. 1, 2.

THE HISTORY OF OUR HUMMING BIRD

By ITS YOUNG MISTRESS

ON the 27th of September a little exhausted humming bird was picked up by my brother Tyler on Wellington Street, Ottawa.

He put it in his pocket thinking it was dying. Tyler reached the shop, gave it a drink and laid it on a piece of cotton in the sun; in a little while it came to and directly flew up to the sun in the window. At night time he took it home and wondered what he would do with it.

A glass sealer was its bed for the first night. On September 18th, Sunday, Tyler decided to let it go, but mother thought that if it turned cold the little thing would perish, so with great joy we took it in, hoping that we would be able to keep it. Daddy and mother fixed up our big fish bowl with some heavy cloth in the bottom and also put in a little twig for it to rest on, but apparently it would not live in there and we soon found out that it wanted the dining-room for its play-room and the bowl for its bed only.

It was so famished that it would eat out of our hands, but now Hummer would rather find its food for itself. Dad made a trellis for one of mother's plants, not thinking that it would come in for a wild bird's resting-place, which it has. Mother kept saying that Hummer would not live because he was a wild bird. For the first week we watched him with great care to note everything he did. Of course we published it among our friends. One day I came in looking for him and he was squeaking very pitifully. I found him between the curtains and the window, very much frightened until I released him.

We started to give Pete flowers with honey in them, but he was not satisfied after a week of this, because he found that the honey was too thick for him. Then we thinned it slightly with water. One day my sister was eating some cantaloupe when Pete decided that he would also like to have some, so he tasted it and liked it. Then we did not have to worry about flowers, because he would eat cantaloupe with sugar mixed up in the juice.

When we had him about four weeks, he began playing on the floor; that is Hummer would fly around and chase particles of dust until they formed a ball of fluff and then fan it with his wings around the floor until he got tired.

One morning, just for fun, mother wondered if he would be frightened if she put out her foot as though to step on him. When mother tried it he just stayed there as calm as though he owned the whole world and that he dared us to try and step on him.

Another time when mother was watering some of her flowers in the front window, Pete flew right around her head and sat down on the pot she was watering, and took a bath. Now, this is an every-day occurrence. Since then, when mother gets her pitcher to water the plants, Pete flies around her and goes right up to the pot waiting for his bath.

My elder sister looks after him first thing every morning, and before taking him out of his bowl mixes his food which is now condensed sweetened milk, with a little water in it, and after taking the muslin cover off the bowl, she strokes him under the chin as well as his back. When Annie does this he opens his bill as wide as possible. Then he is lifted out and let fly to his perch.

This is November 4th, and while I am writing Hummer is sitting on my head governing the story. Hummer is very fond of red, orange, bright yellow and pink.

Hummer is very fond of our company, but if any strange person comes in he makes strange with them. Mother found out that Pete eats sand and will not eat aphis; but let there be little flies or gnats and he will fight until he gets them.

The days began to get very dull and horrible and we all noticed Pete failing in his liveliness. He then became dumpy and sleepy. We put on the electric lights for him, but this seemed to confuse him and the poor little chap kept falling every time he ventured to fly. There was no sunshine for three days so we began losing hope of having him any longer.

The 17th of November came and Pete wanted to be cuddled by mother, that is, he would fly to her and nestle on mother's neck for the warmth. He would not take his food unless we gave it to him. When he was put to bed we all expected to see him dead next morning.

The next day the sun was out and Hummer tried to fly, but it was in vain. Annie fixed a

pad on the coils for him to get warm, but he just fell around. When mother came down she saw no hopes at all for him. At ten minutes to ten a dark cloud passed over the sun and in my hands was Pete's lifeless body. Our little pal left us and went in to Birds' Paradise.

(The above was written by M. Jean Brown, 9 Roslyn Ave., Ottawa Canada.)

NOTES AND OBSERVATIONS

CROW TRAPPING WITH JACK MINER.—As soon as the winter starts, that is to say, as soon as the ground gets a fair covering of snow, some dead animals are cut up and placed in Jack's crow-trap and the crows begin to assemble. Last winter a tremendous discussion took place over the killing of so many crows and this year I got Jack to acquiesce in the plan to do some banding. The snow came about January 5th and the crows quickly sought the food. The snow became exceptionally deep for that district and crows were there in hundreds and almost any day two hundred might have been caught. Then came a telegram on the 19th to say that the trap was to be worked the next day and I had better come. I took the next train, but when we went out on Thursday morning we found that the bare ground which had been exposed in many places by the rain of the day before was a great counter attraction to the birds that had been eating horse meat straight for a week, and the crows were off duty in the trap and were hunting corn and what-not all over the country and all we had around the trap were about seventy-five, most of whom stayed outside. We went up into Jack's "outlookatory" (good word, patent applied for) and watched them, but they were very wary. A group of ten or a dozen would stand on the south side of the trap facing the wind and occasionally one would walk in, but the number was usually balanced by one or two that flew out. Sometimes a crow would fly right in and light on the food, but as a rule they lit outside and walked in.

The trap is seventy-three feet long and twenty feet wide when the wings are down and we were looking down it the long way and some crows that were behind the carcasses would, of course, escape our observation. After waiting for twenty or thirty minutes we decided it was no use to expect a good catch and Jack climbed down the ladder and pulled the trap while I watched for results. At the first sound made by the wire, the birds rose on the wing, but immediately the two wings of the trap came down and not a single bird escaped. A tremendous hubbub was immediately set up by the free birds which circled over the trap, but the captured ones said nothing—but tried their best to find a hole through which they could escape. When we reached the trap the birds overhead had disappeared and we entered with several potato sacks into which we put the crows, which were quite easily caught; the last one after having been chased up and down once or twice lit on the open ground and allowed Jack to pick it up. We then took the bags over to the house and sat on the veranda where we pulled one crow out at a time and banded their legs, a Biological-Survey band on one leg, a Jack-Miner band on the other, and then tossed them into the air.

They resented being handled quite emphatically and bit and clawed. They were not quite strong enough to draw blood but their feelings evidently inclined that way and they did their best—and it was sometimes quite painful to remove the claws of a foot that gripped one's hand.

After the banding was completed we went to see the trap again and there were a few under it already, but we were not near enough to tell if any of the banded birds were among them, and as it was nearly train time we could not drop the trap again. This trap is on exactly the same lines as the goose trap, only smaller. And as I have never seen the goose trap worked I was quite interested in getting all the details of handling the crows.—W. E. SAUNDERS.

A WORD FOR THE EUROPEAN GREY PARTRIDGE.—A great deal is being written and said at the present time regarding the harmful effect that the introduction of the European Grey Partridge (*Perdix perdix*) into Western Canada is having upon our native game-birds, more particularly the Sharp-tailed Grouse. Many writers and sportsmen apparently are under the impression that the native bird is being driven to the point of extinction by the aggressive and pugnacious habits of the introduced species.

While most of the charges preferred against the Partridge are made by men who are anything but ornithological experts and whose opinions we can ignore as being of little value, there yet remain the spoken and written opinions of a few men whose word is above suspicion. Even P. A. Taverner, one of the foremost of our Canadian ornithological experts, in his recently published work *Birds of Western Canada* makes the following remarks in the chapter on the European Grey Partridge (page 361)) "Even so, there is one thing to be borne in mind—that we cannot have foreign

species except at the expense of competing native ones. It is notable that wherever this (Partridge) or other introduced species have increased to any marked extent, the resident Grouse and Prairie Chicken have decreased in a similar degree."

But Mr. Taverner only speaks in general terms, giving no specific instances of the Partridge interfering with the Prairie Chicken, and I think it is very regrettable that so eminent an authority should make such a comprehensive charge against a species of game-bird which is undoubtedly a great acquisition to this or any other country, and whose only fault appears to be that it is clever and speedy enough to take good care of itself. Coming from the pen of an expert on bird matters such a charge will only increase the prejudice that many bird hunters are already fostering against the newcomer.

While it is, unfortunately, only too true that the numbers of our native Grouse—and this includes all species—have sadly dwindled during recent years, I think we must look, not to the advent of the Partridge, but to altered conditions under which bird game is now hunted in order to divine the true cause of the steady decrease.

Let us compare shooting conditions as they existed twenty-five years ago with present day conditions. In the old days if three or four shooting enthusiasts wished to enjoy a few days' hunting it was necessary to choose a point fairly close to the railway. Arriving at the selected place the nimrods had perforce to tramp around and literally hunt for game. Under such conditions the Ruffed and Sharp-tailed Grouse had a fair chance and the birds which did eventually find their way into the game-bag had to be worked for.

To-day all that is changed. A party of city "sports" jump into a high-powered car and in a very short time are well out in the country. Watch is kept on the roadside and when a bunch of Sharp-tails or a couple of Ruffed Grouse are seen the car is stopped, the sportsmen(?) get out and almost invariably a number of birds are obtained—often the whole bunch falling beneath the hail of shot from repeating shot-guns. Quite often the shooting is done from the interior of the car in spite of the act being illegal. This sort of thing goes on all through the day over scores of miles of roads and by hundreds of car-loads of gunners. Unfortunately our native game-birds have not yet learned to either hide or keep at a safe distance. A flock of Sharp-tails will invariably stand erect in full view of anyone passing by and it is rarely that the birds take to flight before a car is within easy shooting range. Not so with the European Partridge. In common with most Old World birds, it has an inbred distrust for mankind. At the slightest sound every bird in the feeding covey flattens to the ground. Even when the birds are stumbled upon, or a keen-nosed dog scents them out, the suddenness of their rising and the speed at which they get away often baffles the shooter. The Ring-necked Pheasant, another introduced species, is equally cunning and as often successful in evading the efforts of the gunner to add him to the bag.

Long before either the Partridge or Pheasant were introduced, our native game-birds were on the decrease, even in the days before cars were in general use, and hunting was done in a more sportsman-like manner. Certainly the introduced species cannot be blamed for the decrease in the numbers of native birds of Ontario, Manitoba and some of the Northern States.

Until our native birds have learned to distrust men and automobiles, I am afraid that it will be very necessary that we have years without an open season, and only by the rigid enforcement of the game laws shall we avoid adding many of our beautiful and interesting native birds to the list of extinct species that already includes the Great Auk, Passenger Pigeon and Eskimo Curlew. To the Grey Partridge all true sportsmen will raise their hats. Fast on the wing, clever at hiding, bold to the point of rashness in defence of their young brood, hardy during the extreme cold of our winter, he is, all-in-all, a most desirable addition to the game list of our Western land.

Living in a district where both Partridge and Sharp-tailed Grouse are plentiful, I have not yet seen anything in the conduct of the Partridge that can be construed in any way to be prejudicial to the welfare of the native species. Long may we have both birds in good numbers.—T. E. RANDALL.

THE LONG-BILLED MARSH WREN IN WINTER.—In the Christmas Census on page 15 of the January number of *The Canadian Field-Naturalist*, there was a very interesting reference to the Long-billed Marsh Wren from Vineland, Ont. This is, I believe, the first time this bird has been recorded from Ontario in the winter. So I wrote to Dr. Hurlburt, who took the responsibility for the report and he gave me the full particulars.

> "Mr. Dickson and I had been following a flock of Tree Sparrows into the bulrushes along the Twenty-Mile creek. We heard a chattering in a clump of willow bushes near the edge of the swamp and investigated. The Wren jumped about in the willows but let us approach within about ten feet. Mr. Dickson had his field glasses on the bird and saw the dark mantle on the upper back. I saw the mark over its eye distinctly. There is no doubt it was a Long-billed Marsh Wren. I visited the same

place after a lapse of a couple of weeks or so but did not see it again."

On quite a number of occasions in the last twenty years, during our winter visits to Point Pelee, Mr. Bert Gardner, who is a keen and accurate observer, told us that he had seen Marsh Wrens in the winter. These birds were seen out in the bulrushes and quite a long distance from shrubby cover, but we hesitated to take serious notice of them as records because Bert did not use glasses on them and in any event one doesn't like to establish a new record by sight only; then one had always to remember that the Carolina Wren lived on Point Pelee all winter and that there are winter records in Ontario of both the Winter Wren and Bewick's Wren. But now that it is established by Dr. Hurlburt and his party that the Long-bill has been positively identified in winter, the sight records of Mr. Bert Gardner may be published as supplementary.—W. E. SAUNDERS.

RECENT FINDS OF ARCTIC SPIDERS.—During the last year several explorers have brought back specimens of rare northern species of spiders which throw additional light on their distribution. In June, 1925, Mr. W. B. Hoare made a small collection near the mouth of the Coppermine River which included the minute *Microneta maritima* Em., described in the report of the Arctic Expedition of 1913-16, and several specimens of *Lycosa pictilis* Em. and *Pardosa galcialis* Thor. common species of the Arctic Coast and New England mountain tops. In July, 1926, Mr. J. D. Soper, at Cape Dorset, Baffin's Land, collected several *Lycosa asivak* Em. which was found in large numbers by the Expedition of 1913-16 along the coast from Alaska to Coronation Gulf. On the top of Mt. Washington, N.H., July 11, 1926, Mr. Nathan Banks found several specimens of both sexes of *Tmeticus alatus* Em., first found on the Arctic Coast by Mr. Frits Johansen of the Expedition of 1913-16, and described in the Report of the Expedition. In the summer of 1926, Mr. R. H. Woodworth, with a party of Harvard University students exploring the waters of Northern Labrador, found in the Torngat region *Lycosa quinaria* Em., first found by J. B. Tyrrell in the Rocky Mountains in 1886 and later in southern Labrador near the Straits of Belle Isle, in western Newfoundland, and near Bangor, Maine.—J. H. EMERTON.

OCCURRENCE OF GRASSHOPPER SPARROW AT TORONTO, ONTARIO.—The Grasshopper or Yellow-winged Sparrow is one of the birds which helps to make bird observation interesting at Toronto. Not that the species is always here to observe—often it is absent. Nor can it be called a particularly interesting bird, for of all the finches, this sombre-coloured unobtrusive little inhabitant of the fields is certainly the least likely to attract attention. Its most interesting feature is the unaccountable manner in which it may appear, become tolerably common for a season or so, then vanish for several succeeding years. My personal observations of this bird at Toronto are as follows:

One of the years this bird appeared in this vicinity happened to be the first that I paid serious attention to bird-study, consequently it became one of my earliest acquaintances. It was in those bygone school-boy days. We had followed the year through from the first of January, duly recording the few winter birds we had met. Then, in turn we learned such spring arrivals as came to our notice. The migration rose to its height, taking us with it, so that by early summer we considered ourselves well-launched in the study of Ornithology. Then came the summer lull.

One July day we visited a large open field surrounded by woods. It was very hot. In memory I still see that field simmering with heat waves. We were resting in the shade of the neighbouring trees, our enthusiasm having waned with the increasing heat. The bird notes too, had given place to the drowsy hum of insects. Presently, from some little distance out on the field, we caught the faint insect-like notes of a strange bird. Before long we saw the singer—a microscopic dot on the sweet clover stalks—buzzing out a microscopic song. Thin and wheezy as the song sounded it has, ever since, seemed to me to be like that day—sizzling hot. "Pit-tuck-zee-e-e-e" it might be written. It was well the bird enunciated his notes so clearly. Thus was the song described in our "bird book." Certainly the singer himself shows no distinguishing marks as an aid to his identification.

This was in 1902. Four years went by before, the Grasshopper Sparrow again came into our ken, and then under very unexpected circumstances. One of my ornithological friends, called one night and suggested we walk down to Scarboro' Bluff in the moonlight, stay at his cottage, and return the next day. We were given to such excursions in those days. Often a midnight tramp brought to light—if I may use such a phrase—incidents of bird-lore we would otherwise have missed. This night there happened to be a glorious full moon. Our route led through various ravines, then out along a long country road, through level farm country. The same road is now a well-paved street flanked by modern stores and travelled by T.T.C. cars. As we passed one wide field, we distinctly heard the Grasshopper Sparrow in song.

There was no mistaking the insect-like notes. Yet how strange they sounded coming from the silence of a moon-lit field! Our first experience had taught us to associate them with fields simmering in the blazing July sun. Naturally we could not see the bird, but any doubt of its presence and identity was cleared away when a day or so later I visited the very spot and collected the specimen now in my collection. Once more in 1906, the same year, and another locality, I collected a second specimen now in The Normal School collection of this city.

Again he vanished. We were constantly near his haunts, but all through the following five years I did not see, nor hear of a record of the Grasshopper Sparrow near Toronto. Then came another meeting by merest chance. It was a warm June afternoon. I had ridden out on my bicycle to the same field where we first saw and heard this bird in song. Perhaps I was thinking of the occasion, that I cannot recall now. Suddenly from the field before me came the same song as of yore and I could see the bird, as it sang at leisure, a few rods away. This is my only record for the year 1911.

Then followed a period of a few years in which I was almost entirely absent from Toronto. During this time the Grasshopper Sparrow may have come to his old haunts, but evidently did not become established, for when I resumed observations in 1920, I saw nothing of the species—nor yet in 1921. But in 1922, again in June, while crossing a large grassy area north of the city, to my delight I came upon several pairs within a few hundred yards. I was specially favoured on this occasion to hear them in song of unusual fullness. In all previous observations the song could be written, as heretofore mentioned, "Pit tuck zee-e-e-e"—a couple of halting notes preceding a long wheezy buzz, more like the rasp of some orthopterous insect than the song of a bird. It is well known that many birds elaborate their usual songs at certain times, such as evening. No doubt the Grasshopper Sparrows on this occasion were so inspired. Not only did I hear the usual song many times, but heard it continued into a series of thin lisping notes oft repeated, until the whole song was actually of ten seconds' duration and audible some fifty yards! It might be rendered "Pit tuck zee-e-e-e zeedle zee-e-e, zee-zeedle-zee-e-e-e, zee-zeedle-zee-e-e-e." A truly remarkable performance!

To see several Grasshopper Sparrows in the same locality aroused interest among observers here, so that we were all on the lookout for the bird of the season. Throughout that summer so many were reported that the species could be considered locally common. They might be expected in any large field. The same proved to be the case during the seasons of 1923-24 and '25. In 1925 the birds seemed so well established that one of our evening strolls was out into the field, near our home, to watch and listen to several singing birds, which soon learned to make use of branches I stuck up in the open field, as singing-perches. We even had the pleasure of showing the bird in song to our friend, R. Owen Merriman of Hamilton, as though by appointment. Yet, common as they were, our repeated searches failed to locate any nests although we had every reason to believe the birds to be breeding.

Such experiences would naturally lead one to believe that the Grasshopper had become a regular summer resident in the vicinity of Toronto. The level farm country which always provides grassy meadows is in every way suited to its tastes. Referring to other observers, I find such notes regarding its occurrence here as: "A regular, but not common summer visitor to south-western Ontario, which has on two occasions been taken as far east as Toronto." Nash—in check list of Birds of Ontario. Both J. H. Fleming and W. E. Saunders make references to the above specimens giving the dates as 1879 and 1890. It would seem that I myself had collected the third and fourth at Toronto. Common in Ohio, as I found during the summer of 1912, "regular but not common in south-western Ontario", irregular and spasmodic at Toronto, all these seem to indicate a petering out of its occurrence as we trace it east. In other words, at Toronto we are on the very fringes of the range of the species. Such seasons as it became common were the "spilling-over" or "boom" years. These were, as above described, 1922-23-24-25.

Gratified though we all were to find the bird become tolerably common during these years in spite of our eager search the year 1926 has gone down in ornithological annals as "the year the Grasshopper Sparrow disappeared again." It remains to be seen what future seasons shall bring us regarding this irregular visitor.—STUART L. THOMPSON.

POINT PELEE SHOULD HAVE A BIRD BANDING STATION.—Bird banders in Canada should not lose sight of the remarkable opportunity for their work that is afforded by Point Pelee National Park. Point Pelee, spring and fall, is a highway of bird migration and when a bird banding station is established there and operated on a fairly extensive scale some very valuable data will be obtained. Here is a chance for another H. S. Osler, or for a Canadian Prentiss Baldwin. I am sure that the co-operation of the Canadian National Parks service could be expected because it

is in this Branch of the Interior Department that all Canadian banding records are kept.—HOYES LLOYD.

RECENT INTRODUCTION OF EUROPEAN GRAY PARTRIDGE IN NEW BRUNSWICK.—In March, 1926, Mr. J. M. Robinson, of Rothesay, New Brunswick, released fourteen European Gray Partridges, *Perdix perdix*, near his premises. The snow was very deep at the time and low temperatures prevailed, and for some time afterwards the birds returned to his outbuildings daily for food. They were exceedingly shy and refused to come close when the caretaker was present. It was not Mr. Robinson's original intention to give these birds their liberty until favourable conditions prevailed in April, but they very soon discovered a small opening in the wire enclosure and made for the nearest thicket.

In an interview with Mr. Robinson in St. John on January 25th, 1927, I was informed that individuals of his flock were seen from time to time during the breeding season and at least two broods of young had been observed. He further stated that he had not been able to find any trace of them since about the middle of October and was apprehensive lest they had fallen victims to their natural enemies which appear to be present in greater numbers than usual. These birds are commonly known as "Hungarian Partridges" and it is Mr. Robinson's intention to liberate additional pairs in the same region, during the spring of 1927.—R. W. TUFTS.

THE PRAIRIE CHICKEN IN WESTERN ONTARIO. —In November, 1925, I had a conversation with Mr. John Crawford, Ailsa Craig, who spent his early life near Mitchells' Bay on Lake St. Clair and about 1855 was very well acquainted with the Prairie Chicken, which he often saw lined up on the fence, a dozen in a row. He was very familiar with their call which he imitated for me. On the 16th of February following, I was told by Mrs. Garnier, widow of the late Dr. John Garnier, whom I met at Lucknow where she is still living, that the doctor used to bring home Quail and Prairie Chicken from Mitchells' Bay to eat, and she liked the Chicken best of all the game birds that the doctor hunted—a clear indication that Prairie Chicken was no unusual event. The Doctor's house boat was located just at the mouth of the Snye Ecarté which is the *eastern-most* channel of the St. Clair river where it empties into Lake St. Clair, and his land hunting was doubtless done on the mainland and the edges of the marsh because the nearby ground on the west was St. Ann's Island which was private property and hunters were excluded.

I once heard the booming call of the Prairie Chicken *Tympanuchus americanus* over toward the main land while paddling a canoe in the Snye in the early eighties.—W. E. SAUNDERS.

THE KING EIDER AT LITTLE LAKE, BARRIE, ONTARIO.—On November 1, 1926, H. B. Haugh collected a female King Eider (*Somateria spectabilis*) at Little Lake, the specimen being sent to the Museum in the flesh. This locality is sufficiently inland to be of interest and suggests that some individuals of this species move south through the interior.—L. L. SNYDER, *Royal Ontario Museum of Zoology, Toronto.*

RECENT INTRODUCTION OF EUROPEAN GRAY PARTRIDGE IN NOVA SCOTIA.—There has been a recent attempt to acclimatize the European Gray Partridge, *Perdix perdix*, in the Province of Nova Scotia and whether this acclimatization experiment ultimately succeeds or not it seems desirable to place the facts of the experiment on record.

These birds, which are commonly known in this country as "Hungarian Partridges" were imported from Czecho-Slovakia by Colonel R. B. Willis of Halifax. From reports furnished the writer by Col. Willis it is noted that in all he liberated one hundred and forty individual partridges, one hundred of which were released between the 7th and the 20th of April, 1926, in the vicinity of Elderbank, Halifax County, and the remainder on the 24th April were liberated at Nappan Experimental Station, which is in Cumberland County.

Several flocks of young were reported from time to time during the summer months by interested persons living in the districts where the birds were released.

It will be interesting to learn whether these birds succeed in passing their first Canadian winter or not.—R. W. TUFTS.

A CHICKADEE'S MEMORY.—An interesting incident occurring last summer proved that even such a small bird as friend Chickadee may have an almost human memory.

For many years these birds have been regularly fed almost every winter at my home on the edge of a small wood. During the hard winter of 1924-25, these birds were unusually numerous and very eager for food. In some way they developed a liking for pumpkin seeds which were preferred to all other kinds of food, not even suet excepted.

None of the birds seemed to fear us, but on account of the bitter weather, it was not possible to become very intimate with them till the latter part of March, when four or five were taught to take food from our hands. One little bird had a habit of dropping directly into my hand from the tree; others would approach by degrees after several feints, brave the danger and snatch something.

Spring coming suddenly at the beginning of April, sent our little pensioners off to the woods to attend to family affairs. During the summer they frequented the adjacent woods, answering or coming up close when called to, and returning as usual in the autumn to the feeding places on the lawn and among the trees. Until Christmas-time they were regularly fed, but since I was not at home to experiment, no attempt was made to coax them to come to hands for food.

From Christmas till the end of April the house was closed; the Chickadees left for other feeding grounds—not returning for food till July of this last summer when two old and two young ones began to come regularly for crumbs which were always spread on their feeding table. The old ones did not appear unusually tame, though they would stay quite near when food was being scattered.

On the 20th of August, going out with a few slippery pumpkin seeds taken fresh and wet from a pumpkin, I held my hand over the feeding table. Without an instant's hesitation the mother Chickie dropped into my hand and perching on my thumb tried to capture a seed. Four seeds slipped from her little bill before she succeeded in carrying away one. After this she came promptly on every occasion when I offered her any seeds of pumpkin or sun-flower. The young ones and the other old one overcoming their shyness began, about two days later, to feed from my hand, though they did not learn to come with the perfect confidence displayed by the mother.

Up to the 20th of August last summer was a year and five months since I had offered a Chickadee food in my hand. I have then, either to conclude that the Chickadee remembered me or that she was willing to risk her life for a pumpkin seed. I prefer to believe that she remembered.—MINA P. COLE, Camrose, Alta.

THE HORNED LARKS.—This group of birds puzzles everybody. Seldom can one separate the varieties, by colour only, in the field, though there are occasions when one may see the impressive size of the large varieties, coupled with the clay-coloured suffusion behind the head which marks Hoyts, or the intense yellow suffusion characteristic of the original species, Alpestris, but, as a rule, even with specimens in hand, one is driven to the manuals and the museums, and even after all that, or when the specimens have been determined by an expert, there will remain some so baffling, that one could not explain why they should be assigned to one variety in preference to another.

This preamble may stand as a sort of an excuse for the long delay in recording a new bird for Point Pelee in the person of a female Hoyts Lark, collected by the late J. S. Wallace on December 21, 1912, and which has just been determined by Dr. H. C. Oberholser, who is the court of last resort on the genus Otocoris.

The first Hoyts Larks for the Western Ontario peninsula were taken in December 9, 1899, by Mr. J. E. Keays, about four miles west of London. Mr. Keays got the only pair he saw that day, and since then many a hunt has been made in December for Northern Larks, but, though these birds go through Ontario both spring and fall (and there can be no shadow of doubt about this fact) they are always spasmodic and rare. Having succeeded in getting Hoyts, which breeds on the west side of Hudson Bay, the next effort was to get the large eastern form "Alpestris" and on writing to my friend, the late John Burk of Blenheim, he went to the lake shore and sent us some larks which were true Alpestris. One of these, number 1362, is at the Victoria Museum, Ottawa, and I have 1361 and 1633, all of them taken in January 12, 1900, a month later than the Hoyts Larks by Mr. Keays at London. All these are males, rather easier to distinguish than the females.

There the local records of these large larks rested, though October, 1925, I obtained specimens of both varieties at Rossport and Crater, north and east of Lake Superior; but on November 11, 1926, that indefatigable collector, Mr. A. A. Wood, Coldstream, went out in a violent snowstorm and was abundantly rewarded by taking his first large larks on November 23. Mr. Roger T. Hedley, Ilderton, Ontario, got four larks in one shot, two of which are Hoyts and two are Alpestris, both of which latter not only have the yellow line above the eye, a yellow throat and suffusion of the same colour farther down on the sides of the neck, but they actually show a yellow tinge below the black crescent on the head.

Both of these locations are in Middlesex county within twenty miles of London, and these dates prove conclusively that the time to find the largest larks is in the last six or eight weeks of the year, and probably the best place is along the edges of the great lakes.

It remains to mention the experiences of my

brother, Dr. F. A. Saunders, who collected on the Experimental Farm in 1890 and 1891 when, on September 27, he took a pair, male and female, of Alpestris and thereafter found them daily, and collected more than a dozen, until the 15th of November; in the following spring they were again present in flocks and he took a male and female on May 16.

Circumstances prevented him from repeating these records in later years, and the Ottawa men declare the birds do not now visit the region.

It will be noted that while everyone has failed to find Alpestris in the south-western end of Ontario, except during the winter months, they reached Ottawa as early as September 27th in 1890, and were at Lake Superior on October 4th, 1925 .All the Northern Country produces large larks every year, and all these larks migrate south in the Autumn, returning north in the Spring, and while they, like the Olive-sided Flycatcher, doubtless pass over most of the territory without stopping, yet it is likely that there are favoured locations where they spend some little time. If the thirty birds which I saw on October 4 at Lake Superior were due to appear in Middlesex in December, they must have put in the intervening time somewhere. On October 22, 1924, I saw fifteen larks at the south-east corner of Lake Huron in a location specially suited to their needs and perhaps they were large northern varieties Some day we shall know where these birds spend November in Ontario.— W. E. SAUNDERS.

WHISTLING SWANS AT HAMILTON, ONTARIO.—On March 11, 1927, the writer, with Mrs. J. G. Farmer, Miss Ida Merriman and William Paterson, had the good fortune to see a flock of about thirty Whistling Swans (*Olor columbianus*) on Hamilton Harbour. When first seen, eighteen were counted, standing on the edge of the ice about a quarter of a mile away from the observers, across open water. These rose and flew about in slow spirals, and were joined by another group of about the same number, one or two birds calling while in flight. The whole flock resettled on the ice at a greater distance from the observers, who watched them walk about on the ice, and finally fly out of sight, in an irregular line which did not rise far above the ice. Whistling Swans are now reported here once or twice each spring, usually towards the end of March; but this was the first time any of this party had been fortunate enough to see them here.—R. OWEN MERRIMAN.

GREATER REDPOLL (*Acanthis linaria rostrata*) AT STRATHROY, ONTARIO.—During the erratic visits of redpolls to this locality, much time has been spent with them in the hope of finding species other than *linaria*, yet in my field trips on various dates and in different localities all specimens secured and studied were the common one. The patience of ornithologists, however, is usually rewarded eventually. Throughout the winter of 1295-26 many fruitless early morning excursions were made with winter visitors in mind; on March 5, 1926, a flock of about forty redpolls was found feeding in an alfalfa field two miles east of the Town of Strathroy, Ontario. Some of the birds appeared larger than others so a few were collected, proving to be the Greater Redpoll (*Acanthis linaria rostrata*). Another one of this species was taken March 16 near the same locality; it was in common with two Common Redpolls (*A. l. linaria*), feeding on Lamb's-quarters' (*Chenopodium album*) seeds.

The five specimens of *rostrata* secured were males, none having the rosy suffusion of the breast. The general colouration was very similar to *linaria*, but the upper breast, sides of neck and flanks were washed with light brown. These birds were at once separated from the Common Redpoll by their much larger size; the measurements ran:

Catalogue No.	Expanse	Lgth.	Wing	Tail	Tarsus
2456.....	242	152	79	65	18
2457.....	242	149	81	63	19
2458.....	238	149	77	61	19
2459.....	235	147	76	59	19
2483.	242	150	81	66	18

These skins, through the kindness of W. E. Saunders, London, were sent to Washington D.C., and determined by H. C. Oberholser.—A. A. WOOD.

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CONTENTS

	PAGE
Golden-crowned Kinglet—American Redstart. By W. J. Brown	93
Official Canadian Record of Bird Banding Returns	94
Publications Received	98
Details of the Release of the Hungarian Partridge (*Perdix perdix*) in Central Alberta. By William Rowan	98
Luxury-Symbiosis. By Henry Mousley	101
Observations on the Double-crested Cormorant (*Phalacrocorax auritus*) on Lake Manitoba. By J. H. Munro	102
Concerning August Bird Life in the Okanagan Valley, British Columbia, 1926. By J. A. Munro	108
Notes and Observations:—	
Two Locked Mule Deer Separated. By A. G. Smith	111
Identification of Flies Found Infesting Bluebirds. By Hoyes Lloyd	111
Viper Swallowing Young. By J. Smith	111
Introduction of Hungarian Partridge in Nova Scotia. By R. B. Willis	112
Canadian School of Prehistory in France. By H. M. Ami	112
The Fluctuation in the Abundance of Rabbits. By J. B. Harkin	113
General Directions for Sending Pathological Specimens to Biological Laboratories	113
A Correction	114
Correction of Anna E. MacLoghlin's "Song of the Peewee" which Appeared in the October Issue	114
Note on Value of Bird Banding Returns. By Harrison Lewis	114
Book Review—Our Mobile Earth. By F. J. Alcock	115
Subscribers to the Canadian Field-Naturalist	116

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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GOLDEN-CROWNED KINGLET—AMERICAN REDSTART

By W. J. BROWN

SURVEYING, at dusk ,a lonely and remote part of a bog, I determined to investigate the incessant whisperings of a family of Golden-crowned Kinglets on the top branches of a luxuriant spruce. I paused long enough to gather that the old birds had not only nested, but had cast their offspring loose and were keeping in touch with them perchance they might wander too far afield from the homesite. The nest was now a flat and mis-shapen mass of moss and feathers and was hanging eight feet from the ground, near the end of a bough of the evergreen. I thought that this brood of at least eight young Kinglets when perched and waiting for food on that very limited sphere of action, would have made an imposing effect. As the dusk deepened there were intervals of silence and eventually not a sound came from the tree tops. The knowledge was gradually stealing over me that miles of rough country lay ahead before reaching the farm and that I had to leave the Gulf of St. Lawrence that night for home. Passing hurriedly through mixed growth, I discovered an American Redstart sitting on a nest containing four incubated eggs. While in the same neighbourhood next season curiosity led me to the old nest and I noted that the young had been successfully launched and that the Redstarts were well established on a new venture—a beautiful nest, six feet up in a sapling, with three fresh eggs—and only ten feet away from the nest tree of the previous year. Knowing that the female would not start to incubate until a fourth egg had been laid, I took a photograph of the nest and then departed for a distant swamp. The Redstart is rare enough in these coniferous woods and bogs to make them more interesting than they are near my home.

Nest of American Redstart

*OFFICIAL CANADIAN RECORD OF BIRD-BANIDNG RETURNS**

Published by Authority of the Canadian National Parks Branch, Department of the Interior, Canada

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 1912

GREAT BLACK-BACKED GULL, No. A.B.B.A. 5828, juvenile, banded by H. H. Cleaves, at Lake George, Nova Scotia, on July 26, 1912, was caught at Grosses Coques, Nova Scotia, on October 30, 1915.

RETURNS UPON BIRDS BANDED IN 1913

GREAT BLACK-BACKED GULL, No. A.B. B.A. 13,672, juvenile, banded by Harrison F. Lewis, at Lake George, Nova Scotia, on July 15, 1913, was found dead at a place near Kennebunkport, Maine, about June 20, 1914.

HOUSE SPARROW, No. A.B.B.A. 6196, adult, banded by E. C. Allen, at Yarmouth, Nova Scotia, on June 15, 1913, was caught at Digby, Nova Scotia, on December 7, 1913.

ROBIN, No. A.B.B.A. 214, juvenile, banded by E. C. Allen, at Yarmouth, Nova Scotia, on June 24, 1913, was found wounded at Keswick, Virginia, on February 20, 1917.

RETURNS UPON BIRDS BANDED IN 1914

GREAT BLACK-BACKED GULL, No. A.B. B.A. 25,561, juvenile, banded by Harrison F. Lewis, at Lake George, Nova Scotia, on July 6, 1914, was shot at Deep Cove Island, Nova Scotia, on January 5, 1915.

GREAT BLACK-BACKED GULL, No. A.B. B.A. 25,565, juvenile, banded by Harrison F. Lewis, at Lake George, Nova Scotia, on July 6, 1914, was shot at Cape Negro, Nova Scotia, on December 1, 1914.

GREAT BLACK-BACKED GULL, No. A.B. B.A. 25,566, juvenile, banded by Harrison F Lewis, at Lake George, Nova Scotia, on July 6, 1914, was shot at Shag Harbour, Nova Scotia, on September 18, 1914.

GREAT BLACK-BACKED GULL, No. A.B. B.A. 25,575, juvenile, banded by Harrison F. Lewis, at Lake George, Nova Scotia, on July 6, 1914, was shot at Baccaro, Nova Scotia, about September 15, 1914.

GREAT BLACK-BACKED GULL, No. A.B. B.A. 25,577, juvenile, banded by Harrison F. Lewis, at Lake George, Nova Scotia, on July 6, 1914, was picked up at Port Maitland, Nova Scotia, on September 3, 1914.

GREAT BLACK-BACKED GULL, No. A.B. B.A. 25,585, juvenile, banded by Harrison F Lewis, at Lake George, Nova Scotia, on July 6, 1914, was killed at Seal Island, Nova Scotia, on October 12, 1914.

GREAT BLACK-BACKED GULL, No. A.B. B.A. 25,586, juvenile, banded by Harrison F. Lewis, at Lake George, Nova Scotia, on July 6, 1914, was caught on a hook at Neil's Harbor, Nova Scotia, on January 1, 1916.

GREAT BLACK-BACKED GULL, No. A.B. B.A. 25,589, juvenile, banded by Harrison F. Lewis, at Lake George, Nova Scotia, on July 6, 1914, was caught by a wing in the ice, at Wellfleet, Massachusetts, on February 1, 1916.

GREAT BLACK-BACKED GULL, No. A.B. B.A. 25,602, juvenile, banded by Harrison F. Lewis, at Lake George, Nova Scotia, on July 6, 1914, was shot at Sambro, Nova Scotia, on September 25, 1914.

GREAT BLACK-BACKED GULL, No. A.B. B.A. 25,617, juvenile, banded by Harrison F. Lewis, at Lake George, Nova Scotia, on July 6, 1914, was found dead at Seal Island, New Brunswick, on November 15, 1914.

OSPREY, No. A.B.B.A. 26,571, juvenile, banded by H. H. Cleaves, at Gardiner's Island, New York, on June 18, 1914, was killed in St. Hugues Parish, Quebec, on August 18, 1914.

ROBIN, No. A.B.B.A. 19,421, juvenile, banded by B. L. Hopkins, at Barrington, Nova Scotia, on May 28, 1914, was caught by a cat at Atwood's Brook, Nova Scotia, on June 1, 1915.

ROBIN, No. A.B.B.A. 20,743, juvenile, banded by Francis Harper, at Chipewyan, Alberta, on June 23, 1914, was shot at a place near Greenwood, Louisiana, on January 24, 1916.

RETURNS UPON BIRDS BANDED IN 1915

BLACK-CROWNED NIGHT HERON, No. A.B.B.A. 25,141, juvenile, banded by J. C. Phillips, at Wenham, Massachusetts, on June 3, 1915, was found dying at a place near Mansonville, Quebec, about October 15, 1915.

FLICKER, No. A.B.B.A. 19,536, female, banded by E. C. Allen, at Yarmouth, Nova Scotia, on May 29, 1915, was shot at Aulander, North Carolina, about January 29, 1917.

BRONZED GRACKLE, No. A.B.B.A. 34,597, juvenile, banded by W. A. Henry, at Zenith, Alberta, on June 20, 1915, was shot at a place near Osceola, Missouri, on November 8, 1915.

CHICKADEE, No. A.B.B.A. 28,699, juvenile, banded by J. N. Gowanlock, at Winnipeg, Manitoba, on June 3, 1915, was caught in the same city, on October 10, 1915.

ROBIN, No. A.B.B.A. 218, juvenile, banded by E. C. Allen, at Yarmouth, Nova Scotia, on May 30, 1915, was found dead in the same locality on July 5, 1915.

RETURNS UPON BIRDS BANDED IN 1916

LESSER SCAUP DUCK, No. A.B.B.A. 35,823, male, banded by E. A. McIlhenny, at Avery Island, Louisiana, on February 4, 1916, was shot at a place near Fort Smith, Northwest Territories, on May 26, 1919.

RETURNS UPON BIRDS BANDED IN 1917

MALLARD, No. A.B.B.A. 25,912, adult, banded by J. C. Phillips, at Wenham, Massachusetts, on May 25, 1917, was shot at Lake Scugog, Ontario, on October 29, 1917.

MALLARD, No. A.B.B.A. 25,915, adult, banded by J. C. Phillips, at Wenham, Massachusetts, on May 25, 1917, was shot at Richdale, Alberta, on October 13, 1919.

PINTAIL, No. A.B.B.A. 36,156, adult, banded by E. A. McIlhenny, at Avery Island, Louisiana, on February 12, 1917, was shot at Moose Lake, Manitoba, on May 21, 1918.

PINTAIL, No. A.B.B.A. 36,226, female, banded by E. A. McIlhenny, at Avery Island, Louisiana, on February 12, 1917, was shot at a place near Albany, Ontario, during the month of October, 1918.

PINTAIL, No. A.B.B.A. 36,229, female, banded by E. A. McIlhenny, at Avery Island, Louisiana, on February 12, 1917, was shot at Hay Lakes, Alberta, about October 15, 1918.*

PINTAIL, No. A.B.B.A. 36,269, female, banded by E. A. McIlhenny, at Avery Island, Lousiana, on February 12, 1917, was shot at a place four and one-half miles north-east of Humboldt, Saskatchewan, on September 15, 1919.*

SCAUP DUCK, No. A.B.B.A. 36,831, female, banded by A. A. Allen, at South Danby, New York, on April 17, 1917, was shot at a place near Kingston, Ontario, on November 17, 1917.

RETURNS UPON BIRDS BANDED IN 1918

MALLARD, No. A.B.B.A. 36,837, female, banded by A. A. Allen, at Ithaca, New York, on March 18, 1918, was shot at Quill lake, Saskatchewan, on September 6, 1920.*

MALLARD, No. A.B.B.A. 36,855, male, banded by A. A. Allen, at Ithaca, New York, on March 18, 1918, was shot at Last Mountain Lake, Saskatchewan, on October 25, 1918.

MALLARD, No. A.B.B.A. 36,858, female, banded by A. A. Allen, at Ithaca, New York, on March 18, 1918, was killed at Ferguson Flats, Alberta, on September 25, 1920.*

MALLARD, No. A.B.B.A. 36,910, adult, banded by H. S. Osler, at Lake Scugog, Ontario, on September 8, 1918, was shot at McClellanville, South Carolina, on January 1, 1919.

BLACK DUCK, No. A.B.B.A. 36,903, immature, banded by H. S Osler, at Lake Scugog, Ontario, on August 31, 1918, was caught in a muskrat trap at Curve Lake, Ontario, on March 31, 1921.*

BLACK DUCK, No. A.B.B.A. 36,986, adult, banded by H. S. Osler, at Lake Scugog, Ontario, on September 10, 1918, was shot at Townsend, Virginia, on December 22, 1920.*

BLACK DUCK, No. A.B.B.A. 36,911, adult, banded by H. S. Osler, at Lake Scugog, Ontario, on September 30, 1918, was shot at a place near the mouth of the Ohio River, Kentucky, on November 14, 1918.

BLACK DUCK, No. A.B.B.A. 36,920, banded by H. S. Osler, at Lake Scugog, Ontario, on October 15, 1918, was caught in a beaver snare at Ellis Bay, Quebec, on April 26, 1920.*

BLACK DUCK, No. A.B.B.A. 36, 922, adult, banded by H. S. Osler, at Lake Scugog, Ontario, on October 15, 1918, was probably shot at Anticosti Island, Quebec, during the spring (?) of 1920.

BLACK DUCK, No. A.B.B.A. 36,925, adult, banded by H. S. Osler, at Lake Scugog, Ontario, on October 16, 1918, was shot at Creswell, North Carolina, during the month of January, 1920.

BLACK DUCK, No. A.B.B.A. 36,932, adult, banded by H. S. Osler, at Lake Scugog, Ontario, on October 25, 1918, was caught in a muskrat trap at a place near Marine City, Michigan, on December 15, 1918.

BLACK DUCK, No. A.B.B.A. 36,936, adult, banded by H. S. Osler, at Lake Scugog, Ontario, on October 25, 1918, was shot at a place near Cincinnati, Ohio, on December 12, 1918.

BLACK DUCK, No. A.B.B.A. 36,939, adult, banded by H. S. Osler, at Lake Scugog, Ontario, on November 1, 1918, was shot at Glencoe, Louisiana, on November 27, 1918.

PINTAIL, No. A.B.B.A. 35,786, female, banded by A. A. Allen, at Ithaca, New York, on March 18, 1918, was shot near the Hudson's Bay Post, Eastmain River, Quebec, some time during the year in which it was banded.

PINTAIL, No. A.B.B.A. 35,787, adult, banded by A. A. Allen, at Ithaca, New York, on March 18, 1918, was shot at a place near Albany, Ontario, during the month of October, 1918.

PINTAIL, No. A.B.B.A. 35,793, female, trapped by E. A. McIlhenny, at Avery Island, Louisiana, during the month of February, 1918, shipped to Ithaca, New York, and banded by A. A. Allen, on March 18, 1918, was shot at Camrose, Alberta, on September 22, 1920.*

PINTAIL, No. A.B.B.A. 36,164, female, banded by E. A. McIlhenny, at Avery Island, Louisiana, on April 9, 1918, was shot at a place near Hodgeville, Saskatchewan, on October 31, 1918.

RETURNS UPON BIRDS BANDED IN 1919

BLACK DUCK, No. A.B.B.A. 36,963, adult, banded by H. S. Osler, at Lake Scugog, Ontario, on September 5, 1919, was shot at Beaufort, South Carolina, on January 2, 1920.

BLACK DUCK, No. A.B.B.A. 36,968, adult, banded by H. S. Osler, at Lake Scugog, Ontario, on September 8, 1919, was shot at Ryan, Oklahoma, on March 13, 1920.

BLACK DUCK, No. A.B.B.A. 36,974, adult, banded by H. S. Osler, at Lake Scugog, Ontario, on September 9, 1919, was shot at Peterborough, Ontario, on September 15, 1920.*

BLACK DUCK, No. A.B.B.A. 36,975, adult, banded by H. S. Osler, at Lake Scugog, Ontario, on September 9, 1919, was shot at a place near Portsmouth, Ohio, on November 11, 1919.

BLACK DUCK, No. A.B.B.A. 36,976, adult, banded by H. S. Osler, at Lake Scugog, Ontario, on September 9, 1919, was shot at Caesarea, Ontario, about October 1, 1919.

*U.S. Department of Agriculture Bulletin, No. 1268, October 16, 1924.

*U.S. Department of Agriculture Bulletin, No. 1268, October 16, 1924.

BLACK DUCK, No. A.B.B.A. 36,979, adult, banded by H. S. Osler, at Lake Scugog, Ontario, on September 10, 1919, was shot at a place twenty miles north of Toledo, Ohio, on November 5, 1919.

BLACK DUCK, No. A.B.B.A. 36,994, adult, banded by H. S. Osler, at Lake Scugog, Ontario, on September 12, 1919, was shot at a place near Bath, Illinois, on December 12, 1919.

BLACK DUCK, No. A.B.B.A. 36,995, adult, banded by H. S. Osler, at Lake Scugog, Ontario, on September 12, 1919, was shot at a place near Port Rowan, Ontario, on October 16, 1919.

RETURNS UPON BIRDS BANDED IN 1920

RING-BILLED GULL, No. 5553, juvenile, banded by Francis Harper and J. A. Loring, at a place six miles north-west of Chipewyan, Lake Athabaska, Alberta, on June 28, 1920, was killed at Grouard, Lesser Slave Lake, Alberta, on October 2, 1920.*

MALLARD, No. 4616, banded by H. S. Osler, at Lake Scugog, Ontario, on September 27, 1920, was killed in Quitman County, Mississippi, on December 4, 1920.*

MALLARD, No. 4640, male, banded by H. S. Osler, at Lake Scugog, Ontario, on September 30, 1920, was killed at Wrightville Beach, North Carolina, on November 27, 1920.*

MALLARD, No. 4697, banded by H. S. Osler, at Lake Scugog, Ontario, on October 23, 1920, was shot at Caesarea, Lake Scugog, Ontario, on November 7, 1920.*

MALLARD, No. 4698, banded by H. S. Osler, at Lake Scugog, Ontario, on October 23, 1920, was killed at Caesarea, Lake Scugog, Ontario, on November 18, 1920.*

MALLARD, No. 5101, banded by H. S. Osler, at Lake Scugog, Ontario, on November 6, 1920, was killed at Long Point Bay, Lake Erie, Ontario, on December 6, 1920.*

MALLARD, No. 5103, banded by H. S. Osler, at Lake Scugog, Ontario, on November 6, 1920, was killed at St. Andrews, Florida, on January 15, 1921.*

MALLARD, No. 5104, banded by H. S. Osler, at Lake Scugog, Ontario, on November 6, 1920, was killed at Port Rowan, Long Point Bay, Ontario, on November 15, 1920.*

BLACK DUCK, No. 4503, banded by H. S. Osler, at Lake Scugog, Ontario, on September 3, 1920, was killed at a place near Saxis, Virginia, on January 2, 1922.*

BLACK DUCK, No. 4505, banded by H. S. Osler, at Lake Scugog, Ontario, on September 3. 1920, was killed at a place two miles south of Hudson, South Dakota, on October 21, 1921.*

BLACK DUCK, No. 4506, banded by H. S. Osler, at Lake Scugog, Ontario, on September 3, 1920, was killed in the same locality, on the day it was banded.*

BLACK DUCK, No. 4508, banded by H. S. Osler, at Lake Scugog, Ontario, on September 4, 1920, was killed at Peterboro, Ontario, on November 8, 1921.*

BLACK DUCK, No. 4518, banded by H. S. Osler, at Lake Scugog, Ontraio, on September 9, 1920, was killed at Port Clinton, Ohio, on November 16, 1920.*

BLACK DUCK, No. 4519, banded by H. S. Osler, at Lake Scugog, Ontario, on September 9, 1920, was killed at Normandale, Ontario, on November 16, 1920.*

BLACK DUCK, No. 4524, banded by H. S. Osler, at Lake Scugog, Ontario, on September 14, 1920, was killed at Gueydon, Louisiana, on December 7, 1920.*

BLACK DUCK, No. 4525, banded by H. S. Osler, at Lake Scugog, Ontario, on September 14, 1920, was shot at Hay Bay, Ontario, on November 2, 1920.*

BLACK DUCK, No. 4526, banded by H. S. Osler, at Lake Scugog, Ontario, on September 14, 1920, was killed at Sandbanks, Ontario (?), about October 25, 1921.*

BLACK DUCK, No. 4542, banded by H. S. Osler, at Lake Scugog, Ontario, on September 15, 1920, was caught in a muskrat trap at Lake Temiscaming, Quebec, on April 20, 1922.*

BLACK DUCK, No. 4543, banded by H. S. Osler, at Lake Scugog, Ontario, on September 15, 1920, was killed at Jamestown, Virginia, on January 1, 1921.*

BLACK DUCK, No. 4549, banded by H. S. Osler, at Lake Scugog, Ontario, on September 15, 1920, was killed at Owensboro, Kentucky, on December 28, 1920.*

BLACK DUCK, No. 4564, banded by H. S. Osler, at Lake Scugog, Ontario, on September 17, 1920, was killed in the same locality, during the fall of 1921.*

BLACK DUCK, No. 4568, banded by H. S. Osler, at Lake Scugog, Ontario, on September 17, 1920, was killed at Bull's Island, South Carolina, on January 29, 1921.*

BLACK DUCK, No. 4570, banded by H. S. Osler, at Lake Scugog, Ontario, on September 17, 1920, was killed at Georgetown, South Carolina, on January 13, 1921.*

BLACK DUCK, No. 4664, banded by H. S. Osler, at Lake Scugog, Ontario, on September 18, 1920, was killed at Rock Hall, Maryland, on November 7, 1921.*

BLACK DUCK, No. 4668, banded by H. S. Osler, at Lake Scugog, Ontario, on September 18, 1920, was killed at Lake St. Clair Flats, Ontario, on November 12, 1920.*

BLACK DUCK, No. 4670, banded by H. S. Osler, at Lake Scugog, Ontario, on September 18, 1920, was shot at Rice Lake, Ontario, on November 15, 1920.*

BLACK DUCK, No. 4674, banded by H. S. Osler, at Lake Scugog, Ontario, on September 18, 1920, was killed at a place fifteen miles north of Peterborough, Ontario, on October 30, 1920.*

BLACK DUCK, No. 4573, banded by H. S. Osler, at Lake Scugog, Ontario, on September 19, 1920, was killed at Long Point, Lake Erie, Ontario, on November 9, 1921.*

BLACK DUCK, No. 4581, banded by H. S. Osler, at Lake Scugog, Ontario, on September 24, 1920, was killed at Melton, Indiana, on November 19, 1920.*

BLACK DUCK, No. 4587, banded by H. S. Osler, at Lake Scugog, Ontario, on September 24,

*U.S. Department of Agriculture Bulletin, No. 1268, October 16, 1924.

*U.S. Department of Agriculture Bulletin, No. 1268, October 16, 1924.

1920, was killed at Orillia, Ontario, on October 1, 1921.*

BLACK DUCK, No. 4592, banded by H. S. Osler, at Lake Scugog, Ontario, on September 25, 1920, was killed at the mouth of the Econfina River, Florida, on November 29, 1920.*

BLACK DUCK, No. 4596, banded by H. S. Osler, at Lake Scugog, Ontario, on September 25, 1920, was killed at Oakley, South Carolina, on December 17, 1921.*

BLACK DUCK, No. 4597, banded by H. S. Osler, at Lake Scugog, Ontario, on September 25, 1920, was killed at Palestine, Texas, on November 26, 1920.*

BLACK DUCK, No. 4598, banded by H. S. Osler, at Lake Scugog, Ontario, on September 25, 1920, was killed at Meltonsville, Alabama, on February 5, 1921.*

BLACK DUCK, No. 4602, banded by H. S. Osler, at Lake Scugog, Ontario, on September 25, 1920, was killed at Cape Fear River, North Carolina, on October 18, 1920.*

BLACK DUCK, No. 4610, banded by H. S. Osler, at Lake Scugog, Ontario, on September 26, 1920, was shot at Caesarea, Lake Scugog, Ontario, on November 4, 1920.*

BLACK DUCK, No. 4611, banded by H. S. Osler, at Lake Scugog, Ontario, on September 26, 1920, was killed at Summerville, Tennessee, on November 23, 1920.*

BLACK DUCK, No. 4612, banded by H. S. Osler, at Lake Scugog, Ontario, on September 26, 1920, was killed at Henderson, Kentucky, on November 19, 1920.*

BLACK DUCK, No. 4629, banded by H. S. Osler, at Lake Scugog, Ontario, on September 27, 1920, was killed at Tybee Island, South Carolina, on November 16, 1921.*

BLACK DUCK, No. 4630, banded by H. S. Osler, at Lake Scugog, Ontario, on September 27, 1920, was killed at Walpole Island, at the mouth of the St. Clair River, Ontario, on November 20, 1920.*

BLACK DUCK, No. 4637, banded by H. S. Osler, at Lake Scugog, Ontario, on September 29, 1920, was found dead at Barnwell, South Carolina, about February 21, 1921.*

BLACK DUCK, No. 4645, banded by H. S. Osler, at Lake Scugog, Ontario, on September 30, 1920, was killed at Albany, Ontario, during the month of May, 1921.*

BLACK DUCK, No. 4646, banded by H. S. Osler, at Lake Scugog, Ontario, on September 30, 1920, was killed at Rock Hall, Maryland, on November 28, 1921.*

BLACK DUCK, No. 4650, banded by H. S. Osler, at Lake Scugog, Ontario, on October 1, 1920, was killed at Havre de Grace, Maryland, on November 11, 1921.*

BLACK DUCK, No. 4656, banded by H. S. Osler, at Lake Scugog, Ontario, on October 1, 1920, was killed in the same locality, on October 23, 1920.*

BLACK DUCK, No. 4687, banded by H. S. Osler, at Lake Scugog, Ontario, on October 4, 1920, was killed at San Souci Island, Georgian Bay, Ontario, on November 1, 1921.*

BLACK DUCK, No. 4688, female, banded by H. S. Osler, at Lake Scugog, Ontario, on October 4, 1920, was killed at Seyppel, Arkansas, on November 23, 1920.*

BLUE-WINGED TEAL, No. 4576, banded by H. S. Osler, at Lake Scugog, Ontario, on September 24, 1920, was killed in Caroni Swamp, near Port of Spain, Island of Trinidad, British West Indies, on December 9 ,1920.*

RING-NECKED DUCK, No. 4700, male, banded by H. S. Osler, at Lake Scugog, Ontario, on October 29, 1920, was killed at Back Bay, Virginia, on November 23, 1920.*

RING-NECKED DUCK, No. A.B.B.A. 37,304, banded by H. S. Osler, at Lake Scugog, Ontario, on October 29, 1920, was killed in Georgetown County, South Carolina, on January 5, 1921.*

RETURNS UPON BIRDS BANDED IN 1921

HERRING GULL, No. 100,633, young, banded by Ernest Joy, at Little Wood Island, Grand Manan, New Brunswick, on August 18, 1921, was found on the ice unable to walk or fly at Jamaica Bay, New York, on January 4, 1922. It died five days later.*

HERRING GULL, No. 100,646, young, banded by Ernest Joy, at Little Wood Island, Grand Manan, New Brunswick, on August 18, 1921, was found wounded after a stormy night on the shore at Maceo Bay, Charlotte County, New Brunswick, on October 18, 1921.*

HERRING GULL, No. 100,698, young, banded by Ernest Joy, at Little Wood Island, Grand Manan, New Brunswick, on August 18, 1921, was found wounded at San Antonio Bay, Texas, on April 9, 1922. Its band was removed and the bird was released.*

MALLARD, No. 5158, banded by H. S. Osler, at Lake Scugog, Ontario, on Sepetmber 12, 1921, was shot at a place two and one-half miles east of Toledo, Ohio, on November 11, 1922.*

MALLARD, No. 5159, male, banded by H. S. Osler, at Lake Scugog, Ontario, on September 12, 1921, was killed in Durham County, Ontario, on October 4, 1921.*

MALLARD X BLACK DUCK, No. 5118, banded by H. S. Osler, at Lake Scugog, Ontario, on August 26, 1921, was killed at Niagara-on-the-Lake, Ontario, on October 20, 1921.*

BLACK DUCK, No. 5162, banded by H. S. Osler, at Lake Scugog, Ontario, on September 12, 1921, was killed at Fenelon Falls, Ontario, on November 7, 1921.*

BLACK DUCK, No. 5169, banded by H. S. Osler, at Lake Scugog, Ontario, on September 14, 1921, was killed at Hay Bay, Lake Ontario, Ontario, on November 2, 1921.*

BLACK DUCK, No. 5181, banded by H. S. Osler, at Lake Scugog, Ontario, on September 15, 1921, was killed at Cookstown, Ontario, on November 9, 1921.*

BLACK DUCK, No. 5195, banded by H. S. Osler, at Lake Scugog, Ontario, on September 16, 1921, was shot at Long Point, Lake Erie, Ontario, on November 6, 1922.*

BLACK DUCK, No. 5196, banded by H. S. Osler, at Lake Scugog, Ontario, on September 16, 1921, was killed at a place twenty miles northeast of Alexandria, Louisiana, on December 4, 1921.*

*U.S. Department of Agriculture Bulletin, No. 1268 October 16, 1924.

*U.S. Department of Agriculture Bulletin, No. 1268. October 16, 1924.

BLUE-WINGED TEAL, No. 5186, banded by H. S. Osler, at Lake Scugog, Ontario, on September 15, 1921, was shot in the same locality, on September 24, 1921.*

BLUE-WINGED TEAL, No. 4708, banded by H. S. Osler, at Lake Scugog, Ontario, on September 16, 1921, was killed at Glen Elder, Kansas, on October 11, 1922.*

BLUE-WINGED TEAL, No. 4709, banded by H. S. Osler, at Lake Scugog, Ontario, on September 16, 1921, was shot at a place seventy-five miles south-east of Lake Scugog, Ontario, on September 26, 1921.*

BLUE-WINGED TEAL, No. 4713, banded by H. S. Osler, at Lake Scugog, Ontario, on September 16, 1921, was killed in the same locality, on October 6, 1921.*

BLUE-WINGED TEAL, No. 4715, banded by H. S. Osler, at Lake Scugog, Ontario, on September 16, 1921, was shot at Seagrave, Ontario, on October 12, 1921.*

BLUE-WINGED TEAL, No. 4721, banded by H. S. Osler, at Lake Scugog, Ontario, on September 16, 1921, was killed at Pigeon Lake, Ontario, on October 14, 1921.*

BLUE-WINGED TEAL, No. 4726, banded by H. S. Osler, at Lake Scugog, Ontario, on September 16, 1921, was shot on the Scugog River, Ontario, on September 26, 1921.*

BLUE-WINGED TEAL, No. 4729, banded by H. S. Osler, at Lake Scugog, Ontario, on September 16, 1921, was killed in the same locality, during the fall in which it was banded.*

BLUE-WINGED TEAL, No. 4732, banded by H. S. Osler, at Lake Scugog, Ontario, on September 16, 1921, was killed at East Islip, Long Island, New York, on November 12, 1922.*

BLUE-WINGED TEAL, No. 4733, banded by H. S. Osler, at Lake Scugog, Ontario, on September 16, 1921, was killed in the same locality, during the fall in which it was banded.*

FLORIDA GALLINULE, No. 5122, banded by H. S. Osler, at Lake Scugog, Ontario, on August 30, 1921, was killed in the same locality, on September 4, 1922.*

PHOEBE, No. 11,626, juvenile, banded by Philip F. Foran, at the Royal Ottawa Golf Club, Aylmer Road, Quebec, on July 11, 1921, was picked up dead near the place where it was banded, on August 4, 1921.*

CEDAR WAXWING, No. 11,632, juvenile, banded by Philip F. Foran, at Ottawa, Ontario, on July 20, 1921, was found dead near the place where it was banded, on July 20, 1921.*

*U.S. Department of Agriculture Bulletin, No. 1268, October 16, 1924.

CORRECTION

Attention is called to the fact that on page 162, Vol. 40, Californian Partridge No. 279,703 is given as Californian Partridge No. 289,703; on page 163, Mallard No. 305,337 is given as Mallard No. 350,337; and on page 164, Black Duck No. 323,584, killed on January 15, 1925, is given as killed on January 15, 1924. This bird was not banded until October 24, 1924.

PUBLICATIONS RECEIVED

A Short Guide to Canadian Genera of Seed Plants. By John Adams, M.A. Bulletin No. 78, Dominion of Canada Department of Agriculture.

Bulletin of the Northeastern Bird-banding Association, Boston, Mass.

Year Book of the Public Museum of the City of Milwaukee.

A Preliminary Report on the Progress and Encouragement of Science Instruction in American Colleges and Universities, 1912-1922. By N. M. Grier.

American Bee Journal, Hamilton, Illinois.

Bulletins of the United States Department of Agriculture, Washington, D.C.

University of Oklahoma Bulletin.

DETAILS OF THE RELEASE OF THE HUNGARIAN PARTRIDGE (Perdix perdix) IN CENTRAL ALBERTA

By WILLIAM ROWAN

IN ACCORDANCE with your wish to have such things put on record in the columns of *The Canadian Field-Naturalist*, I herewith beg to present, on behalf of the Northern Alberta Game and Fish Protective League, details of the releases of the Hungarian Partridge (*Perdix perdix*) made in the central sections of Alberta.

A total of 230 birds (procured from the Bendic Brothers' Game Farm at eLduc, Alta.) was turned down by the League in 1923 in the following localities and in the numbers (individuals) indicated:

10 Kleskun Ranch, near Grande Prairie;
20 North of Fort Saskatchewan;
20 Morinville;
20 St. Albert;
20 Hastings Lake;
20 Cooking Lake;
20 Ardrossan;
10 Clover Bar;
40 Namao and vicinity north of Edmonton;
30 Govt. Farm, Halfway House (Edmonton);
20 University Farm, Edmonton.

In addition to these, about 100 birds were liberated in the Edmonton district by and under the supervision of the Game Branch of the Alberta Department of Agriculture in 1923 and 1924.

These birds were specially trapped at Cayley (near High River), Alta. About a dozen birds, obtained from the same source, were privately turned down at Cherhill, Alta., in 1925.

In a recent issue of *The Canadian Field-Naturalist* (Oct., 1926, p. 157) Mr. L. B. Potter, writing from Eastend, Sask., makes the following remark: "I am now beginning to realise that the partridge, like the house sparrow and the starling, is an undesirable alien, that we should be better without."

In his *Birds of Western Canada* (Ottawa, 1926), Mr. P. A. Taverner makes the following comment (p. 161): ". . . there is one thing to be borne in mind—that we cannot have foreign species except at the expense of competing native ones. It is notable that wherever this (Hungarian partridge) or other introduced species have increased to any extent, the resident grouse and prairie chicken have decreased in a similar degree. Sportsmen and game departments of the various provinces should face this fact squarely and decide whether they prefer foreign or native game; they cannot well have both in the same area."

Mr. T. E. Randall has expressed an exactly opposite opinion in the pages of *The Canadian Field-Naturalist* (Dec., 1926, p. 192); his views being based on personal experience during the last seven or eight years (at Castor, Alberta. There is no indication of locality in Mr. Randall's note as his address has been omitted).

May I be permitted briefly to add something to this discussion. Mr. Potter points out that the present decrease of the chicken in his district coincides with the advent of the partridge and he relates episodes, as witnessed by a friend, that picture the partridge as an aggressive and successful foe of the chicken. If there was no error on the part of the observer and these incidents are actually authentic, they must be of such rare occurrence as to be negligible in bringing about the reputed situation. No one who has seen the two species living and breeding in peace together in large numbers as in central Alberta in recent years, can accept such stories as anything but most exceptional. Moreover, the prairie chicken has so frequently been observed in farmyards trouncing domestic fowl and even roosters that to imagine its being continually bullied by the diminutive partridge requires a fair stretch of the imagination.

Mr. Taverner puts his case much more forcibly and with seeming conviction, but it would have materially added to the weight of his views if he had adduced the evidence on which they are based. It is only in British Columbia and Alberta that the partridge is at present really well established within the Dominion, although it will doubtless not be long before it is equally at home in Saskatchewan. The various introductions into British Columbia were made under circumstances that want very careful analysis before a verdict can be formulated, but in some districts at least the case is simple, for the partridge was turned down after, and because, the native birds had already disappeared. The introduced species can certainly not be blamed for pre-existing mischief.

The original Alberta introductions were made in the Calgary district in 1908 and 1909 when some 200 pairs were turned out in the localities to the east, south-east and south of the city, none of which is chicken country. It is in the main "baldheaded prairie", such chicken as occur being confined to the coulies and occasional bluffs. Some 16 pairs were liberated also at Alix in April, 1909, but, according to Horsbrugh (*Ibis*, Oct., 1915, p. 681), these had disappeared by 1911. The main centre of distribution, therefore, did not present any problems. The bird was released in a natural vacuum. The few birds liberated at Alix (good chicken country) apparently failed to establish themselves. Had they been the aggressive birds they are so frequently represented to be, the story might conceivably have been otherwise. Incidentally, these, as well as the Calgary contingent, were all imported direct from Hungary through a well-known American firm of importers.

When the Game League turned out its contributions in central Alberta, the Hungarian had already come in to stay. The liberations were chiefly made with the idea of importing fresh blood. The rapid spread of the species from the Calgary district to the north and east is now a matter of history. I am informed by Mr. Benjamin Lawton, Game Commissioner of the Province, that the bird has recently been reported from Wabiskaw, some 90 miles north-east of Lesser Slave Lake. Its northward spread has truly been spectacular.

If, as Mr. Taverner states, the Hungarian is a foreigner competing with native races, could it have maintained that remarkable rate of progress if competition had actually been involved? Even were it the successful fighter that it is reputed to be and invariably able to vanquish a foe that weighs more than twice as much as itself, the inevitable drag of such competition would seem to me to preclude all possibility of so speedy a northward march. But supposing that such competition was purely imaginary and that the species were filling a natural gap not already preoccupied by grouse or any other species, it could spread without obstacle other than its own limited rate of reproduction and the toll taken by predators, mammalian and avian. The gunner is not yet a menace in this part of Alberta for he is only just learning to hit them!

It seems to me that the first question to decide is whether or not there actually is competition between the two species, and if there is, what is its nature? There are two possibilities. Rivalry for either food or nesting sites would prove fatal to the weaker race. As far as food is concerned, both species become largely insectivorous during the breeding season, but while the chicken shows a marked preference for Orthoptera (grasshoppers. etc.) the partridge prefers Hymenoptera (particularly ants). But both exhibit considerable latitude in this respect. At other times of the year the partridge is mainly grainivorous, while the chicken is largely herbivorous. Their tastes overlap, it is true, but at no time of the year is their diet identical and their staples are different at all times. That food is a matter of competition, except perhaps incidentally, is extremely unlikely.

The only other serious possibility is competition for nesting sites. Both are ground nesters. Sites are therefore virtually unlimited and competition in this respect is inconceivable. In fact we are inevitably led to the conclusion that the two species should be able to live amicably side by side rather than the one at the expense of the other. Moreover, this conclusion fits the facts, and were it not for a peculiar circumstance, there would probably be little doubt about it in the popular mind.

Ten years ago, when the partidge was pushing its way north from Calgary, it reached the excellent chicken country of south central Alberta just at a time when a chicken cycle was reaching its minimum. Shooting of chicken was prohibited throughout the Province in 1917. The scarcity moreover affected the entire west. The sporting wise-acres of central Alberta readily put such obvious two and two together and concluded that the partridge had exterminated the grouse. Three years ago, together with Mr. F. L. Farley, I enjoyed a trip through this country by car. I never saw so many chicken in cultivated country in my life. Indeed I have never seen them as abundant anywhere outside of the sparsely settled districts around Lac La Bisch. The entire countryside seemed to be full of chicken —*and partridge*. The Sharptail had not only come back, but had in fact come back with the partridge now firmly established and in full possession of the ground.

Once again we are witnessing the anticlimax of a chicken cycle and once again there is to be no open season on grouse (other than ptarmigan) within the Provincial boundaries. The wave of mortality has swept south and east. There still remain a few districts in southern Alberta and Saskatchewan where chicken are fairly numerous as well as a few isolated patches in the north. Saskatchewan is today experiencing exactly the same thing as did central Alberta ten years ago. The partridge is coming in; the chicken is going. But its going is periodic and has been repeated at intervals since the white man first knew the prairies and probably long before. There is not the least cause on this occasion to blame it on the partridge. There is no reasonable doubt that in another few years Saskatchewan will enjoy its foreign and native game side by side as Alberta has done for the last few years—not foreign game alone at the expense of the native.

Comparison of the grey partridge with the house sparrow is manifestly impossible. The latter all too frequently comes into very keen competition with numerous native species for limited nesting sites of a certain kind. Being the superior fighter it comes out top to the detriment of the natives But the evidence of competition between partridge and chicken, if it exists at all, is so unsatisfactory as to be worthless. And if there is no competition then obviously the partridge cannot be living at the expense of the chicken.

As a matter of fact, the advent of the partridge may, in one important respect, be an undiluted blessing to the Sharptail. As population, settlements and motor cars increase year by year, the chances of the chicken regaining its former numbers after the bursting of a cycle become more remote each decade. On account of the ease with which it is killed it can hardly be expected to hold its own in any thickly-settled locality. In time, when the Hungarian has achieved the popularity it deserves, it will without doubt receive a great share of the shooters' attention that would, without it, have fallen undivided upon the chicken. So far from wiping it off the map, the Hungarian may ultimately, when Alberta has reached that state of settlement that would mean the final obliteration of the grouse, prove to be just the one factor needed to ensure its permanent preservation.

It is by no means a universal law that an imported species must of necessity prove detrimental to some native race, though it is very frequently the case if rivalry of any sort is involved. Even the predatory, and in many respects harmful, little owl (*Athene noctua mira*) when introduced into Britain proved complementary to native birds and not competitive. It has ousted no native species. The introduction of the red-legged partridge (*Alectoris rufa rufa*) into England proved a success in spite of the presence of indigenous grouse and other game birds, for it was complementary, not competitive. The evidence, as it stands to-day, nearly-20 years after the first importation of the grey partridge into Alberta, is most distinctly in its favour. A vastly superior table bird and a much more sporting proposition than the chicken, it gives me particular pleasure to come to its defence, for it is only five

years ago that I was opposing, on biased principle the local liberations that I am herewith putting on record. Subsequent and more critical examination of the actual facts has convinced me that the partridge is an acquisition to our avifauna that has, up to date, done no harm to any native species and is unlikely to do so in the future, except that, in the perhaps rather unlikely event of its ultimately reaching north to the Mackenzie, it may conceivably come into conflict with a rather unexpected species—the sandhill crane. To the west of the Slave River lies what is perhaps the greatest remaining stronghold of this crane.* Its chosen habitat will probably not attract the partridge but should it be otherwise, the mutual love of ants at the critical period of breeding might bring about a situation that would almost inevitably go against the crane.

*The identity of cranes from this region seems to be still in doubt. Bent, in his *Life Histories of North American Marsh Birds* (Washington, 1926) apparently considers all cranes north of southern Alberta to be little browns, while Taverner (Loc. cit.), speaking of the two races, says "We do not know just where the dividing line comes between their ranges," but infers that the sandhill probably goes north to Great Slave Lake. Skins and measurements of cranes, at present in my possession from west of the Athabasca north to Great Slave Lake are all undoubtedly sandhills.—Wm. Rowan.

LUXURY-SYMBIOSIS

By HENRY MOUSLEY

"GOOD GRACIOUS," I hear some one exclaim, what is luxury-symbiosis; I never heard of it before.

Well, I will try and explain. Luxury-symbiosis is a term or phrase—call it which you please—that serves to denote an intimate alliance into which two bodies or organisms have entered to their mutual benefit.

Most orchids, for instance, in their natural state, are associated with a mycorrhizal fungus, which inoculating or entering the embryo—and thereby finding a resting place if nothing more—sets up a symbiotic condition. In other words, the invasion —from the humus outside—of the hyphæ of the fungus into the protocorm of the orchid, by means of the hair-like structures emanating from the latter, serves in some way or another to feed and nourish the orchid, in return for which, the fungus—as already mentioned—finds at least a resting place, and is probably saved the necessity of reproduction by spores, as it passes from one generation of seeds to another. At all events, the alliance must be a close one, as both organisms appear to thrive well when in association, although the seeds of cultivated orchids—after being sterilized—have been germinated under aseptic conditions in tubes and flasks, in fact, "bottle-fed" in their infancy—as it has been said—on culture solutions—sugar—such as fruotose or glucose, preferably the former, I believe—which of course are in the form of a jelly. Be this as it may, in nature unadulterated, I have always found the finest plants in situations where mycorrhiza fungus predominates, notwithstanding the fact that some consider this symbiotic association harmful, rather than beneficial to the orchid.

Another interesting case of luxury-symbiosis, far removed from the one just mentioned, is that of the Hermit Crab (*Pagurus calidus*), and one of the Actiniae (*Adamsia Rondeletii*), a very beautiful sea-anemone, which is found in large numbers off the island of Capri, on the west coast of Italy. The Hermit Crab makes its home in the shells of snails —the legal owners of which are devoured—and thus protected, crawls on the ocean-bed in search of its prey. Attached to these shells, are always found one or more of the little Actiniæ, which in their turn, make use of the crab for carrying them about in search of their prey, of which they take toll, as well as that of the hermit-crab—no doubt. For a long time it was not known what, if any, benefit, accrued to the host in return, until one day, by mistake, a large octopus (*Octopus culgaris*)—the most dangerous enemy of the hermit-crab—was put into a tank containing one of the latter. Immediately the octopus attacked the crab, endeavouring by means of its long tentacles to suck it out of its shell. Thereupon, was the mystery solved, for the sea-anemone, seeing the danger to its host, threw out its numerous poison-lassoes—situated all round it—on the soft and unprotected arms of the octopus, who departed in great haste, with every sign of pain and terror. By means of experiments, it has been proved that the hermit-crab is well aware of the value of this symbiotic alliance, with the little sea-anemones, or sea-roses, as they are sometimes called.

In conclusion, yet one other very interesting case of symbiosis comes to mind, in quite a different order—that of the butterflies. For years the life history of the larva of the Large Blue (*Nomiades arion*)—at least the latter stages after hibernation —was a puzzle to entomologists. The butterfly is distributed more or less throughout Europe, being very rare, however, in England, its last stronghold in that country being Cornwall. It is to Capt. Purefoy that we owe the final solution of the mystery

that had so long enshrouded the last stages of the larva or caterpillar, the earlier ones, up to the third and last moult, having been previously worked out by Mr. W. F. Frohawk, in conjunction with Dr. T. A. Chapman. It was not, however, until the latter in 1915—on pulling up a root of Wild Thyme (*Thymus serphyllum*)—the food plant of the larva—discovered a pupa in the centre of a nest of ants (*Myrmica scabrinodis*), thereby strengthening the already-formed supposition, that some kind of symbiosis existed between the larvae and the ants, from the fact that, wherever the former had been found feeding, there, surely enough, would a nest of ants be found at the foot of the food-plant also. Working on this basis, Capt. Purefoy was at length enabled to clear up the mystery surrounding the final stages of the larva, which I will try and describe as shortly and clearly as possible.

After the third, and last moult, which takes place in August, when the young larva is about twenty days old, and 3.18 mm. in length, it refuses to eat any more of its food plant, and literally seems at a loss to know exactly what it does want, as it lies or crawls sluggishly about on the ground near its food plant. At this juncture, it is probably found by an ant, who at once begins to caress it, by waving its antennae over and upon it, which proceeding seems to have the effect of inducing the honey gland—situated on the 10th segment—to exude a sweet fluid. At once the ant proceeds to milk it, i.e., by imbibing the beads of this liquid, and perhaps other ants appear, and do likewise, but it is always left to the individual ant that first found it, to carry out the duty of transporting the little larva to their nest, where it at once commences to feed on a new and strange pabulum, the very small larvae of the ants, and continues doing so for a time, when it hibernates in the nest for the winter. In the spring it commences to feed again on the same pabulum, and continues doing so until early June, when it becomes full fed, being them about 14.8 mm. in length, as compared with the 3.18 mm., the length when it was first brought into the nest by its attendant ant.

Having arrived at this stage, it now proceeds to pupate, usually right in the center of the nest and emerges—by crawling through one of the ant passages—as a perfect butterfly, some three weeks later, or towards the end of June or early July.

In this case, it will be noticed, that the ants derive pleasure and nourishment by feeding on the sweet fluid excreted by the larvae, in return for which, the latter are protected from such natural enemies as ichneumon flies, and predaceous insects by the attendant ants, truly a case of mutual benefits conferred.

There are, of course, many other examples of symbiotic alliances to be found, both in the animal and vegetable kingdoms, but probably sufficient has been said, to give my readers a fair idea of what is meant by the term—luxury-symbiosis.

OBSERVATIONS ON THE DOUBLE-CRESTED CORMORANT (PHALACROCORAX AURITUS) ON LAKE MANITOBA.

BY J. A. MUNRO

WITH the object of obtaining information regarding the food habits of the Double-crested Cormorant on Lake Manitoba the writer made his headquarters at Steep Rock settlement, near the north end of Lake Manitoba, from July 7th to July 20th 1925. In this investigation valuable assistance was given by Mr. John Lyndal, Fishery Overseer for Lake Manitoba, Mr. A. Burton Cresham of Winnipeg, and Dr. Wilbert A. Clemens, Director of the Pacific Biological Station. The latter helped materially by his work in the identification of fishes.

General Notes on the District

Lake Manitoba is approximately 115 miles long and 32 miles wide at its widest point. Cormorants nest only in the northern half of the lake to which the following notes have reference. Here the average width is approximately 12 miles and the northerly portion is bisected by a narrow wooded peninsula extending south from the head of the lake for a distance of 30 miles. This peninsula, known as Peonan Point, is reserved as a Game Refuge under the Manitoba Game Act. The depth of the lake is said not to exceed 26 feet and in general is much shallower. Mineral salts of some sort held in solution impart to the water a slightly saline taste and the soapy froth which is churned up during storms and deposited in windrows on the beach is probably due to this.

Lake navigation is rendered hazardous by the many sunken reefs, the scarcity of harbours and the prevalence of sudden and violent storms which in a short time raise heavy foam-crested

seas that spend themselves in a turmoil of yeasty spindrift against the rocky islands and the boulder-strewn shores of the mainland.

Along parts of the east shore near Steep Rock occur a succession of white limestone cliffs ten to fifteen feet in height—above high-water mark brightened by a growth of rusty-orange lichen—where erosive wave-action, cutting into the soft limestone has formed narrow, deep, bights and prominent headlands of picturesque variety. Elsewhere the shores are low with shelving beaches of flat limestone pebbles or fine white sand, interrupted by long stretches piled high with boulders of glacial origin where walking is a matter of difficulty.

The surrounding country, of a general level aspect, is covered with a forest of low poplar, oak, elm and Manitoba maple broken here and there by open glades where flat limestone outcrop is over-laid with a thin deposit of soil Close to the lake are many wide marshy meadows of slough-grass and scattered through the forest are occasional swampy tracts and muskegs in some of which are found a few isolated spruces.

Being south of the coniferous forest belt the bird-life of the region is that associated with the Transitional Zone. The following species of land birds, all apparently breeding, were recorded Ruffed Grouse, Marsh Hawk, Red-tailed Hawk, Broad-winged Hawk, Sparrow-Hawk, Great Horned Owl, Black-billed Cuckoo, Northern Hairy Woodpecker, Downy Woodpecker, Yellow-breasted Sapsucker, Boreal Flicker, Nighthawk, Whip-poor-will, Kingbird, Crested Flycatcher, Least Flycatcher, Crow, Cowbird, Thick-billed Redwing, Western Meadowlark, Baltimore Oriole, Brewer's Blackbird, Bronzed Grackle, Goldfinch, Western Vesper Sparrow, Savannah Sparrow, (subsp.?), Leconte's Sparrow, Nelson's Sparrow, White-crowned Sparrow, Clay-coloured Sparrow, Slate-coloured Junco, Dakota Song-Sparrow, Rose-breasted Grosbeak, Purple Martin, Barn Swallow, Tree Swallow, Cedar Waxwing, Red-eyed Vireo, Yellow Warbler, Redstart, House Wren, Short-billed Marsh Wren, Red-breasted Nuthatch, Black-capped Chickadee, Willow Thrush and Robin. Only two species were encountered of northern breeding warblers which are considered characteristic of the Canadian Zone, these being the Tennessee Warbler and Bay-breasted Warbler.

FISHES OF LAKE MANITOBA

Before proceeding with a discussion of the Cormorants' food habits it is thought advisable to present what was learned regarding the different fishes found in Lake Manitoba. These are listed in the order of their commercial importance Specimens were examined of the species listed below with the exception of Tullibee and Whitefish; some were taken in nets and others from the gullets of Cormorants collected for that purpose but the majority were selected from the large number regurgitated by Cormorants on the nesting islands.

PICKEREL OR PIKE PERCH. *Stizostedion vitreum* (Mitchell).—This is the most important food fish in the lake and except at the extreme north end is found commonly everywhere. Spawning takes place in the spring, directly after the ice moves out, in the numerous shallow marshy bays and in the sloughs and streams tributary to the lake. North of the Narrows the average fish now taken is slightly over a pound in weight, but in the southern part of the lake the average is slightly heavier.

PIKE. *Esox lucius* (L.).—The abundance of this species makes it of greater importance commercially than the more valuable Whitefish. Large specimens are taken but the average fish marketed is less than five pounds in weight. The spawning season is coincident with that of the Pickerel.

TULLIBEE. *Corigonus tullibee* (Richardson).—The spawning habits of the Tullibee are similar to those of the Whitefish, the run taking place in the late fall after the ice is formed. Spawn is deposited in the shallows not far from shore. At other times this species frequent the deeper water. Tullibee average one-half pound in weight when caught in a 3¾″ mesh net and one pound when caught in a 4″ mesh net.

COMMON WHITEFISH. *Coregonus clupeiformis* (Mitchill).—Being a deep water fish during the summer months this species was not encountered. The centre of their abundance is in the deeper and wider portions of the lake south of the Narrows; there are few Whitefish at the north end of the lake. Early in October there is a migration to the shallows along the shores of the mainland and islands and over the many reefs. The spawning season over, the fish again return to deep water.

No information was obtained rgearding the movements of the fry in the spring but it is generally understood they seek deep water soon after being hatched. Whitefish is not an abundant species in Lake Manitoba and is apparently becoming less so each year.

PERCH. *Perca flavescens* (Mitchill).—Apparently this species is local in its distribution and only a limited number are taken. An average specimen runs less than a half pound in weight. The spawning season is in the late winter or early spring while the lake is still ice-bound.

SAUGER. *Stizostedion canadense* (DeKay).—This species resembling the Pickerel in appearance and habits is of much less value commercially and the demand is limited. It is apparently common to all parts of the lake and the average specimen taken is less than one pound in weight.

MULLET OR RED HORSE. *Moxostoma aureolum* (Le Sueur). LONG NOSED OR NORTHERN SUCKER. *Catostomus catostomus* (Forster).—Both these species are known commercially as mullet. Vast numbers are caught in the nets and a small percentage are sold at a nominal figure. Both are abundant in all parts of the lake. The spawning season is in the spring.

LING. *Lota maculose* (Le Sueur).—This species known locally as "Maria" is found in all parts of the lake, but more commonly north of the Narrows. It is not considered an edible fish and none is marketed.

BROOK STICKLEBACK. *Eucalia inconstans* (Kirtland).—This species was found commonly in cormorant castings. No live specimens were taken.

LAKE SHINER. *Notropis atherinoides* (Rafinesque).—Shoals of unidentified minnows were observed in the shallow water along the shores of the mainland. Three specimens taken from a cormorant casting have been identified provisionally as of this species by Dr. Clemens.

GENERAL ACCOUNT OF THE DOUBLE-CRESTED CORMORANT

Local fishermen stated that the "crow duck" arrives on Lake Manitoba about the first week of May, shortly after the ice breaks up. Lake Manitoba being on the migration route of those nesting farther north on Lake Winnipegosis there is probably a concentration of birds during migrations and this has led to an exaggerated idea of the number actually inhabiting the lake area. The resident population exclusive of young, was estimated to number between 1200 and 1500 birds of which twenty-five per cent were non-breeding yearlings. No information is at hand regarding their departure for the south in the autumn, but this probably occurs early in October. On September 18th to 21st, when Steep Rock was again visited, cormorants were still present. Shortly after arriving the cormorants commence nesting on certain isolated rocky islands situated usually some distance from the mainland. There are reported to be ten such rookeries each one used by 40 to 100 pairs of Cormorants. Only three colonies were visited. These were identical in character and of approximately the same size, roughly 150 feet long and 50 feet wide. According to the fishermen these islands were representative and typical of the others in respect to population.

Boats were at a premium at the time of the investigation, owing to a series of accidents, and the investigators were unable to visit as many of the islands as they otherwise would have done.

These islands may be described as the exposed portions of the many reefs, evidently of glacial origin, which are found in many parts of the lake. All lie more or less north and south following generally the direction of the glacial striae. On all sides the water surrounding them is shallow and usually it is impossible to approach within a quarter of a mile by gas-boat. All are saucer-shaped, the rim of the saucer consisting of piled granite boulders which serve to shelter the hollow centre from the surf. There are many such islands in the lake but only those having high sheltering sides are used as nesting places, the more exposed islands being utilized only as resting places.

The more or less concave centres of the breeding islands are covered with a thick compost of excrement decayed nesting material, dessicated fish and cormorant bones, and, side by side upon this spongy foundation, are built the majority of the bulky nests.

As the young develop in size and strength the nests are flattened and finally are trodden into the oozy mixture below. A few nests, however, built on a firm foundation afforded by the boulders scattered about on the sheltered portion of the island within the saucer-rim, remain longer in a state of habitation. Early in the season dead bog-rush is the chief material used to insulate the usual foundation of sticks, while nests built later on in the season contain a large percentage of green rushes and grasses; all this material probably being carried from the mainland, several miles distant in some cases. In one nest was found a quantity of cord from a fish-net.

Although laying commences in the latter part of May, fresh eggs may be found as late as the middle of July or even later. There are many accidents in these crowded colonies and no doubt the destruction of a brood by trampling is a common occurrence. Probably in such cases a second clutch of eggs is laid. It is interesting to note that the reproductive organs of a female taken on July 15th were in a condition which indicated that laying would commence in a week or ten days. It was reported that fishermen destroyed the eggs on a reef north-east of Skunk Island during the last week of May. The nests were said to contain two or three eggs each. This colony was visited on July 17th, less than

two months later, and 118 nests were counted containing an average of two young, ranging from newly hatched chicks to birds estimated to be four weeks old. The total number of young birds was 219. There were also 31 eggs; two clutches of two and one of three, the remainder being in nests containing chicks either newly hatched or a few days old. Because of the early destruction of eggs on this island the young were not so far advanced as those on the other islands. A second colony visited the same day contained young birds able to fly amongst the estimated population of two hundred in various stages of development. These flew into the water as landing was made, the remainder with the exception of a few nestlings herded together in close formation and marched over the rocky escarpment and into the surf. Later on some of these returned and crawled into crevices between the boulders where they were captured and banded.* The larger number, however, kept together and swam steadily away from the reef. Nests containing eggs were also found on this island. Two clutches of three were apparently fresh and a third clutch of three was on the point of hatching.

It seemed particularly desirable to visit the Gull Island reef near the extreme north end of the lake because reports had been received that this colony contained at least 2000 birds. This was carried out on July 12th, when it was found that the entire population numbered 233 by actual count, consisting of 80 adults, 3 yearlings and 150 young. The adults and yearlings, rising from the island as the boat approached, were counted by four people. A few young birds still occupied nests but the majority of the larger birds stood about on the rocks in companies as is their usual habit when disturbed. Loath to enter the water these birds did so only when driven and returned immediately to the warm rocks when the disturbance was over. Two nests contained three eggs each and a third held two eggs and a newly-hatched chick. Young in the nest when approached stretched their necks to the fullest extent and hissed fiercely with wide open mouth. All were fearless and resented handling by pecking and by scratching with their powerful feet.

At one end of this reef some scant vegetation persisted, sheltered by the usual escarpment of boulders which was higher than usual at this particular point, and close to this shelter a small colony of Common Terns was nesting. Several clutches of eggs were held in position by a few pieces of dry weed—a nest of sorts, but in the majority of cases the eggs were lying on the hard ground quite unprotected; with the result that some had been trampled, probably by Cormorants, and others had rolled some distance. Examination of broken eggs showed that incubation was well advanced. Twenty-two nests were counted containing one to four eggs, two being the average number in a clutch. All these were contained in a space six feet by eight feet. The Terns had left with the Cormorants as the boat approached and the majority alighted on another island half a mile away; only a few remained in the air and circled high above us over the nesting ground.

Several opportunities occurred of studying a small band of Cormorants, apparently non-breeding birds, which frequented the lake south of Steep Rock. Owing to the shallowness of the water and the general abundance of fish the Cormorants' fishing is not restricted to well defined areas and these particular birds fished usually a considerable distance from shore, too far away for us to see when a fish had been captured. They submerged for 30 to 70 seconds, apparently swimming in a fairly straight course, and emerging remained on the surface for 8 to 12 seconds when another dive was taken. Upon securing a meal, a shoreward flight was taken, sometimes to the mainland but more often to a small reef close to Steep Rock where the gorged bird would remain prefectly inactive during the process of digestion. On calm days, the small reef referred to always held its quota of cormorants standing motionless amongst a gathering of Herring (?) Gulls, but in rough weather waves washed clear over this reef and the birds sought refuge elsewhere. On some portions of the mainland trees are used as resting places. At Elm Point, five miles south of Steep Rock, two dead poplars standing in the midst of green timber were so used and the ground and shrubbery below was coated with the familiar whitewash.

A non-breeding bird, shot as it arose from a boulder on the end of Elm Point, had swallowed a fourteen-inch pike. This fish, weighing approximately 15 ounces, filled the stomach and the gullet to within three inches of the rictus, yet the bird's neck was not noticeably distended. The head of the fish was mascerated by digestion while the body remained firm and fresh.

FOOD HABITS OF THE DOUBLE-CRESTED CORMORANTS

Under the conditions existing on Lake Manitoba where the rookeries are isolated by miles of open water, observations must necessarily be made either from an approaching boat or on the rookery

*It is of interest to record the capture of one of these birds wearing band No. 305388 at Old River, Mississippi on October 19th, 1925.

itself. In either case the adult birds will be disturbed and young birds will not resume their normal activities until the intruders have withdrawn. It was not possible, therefore, to make an intimate study of the home-life of the Cormorants. Information regarding food habits was obtained from analyses of the stomach contents of 13 specimens of both adult and young and from examination of the fish disgorged on the islands.

It was difficult to secure adult specimens. Breeding birds show little concern for their young and invariably leave the nesting island at the approach of a boat, consequently these were seldom in gunshot. Sometimes a few returned later to circle the island, usually outside the danger zone, and through this habit several specimens were secured. Non-breeding birds, which occasionally are seen resting on boulders or in trees on the mainland or flying along shore, were equally wary and a number of those which were shot, hoping that wind and tide would carry them ashore, were not retrieved for want of a boat.

Numerous fish were found on all the islands visited and practically all were in a condition which permitted identification. On one small reef, off the Gull Islands, the following specimens were examined, viz.: 7 Pike, 8″ to 16″; 5 Ling, 10″ to 12″; 3 Mullet 9″ to 10″; 2 Perch, 4″ to 6″; 2 Pickerel, 8″ to 10″; 1 Sauger 5″; the measurements are approximate. Some of these were on or about the nests, a few had dropped into crevices between the rocks, and many others lay on the baked earth outside of the nesting area which was common ground for both adults and young. A number of specimens were quite fresh, others had mummified in the hot sun, but in every case the head was either missing or partly mascerated due to digestive action during the time it had been encased in the stomach of the bird. Many, perhaps all, of the fish disgorged on the nesting grounds are wasted as apparently the young do not pick up this food. The guano filling the declevities in the islands contains a large percentage of decomposed fish. It would therefore seem that many more fish are taken than are actually required as food. This was the condition observed on all the islands visited. Small fish such as shiners and sticklebacks were regurgitated in large quantities, one hundred of the latter being found in one casting and 10 castings were found on one island. These fish had been identified as Pickerel fry by interested fishermen. Castings composed entirely of crayfish remains were common every where.

The number of individual fish of different species found on the reefs was in proportion to their local abundance in the waters close at hand which suggests that fishing is done near the nesting island and that preference is shown for no particular species. Specimens of all the fishes previously listed in this article, wieh the exception of Whitefish and Tullibee, were found on the reefs in various degrees of abundance. The summer habitat of Whitefish and Tullibee being the deeper portions of the lake it is probable that these species are seldom taken by Cormorants.

STOMACH CONTENTS OF TWELVE CORMORANTS

No.	Sex	Date	Hour	Condition of Stomach	Contents
217	♀ ad.	July 9	9.15 a.m.	Full	One 14″ Pike.
218	♀ ad.	July 12	8.00 a.m.	⅓ full	2 crayfish; remains of 2 unidentified fish approx. 2½ long.
219	♂ ad.	July 12	8 00 a.m.	Full	One 12″ Ling.
220	♀ ad.	July 15	2.00 p.m.	⅔ full	Remains of approx. 10 crayfish.
221	♂ juv.	July 17	9.30 a.m.	Full	Remains of crayfish and unidentified fish pulp.
*222	♀ juv.	July 17		½ full	ditto.
*223	♀ juv.	July 17		ditto	ditto.
*224	♂ juv.	July 17		ditto	ditto.
*225	juv.	July 17		Nearly empty.	Three pieces of bogrush.
*226	♀ juv.	July 17	9.15 a.m.	ditto	Vertebrae of fish four mm. in diameter.
227	♂ juv.	July 17	9.15 a.m.	Nearly empty.	Vertebrae of fish three mm. in diameter.
228	flying juv. flying	July 17	9.30 a.m.		Gravel.

*Numbers 222, 223, 224, 225 were from specimens found dead on the rookery.

Cestodes were present in five stomachs and gravel or pebbles of various sizes were noted in all but three.

What species of fish were contained in the semi-liquid material in the stomachs of young birds could not be determined and it is considered that stomach analysis is of little value in this instance.

SUMMARY

Evidence that crayfish form an important item in the food supply of cormorants was obtained both from stomach analysis and from observations on the nesting islands. Castings composed of the hard portions of crayfish were found commonly; on one island 150 such castings were found. These crustaceæ were also present in six of the stomachs examined (2 adults and 4 juveniles) in one instance forming the entire contents. It was estimated that crayfish represent 25 per cent of the food taken by Cormorants, the remainder being fish of various species.

In their food habits Cormorants show no preference for any particular species of fishes;

Young Double-breasted Cormorants leaving nesting island when disturbed

Young Double-breasted Cormorants on nesting island

the percentage of the various species consumed being dependent upon relative abundance. The bird's swallowing capacity is the only factor governing the size of the fish consumed. Within this limit fish of all sizes are taken indiscriminately. Of the seven species of fishes eaten only two, the Pickerel and Pike, are important commercially. It is estimated that these two species combined comprise one-third of the fish taken or 25 per cent of the Cormorants' entire food. It has been stated that the Cormorant population including only adults and non-breeding yearlings, was estimated to number 1200 to 1500 individuals. In an attempt to estimate the annual consumption of fish the higher figure has been taken as a basis. It has been assumed that 75 per cent of these are breeding birds, and that amongst them 600 young are raised to maturity, which gives, roughly, a population of 2100 birds towards the end of the season. Cormorants are present on Lake Manitoba for about 5 months in the year and it is probable that an average of one pound of food per day is consumed by each bird, no allowance being made for the difference in capacity as between adults and young, or for the increased consumption by the latter as the season advances. On this basis the total weight of food consumed in one season is approximately 3150 cwt., of which 25 per cent or 788 cwt., represents Pike and Pickerel. Assuming these figures to be approximately correct it must be admitted that the toll of food-fishes taken by Cormorants is a heavy one.

In studying the relations of the Cormorant to fishing interests, consideration must be given the probable effects, produced by the birds' destruction ofsuch piscivorous fishes as the Ling and Sauger, both enemies of the valuable food fishes, and also the destruction of Mullet and Suckers to which spawn eating habits are ascribed. No doubt under native conditions a balance between the various species is maintained partly through the work of fish-eating birds and partly by the piscivorous habits of the fishes themselves. In Lake Manitoba an exceedingly complex relationship between birds, fishes, crustaceæ, insects and plants has been permanently disrupted by man's activity and whether a condition more suitable to man's requirement could be established by further interference, such as the control of Cormorants or the destruction of less valuable fishes is a matter of doubt. A dominant instinct in humanity is to destroy whatever creature is suspected of interference with man's complete enjoyment of the fruits of the earth. Such rough and ready methods may be desirable and expedient in some cases, but in this instance the cure is believed to lie elsewhere.

Regarding the future of the Cormorant on Lake Manitoba, it may be said that, as the nesting grounds are confined to certain types of reef, which are relatively few in number, there is probably a definite limit to any local increase. Cormorants will desert a reef that, through a fall in the lake level, becomes joined to the mainland. There is no reason for believing that the number of breeding birds has increased within recent years and any considerable increase in the future is thought to be most unlikely.

CONCERNING AUGUST BIRD LIFE IN THE OKANAGAN VALLEY, BRITISH COLUMBIA, 1926

By J. A. MUNRO

TO THOSE who seek intimate knowledge of bird life—here, in the Okanagan Valley—the month of August is perhaps the most fascinating time of the year. Nesting is practically over and birds, old and young, tend to concentrate along the lake shore. In mountain draws the birch leaves droop and shrivel in the heat; bare ranges are sered a dingy yellow and pine forests grow dry and dusty—there is no moisture left. Thus the lake shore, offering the miracle of water in a thirsty land, proves irresistibly attractive and here the birds come from hillside, forest and open range. Near Okanagan Landing a wide bay is so situated, in respect to the configuration of surrounding hills that it receives the early morning sun a good half-hour before less favoured places on either side—not a human blessing, perhaps, on hot August days, but surely one to which birds respond. Here on the shore grow choke cherry, black haw, snowberry, rosebushes, poplar and sand-spit willow in a tangled and all but impenetrable hedge. Attracted first, no doubt, by the life-giving water and later by the bountiful berry-harvest, so conveniently placed in this safe harbourage, comes a daily varying crowd of birds to swell the resident population of Catbirds, Kingbirds, Towhees, Yellow Warblers, Cedar Waxwings, Bullock's Orioles, Song Sparrows and others. Hardly a day passes but some fresh note

heard demands investigation, or some inconspicuous juvenile of a familiar species must carefully be scrutinized. Not a "bird-wave" this—such as one sees in Eastern Canada—but a steady, ever-changing stream of local birds from the hills followed by, or sometimes coincident with, a migration from the north. Here, August is the Warbler month—as September is the month for Sparrows—and all, save the scarce forest-loving *townsendi*, tarry on this lake shore.

Towards the month's end old summer friends depart—one morning the Catbird's whined complaint is missed or we note the Kingbird's absence from the poplar top, so valiantly held all summer —and, as days pass, the August pageant thins out until, where scores of one species had been common, only individuals are seen.

August of the past year—a month of hot days tempered by cool nights and occasional showers—brought an exceptionally heavy migration. The Western Tanager, entirely frugivorous in the late summer, was perhaps the most abundant of the various species harvesting the wild fruit crop, and, for the first time, adult males in winter plumage were taken. Bullock's Oriole was a close second in point of abundance, with Cassin's Purple Finch in third position. Catbirds—late broods were the rule this year—seemed to feed almost entirely on the soft black haws while other species, such as Robins, Towhees, Red-naped Sapsucker, Western Lark Sparrow, Western Vesper Sparrow, Mountain Bluebird, Red-shafted Flicker, Cedar Waxwings and Kingbirds took also the service berries which, fruiting earlier, had dried currant-like on the bushes. Choke-cherries—there was an unusually heavy yield—attracted few birds and the greater part of the crop, plumped out with the fall rains, remained on the trees until early winter when it was harvested by Evening Grosbeaks, Bohemian Waxwings and Robins. The tawny-spotted young of Townsend's Solitaire came frequently to the hawthorns, and once, on August 12th an adult male Black-headed Grosbeak was seen.

Other species passing along the lake shore at this time were: Lewis' Woodpecker, Batchelder's Woodpecker, Vaux Swift, Black-chinned Hummingbird, Rufous Hummingbird, Say's Phoebe, Western Wood Pewee, Alder Flycatcher, Hammond's Flycatcher, Wright's Flycatcher, Pale Goldfinch, Western Savannah Sparrow, Gambel's Sparrow, Western Chipping Sparrow, Shufeldts Junco, Rusty Song Sparrow, Lazuli Bunting, Cliff Swallow, Barn Swallow, Tree Swallow, Northern Violet-green Swallow, Bank Swallow, Rough-winged Swallow, Red-eyed Vireo, Western Warbling Vireo, Cassin's Vireo, Orange-crowned Warbler, Yellow Warbler, Audubon's Warbler, Macgillivrays Warbler, American Redstart, Western House Wren, Western Golden-crowned Kinglet Ruby-crowned Kinglet, Willow Thrush and Olive-backed Thrush.

On August 25th, a Mourning Dove's nest, containing two young about one-third grown, was found in a poplar-bluff a quarter mile from the lake shore; the female was brooding while the male, in close attendance, perched on the top of a nearby poplar. The nest had been placed in a hawthorn where two dead branches crossed—a slight platform of twigs which the young entirely covered. This is the latest local breeding record of which I have knowledge.

North of the lake on cultivated bottom lands Blackbirds attacked the green corn. Three species of Blackbirds breed in the district, the Yellow-headed, Red-winged and Brewer's, and, in the late summer, although sometimes all three associate in flocks, there are specific differences in feeding habits. Through the early summer all three species had waged war on a devastating army of Rocky Mountain crickets and grasshoppers—gorging on these insects and feeding them to their young. As the sweet corn ripened, however, Yellow-heads and Red-wings turned their attention to this food, thus incurring the enmity of farmers who were raising corn either as a fodder crop or for canning purposes. Although the three species of Blackbirds still occasionally associated it was observed that Brewer's continued feeding on the grasshoppers, which at this late season had become relatively scarce, while Red-wings, and Yellow-heads in lesser numbers, systematically worked the corn patches. The method of feeding is this: Perched usually on the ear itself the birds first open the covering at the end to expose the kernels and then work downward, shredding the wrapping with their sharp bills—covering leaves on partly stripped ears resemble nothing so much as bunches of raffia. Once the kernels are exposed a mould attacks the ear rendering it unfit for use. Thus a fifty-acre field of Golden Bantam Corn, planted at different times in order to give successive crops had suffered severely, particularly in the portion which had earliest been sown. In some rows, which were 300 feet in length, every plant held at least one damaged ear. Field corn, much greater in height and producing larger ears, had suffered relatively less but even so the damage was considerable.

This diet was varied by wheat gleaned from the stubble fields—such crops are harvested early in the Okanagan—and stomach analyses showed remains of various carib beetles no doubt picked up in the wheat fields.

Late in August came an eruption of large heavy-billed Redwings, quite distinct from the local breeding race, and these also attacked the corn patches. At this time all the specimens taken for stomach analysis were of this race, the local birds having shifted their quarters.

A male Pigeon Hawk harried a Blackbird flock which frequented the open bottom adjoining the north end of Okanagan Lake. He appeared several times and one of his decapitated victims was found beside a corn patch. Swainson's Hawks, attracted here in great numbers by the cricket plague and hunting their food on the bare ranges, rarely came in contact with the Blackbirds. but one specimen taken on August 24th contained the remains of a male Red-wing.

Several August days were spent in the Lumby and Rollings Lake district, twenty-five miles north east, where different faunal conditions exist. On the telephone wires along the Lumby road, which runs through the broad cultivated fields and orchards of White Valley, the season's crop of Sparrow Hawks had gathered—there seemed to be one every fifty yards or so. Here also, crickets were the attraction. To this plague likewise was due the invasion of Red-tailed Hawks, chiefly young of the year, which remained for a month at least, and, as far as observed, fed exclusively on this food. Moreover crickets engaged the attention of crows at this time; a flock five hundred strong being observed at work in scattered formation—a bird for every square yard—over the open range.

Rollings Lake, an area of shallow water approximating 300 acres in normal years but now gradually contracting, is surrounded partly by cultivated fields and partly by tule marsh, and, on one side, its waters reach the base of a steep timbered mountain, the home of Rocky Mountain Jay, Black-headed Jay, Olive-sided Flycatcher and Chestnut-backed Chickadee. The warm shallow water is rich in aquatic vegetation, *amphipoda* and *mollusca*, thus assuring an interesting bird-population. Red-winged Blackbirds nest in the bordering tules; Brewer's Blackbird, Tree Swallows and Hairy Woodpeckers in old decayed trees, killed years ago by a rise in the lake level. In these trees also nest Barrows' Goldeneye and Buffle-head, not so commonly in late years, however, for cultivation has claimed many of the old pines and poplars. Nesting farther inland, Barrow's Golden-eye still lead their broods to this lake for it is the only suitable nursery for many miles. On May 23rd last, on the main road through the timber at a point about two and a half miles from the lake, we met a female Barrows' Golden-eye leading her brood of ten newly hatched ducklings straight down the centre of the dusty road. Hoping to get a photograph I followed for several hundred yards, interested to note how she accommodated her walk to suit the utmost effort of the running youngsters—they followed in a compact group—and expecting to see a hurried retreat into the brush. But this did not occur until I was within ten feet and she immediately led her flock back again to the road when I stepped out of sight behind a tree. This family undoubtedly was headed for Rollings Lake.

In August, when the receding waters uncover wide stretches of sticky mud insulated with a summer growth of water plants, comes a varied throng of migrant waders to feed on a rich harvest of insect and crustacean life concealed under the mat of decaying vegetation. Thus on August 13th a mixed assemblage carefully sorted out, tallied as follows: Northern Phalarope 7, Lesser Yellowlegs 20, Greater Yellowlegs 5, Baird's Sanpdiper 10, Semi-palmated Sandpiper 30, Western Solitary Sandpiper 6, Eastern Solitary Sandpiper 2, Stilt Sandpiper 1, Spotted Sandpiper 10, Semipalmated Plover 1, Killdeer Plover 20.

Other water-birds were estimated as follows: Holboell's Grebe 6, Horned Grebe 2, Pied-billed Grebe 2, California Gull 1, Ring-billed Gull 1, Black Tern 1, Mallard 100, Pintail 10, Baldpate 6, Green-winged Teal 8, Barrow's Golden-eye 10.

Towards the end of the month Yellow-throats came to the densely-growing tules on the lake shore, and, in the weed patches which occupy dryer ground between marsh growth and the edge of cultivation, Lincoln's and Gambel's Sparrows appeared. At this time the nearby fir and jack-pine forest proved well worth investigation. The migration of Audubon's Warbler was at its height and accompanying them were a few Townsend's Warblers and Ruby-crowned Kinglets. Already little associations of kindred residents—Chestnut-backed and Mountain Chickadee, Golden-crowned Kinglet, Red-breasted Nuthatch and, usually, a Brown Creeper—had come together and the whole troupe came readily to a whistled imitation of the Pigmy Owl's call. Here also, on August 28th, we found Crossbills and several flocks of silent Evening Grosbeaks. These latter favoured the tops of the tallest fir trees, and, it was suspected, were extracting seeds from the fir cones. Not until late autumn would they leave this district, their probable nesting ground, for winter quarters in the open valley.

NOTES AND OBSERVATIONS

TWO LOCKED MULE DEER BUCKS SEPARATED.—The caretaker of the Cattalo Enclosure at Buffalo Park found two locked Mule Deer bucks near his residence one morning in December. In his opinion they had been locked for some time and as he was alone he did not feel quite equal to the task of separating them. The two animals pulled and shoved one another all day and during the day travelled about half a mile from the place where they had been discovered in the morning. As they were still further away and still securely locked the next morning, three or four riders were sent, the deer were roped, and safely separated. When freed they jogged off in different directions carrying their heads sideways, no doubt because of the cramped position in which their necks had been for so long.

We often hear of locked deer dying and usually the first evidence of the struggle is the discovery of the skeletons locked together by the antlers. In this case the struggle was watched and photographed and then the fighters were rescued from their perilous predicament. The photographs show more graphically than words the terrific nature of such a struggle.—A. G. SMITH.

IDENTIFICATION OF FLIES FOUND INFESTING BLUEBIRDS.—In *The Canadian Field-Naturalist*, Vol. XXXVI, No. 6, September, 1922, I mentioned finding the larvæ of certain flies on nestling Bluebirds. These were identified at the time by Dr. Aldrich of the U.S. National Museum as *Phormia chrysorrhea* Macq. A recent article in the "Bulletin of the Northeastern Bird-Banding Association", Vol. III, No. 1, January, 1927, pages 1-3, by Charles W. Johnson, refers to the blood-sucking fly *Protocalliphora splendida* being found on Bluebirds at Rock, Mass. It is stated in the article that in several papers by H. W. Henshaw[1], Albert F. Contant[2], and O. E. Plath[3], the blood-sucking flies had been identified as the European species *P. chrysorrhea* and *azurea*, but later studies by R. C. Shannon and I. D Dobroscky[4], show that the American species are distinct.

Mr. Arthur Gibson, Dominion Entomologist, was made acquainted with this recent article on blood-sucking flies, and now tells me that Mr. C. H. Curran, Dipterist of the Entomological Branch has examined the specimens which I took from nestling Bluebirds near Hull, Quebec, and identifies them as being *Protocalliphora splendida* Macq., and not *Phormia chrysorrhea*, as formerly recorded.—HOYES LLOYD.

VIPER SWALLOWING YOUNG.—About the year 1863 I was on a survey on the west side of Lake Windermere, England, on the hills above "The Ferry". One day as I was walking over some uncultivated ground I saw a Viper, locally called a hagworm, coiled up on a flat stone,

1. The Auk, vol. 25, pp. 87-88, 1908.
2. Journ. Parasitology, vol. 1, pp. 135-150, 1915.
3. The Condor, vol. 31, pp. 30-38, 1919. Univ. Calif. Publications in Zool., vol. 19, pp. 191-200, 1919. Ann. Ent. Soc. Amer., vol. 12, pp. 373-378, 1919.
4. Journ. Wash. Acad. Sci., vol. 14, pp. 247-253.

Two buck mule deer with horns locked

about 8 feet from me. It immediately uncoiled and then a number of young ones swarmed towards her and into her mouth as fast as they could follow one another. The old one then slid off the stone disappearing into some heather a short distance away.—J. SMITH.

The plausibility of a parent snake taking her young into her mouth as a means of protecting them, has led to considerable controversy. Accounts of personal observation of such acts would be appreciated by the Editor.—ED. HERP.

INTRODUCTION OF HUNGARIAN PARTRIDGE IN NOVA SCOTIA.—Fifty pairs in all were released in Nova Scotia in the early spring of 1926. These birds arrived the latter part of February and were penned and looked after by myself until the second week in April when they had started to mate, so I rushed them out to the Musquodobit Valley. Great care was taken in releasing them, they were made to walk out over plenty of food, winding their way through spruce boughs before they could fly. This was done so that should they require food at any time, they would know where to get it, but they appeared to find food almost at once, notwithstanding the fact that there was over a foot of snow on the ground and everything frozen up. Posters were put up in all the stores and Post Offices in that vicinity asking the people to help this little stranger in a strange land, and a little history of the bird, in pamphlet form, was also given away from these places pointing out the good this bird had proved to be to the farmer in other places. Lectures were given in the schools, and in this way I was able to keep tab on all the nests. Three farmers reported that a pair of birds on each of their farms had had three broods, and from the size of the flocks in the Autumn, I would take it that this was correct.

The first early nesting was more or less a failure on account of the very prolonged and wet spring, rain never ceasing until the end of June and the whole Valley being under water. I had little hope of any birds surviving, but the majority came through wonderfully well. I carried out a system of weekly reports from the farmers and visited the district myself each month, and in this way have been able to keep in touch with exactly what is going on amongst them. The second nesting was a complete success, the birds building their nests on higher ground, not one nest containing less than 20 eggs. In the case of the third hatching one nest had 3 eggs, one 12 and the other 10, all of which hatched out. The farmers have taken very great interest in them and report that already they have been a great benefit in keeping down the insects on the turnips and even the potatoes.

I visited these birds the second week in January and found that they were eating the buds from the ground juniper, and also from the ground hemlock, this I witnessed myself. A few days before I arrived one of these birds was killed by a telephone wire and was kept for my observation. It was in splendid condition and its crop contained what appeared to be dead blue-berries, ground juniper berries and a few grains of old wheat and buckwheat. There were a few other things which I could not recognize.

I have been in the United States the past three weeks and on my return a few days ago I at once got in touch with the Valley and reports state that all is well with them. No losses are reported. It would therefore look as if they would pull through their first winter. As regards the second and third winters, only time will tell.

In my opinion, putting out this bird in less numbers than fifty pairs is almost doomed to failure as they require plenty of company and the system to be adopted in liberating them should be in the form of a wheel, viz.:—

10 pairs
|
10 pairs — 10 pairs — 10 pairs
|
10 pairs

Ten pairs at the hub, and ten pairs at the end of each of the four spokes, and to be within three miles of each other and no more. A few pairs as I said before are doomed to failure because they congregate at night in large numbers as the Quail do. This is for protection and warmth. You probably know more about this than I do, however, this is what I have discovered. Any further information will be gladly given at any time.—R. B. WILLIS.

CANADIAN SCHOOL OF PREHISTORY IN FRANCE.—The Canadian School of Prehistory in France, organized by a committee of the Royal Society of Canada in 1925 is expected to open its second session at Combe-Capelle about June 15th under the auspices of Les Beaux Arts de France. Arrangements are in charge of M. Pierre Dupuy, Secretary to the High Commissioner for Canada in Paris, 39 Boulevard des Capucines, Paris, and Dr. H. M. Ami, F.G.S., Laboratory of Geology and Palæontology, Elgin Annex, Ottawa, Canada. The school is expected to carry on special excavations in the valley of the Couze River, Dordogne District, in the southwest of France, and will

also devote some time in visiting the prehistoric sites, caves, rock shelters, etc., of the classic region about Les Eyzies de Tayac.—H. M. AMI.

THE FLUCTUATION IN THE ABUNDANCE OF RABBITS.—About two years ago inquiries were sent to a limited number of interested persons in Canada with a view to obtaining information as to the cause of the recognized fluctuation in the abundance of rabbits throughout Canada. The difficulty has always been to bring together a pathologist and a newly deceased or sickly wild rabbit and our former letter told how this could be done.

There were some positive results from this letter and the actual cases examined were as follows:

(1) Location: Sicamous, B.C.
Specimen: From Constable R. Pritchard
Examination made by: Dr. E. A. Bruce.

Summary of result: Specimen consisting of hind leg of rabbit was infected with *Coenurus serialis* which is an intermediate stage of a tape-worm, the other host of which is of the dog tribe. The carcass was in poor condition for critical work but some microfilaria (microscopic worms) were found in the blood and some indication of the presence of protozoa. Pathologist needs further specimens as fresh as possible.

(2) Location: Golden, B.C.
Specimen: From Constable R. Pritchard.
Examination made by: Dr. E. A. Bruce.

Summary of result: "The rabbit was fairly heavily infected with Cysticercus pisiformis, the larval stage of a tape worm (*T. serrata*) of dogs, etc."

(3) Location: Ottawa, Ontario.

Specimen: Portion of a rabbit which came into the possession of Mr. C. L. Patch, Chief Taxidermist of the National Museum of Canada, and by him handed to Mr. Hoyes Lloyd of this Branch.

Examination made by: Dr. A. B. Wickware.

Result: The muscular tissues contained Larva or intermediary forms of the tape worm *Multiceps serialis* = *Coenurus serialis*. This is a tape worm of the dog and has as its secondary host various species of rabbits and squirrels. It is located in the small intestine of the primary host and in the connective tissue of the secondary hosts. Its life history is as follows:

"Eggs developed by the adult worm in the intestine of the primary host pass out and are ingested by the secondary host with contaminated food and water. In the digestive tract of the secondary host the embryo escapes and bores into the tissues and possibly into the circulation of the host. In the connective tissue under the skin, between the muscles and elsewhere, it comes to rest and develops into a larval form, or coenurus, with numerous heads attached and also with the production of internal and external daughter bladders which in turn develop numerous heads. On ingestion of these bladders by the primary host the tape worm heads develop segments and form the strobilate worm."

As Constable Pritchard noted in connection with diseased rabbits in his vicinity, the most likely indication of tape worm infection is the presence of a bladder-like lump or bag in the muscle or under the skin. This is more or less filled with a clear liquid in which a number of white bodies, resembling corals, are floating. This is the ordinary non-scientific description of the tape worm cyst.

This tape worm infection occurs in rabbits both when they are abundant and when they are scarce and probably has nothing to do with the presumed infectious disease which occurs in epidemic form and kills the majority of the rabbits in any one vicinity once it breaks out.

Consequently further specimens of newly deceased or sickly rabbits are needed in a fresh state if we are to find the cause of the epidemic rabbit disease. Specimens should be sent to:—

Dr. E. A. Watson, Biological Laboratory, Ottawa, Canada.

Dr. L. M. Heath, Veterinary Research Station, Lethbridge, Alta.

Dr. E. A. Bruce, Agassiz, B.C.

Persons sending wild rabbit specimens will be reimbursed for any reasonable expenditure incurred in making a shipment. General directions for sending pathological specimens are attached.

In connection with the study of the disease of rabbits and the resulting fluctuation, I should be glad to have the following questions answered for as many localities in Canada as possible:

(1) Locality;
(2) Species of rabbit upon which report is made;
(3) Name of person making report;
(4) Years in which rabbits were abundant;
(5) Years in which rabbits were normal;
(6) Years in which rabbits were far below normal.—J. B. HARKIN, *Commissioner*.

GENERAL DIRECTIONS FOR SENDING PATHOLOGICAL SPECIMENS TO BIOLOGICAL LABORATORIES.—The method of packing specimens for shipment to a laboratory depends to a great extent on the distance which must be traversed, the nature of the specimen, and the season of the year. During

the winter period, the simplest method of preservation is to freeze the entire carcass. It should then be wrapped in several thicknesses of paper and packed in a strong wooden box for immediate shipment to the nearest laboratory, unless otherwise instructed.

When the season is warm or only moderately cold, the entire carcass should be wrapped in several thicknesses of paper and then in a piece of oilcloth or similar material. It should then be packed in ice and sawdust.

These methods of preservation apply in all cases but must be modified to include only portions of the diseased organs of larger animals.

Where ice is not available, various expedients must be resorted to, such as wrapping the carcass in cloths saturated with a solution of bichloride of mercury, or good commercial disinfectant. Afterwards, the method of packing in sawdust, chaff or other similar material, should be followed.

All boxes and containers should be as leak-proof as possible to eliminate danger in handling during shipment. *Express or postal charges must be prepaid.* Packages should be plainly addressed marked *pathological specimen, perishable, rush, keep in a cool place.*

The sender's name and address and some mark of identification should be conspicuously placed on the package, the identification mark corresponding to one in the covering letter.

Specimens may be forwarded to any of the following addresses:—

Chief Pathologist, Biological Laboratory, 41 Cliff St., Ottawa, Canada.

Dr. L. M. Heath, Veterinary Research Station, Box 819, Lethbridge, Alberta.

Dr. E. A. Bruce, Veterinary Research Station, Agassiz, B.C.

A CORRECTION.—The following corrections should be made in the March number: Page 49, line of Taraxacum officinale, last column, should read 11 instead of 71. Page 50, line of Camelina dentata, last column, should read 43, instead of 34. Page 51, line of Conringia orientalis last column should read 52 instead of 152. Page 53, line of Parnassia palustris, last column, should read 43, instead of 434.

CORRECTION OF ANNA E. MACLOGHLIN'S "SONG OF THE PEWEE" WHICH APPEARED IN THE OCTOBER ISSUE.—Each phrase should end with a double bar, as each is sung separately, and at different times, and not continuously as you have printed them. See bars I, II and III.

I find a mistake also in the rests used, namely eighth-note rests, instead of quarter-note rests, at the end of the male bird's song. Bars I, II and III.

In bar II the C sharp should come on the 6th beat of the bar, and have a single line after it.

In bar III, the last note should be B.

NOTE.—It may be of interest to readers of *The Canadian Field-Naturalist* to point out the value of records obtained by bird banding. The banding method enables us to obtain very accurate information about individual birds, which, when it has been accumulated in sufficient quantity, will make possible may important generalisations relating to species and larger groups. Some of the questions which may eventually be solved by bird banding are: To what extent do birds return to their birth-places to breed? How are new areas added to the range of a species? What birds have definite winter quarters? To what extent are migration routes definite? Do young birds and adults travel in company or by the same route and do they winter in the same area? What relation do the winter quarters of the northerly nesting individuals of a species bear to those of the southerly nesting individuals? To what age do birds of various species live? How long does a family group (parents and young) remain together? For how long a period does a mating normally endure in any given species? What are the details of the successive plumage moults? And so on, for a great many more points of interest might be mentioned.

Even when a "repeat" record is separated only by a day from the original banding record, it has its value, for it indicates a certain length of tarrying in the vicinity and helps to determine the time of departure on migration. Data of this kind are of value, for instance, in an investigation of the separate migration in autumn of adults and of young birds of the year, which is a question of much biological importance, and one where a difference of a day in time of migration might be highly significant. Yet, as A. Landsborough Thomson states in his recent work on *Problems of Bird Migration*, "Many records showing the dates of movement both of young birds and of adults, in a given species, are required before conclusions can be safely drawn from this source."

By publishing a list of Canadian bird banding records, including even the "short-time repeats", *The Canadian Field-Naturalist* is making available without the necessity of consulting a large filing system at some central point, an ever-increasing quantity of information of a definite character, relating to avian activities and "life histories". In this way it is rendering to its readers and to science an important service whose value will increase steadily as these data accumulate. To omit any data of possible significance would deform the foundation on which future investigators will depend.—HARRISON F. LEWIS.

BOOK REVIEW

OUR MOBILE EARTH *by R. J. Daly Charles Scribner's Sons, 1926.*

This is a new book on Intrageology by Reginald Aldworth Daly, Sturgis-Hooper Professor of Geology, Harvard University. Professor Daly is a Canadian by birth, a graduate of Toronto University, and one of the foremost living geologists. He is the author of a number of reports published by the Geological Survey of Canada, the chief of which is the "Geology of the North American Cordillera at the Forty-Ninth Parallel", in three parts. He is also the author of "Igneous Rocks and Their Origin" and numerous papers dealing with many phases of geology. He originated the theory of "stoping" to account for the manner of intrusion of batholithic masses of igneous rock and many of his publications deal with this problem and its related one, that of magnetic assimilation and its effect in producing different types of igneous rocks.

Intrageology or the science of the interior of the earth is one which is receiving more and more attention. In the present volume Dr. Daly summarizes in a most interesting and attractive way what is known about the interior of the earth and what is inferred from the known facts. The facts and the theories are, however, so intimately interwoven that the amateur reader will probably have difficulty in separating them. Earthquakes, volcanic activity, geologic structure and crustal movements all have a tale to tell bearing on the problem of what lies below the surface crust of the earth, and each is discussed in an equally interesting way. Daly believes that underlying the earth's crust everywhere is a hot, glassy basaltic substratum. This is under conditions of such high pressure that it acts as a rigid solid for sudden stresses while over long periods of time it yields sufficiently to allow the continents to stand in isostatic adjustment. When the pressure on it is locally reduced, as for example by a fracture in the earth's crust extending down to it, the material at this point becomes highly mobile and rises along the fracture forced up by the dead weight of the crust and by the effervescence of the gas-charged glass or lava. Volcanic eruptions of both the fissure type and the central type are explained by such abyssal fissuring and abyssal injection.

In connection with the theories about the interior of the earth, an interesting discussion of mountain ranges and their origin is given. Again his theory for the origin of mounains depends on the existence of the substratum of glassy basalt beneath the earth's crust. It is a known fact that mountain ranges occupy the sites of former geosynclines, areas in depression in which great thicknesses of sediments accumulated. Daly believes that in the formation of a mountain range from a geosynclinal prism, the basin of sediments was sufficiently downwarped for the crust at this point to be broken into fragments. Some of the broken crust-blocks foundered in the basaltic substratum and other fragments sliding down the flanks of the basin crumpled the rocks ahead into mountain structures. This landslide theory is also offered to explain the migration of the continents according to the Wegener theory.

The book is stimulating to the technical reader and will be of interest to the lay reader who is interested in some of the major problems about the earth as a whole. It is well illustrated with pictures and diagrams and contains a useful list of suggested works of reference for those who wish to widen their reading along these lines.—F. J. ALCOCK.

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CONTENTS

PAGE

Note on the Discovery of the Champlain Fauna on Lake St. John, Quebec, Canada. By I. P. Tolmachoff..... 123
Transfers of Elk for Re-Stocking. By Hoyes Lloyd..... 126
Fresh-Water Fish of Manitoba. By E. D. R. Bissett, M.D..... 127
Mushroom Growing by an Amateur. By W. S. Odell..... 128
Fresh-Water Cladocera from the East Shore of Hudson and James Bays. By Chancey Juday..... 130
A Day in the Woods. By W. J. Brown..... 131
Further Observations on Canadian Fresh-Water Crustacea Made in 1926. By Frits Johansen..... 132
Programme of Field Work of National Museum of Canada, 1927. By W. H. Collins..... 133
In Memoriam—Charles W. Nash..... 135
Notes and Observations:
A Note Concerning Fur Farming. By Norman Criddle..... 137
Additional Comments Regarding Mallards Wintering at Buffalo Lake, Alberta, 1923-24. By Hoyes Lloyd..... 138
Unusual Song from a Carolina Wren. By W. E. Saunders..... 138
Another Mystery Band. By Hoyes Lloyd..... 139
Loon Banded in Pennsylvania Killed in Ontario. By George Miksch Sutton..... 139
Hudsonian Curlew Seen at Ottawa, Ontario. By L. H. de Puyjalon..... 139
Rocky Mountain Sheep Transferred from Banff to Spence's Bridge, B.C. By Hoyes Lloyd 140
Extract from *The Debates of the Senate*, March 29, 1927..... 140
Louisiana Water-thrush at Kingston, Ontario. By R. O. Merriman..... 140
Instalment No. 15, Bird-Banding Returns..... 141

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The Canadian Field-Naturalist

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NOTE ON THE DISCOVERY OF THE CHAMPLAIN FAUNA ON LAKE ST. JOHN, QUEBEC, CANADA

By I. P. TOLMACHOFF

TWO SAMPLES of sand containing shells of Pleistocene pelecypods which had been collected near Lake St. John, Quebec, Canada, at the request of Dr. George H. Clapp, the Honorary Curator of Conchology at the Carnegie Museum of Pittsburgh, Pa., were delivered to the Museum in January, 1927.

Since fossils of this age, so far as known to the writer, have not been previously discovered on Lake St. John, the new locality merits attention. This locality, which is situated about an eighth of a mile above the earth fill dam on the west branch of the Grand Discharge (Fig. 1), the main channel of the Saguenay River into which Lake St. John empties its waters, has been carefully examined and described by the employes of the Quebec Development Company, and the following description is based on data furnished by them. Mr. W. D. Stal of this company has kindly supplied Figures 1 and 2.

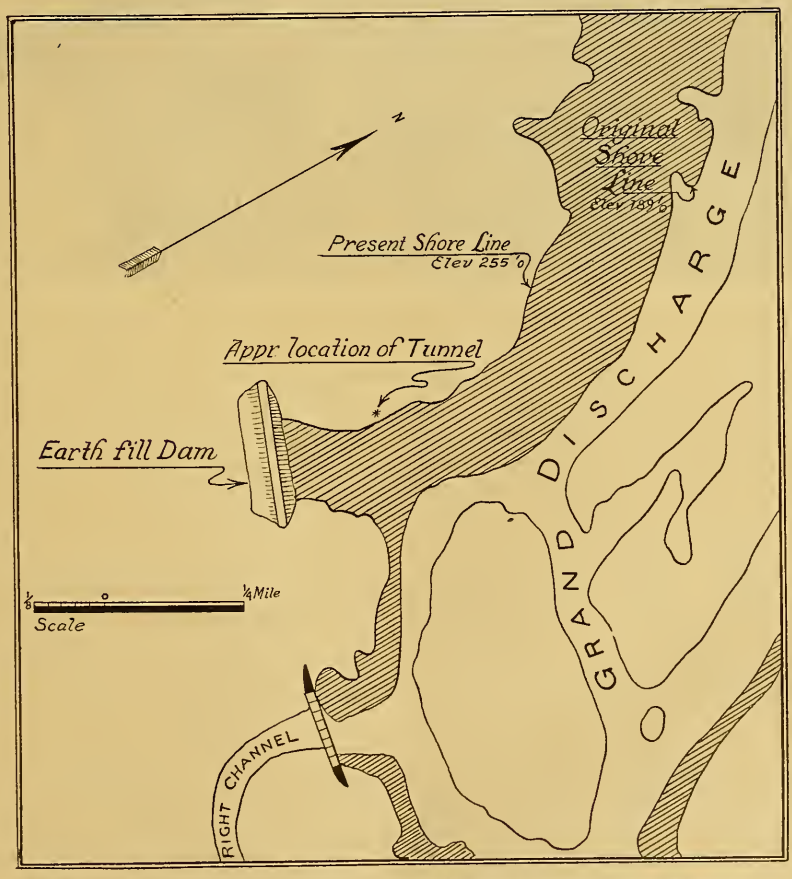

FIGURE 1.—Map showing the location of tunnels on the shore of Grand Discharge of the Saguenay River. Figures for elevations are approximate.

The shore bordering here the Grand Discharge, is elevated about 20 feet above the level of the river. This elevation had been about four times greater than before the Grand Discharge was dammed. According to the map (Fig. 1), the original shore line, referred to the water level before the river was dammed, had an elevation of 189 feet, the present shore line, originated since the dam was constructed, is located 255 feet high, thus the river has been elevated through the dam 66 feet. The slope of the shore is covered with young trees, bushes and grass. Less than a quarter of a mile north of the earth-fill dam, on the spot marked on the map with an asterisk, in the lower part of the slope, are uncovered clays with regularly arranged thin intermediate layers of sand giving the outcrop a laminated appearance. Both the clay and sand layers are well seen on the photographs of plate I and shown

PLATE 1A.—Laminated beds and topography of western shore of Grand Discharge north of the earth fill dam.

schematically on the section, fig. 2. Sand with clay composes the upper three-quarters of the slope. This outcrop attracted the attention of the Engineers of the Quebec Development Company in the summer of 1926, when they discovered fossil shells there, but having been unable to collect good material, they made special excavations later. This was done by digging two short tunnels the entrance to one of which is shown on plate I, fig. B. According to data furnished along with the collection, shells were found in sand layers intercalated with clay, and especially in sand on the top of the uppermost layer of clay where "the varieties of larger size were encountered" Fig. 2. In intermediate sand layers were found only smaller sized shells and a very few of them (9-10 specimens) were found "in the bulk of clay laminæ". The general slope of clay laminæ is towards the east, about 1 to 20, i.e. about 3°.

The delivered samples consist of sand with a few stone pebbles, the largest of them less than ½ cubic inch, and of fragments of hard clay with difficulty disintegrated in water. Grains of sand are rather fine, and mostly go through No. 40 mesh and partly even through smaller numbers including 100-mesh sieves. The bulk of the sand is fairy pure quartz with a few grains of felspar and of coloured minerals, all worn by water.

Although the shells of pelecypods were found on the spot in great numbers and 164 valves have been washed out from delivered sand samples, all of them belong to two species only. These are the commonest and most abundant ones reported from the Champlain of Canada*, viz., *Macoma balthica* L. (95 valves) and *Saxicava arctica* L. (69 valves). All of these shells are smaller than the corresponding recent forms and a little smaller than the average fossil forms from Montreal, as described by Goldring.

The only plant remnant which has been found in the samples of sand is identified by Dr. O. E. Jennings as *Zostera marina* L.

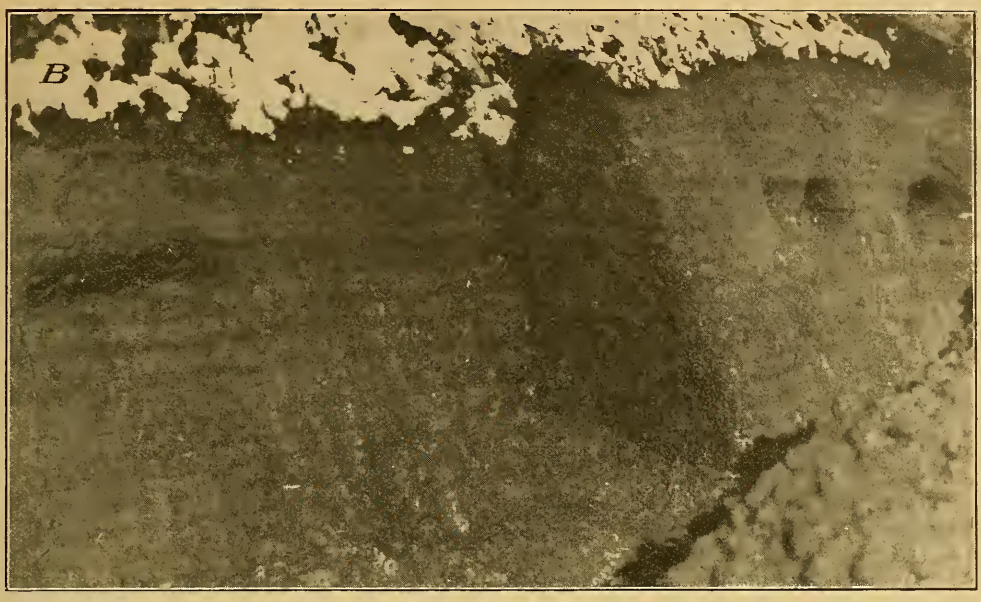

PLATE 1B.—Laminated clays and tunnel on western shore of Grand Discharge, north of earth fill dam

Quaternary deposits of the same character, and probably of the same age, have been known for years near the foot of the Ouiatchonau falls, three miles west of Chambord Junction of the Quebec and Lake St. John Railway, and at other points located near the south-western corner of the lake. Dresser, who had described them, is not quite sure, "Whether they are deposits of the Champlain period, or are part of a recent delta formed by a small stream which now cuts through the gravel beds"†. He considers them to probably represent the Champlain only because of the evidence of Post-Glacial submergence reported by Barlow‡ about 5 miles west of these localities, at an altitude of nearly or quite 650 feet. The present discovery of typical Champlain fossils on the Saguenay River makes possible an unquestionable correlation of the corresponding Quaternary deposits of the Lake St. John region with the Champlain of Eastern Canada and United States.

*Goldring, W., The Champlain Sea: New York State Museum Bulletin, Nos. 239-240, November-December, 1920, p. 165, 1922.

†Dresser, John A., Part of the District of Lake St. John Quebec: Geol. Survey of Canada, Memoir 92, No. 74, Geological Series, p. 45, 1916.

‡Barlow, Geological and Mineralogical Resources of Chibougam Region: Department of Mines, Quebec, 1911. Quoted after Dressler, Léc.

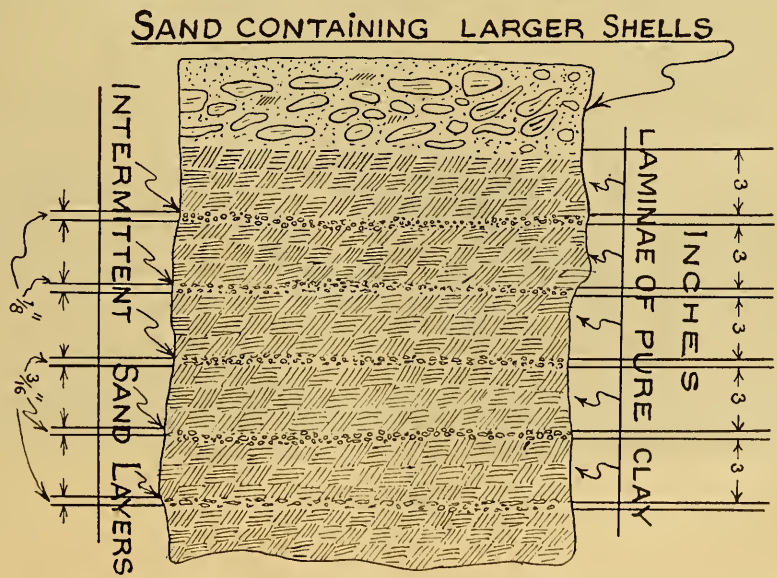

FIGURE 2.—Schematic section through a part of the clay and sand layers outcropping near the tunnels on the shore of Grand Discharge.

TRANSFERS OF ELK FOR RE-STOCKING

By HOYES LLOYD

TRANSFERS of wild mammals are thought to be worthy of note and so the details of certain elk transfers made by the Canadian National Parks Branch have been gathered from the records for the information of Naturalists.

The elk of Yellowstone Park in the United States have been short of winter range from time to time in the past and when in 1916 the late Dr. Charles Walcott advised the Department of the Interior, Canada, that he had discussed the question of transferring elk to Canada with the United States Department concerned and that there would be no difficulty in getting fifty or sixty animals, the Department of the Interior at once agreed to accept the offer. As an exchange for these elk from Yellowstone, Canada gave Rocky Mountain Goat and Sheep for the National Zoological Gardens at Washington, D.C.

ELK FROM YELLOWSTONE FOR BANFF

In October, 1916, there were 32 elk in captivity at Banff, and apparently the species had completely or practically disappeared from the vicinity in the wild state.

The records show that this Banff herd originated with four males and one female purchased by the late Mr. Valentine Winkler, then a member of the Manitoba Legislature, from Mrs. Ticknor of Morden, Manitoba. These were bought from Mr. Winkler and shipped to Banff in January, 1900. In March, 1902, one female was bought from Mr. S. R. Marlatt of Portage la Prairie and presumably one female was bought from Mr. William Blanchard of Calgary in October, 1902. In April, 1910, six were shipped to Wainwright and four, two males and two females, were bought from Mr. Joshua Hill of Pontiac, Michigan, whose herd was of Wyoming origin, and taken to Banff.

On February 20, 1917, Superintendent S. J. Clarke and Mr. H. E. Sibbald of Banff Park left Gardiner, Montana, for Banff with 63 head of elk. These were yearlings and two-year-olds.

On July 9, 1917, the elk census at Banff was as follows:—Original herd, 17 males, 14 females;

BUGLING ELK. *Cut by courtesy Canadian National Parks.*

from Yellowstone, 5 males, 45 females, the decrease in the latter being largely due to losses during the long journey or occurring shortly after arrival.

On June 17, 1918, 41 of the Yellowstone herd and 8 males and 2 females of the original herd were released. The increase in the Yellowstone herd had been eight in this time.

In December, 1919, newspaper reports indicated that elk were starving at Yellowstone Park. The United States authorities again generously gave Canada a shipment of elk for Banff Park, the Dominion authorities bearing all expense of shipment. All told 206 were shipped by express from Gardiner, Montana, on February 4, 1920, and 194 arrived safely at Banff. Of the shipment ten per cent were males. The shipment was released at Massive and Duthil.

On May 15, 1923, the Superintendent at Banff reported the following census of elk:—100 one mile west of warden's cabin, Canmore, north side of Bow River; 20, south side of Bow River; 20 near Deadman's cabin, south side of Bow River; 12, Gap Summit; 20, Loop and Golf Links; 50, hills north of Anthracite; 30, near Stoney Creek on Cascade River; 25, near Cuthead Creek; 40, near Hillsdale, one mile west of Massive; 20, south side Bow River near the mouth of Red Earth Creek; total 337. The farthest north from which any herd was reported was Cuthead Summit; those in the Cascade Valley were the original herd from Yellowstone with increase, and the ones released near Duthil and Massive seemed to have remained there.

On May 31, 1927, Mr. J. A. Wood reported that elk were very numerous in Banff Park and that he expected them to reach the Red Deer this year. In travelling 41 miles by motor from Banff to Lake Louise this spring, he saw 150. They have spread practically over the entire park.

Elk from Yellowstone for Jasper

The United States supplied one shipment of elk for Jasper which on leaving Gardiner, Montana, March 13, 1920, comprised 88 females and 10 males. The total loss by the time the shipment was unloaded at Jasper was ten, and five more casualties had occurred by June 4, 1920.

On October 22, 1921, Superintendent S. Maynard Rogers estimated there were 170 elk from this introduction, and by April 14, 1923, he reported that there were 300 in the vicinity of Jasper. No doubt some of these had been drawn from the indigenous herd of about 35 head that ranges in the Brazeau valley.

The Superinendent could account for some 900 elk in the park in October, 1925, and for 1,000 to 1,200 at the end of 1926. They were then found in every valley of Jasper Park, having reoccupied their original range.

Elk from Wainwright, Alberta, to Cookson, B.C.

The Department of the Interior at Ottawa granted the application of British Columbia for elk to be used in re-stocking areas between the Okanagan and Kettle Valleys, B.C. Five males and twenty females were shipped to Cookson, B.C., from Wainwright, Alberta, on March 28, 1927. The Wainwright herd, which numbers approximately 400 head was, as stated above, begun by the transfer of six animals from the Banff herd in 1910, to which were added in April, 1911, seven elk, two males and five females bought from Michel Pablo of the Flathead Indian Reservation, Montana. The growth of the herd in the sanctuary afforded by Wainwright Park has thus been rapid.

FRESH-WATER FISH OF MANITOBA

By E. D. R. BISSETT, M.D., Pine Falls, Man.

THE MAKING of a list is generally the first thing attempted by one who becomes interested in either birds flowers or fish.

These lists form a never-ending source of pleasure to the maker thereof, and oftentimes to others who may be interested in similar subjects.

This list of Fresh-Water Fish is the result of observations extending over a period of ten years, in connection with the fish of the Province of Manitoba.

The Northern Lamprey, *Ichthymyzon castaneus*, Girard; Brook Lamprey, *Lampetra Wilderi;* The Lake Sturgeon, *Acipenser rubicundus*, Le Sueur; The Common Sturgeon, *Acipenser sturio*, Linnæus; Channel or spotted Catfish, *Ictalurus punctatus*, Rafinesque; Great Lake Catfish or Mathemeag, *Ameiurus lacustris*, Walbaum; The Dark Catfish or Long-Jawed Catfish, *Ameiurus vulgaris*, Thompson; Common Bullhead or Horned Pout, Common Catfish, *Ameiurus nebulosus*, Le Sueur; Stone Catfish, *Noturus flavus*, Rafinesque;

Common Buffalo Fish, *Ictiobus cyprinella*, Cuv. and Valenciennes; White or Small-mouth Sucker or Small Mouth Buffalo Fish, *Ictiobus bubalus*, Rafinesque; Northern Sucker, *Catostomus catostomus*, Foster; Common White Sucker, *Catostomus commersonii*, Lacéfrède; The Quillback Sucker, *Carpiodes velifer*, Rafinesque; White-nosed Red Horse, *Moxostoma anisurum*, Rafinesque; White-nosed Red Horse, *Moxostoma anisurum*, Rafinesque; The Mullet or Red Horse, *Moxostoma aureolum*, La Sueur, Northern Red Horse, *Moxostoma lesueuri*, Richardson; Gray Sucker, *Catostomus griseus*, Girard; Chub Sucker, *Erimyzon sucetta oblongus*, Mitchill; Minnow, *Notropis scopifer;* Flatheaded Chub, *Platygobio gracilis*, Cope; Minnow, *Couesius dissimiliis*, Girard; Dace, *Notropis cornutus*, Mitchill; Blunt nose minnow, *Pimephales notatus*, Rafinesque; The Silver Minnow, *Hybognathus nuchalis*, Agassiz; The White Minnow, *Hybognathus argyritis*, Girard; The Fathead or Bull Minnow, or Blackhead, *Pimphales promelas*, Rafinesque; Straw-coloured Minnow, *Notropis blennius*, Girard; The Shiner, Spawn Eater, *Notropis Hudsonius selene*, Starr Jordan; The Poor Minnow, *Notropis jejunus*, Forbes; The Great Minnow, *Notropis atherinoides*, Rafinesque; Storer's Minnow, *Hybopsis storerianus* Kirtland; Western Gold-Eye, *Hiodon chrysopsis*, Richardson; The Moon-Eye, *Hiodon tergisus*, Le Sueur; The Shad Moon-Eye, *Hyodon alosoides*, Rafinesque; Round Whitefish, *Coregonus quadrilateralis*, Richardson; Common Whitefish, *Coregonus clupeiformis*, Mitchill; Labrador Whitefish, *Coregonus labradoricus*, Richardson; Brook Trout, *Salvelinus fontinalis*, Brook Trout; Great Lake Trout, Touladi, or Grey Trout or Salmon Trout, *Cristivomer namaycush*, Walbaum; Land-locked Salmon, *Salmo Salar Ouananiche*, E. McCarthy; The Tullibee or Mongrel Whitefish, *Argyrosomus tullibee*, Richardson; The Jack-fish or Pike, *Lucius lucius*, Linnæus; Banded Pickerel, *Esox Americanus;* The Maskinonge (erroneously Muskellunge) *Esox Masquinongy*, Mitchill; Nine-spined Stickleback, *Pygosteus pungitius*, Linnœus; Brook Stickleback, *Eucalia inconstans*, Kirtland; The Trout Perch or Sand Roller, *Percopsis guttatus*, Agassiz; The Calico Bass, *Pomoxis sparoides*, Lacepede; Green Rock Bass, *Ambloplites rupestris*, Rafinesque; Small-mouth Black Bass, *Micropterus dolomieu*, Lacepede; Large-mouth Black Bass, *Micropterus Salmoides*, Lacepede; White Bass, *Roccus chrysops*, Rafinesque; Yellow Pickerel, Pike-perch or Dore, *Stizosledion vitreum*, Mitchill; Grey Sauger or Pike Perch, *Stizostedion canadense griseum*, DeKay; The Yellow Perch, *Perca flavescens*, Mitchill; Black-sided Darter, *Hadropterus aspro*, Cope and Jordan; Gunther's Darter, *Hadropterus guntheri*, Eigenmann & Eigenmann; Johnny Darter, *Boleosoma nigrum*, Rafinesque; Northern Darter, *Etheostoma boreale*, Starr Jordan; Sheephead or Lake Drum-fish or Fresh Water Drum, *Aplodinotus grunniens*, Rafinesque; Olivaceous Miller's Thumb, *Cottus pollicaris*, Jordan & Gilbert; Lake Ling, Burbot, Lake Cusk, Losh and Methy, *Lota maculosa*, Le Sueur.

MUSHROOM GROWING BY AN AMATEUR

By W. S. ODELL

DURING recent years public interest in the identification of wild mushrooms, and the cultivation of the commonly known meadow mushroom, *Psalliota (Agaricus) campestris*, has greatly increased. Much ignorance still exists, however, concerning the manner of its growth, reproduction, and the time required to reach maturity. In distinguishing the edible from the poisonous kinds of fungi which are found in nature, the terms "mushroom" and "toadstool" respectively, are often employed.* This practice is to be discouraged, for one gets the impression that the differences in shape, size and texture are quite marked, whereas they are identical in those characters, the terms being synonymous. It is better to call them all mushrooms, and divide into edible and poisonous varieties. The poisonous species are few, and the edible kinds number over a thousand. Strange as it may appear, after many years of scientific investigation, the field mushroom is the only kind that has been reproduced commercially in this country. The public may rest assured that the cultivated mushrooms exposed for sale are not poisonous if in a fresh condition.

Mushrooms contain no chlorophyll—the green colouring matter of plants—therefore light is not essential for their growth.

Horse manure has been found to be the best material in which mushrooms can be grown commercially. In order to start a bed, fresh manure from which all long straw is removed is made into a pile, protected from rain and frost, and turned

*"Mushrooms and Toadstools" an account of the more common Edible and Poisonous Fungi of Canada, by H. T. Gussow and W. S. Odell, Dominion Department of Agriculture. Special Bulletin (in press).

over at intervals till fermentation has reduced the mass to a deep chocolate colour, sufficiently moist to retain its shape when squeezed in the hand. All objectionable odor is removed during the process. Early fall is the most suitable time to cure manure, as flies are less liable then to lay eggs in it, which might hatch out later. After the temperature induced by the fermentation process has fallen, the manure may be made into a bed in one's cellar, or any convenient building, where conditions of moisture, temperature, and ventilation are at all times under control. A bin about ten inches deep should be used for holding the manure. This may be constructed of any rough material, and if the bed is to be placed on a concrete floor, the bin should be provided with a bottom so as to keep the manure from the floor The temperature of the manure may rise again, after being made into beds, but a delay of a day or two will allow it to cool sufficiently so that one's hand will not feel uncomfortably hot when inserted in it. "Spawn", sold either in "brick" form or in glass containers, which latter is to be preferred, is broken into pieces about an inch square, planted one inch or so beneath the surface of the bed, and spaced at interavls of nine or ten inches. After five or six days, the spawn should show signs of activity by producing a large number of fine white threads running through the manure; the bed may then be "cased" or covered with an inch or two of garden soil. If all processes have been properly carried out, mushrooms should appear after six or eight weeks, and continue to be produced till the bed is exhausted. This cured manure from the bed cannot be used a second time for mushroom propagation, but may be utilized as a fertilizer for one's garden or lawn.

A few remarks on the growth of a cultivated mushroom may be of interest. An examination of the underside of the cap of a mushroom, shows many thin plates or "gills" radiating from the stem to the margin of the cap. When these gills are viewed under the microscope, countless numbers of club-shaped cells or "basidia" will be found on both surfaces. On these are borne the "spores", two to a basidium in the case of the cultivated mushroom and four on those found in nature. Spores are in some respects analogous to the seeds of the higher plants, but are invisible to the naked eye; they are produced by a mushroom in prodigious numbers. The dust or powder seen when a dried-up puffball is pressed, is composed of countless millions of spores. In the eye of the finest cambric needle, viewed under a microscope, and with a single layer of *Psalliota campestris* spores inserted, 4,700 spores may be placed side by side, with room for over fifty more layers; or a capacity of over 156,000. Professor Buller of the University of Manitoba has estimated that a cultivated mushroom four inches in diameter may produce sixteen thousand millions of spores. A simple and interesting method of "viewing" spores "en masse" is by means of a "spore print" made by cutting the stem of a mushroom close under the cap. This when placed on a sheet of white paper, covered tightly with a tumbler or glass dish, and left for a few hours, will leave a deposit of spores on the paper, a perfect replica of the shape of the gills, and composed of untold numbers of spores.

Spores are lighter than thistledown, and are dispersed by the wind, often for many miles. When these fall on a suitable medium, germination takes place sooner or later, otherwise they perish. From these spores are eventually produced fine white threads, which continually branch and increase in size, and upon which after a long or short time small rounded bodies appear. The thread-mass is called "mycelium", commonly known as "spawn". The rounded bodies or "buttons" are always found near the surface of the bed. They increase in size and at an early stage show a differentiation between cap and stem, the latter growing more quickly. As growth continues, the cap remains neatly infolded; as the stem lengthens, the first appearance of active growth in one's bed is shown by a slight mound, bursting into cracks from its centre. It is a popular impression that a mushroom comes up rapidly, even in a night; whereas the cultivated form generally takes four days to show its cap clear above ground. The stem elongates till near its maximum height, the cap meanwhile unfolding slowly. At this stage a thin felted membrane is apparent extending from the stem to the margin of the expanding cap, called the "veil". This is a marvellous adaptation of nature serving a two-fold purpose, the exclusion of insects from the growing mushroom, and providing a chamber for the gills, of equable temperature and moisture. This membrane gradually separates from the margin of the cap remaining on the stem in the form of a collar or "ring".

Spore discharge commences as soon as the ring collapses from the margin of the cap, continuing without cessation until the mushroom reaches maturity; that is till all the basidia have collapsed, and no more are produced. Generally this process requires a period of about six days. The whole purpose of a mushroom is to shed its spores; when this process is completed its life work is accomplished and the plant dies. We see, therefore, that the cultivated mushroom requires a

period of about ten days in which to complete its cycle of growth.

For commercial purposes mushrooms are collected before the veil breaks from the margin of the cap but for home consumption they may remain in the bed till expansion of the cap is complete, meantime increasing in weight up to a certain period.

Mushrooms are composed of about ninety per cent of water, and can never take the place of meat. Their nutritive value is frequently over-estimated; they rank with carrots and similar vegetables, and serve rather as a relish than as an article of steady diet.

The questions are frequently asked "Can anyone without experience engage in the enterprise of mushroom growing?" and "May mushrooms be grown profitably from a small bed in one's cellar?" Advertisements regarding these are frequently misleading. One does not usually engage in a commercial undertaking and expect success without first becoming thoroughly acquainted with all details necessary to conduct it. Mushroom culture is a definite business, and as such requires much experience to prevent errors arising through improper methods employed, before one may reasonably look for success. True, some have succeeded phenomenally at their first attempt, but later efforts resulted in failure. Observation bears out the fact that failures in mushroom growing far outnumber successes till all details are mastered. The writer's experience may be unusual: persistent experimentation with small beds in a cellar resulted during five seasons in a negligible quantity of mushrooms; and not until the sixth year was success achieved.

In a small bed mushrooms frequently come up, at irregular intervals, and since they cannot be kept for any length of time without deterioration there may not be sufficient to warrant a shipment. Even should a few shipments be made, the financial returns would be small, hardly repaying one for the outlay and trouble involved. The whole matter depends largely upon the size of the yielding bed or beds. The experiment is worth the trial, and when successful, many an appetizing meal of fresh material would be available for one's household, affording at the same time much satisfaction to the grower. There is always a steady demand for mushrooms, and money in the business for those who have mastered and engage in it, on a larger scale than outlined.

FRESH-WATER CLADOCERA FROM THE EAST SHORE OF HUDSON AND JAMES BAYS

By CHANCEY JUDAY
Wisconsin Geological and Natural History Society

THE PRESENT report deals with the Cladocera found in a plankton collection which was obtained by Mr. F. Johansen along the east shore of Hudson and James bays in 1920. The material presents two interesting features: (1) it comes from a region in which collections had not been made hitherto, and (2) it contains eight species of Cladocera as compared with seven species in the more extensive collection secured by him during the Canadian Arctic Expedition in 1913-16. Only well known and widely distributed forms are represented in both collections, however.

Dahpnia magna Straus.

Many specimens were present in a catch taken from a pond at the mouth of a river about 35 miles north of Great Whale river, east coast of Hudson bay, about latitude 55½° N., August 7, 1920.

Daphnia pulex (de Geer)

This cosmopolitan form was well represented in the catches as indicated by the following localities:—

1. Rock-pool on limestone island between most southern of Manitouk Islands and mainland, east coast of Hudson bay, August 6, 1920.

2. Pond near divide of peninsula forming north side of Boat opening, Manitouk sound, east coast of Hudson Bay, August 10, 1920.

3. Pond on river flats, Second river (south of Little Whale river), east coast of Hudson bay, August 12, 1920.

4. Rock-pools about 25 miles up Big river, east side of James bay, about latitude 54° N., September 6, 1920.

5. Pools and ponds on Cape Hope Islands, east side of James bay about latitude 52° N., September 13, 1920.

Simocephalus vetulus (O. F. Mueller)

Three specimens were found in a catch taken from a rock-pool on limestone island between most southern of Manitouk islands and mainland, east coast of Hudson bay, about 6 miles north of Great Whale river, August 6, 1920.

Bosmina longirostris (O. F. Mueller)

In Rock-pools about 25 miles up Big river east side of James bay, about latitude 54° N.,, September 6, 1920.

Ophryoxus gracilis Sars.

Many specimens were noted in material obtained from pools and ponds on Cape Hope islands, east side of James bay, September 13, 1920.

Alona guttata Sars.

One specimen was found in material taken from a pond on the river-flats, Second river (south of Little Whale river), east coast of Hudson Bay, August 12, 1920.

Chydorus sphæricus (O. F. Mueller)

This form was found in two plankton samples.

1. Rock pool on limestone island between most southern of Manitouk islands and mainland, east coast of Hudson bay, about 6 miles north of Great Whale river, August 6, 1920, abundant.

2. Rock pools about 25 miles up Big river, east side of James bay, about latitude 54° N., September 6, 1920.

Polyphemus pediculus (Linnæus)

This form was obtained from rock-pools about 25 miles up Big river, east side of James bay about latitude 54° N., September 6, 1920.

A DAY IN THE WOODS

By W. J. BROWN

IT WAS a beautiful summer morning down on the southern shores of the Gulf of St. Lawrence and a Fox Sparrow was singing on a knoll behind the farm house. As I listened for a second call from the sparrow, I heard the waves splashing up on the beach in front of my room and the warbling of the trout stream a few yards in the rear. The bird, however, was the cause of hasty preparations for the woods at 5.30 a.m. On reaching the hill I found that the songster had flown to another knoll some 200 yards further to the southward where this bird has nested for years. It is difficult to discipline our actions to narrow circles on a bright morning in the north country where everything is so fresh and green, so the call of the wild forced me much further afield than I anticipated. Trailing through diversified and beautiful woodlands for miles seemed to be the order for the day. Everywhere the northern warblers were harping their tiny breezy songs and whistles; but the Tennessee was superior in strength to all the others, as it was the most numerous and the song more striking. The contrast in the Nashville and the Tennessee is easily grasped here. I well remember the time when the latter was an epoch in the bird world. Now there are always at least several pairs nesting in suitable localities, usually among the tamaracks. A male Tennessee was singing vigorously overhead and after watching and listening for some time in the swamp. I believed that a nest was close by. Treading on their breeding grounds, especially near the nest, before actual egg laying begins, I incline to the belief, after considerable experience, that the birds will desert. Shortly I flushed a female off a nest, containing five fresh eggs, well hidden in a mound and built of fine grasses and arched over by similar material. The female was chipping about in the foliage and was very shy, while the male continued singing now only 5 or 6 feet above me. A Yellow-bellied Flycatcher was heard nearby and much to my surprise I flushed the female off the nest, with four fresh eggs, just four feet from that of the Tennessee and similarly situated. It was a great field event, and one has a sensation of indescribable and irresistible joy, to find these two species nesting together. Thirty yards away another male Tennessee was singing fifteen feet up in a tamarack. I stood right below the bird and he stretched his neck out and looked down apparently at the hummock at my feet. I had switched this mound often enough days before, as it was covered with pigeon berries and was an ideal location for any ground-nesting warbler. The bird was so persistent in trying to lose his balance that I took another chance by moving my hand gently over the mound and out fluttered a female Tennessee from a nest containing four fresh eggs. This accounted for the extraordinary actions of the male

Returning through mixed bush at eventide, I heard a male Sharp-shinned Hawk cackling, always a welcome change at the end of any day, and starting off in search of the hawk's secret I saw feathers of different birds scattered about on the ground, and a White-winged Crossbill sitting in a small tree, apparently sleeping. The bird showed no inclination to fly at close approach and

I thought instantly of the hawk and how narrowly the Crossbill had missed the fate of other birds of the neighbourhood. The bird displayed feeble effort to be released when placed in the hand and seemed to have been paralyzed and intimidated by the presence of the bird of prey, but was otherwise unharmed.

After being sheltered and warmed by the hand for some minutes, it would peck energetically at pine needles which were placed before it. Perching the Crossbill again on the bush, it took more interest in the surroundings and started to compose its feathers, a preparatory movement to flight, and eventually flew away, much to my delight.

Perhaps I am soured by not being popular with the Sharpshins. Early next morning, however, I decided to entertain the hawks and improve my acquaintance with them. The female was sitting on a nest, containing five eggs, situated 15 feet up in a black spruce, about 50 yards from the vicnity where the Crossbill was liberated. This pair were not in a friendly way; the blazing eyes and mood of the male certainly pointed to a previous visit, but I have no recollection of it.

FURTHER OBSERVATIONS ON CANADIAN FRESH-WATER CRUSTACEA MADE IN 1926

By FRITS JOHANSEN

PART I.

EUPHYLLOPODA

Eubranchipus Gelidus.—The weather around Ottawa during the first half of April, 1926 (1st-20th) was cool, with temperatures between 7° and 50°F. On April 4th, I visited Billings Bridge, Ont., and found the Rideau river still frozen solid, and the country wintery. In fact, the month of April, 1926, was the coldest one recorded in 37 years (see *Oitawa Journal* for May 2nd, 1926). April 21st-24th were warm spring days, with temperatures until 66°F. and mostly clear weather, while the six last days ot the month had temperatures below 54°F. and the weather mostly overcast. On April 21st I visited Billings Bridge,and found that the Rideau river was now free from ice, high, and flooding the fields far around so that no observations were possible. The day after I went out to Fairy Lake and examined the ponds on the fields outside Wrightville, Que. Only Copepods were seen and there was much water upon the fields and some ice and snow in the ponds yet. Air 52°F., water 3 7°F. at 7 p.m.

May 1st-6th had temperatures between 25° and 75°F., the maximum for all the days except May 4th being above 55°F. Weather mostly clear and warm. On May 1st I visited Billings Bridge and found the Rideau River still high, though receded a little upon the fields, but no pools formed here yet. No Euphyllopoda were to be seen, nor in the pond at Brulé's quarry at Hogsback.

The day after I went to Fairy Lake and succeeded, by careful searching, in finding the first nauplii and metanauplii of *E. gelidus*, 1-6 mm. long, in the pool among a cluster of trees upon the fields between Wright's farm and Fairy Lake, where I have found them in preceding years, Air about 60°F., water 57°F., at about 6 p.m. The majority of these young Euphyllopoda were between 2 and 5 mm. long, and the largest ones of them had probably hatched during the warm days a week ago. The succeeding cooler weather the six last days of April (see above) then probably delayed the hatching of more eggs until May 1-2, when the bulk of these larvæ came out. The smallest one found to-day (May 2nd) had an appearance (half a dozen free, foliaceous legs etc.) as figured and described in the *Canadian Field-Naturalist* for January, 1924.

The hatching of *E. gelidus* eggs around Ottawa was thus very late this year (a week later than in 1923) owing to the cold weather during most of April (see above).

On May 5th I examined the usual pools upon the pasture at the mountain road between Fairy Lake and Kings Mountain, and found the larger ones containing many *E. gelidus*, 4-8 mm. long, besides Copepods and young Ostracods. The pond on the slope near Fairy Lake (upon Fairmont Golf Club grounds) was now entirely free of ice, but no Euphyllopoda were to be seen in it.

Four days later I examined the various pools upon the pastures between Wrightville, Fairy Lake and Wright's farm, and found them to contain many *E. gelidus* of a length between 3 and 13 mm., the majority of them being more than 5 mm. long. In the largest ones the males had the claspers well developed, and the females unripe eggs.

On May 15th I went to Billings Bridge but in

spite of careful search I was unable to find any *E. gelidus* in the usual pools upon the pasture here, though the overflow from Rideau river had now receded considerably, and the pools became isolated or even dried up. Perhaps the great volume of river water this year has washed away the eggs from here, or is it a case of the occasional absence of this species in certain pools some years? In the pool upon the low land among trees on Brulé's quarry at Hogsback (see April 13, 1925) adult *E. gelidus* of both sexes were, however, numerous and fully developed, the females carrying ripe eggs.

Two days later I went to Tenaga, on the Gatineau river and found in the usual pond here many adult *E. gelidus* of both sexes, fully or almost fully developed, together with young *Limnetis gouldii*. Finally, on May 30th, I visited the usual pools near Fairy Lake, but no *E. gelidus* were found, though other Entomostraca (*L. gouldii*, Copepods, Cladocera and Ostracods) were common. The occurrence of *E. gelidus* around Ottawa in 1926, was thus practically limited to one month (May) although a month and a half is its ordinary "season" here.

LIMNETIS GOULDII (*L. brachyurus*).—The weather around Ottawa during May 7th-17th was mostly clear and warm with temperatures ranging from about 40°F. to about 75°F. In spite of careful search I was unable to find any trace of *L. gouldii* during the whole of April and the first half of May this year.

On May 17th I found the first young of this species in the pond at Tenaga, Que. (see above). They were not common here and had a size about 1 mm. all in the metanauplius stage (double "clam-shell", etc.), into which they had just transformed, after hatching one or two days ago. I secured about ten of them by stirring up the water at the margin of the pond. The hatching of *L. gouldii* around Ottawa in 1926 was thus almost a month later than usually, a most interesting fact, which I cannot quite explain by the weather records.

On May 30th, I examined the pools on the pasture between Fairy Lake and Kings Mountain (near the mountain road), and in one of the small pools (not the same in which I found *L. gouldii* last year), I secured a number of adults of both sexes. They were *not* found in the larger pools, nor in any of the other pools upon this pasture, most of which had dried up now, but still contained many Copepods, Ostracods and Cladocera, and filamentous algæ. The *L. gouldii* were rather sluggish in their movements and easily captured

Six days later I went to Billings Bridge and found that most of the small pools upon the pasture at the brick-yard here had dried up, but in some of them which still contained water were a few *L. gouldii*. In the largest one of the ponds were many of these clam shrimps of both sexes (the females with greenish eggs), and most of them had almost double the size of the ones found in the small pools

On June 24th I again visited this place, and found that all the small pools had now dried up, but in the two largest ones which still had water and usually contain clam-shrimps, *L. gouldii* were still common as adults of both sexes often were seen in copulation. I kept a number of them alive in a glass jar without food and the last one died six days later.

Finally, I again went to Billings Bridge on July 11th, but although the heavy rains the preceding week had resulted in quite a little water in the pools, there was no sign of *L. gouldii* in spite of careful search for them. The "season" for this clamshrimp around Ottawa was thus probably only about a month and a half in 1926 (the shortest on record) owing to the very late hatching of the eggs (see above).

PROGRAMME OF FIELD WORK OF NATIONAL MUSEUM OF CANADA, 1927

By W. H. COLLINS, Acting Director

LONG before the days of Confederation, in 1844, the first Director of the Geological Survey, Sir William Logan, commenced a natural history museum which has existed continuously since then and has grown into the National Museum of Canada. Each year the National Museum sends out field parties into widely separated parts of the country to investigate its natural history and ethnology and to augment the already vast collections of specimens housed in the Victoria Memorial Museum at Ottawa. During the summer of 1927 eleven Museum parties have taken the field—five for anthropological work, five for biological and one for mineralogical, in addition to the field parties of the Geological Survey, whose work is so closely associated with that of the Museum.

C. M. BARBEAU, who has already made a

close study of the Indian tribes in the basin and around the mouth of the Skeena river, in British Columbia, is investigating the closely related tribes on the Nass river, especially their religion, social organization, traditions and totem-pole art. His work this year will complete the investigations undertaken by the Museum into the ethnology of the important and little known Tsimshian nation.

H. I. SMITH, acting under an interdepartmental board established two years ago through the co-operation of the Department of Indian Affairs, the Canadian National Railways, the Parks Branch of the Department of the Interior and the National Museum, is continuing to supervise the restoration and preservation of the Indian totem-poles in the Skeena river area, which even in their present state of decay have attracted much attention from tourists and artists. At the same time he is investigating the archæology of the surrounding region to secure motion pictures illustrating the life of the Indians.

J. C. BOILEAU GRANT, professor of Anatomy in the University of Manitoba, is investigating for the Museum the somatology of the Cree Indians at Island lake, on the border of Ontario and Manitoba, making a complete series of physical measurements. The Crees, like other northern tribes of Canada, have been entirely neglected hitherto, although important anthropometric studies have been made of the Indians in the more settled parts of Canada.

W. J. WINTEMBERG is investigating and excavating a prehistoric camping place or village site in the vicinity of Tadoussac, Quebec, where it is claimed that the early inhabitants were neither Iroquois nor Algonkian Indians, but either Eskimos or some ancient people of whom we know nothing. It seems possible that it may represent a settlement of the extinct Beothuck Indians of Newfoundland, who are thought to have migrated to that island from the Labrador peninusla. After investigating this site, Mr. Wintemberg will search the coast between Tadoussac and Montreal for other early ruins, and excavate wherever he finds any important remains.

D. JENNESS is making a reconnaissance of the archæology of the extinct Beothuck Indians with a view to ascertaining their origin, their contact with an ancient Eskimo tribe that inhabited Hudson strait, and their relationship to the Algonkian tribes of eastern Canada. At the conclusion of this work he will, if possible, search the north coast of the Strait of Belle Isle for Eskimo remains, to determine the antiquity of their visits to Newfoundland and their relationship to Eskimo remains in Hudson strait.

BIOLOGY

C. H. YOUNG and H. M. LAING began work early in May at Huntingdon, New Westminster district, British Columbia. After intensive collecting at that point, they will proceed eastward by Coquihalla Valley branch, to Hope, Penticton, Grand Forks, Kootenay lake, Elko, and other points. The primary object of this expedition is to make as complete collections as possible of the smaller mammals found in southern British Columbia in the region near the International Boundary line. A number of species reach the northern limit of their distribution near this line, and it is possible that active field work may add some new species to Canadian records. The southern part of British Columbia, being much cut up by alternating mountain ranges and valleys, showing different climatic conditions due to altitude and humidity, has developed many local races, and accurate information is desired on the local fauna of each district. Birds and other animals will also be collected.

J. D. SOPER, who returned last fall from two years work for the Museum in Baffin island, is collecting and studying the mammals found near the International Boundary line in Alberta. Beginning in the district south of Lethbridge and Medicine Hat, he will work to the western end of Cypress hills in Alberta, thence along Saskatchewan border south of Cypress hills, Wood mountain, Turtle mountains in southern Mantoba. This will connect with previous work done in Waterton Lakes park and should add a valuable collection of prairie and plains forms to the Museum collections.

M. O. MALTE and W. R. WATSON are continuing systematic botanical investigations in New Brunswick paying particular attention to districts where little intensive work has been done. The work of last season showed a surprising number of both native and introduced species previously unrepresented in our collections from this province and some previously unrecorded. This work is important in completing the list of the flora of Canada, and similar investigations in Prince Edward Island have already proved of great economic importance in discovering varieties of grasses which are now being developed agriculturally for seed.

M. O. MALTE joined the Canadian Arctic Expedition of 1927 which sailed on the S.S. *Beothic* from North Sydney, Nova Scotia, July 15, and is visiting western Greenland, Ellesmere Island,

Devon island, Baffin island, and possibly other islands in the Canadian Arctic archipelago. He is collecting plants at all points visited, making a study of certain plants *in situ*, and filling gaps in certain groups of the large collections of plants in the Herbarium from various points in the Canadian Arctic. This work is in preparation for a comprehensive flora of Arctic Canada, including the results of all Canadian and many foreign expeditions, in collaboration with Professor C. H. Ostenfeld, of Copenhagen, the well-known authority on northern floras.

R. M. ANDERSON is engaged in local field work as opportunity offers, and later in the season will make collections in parts of the Prairie Provinces, paying particular attention to areas which have few mammal specimens represented in the National collection. The collected specimens and published data on Canadian mammals are scattered, and Dr. Anderson is endeavouring to assemble data for a "Check-list of Canadian Mammals", bringing the nomenclature and range of species up to date as far as possible.

C. L. PATCH, C. E. JOHNSON, D. BLAKELY and JOS. ROCHON are collecting in Ottawa district, principally to fill gaps in the exhibit series of mammals, birds, reptiles and amphibians and collecting accessories for use in the habitat groups which are being prepared. Mr. Patch is collecting specimens and information for a check-list of Canadian reptiles and amphibians, and Mr. Johnson is preparing coloured drawings and sketches for the illustration of this work.

GEOLOGY

Specimens of rocks, ores, minerals and fossils are collected each year by parties of the Geological Survey for the Museum. Forty-eight Survey parties are distributed throughout Canada, from Yukon and Baffin island to Cape Breton, during the season of 1927.

MINERALOGY

A. T. MACKINNON is collecting quantities of minerals from various places in Ontario and Quebec. These supplies are used mainly for the preparation of educational collections which are distributed to Collegiate Institutes, High and Public schools and other educational institutions in Canada and other countries, and also to prospectors and mining institutions.

PALÆONTOLOGY

Palæontological collections are being made by many of the Geological Survey parties.

IN MEMORIAM—CHARLES W. NASH

BORN AUGUST 15, 1848. **DIED FEBRUARY 13, 1926.**

CHARLES W. NASH, Biologist of the Provincial Museum, St. James Square, Toronto, for the past twenty-three years, died at the home of his daughter, Mrs. H. S. Sweatman, 250 Heath Street West, on February 13, 1926. He is survived by two daughters, Mrs. H. S. Sweatman and Mrs. L. Lacey, as well as by grand-children. The funeral service and interment took place at Niagara-on-the-Lake, on Monday, February 15th.

Mr. Nash was born at Bognor, Sussex. England, on August 15, 1848, and received his education at Shoreham Grammar School. On February 13, 1877, he was married to Harriet Burns Campbell, daughter of His Honour E. C. Campbell, first judge of the united Counties of Lincoln, Welland and Haldimand, and late County Judge of Simcoe. Mrs. Nash predeceased him by a few years.

He came to Canada in 1869 when he would be twenty-one years of age, and here his earlier love of nature could find an outlet in a country where there was rare opportunity for the development of a sportsman and naturalist. Very shortly after his arrival in Canada he began lecturing on the subject of birds in relation to agriculture, and he took an early step in conservation by becoming a founder of a game and fish protective association at Hamilton, Ontario, about 1873. I think he has told me that he was the first Secretary-Treasurer of this Society, and it was founded at a time when game was abundant and when only a far-sighted man could foresee the great coming need for game protection.

Mr. Nash brought to Canada high ideals of sportsmanship and never missed an opportunity of teaching these in a country where the abundance of game and the pioneer conditions prevailing must have made them appear rather out of place.

He loved the frontier, and in the eighties went to Portage la Prairie and continued his natural

history observations while practising law in that community. Many of these are included in Seton's *Birds of Manitoba* which, although published many years ago now, is still the outstanding ornithological work on the birds of the province. In 1887 he returned to Ontario and devoted himself exclusively to the study of biology.

In connection with sportsmanship, Mr. Nash was a lover and a breeder of good gun dogs. He kept the same hunting stock generation after generation, and these were of mixed Sussex and Norfolk Spaniel blood. It was always his argument that these large Spaniels were the best all-around hunting dogs for our country, and the tremendous popularity of the Springer Spaniel, as the Norfolk is now called, in recent years shows how truly his insight into sport with the gun guided him in this particular. About 1899 he became lecturer on biology for the Farmers' Institute Bureau of the Ontario Department of Agriculture and in this capacity lectured for years. at the rate of 100 lectures per annum, to farmers, on such subjects as birds in relation to agriculture. In this capacity and later as Biologist of the Provincial Museum, he published extensively works which have done much to advance the knowledge of wild life, and to advance the protection of wild life in Canada. He always took a keen interest in exhibitions of natural history work and for many years acted as judge in the natural history exhibits of the Canadian National Exhibition at Toronto.

I well remember the first occasion on which I met Mr. Nash. It was a fine April morning and with another boy I was hunting for birds near the Kingston road, just about where the residence of Sir Donald Mann stands now. We had secured a Warbler as a specimen and did not know the species. Mr. Nash, accompanied by his spaniels, happened along the road and meeting us, he at once identified the bird as a Pine Warbler, the first we had ever seen. This contact continued through many years and although we were separated by difference in age, this made no barrier in the case of Mr. Nash. On one occasion we planned and completed a short expedition to Point Pelee to study the bird migration. Mr. Nash was not a young man then, but his good sportsmanship and ability to meet cheerfully all sorts of circumstances made him a charming companion and a very instructive one. A keen sense of humour always pervaded our discussions and while some persons might have taken his expressions of opinion as somewhat outspoken and even blunt, he had a friendly heart to his fellowman as he did to the wild creatures. Many scores of times I have called on him and it must have been rather upsetting to his work to have been so popular with youthful visitors, but I was always courteously received and welcomed. Located as he was in the Normal School Building, his instruction was available for hundreds of teachers who scattered from this school to all parts of the Province and certainly many of them took with them when they left Toronto, some insight into wild life and its protection.

Mr. Nash worked unceasingly in perfecting the collections of the Museum, and extended his efforts over a wide range of subjects. He was an old-fashioned naturalist, and at home in many fields. He was particularly interested of late years in completing coloured casts of the fishes, batrachians and reptiles of Ontario, but in addition to this work in ichthyology and herpetology, he studied in the fields of entomology, mammalogy and ornithology.

The following outline of his activities in Ichthyology has been furnished by Professor J. R. Dymond:

"Mr. Nash's breadth of interest in natural history is perhaps best shown by what he did in connection with the fish of the province. Most naturalists take comparatively little interest in fish, but Mr. Nash knew them as well as he did birds, mammals, insects, etc. In fact, he probably contributed more than any other one individual to our present knowledge of the fish fauna of the province. Not only was he interested in fishes, from the systematic and distributional point of view, but he was concerned with their conservation from both the economic and recreational point of view. His advice on matters of angling and fisheries regulations was sought by provincial officers in charge of these matters. About 1895 he was a member of a commission appointed by the Provincial Government to inquire into the question of the sale of bass and maskinonge. The report of this commission was never published, but acting on their recommendation the sale of these fish was prohibited. In discussing this question Mr. Nash has been heard to remark that in 1877 bass sold at 3¢ per pound and in 1885 at 40¢. He championed the poor man's rights in matters of this kind. He deplored the destruction of the angling in Toronto Bay and waters near Toronto, even though the fishes to be taken here were not as high-class game fish as those taken in more remote regions, but these nearby fish were all the poor man could afford to angle for, and Mr. Nash considered their interests perhaps before those of the trout and bass fishermen."

Mr. Nash was a member of the Ottawa Field-Naturalists' Club—the first number of the *Ottawa Naturalist* I ever saw was on his desk—and a member and for some years a director of the Entomological Society of Ontario.

The effect of his educational work was to lay a foundation in wild life protection in Ontario on which we are building to-day, and which has proved invaluable as further wild life protection becomes

necessary with the increase in the settlement of our Province. He was a great naturalist of an old-time school that has practically disappeared in modern-day specialization, a conservationist of note, and an educationalist, who reached and touched the grown-ups as well as the youth of our Province, and whose influence extended beyond its boundaries. Ontario, particularly, owes him a debt for his work along these lines, and yet to some of us he meant more than a naturalist, for he was a warm-hearted and true friend—HOYES LLOYD (*with the kind assistance of The Toronto Field-Naturalists' Club*).

Notes on the bibliography of the late Charles William Nash. By J. H. Fleming:—

"Although the field notes and scientific data gathered by Mr. Nash are now in the library of the Royal Ontario Museum of Zoology, Toronto, it has been found impossible to bring together a complete bibliography. The collection consists of a series of scrap-books each with a special heading containing notes and references in pencil together with articles cut from publications, often without definite indication of authorship. The official publications are as follows and the list is believed to be complete:

"*The Birds of Ontario in Relation to Agriculture*, published by the Department of Agriculture Toronto, 1898 (Reprinted from the Report of the Farmer's Institutes of Ontario, 1897-8). This is a pamphlet of thirty-two pages and thirty-two full page plates of birds from drawings by the author. A second edition was published in 1901 with some slight changes, a third edition, published in 1904 is unaltered from the second. Largely rewritten, a fourth edition appeared in 1909 as Bulletin 173, Ontario Department of Agriculture, followed by a fifth edition in 1913, revised as Bulletin 218.

"*Check List of the Birds of Ontario and Catalogue of the Birds in the Biological Section of the Museum*, Department of Education, Toronto, 1900. This is a pamphlet of fifty-eight pages containing an annotated list of 304 species and subspecies of birds.

"*Check List of the Vertebrates of Ontario and Catalogue of Specimens in the Biological Section of the Provincial Museum; Birds*, Department of Education, Toronto, 1905. This is a pamphlet of eighty-two pages, more fully annotated and with illustrations in the text by the author, it lists 324 species and subspecies of birds.

"*Check List of the Vertebrates of Ontario and Catalogue of Specimens in the Biological Section of the Provincial Museum; Batrachians, Reptiles, Mammals*, Department of Education, Toronto, 1905.

"*Check List of the Vertebrates of Ontario and Catalogue of Specimens in the Biological Section of the Provincial Museum; Fishes*, Department of Education, Toronto, 1908, with thirty-two full page plates by the author.

VERTEBRATES OF ONTARIO, *Deparmtent of Education, Toronto, 1908*. This consists of the last three titles bound together with new title page glossary and index.

A series of articles in *Farming World* beginning June 15th, 1904, and ending January 15th, 1908, show the versatility of the author in matters of benefit to the farm.

Nature about the farm, farm forestry and tree planting, planting for fence posts, farm windbreaks, grazing the woodlot, the relation between forestry and water power; are a few of the subjects written about.

There are articles scattered in various publications, one at least in *Forest and Stream*, Vol. 38, 1892, page 77, *Shore Birds Near Toronto*, one in *Report of Bureau of Forestry of the Province of Ontario, 1903, on Farm Forestry*. There are two contributions to the *Auk* Bird Notes from Toronto, Canada, 1896, page 347. *Nelson's Sparrow* at Toronto, Ontario, 1899, page 277. The list of articles is unfortunately incomplete and in addition Mr. Nash contributed manuscript lists to the Committee on bird protection of the American Ornithologists Union beginning with observations on the birds of Portage la Prairie and vicinity, 1884-5, and followed with regular yearly reports to the Biological Survey at Washington on the birds observed at Todmorden, Ontario (a suburb of Toronto) and later from Toronto."

NOTES AND OBSERVATIONS

A NOTE CONCERNING FUR FARMING.—Fur farming in Canada is a comparatively new line of business and much concerning it has yet to be learned. The industry presents many attractive possibilities and on that account it is apt to attract many to it, as a means of making an easy livelihood without their having the experience necessary to success. As a matter of fact, there are a number of pitfalls to be avoided among which must be reckoned the danger of introducing diseases and the weakening of our northern stock by bringing in less hardy animals. A recent letter from a correspondent whose name I have been requested to withhold, puts the matter very clearly and it is, therefore, quoted at length:—

"A number of people throughout Canada are interested in stocking marsh areas with muskrats. It is very desirable for many reasons to use the local native stock for this purpose, rather than to bring in breeding stock form a distance which is thought at the time to have some advantage or other.

"Animals like the muskrat exist as different varieties in each part of their range and these local varieties or subspecies are almost certainly better adapted to meet local conditions than an outside strain would be.

"It may be that extra dark rats are in demand

at the moment but it would be distinctly harmful to secure a strain of dark rats from another section of the country just because of this. Fashion is fickle and some other colour, phase or variety may be the popular one next year. If the local stock has been mongrelized in the meantime it is quite possible that the mongrels are of far less value than the pure local stock and they are almost certain to be less suited to the local conditions.

"The transfer of stock from one section of Canada to another, or bringing stock from outside has a distinct disadvantage as well in the likelihood of disease being carried and infesting the local animals.

"These points are thought to be of greater importance in the case of muskrats than in the case of other animals, for muskrats can be expected to escape from complete or partial confinement and intermingle with the native local stock.

"Our native breeds of wild animals should be kept pure and not intermingled haphazardly with stock from distant points."

It might be added that our northern animals average a thicker and finer quality of fur than can be obtained elsewhere and on that account alone care should be taken to avoid polluting our stock with inferior strains. Moreover local colour phases are usually due to climatical conditions and it is probable that such colours will speedily disappear when the animals are transferred to another locality.

The whole matter is one that vitally affects fur farmers and it is hoped that they will exercise all possible precautions before introducing animals which may prove less suitable to our condition and before intermixing seriously endangers the health of the native stock.—NORMAN CRIDDLE.

ADDITIONAL COMMENTS REGARDING MALLARDS WINTERING AT BUFFALO LAKE, ALBERTA, 1923-24.—Mr. Frank Farley* has recorded the wintering of a large number of Mallards at Buffalo Lake, Alberta, and Prof. Wm. Rowan has discussed this to some extent in a recent paper on photoperiodism and migration. As some additional information on this unusual occurrence is available it is felt that it ought to be placed on record in order to supplement, as far as possible, the printed word.

By letter of February 6, 1924, Mr. George Cook than Sanctuary Caretaker who was in charge of the feeding of the ducks reported the birds all strong except that fifteen dead ones were found in the opening in the ice described by Mr. Farley. He was asked by letter of February 13th to ship a box of the dead birds to Mr. P. A. Taverner, Ornithologist of the National Museum at Ottawa, to be used as specimens, and he accordingly sent ten in the flesh. They were in very poor condition and according to Mr. Taverner had apparently starved to death.

On February 24th, when Mr. Cook visited the hole in the ice he found forty-seven dead birds and others in the open water which were paralyzed and attempting to swim. Having in mind the previous request for specimens and the unusual death of so many birds he collected and sent to the National Museum, a box containing twenty-seven of these birds. Mr. Cook suspected that they had been poisoned because there had been some criticism of the feeding of these birds which are known to damage crops at times.

Dr. Frank T. Shutt, Dominion Chemist at the Central Experimental Farm, Department of Agriculture, Ottawa, kindly had the stomachs and crops of four specimens examined for strychnine and arsenic, but the results were negative.

Mr. H. M. Lancaster, for the Laboratories of the Department of Health, Ottawa, reported that the two birds they examined had been feeding on wheat, lamb's quarters, black bindweed, dock, wild oats and flax. A complete examination for volatile and non-volatile poisons, organic and inorganic, did not disclose positive results.

Dissection of specimens by the pathologist of the Poultry division, Department of Agriculture, Ottawa, showed no pathological condition, and no evidence of acute poisoning. The birds here examined and those I prepared as specimens were apparently gaining in flesh and had a fairly good layer of fat next to the skin.

All attempts to account for the sudden death of nearly fifty of these Mallards on February 24th have been unsuccessful, and although I have often considered the problem in the intervening time, it seems advisable even if unsatisfactory to record the facts and to deliver an open verdict. These birds, even though given ample foods, may have succumbed to exposure after a valiant effort to weather the rigors of an Alberta winter.—HOYES LLOYD.

UNUSUAL SONG FROM A CAROLINA WREN.—At long intervals in the life of a bird student come opportunities to hear something exceptional in the way of bird songs, and a recent occurrence goes to show that even good singers have periods of super-excellence in their music. Such an experience happened on the morning of Sunday, June 26, 1927, when I was awakened shortly after dawn by a loud song of magnificent quality and one that puzzled me completely. It was something after the style of a Super-Chewink with an Oriole quality, but immediately he changed to another song and hardly ever repeated himself. I got up, of course, but could not find him. But around seven o'clock he sang again and this time I got a fleeting glimpse in a pear tree of a bird

that had the size and back-colour of a Carolina Wren, but, as I thought, a longer tail. I did not hear him again until nearly eleven o'clock when he sang for quite a long time and we got many perfectly good views of a Carolina Wren.

Although the tone was of exceptional brilliance for this species, I felt confident of his identity before he was satisfactorily seen. Quite frequently one is compelled to judge a song by quality rather than by melody and previous experience of that character led me to suspect this bird's identity before he was seen at all.

This occurrence has been submitted to Mr. F. C. Lincoln and Dr. Wetmore of the Biological Survey at Washington and neither of these two experienced field men had ever heard anything comparable with it, but they agreed that "it should be classified as one of those unusual cases that are frequently coming under observation. Possibly the fact that this bird was at the northern part of its range may be responsible for the unusual character of its song." This very interesting suggestion from Mr. Lincoln should be borne in mind by anyone who is listening to birds that may possibly be unable to find a mate. Mr. ——— in the last number of the *Auk* is confident that the male arrives first, selects and appropriates, so to speak, his nesting ground and then sings, awaiting the arrival of his mate. And this wren, on June 26, was five or six weeks behind his nesting period and he had good reason to become excited on account of the absence of a mate and the lessened prospect of finding one at all. There are perhaps ten or twenty pairs of Carolina Wrens nesting in Ontario and if this London bird was hunting for a widowed female he was looking for a needle in a haystack.

A curious confirmation of this theory comes from Mr. G. A. Ramsden of Grimsby, who tells me that about July 27 he and his wife were awakened by a wonderful singer. He described the song and I read him my notes on this Carolina Wren and our accounts agreed pretty well. He stressed particularly the wonderful character and tone of its whistle; it seems quite within the bounds of probability that the bird heard at London had wandered as far as Grimsby in search of a mate.

Both at Grimsby and London the bird was heard on one morning only and similar occurrences have been noted with the Mockingbird at Point Pelee. Bert Garner and P. A. Taverner have both told me of visits from singing Mockingbirds that would last only a few hours and would not again be heard, all of which falls in very well with the theory of a bird hunting a mate.

Down at Point Pelee and elsewhere I have heard perhaps twenty-five of these birds sing and invariably they are repeaters, using the same phrase five to ten times in a song and the next song is probably the same, although occasionally it differs. But this fellow seldom repeated himself at all and he certainly was a wonderful singer, who made the morning of his arrival one long to be remembered.—W. E. SAUNDERS.

ANOTHER MYSTERY BAND.—The Canadian National Parks Branch, Department of the Interior, Ottawa, which is keeping the file of official Canadian Bird Banding Records has recently received a letter from Mr. F. Kermode, Director of the Provincial Museum, Victoria, British Columbia, in which it was stated that on June 19, 1927, Mr. Euke, of Oak Bay district, near Victoria, found a dead Barn Swallow, wearing a red celluloid band inscribed with the number "16".

The band is not one of the official series being used throughout Canada and the United States, and an endeavour is being made to trace its origin. The Canadian National Parks Branch would appreciate very much hearing from any person who has information concerning the placing of this band.—HOYES LLOYD.

LOON BANDED IN PENNSYLVANIA KILLED IN ONTARIO.—On May 12, 1926, Mr. J. S. Reinert, of Lansdale, Montgomery County, Pennsylvania, forwarded to this office a live and healthy Loon (*Gavia immer immer*). After photographing, sketching and banding this bird, we liberated it on May 15, at Wildwood Lake, Harrisburg. It swam to deep water, dived several times and later in the evening flew to the nearby Susquehanna River.

In a letter from Mr. George E. Donkin of Toronto, dated August 1, 1927, we received interesting information concerning this Loon. Mr. Donkin writes: "On Sunday, July 31, while walking on the beach at Brighton, Ontario, I found a Loon with a leg band of your Commission, No. 9684. The bird had evidently just arrived or was sleeping and had been killed by a skunk, as the approach and attack were all clearly indicated in the sand. Likely after a long flight it was exhausted. I am taking the liberty of keeping the clip as a novelty."

Thus this Loon had wandered for fifteen months after its liberation in Pennsylvania. It had likely visited the Gulf of Mexico during this period.—GEORGE MIKSCH SUTTON, Game Commission, Harrisburg, Pa.

HUDSONIAN CURLEW SEEN AT OTTAWA, ONTARIO.—At Britannia, near Ottawa, Ontario, on Friday, July 15, 1927, at 8 p.m., I saw a flock of

Curlew, almost certainly Hudsonian, containing about fifty birds. They were flying southwesterly and in the usual V formation, with a few outside the lines. The identity of these birds was known to me because of many years experience on the Canadian Labrador coast where I used to shoot them. The long curved beak, the size, and the whistled note can never be forgotten.

A fishermen reported having seen birds as large as partridges wading in the water at Long Sand Point, Lake Deschenes, twenty miles up river, on the 18th of July. He said there were about sixty birds and no doubt this was the same flock. —L. H. DE PUYJALON.

ROCKY MOUNTAIN SHEEP TRANSFERRED FROM BANFF TO SPENCE'S BRIDGE, B.C.—Fifty Rocky Mountain Sheep were supplied to the British Columbia Game Conservation Board by the Canadian National Parks Service in March, 1927. These sheep were from the surplus near Banff and are to be used by the British Columbia Game authorities for stocking a former range of the species near Spence's Bridge, B.C.—HOYES LLOYD.

EXTRACT FROM *The Debates of the Senate*, MARCH 29, 1927, HON. SIR GEORGE FOSTER. P. 221.—"I agree in the main with the argument which my honourable friend (Hon. Mr. Dandurand) has presented for the passage of this Bill. But I think there is another consideration that has not been mentioned, and it weighs with me to a certain extent. The imposition of such an export that will have some influence, and I should think a considerable influence, in protecting game in those wide regions and preventing a slaughter which can only eventuate in the extinction of the game.

"A new danger threatens those far-distant parts of our territory. The aeroplane now takes people beyond our sight and above the ken of our customs officers, and transports them to the very centre of the haunts of large and small game, and so measures will have to be taken, I have no doubt, to prevent an indiscriminate slaughter by adventurers and sportsmen of that kind who will easily find their way into those regions. It would be a tremendous pity and a great shame if we should wake up years from now or generations from now and find that those preserves, which Nature thought she had made almost impregnable, had been denuded of their game. I think, the Government, if it has not already done so, should take some steps with a view to averting that danger My honourable friend will remember that a few years ago sporting parties from another country and sometimes, perhaps, from our own, made their way in swift launches up along our coast and shot the sea fowl as they were sitting upon their nests and incubating the future supply of birds of that kind. Fortunately a Treaty has been made between Canada and the United States which goes very far towards protecting sea fowl and large migratory birds; but there is a great danger looming ahead, by reason of the facility with which sportsmen, so-called, in aeroplanes, may reach the territories inhabited by game and destroy what we should try to preserve.

"I do not know whether there are any regulations as to the licensing of people from outside our own country, and preventing them from shooting game in such sections of our country, or whether there is any preventive or supervisory attention given to that phase of the subject.

"Our birds and game are distributed over wide areas; they are to be found in the mountains, thousands of feet high, and on the lakes and rivers, and far up into the north, where caribou and other large game animals come and go. I think that is something which we ought to keep in mind, it is so distinctive of Canada and such a gem in her crown. Take the musk-ox, for instance, about which some of the Departments of the Government have issued a most entertaining and instructive little book. It should be our care to preserve our game and in that way make Canada a country of renown. We are doing that to a certain degree by our game preserves and parks but there is a mighty region up towards the north, which is open to invasion by all kinds of sporting characters who may easily reach those areas by aeroplane.

"I am in favour of this Bill because I think it will have some influence in diminishing the destruction of game. I do not suppose that among the people who live in those distant regions one out of a hundred traps with any idea of exporting personally. Their market is in the stores of that country; but I think the profit on furs is so large that even those who buy them in quantities and look for their returns only after they have exported them, should have no objection to a fairly good tax."

LOUISIANA WATER-THRUSH AT KINGSTON, ONTARIO.—A Louisiana Water-thrush (*Seiurus motacilla*) spent several hours in a small city garden on May 2, 1927. I had excellent opportunities of observing it closely, in good light, with 6X glasses, at distances of from five to fifteen yards; and I noticed especially that the throat was unmarked. The bird was first seen about one p.m., and was then watched for an hour. It apparently spent the rest of the day in the neighbourhood; for it was still present on my return to the garden for an hour from four to five p.m.—R. O. MERRIMAN.

OFFICIAL CANADIAN RECORD OF BIRD-BANDING RETURNS.

Published by Authority of the Canadian National Parks Branch, Department of the Interior, Canada

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.

INSTALMENT No. 15

RETURNS UPON BIRDS BANDED IN 1921

BLACK DUCK, No. 4740, banded by H. S. Osler, at Lake Scugog, Ontario, on September 19, 1921, was killed at Crawfordsville, Indiana, on December 3, 1921.*

BLACK DUCK, No. 4742, banded by H. S. Osler, at Lake Scugog, Ontario, on September 19, 1921, was killed at Long Point, Ontario, on October 12, 1921.*

BLACK DUCK, No. 4745, banded by H. S. Osler, at Lake Scugog, Ontario, on September 19, 1921, was killed at Long Point Bay, Ontario, on December 6, 1921.*

BLACK DUCK, No. 4747, banded by H. S. Osler, at Lake Scugog, Ontario, on September 19, 1921, was killed at a place thirteen miles northwest of Williamsburg, Virginia, on December 28, 1921.*

BLACK DUCK, No. 4758, banded by H. S. Osler, at Lake Scugog, Ontario, on September 19, 1921, was killed at Port Rowan, Ontario, on November 14, 1921.*

BLACK DUCK, No. 4761, banded by H. S. Osler, at Lake Scugog, Ontario, on September 19, 1921, was killed at Port Perry, Ontario, on October 7, 1921.*

BLACK DUCK, No. 4765, banded by H. S. Osler, at Lake Scugog, Ontario, on September 19, 1921, was killed at a place five miles north of Lake Scugog, Ontario, on November 18, 1921.*

BLACK DUCK, No. 4769, banded by H. S. Osler, at Lake Scugog, Ontario, on September 19, 1921, was killed at Port Rowan, Ontario, on December 7, 1921.*

BLACK DUCK, No. 4771, banded by H. S. Osler, at Lake Scugog, Ontario, on September 19, 1921, was killed at New Castle, Delaware, on December 2, 1921.*

BLACK DUCK, No. 4773, banded by H. S. Osler, at Lake Scugog, Ontario, on September 19, 1921, was killed in Woodford County, Illinois, on November 11, 1921.*

BLACK DUCK, No. 4780, banded by H. S. Osler, at Lake Scugog, Ontario, on September 20, 1921, was killed at Stony Brook Harbor, New York, on January 2, 1922.*

BLACK DUCK, No. 4783, banded by H. S. Osler, at Lake Scugog, Ontario, on September 21, 1921, was shot at Pomeroy, Iowa, on November 12, 1922.*

BLACK DUCK, No. 4786, banded by H. S. Osler, at Lake Scugog, Ontario, on Sepember 21,. 1921, was killed at Clear Creek, Ontario, on November 8, 1921.*

BLACK DUCK, No. 4787, banded by H. S. Osler, at Lake Scugog, Ontario, on September 21, 1921, was killed at a place twenty miles east of Toronto, Ontario, on November 26, 1921.*

BLACK DUCK, No. 4789, banded by H. S. Osler, at Lake Scugog, Ontario, on September 22, 1921, was killed at Rockwood, Michigan, on November 10, 1921.*

BLACK DUCK, No. 4796, banded by H. S. Osler, at Lake Scugog, Ontario, on September 22, 1921, was killed at a place three miles east of Rockford, Ohio, on December 19, 1921.*

BLACK DUCK, No. 4800, banded by H. S. Osler, at Lake Scugog, Ontario, on September 24, 1921, was killed at Belleville, Ontario, during the fall of 1921.*

BLACK DUCK, No. 4804, banded by H. S. Osler, at Lake Scugog, Ontario, on September 24, 1921, was killed in the same locality, during the fall in which it was banded.*

BLACK DUCK, No. 4810, banded by H. S. Osler, at Lake Scugog, Ontario, on Spetember 24, 1921, was killed in the same locality, during the fall in which it was banded.*

BLACK DUCK, No. 4815, banded by H. S. Osler, at Lake Scugog, Ontario, on September 25, 1921, was killed at Lake Katchawannooka, Ontario, on October 29, 1921.*

BLACK DUCK, No. 4822, banded by H. S. Osler, at Lake Scugog, Ontario, on September 26, 1921, was killed at Hamilton, Ontario, on October 22, 1921.*

BLACK DUCK, No. 4884, banded by H. S. Osler, at Lake Scugog, Ontario, on September 28, 1921, was killed at Hardyville, Kentucky, on November 12, 1921.*

BLACK DUCK, No. 4888, banded by H. S. Osler, at Lake Scugog, Ontario, on September 28, 1921, was killed at Marmora, Ontario, on October 13, 1921.*

BLACK DUCK, No. 4892, banded by H. S., Osler, at Lake Scugog, Ontario, on September 28 1921, was killed at Henry, Tennessee, on November 10, 1921.*

BLACK DUCK, No. 4895, banded by H. S. Osler, at Lake Scugog, Ontario, on September 28, 1921, was shot at the mouth of the Mississippi River, Louisiana, on November 5, 1921.*

BLACK DUCK, No. A.B.B.A. 37,330, banded by H. S. Osler, at Lake Scugog, Ontario, on October 2, 1921, was killed at Brechin, Ontario, on October 17, 1921.*

BLACK DUCK, No. A.B.B.A. 37,338, banded by H. S. Osler, at Lake Scugog, Ontario, on October 2, 1921, was killed in the same locality on November 2, 1921.*

BLACK DUCK, No. A.B.B.A. 37,340, banded by H. S. Osler, at Lake Scugog, Ontario, on October 2, 1921, was killed in Kent County, Delaware, on October 22, 1921.*

BLACK DUCK, No. A.B.B.A. 37,341, banded by H. S. Osler, at Lake Scugog, Ontario, on October 2, 1921, was killed at Toledo, Ohio, on November 23, 1921.

*U.S. Dept. of Agric. Bull., No. 1268, Oct. 16, 1924.

*U.S. Dept. of Agric. Bull., No. 1268, Oct. 16, 1924.

BLACK DUCK, No. A.B.B.A. 37,342, banded by H. S. Osler, at Lake Scugog, Ontario, on October 2, 1921, was killed at Pontiac, Michigan, on November 17, 1921.*

BLACK DUCK, No. A.B.B.A. 37,348, banded by H. S. Osler, at Lake Scugog, Ontario, on October 2, 1921, was killed at East St. Louis, Illinois, on November 13, 1921.*

BLACK DUCK, No. A.B.B.A. 37,350, banded by H. S. Osler, at Lake Scugog, Ontario, on October 2, 1921, was killed at Cartersville, Georgia, on February 20, 1922.*

BLACK DUCK, No. A.B.B.A. 37,362, banded by H. S. Osler, at Lake Scugog, Ontario, on October 2, 1921, was killed at Havre de Grace, Maryland, on January 17, 1922.*

BLACK DUCK, No. A.B.B.A 37,367, banded by H. S. Osler, at Lake Scugog, Ontario, on October 2, 1921, was killed at Big Rice Bay, Ontario, on October 13, 1921.*

BLACK DUCK, No. A.B.B.A. 37,368, banded by H. S. Osler, at Lake Scugog, Ontario, on October 2, 1921, was killed at Port Clinton, Ohio, on November 3, 1921.*

BLACK DUCK, No. A.B.B.A. 37,385, banded by H. S. Osler, at Lake Scugog, Ontario, on October 2, 1921, was killed at Port Rowan, Ontario, during the month of October, 1921.*

BLACK DUCK, No. 101,102, banded by H. S. Osler, at Lake Scugog, Ontario, on October 16, 1921, was killed at Saxis, Virginia, on January 3 1922.*

BLACK DUCK, No. 101,124, banded by H. S. Osler, at Lake Scugog, Ontario, on October 23, 1921, was shot at St. Clair Flats, Ontario, on November 2, 1922.*

BLUE-WINGED TEAL, No. 4856, banded by H. S. Osler, at Lake Scugog, Ontario, on September 24, 1921, was shot at Scugog River, Ontario, on September 27, 1921.*

BLUE-WINGED TEAL, No. 4858, banded by H. S. Osler, at Lake Scugog, Ontario, on September 24, 1921, was shot at Long Point, Lake Erie, Ontario, on September 26, 1921.*

BLUE-WINGED TEAL, No. 4867, banded by H. S. Osler, at Lake Scugog, Ontario, on September 24, 1921, was killed at Middle Lake, Nicollet County, Minnesota, on September 18, 1922.

BLUE-WINGED TEAL, No. 4869, banded by H. S. Osler, at Lake Scugog, Ontario, on September 24, 1921, was killed at Arlington, South Dakota, approximately on September 15, 1922.*

BLUE-WINGED TEAL, No. 4875, banded by H. S. Osler, at Lake Scugog, Ontario, on September 24, 1921, was killed at Rice Lake, Ontario, on October 14, 1921.*

SCAUP (?) DUCK, No. 101,122, banded by H. S. Osler, at Lake Scugog, Ontario, on October 16, 1921, was killed in the same locality, on November 4, 1921.*

RETURNS UPON BIRDS BANDED IN 1922

GANNET, No. 207,236, fledgeling, banded by H. L. Stoddard, at Bonaventure Island, Quebec, on July 31, 1922, was "taken while driving mackerel from a fish trap" at Casco Bay, Maine, on September 15, 1922.

GANNET, No. 207,269, fledgeling, banded by H. L. Stoddard, at Bonaventure Island, Quebec, on July 31, 1922, was caught in a herring net at Neils Harbor, Nova Scotia, on November 27, 1922.*

MALLARD, No. 101,327, banded by L. V. Walton, at Cuivre Island, Missouri, on January 7, 1922, was shot at a place fifteen miles northwest of Prince Albert, Saskatchewan, approximately on October 12, 1922.*

MALLARD, No. 102,057, ♀ banded by L. V. Walton, at Cuivre Island, Missouri, on January 30, 1922, was shot (?) at Wordsworth, Saskatchewan, on April 19, 1923.*

MALLARD, No. 101,682, ♂, banded by E. A. McIlhenny, at Avery Island, Louisiana, on February 9, 1922, was killed at Cumberland Lake, Saskatchewan, on August 17, 1922.

MALLARD, No. 102,421, ♂, banded by F. C. Lincoln, at Browning, Illinois, on March 6, 1922, was shot (?) at Luck Lake, Saskatchewan, on October 7, 1922.*

MALLARD, No. 102,633, ♀, banded by F. C. Lincoln, at Browning, Illinois, on March 11, 1922, was killed by a dog at Buchanan, Saskatchewan, on April 22, 1922.*

MALLARD, No. 102,794, ♀, banded by F. C. Lincoln, at Browning, Illinois, o nMarch 13, 1922, was shot at a place six miles north of Sheho, Saskatchewan, on September 16, 1922.*

MALLARD, No. 102,832, ♂, banded by F. C. Lincoln, at Browning, Illinois, on March 14, 1922, was killed at a place two miles south of Seward, Saskatchewan, on September 15, 1922.*

MALLARD, No. 101,198, ♂, banded by H. S. Osler, at Lake Scugog, Ontario, on August 24, 1922, was shot at a place six miles west of Paxton, Nebraska, in the South Platte River, on October 31, 1925.

MALLARD, No. 101,259, ♂, banded by H. S. Osler, at Lake Scugog, Ontario, on August 29, 1922, was shot in Ottawa County, Ohio, on October 19, 1922.*

MALLARD, No. 202,420, imm., banded by Harry H. Felt, at Findlater, Saskatchewan, on September 3, 1922, was killed at a place three miles north of Cataro, Louisiana, on November 25, 1922.*

MALLARD, No. A.B.B.A. 37,424, ♂, banded by H. S. Osler, at Lake Scugog, Ontario, on September 24, 1922, was shot at Wabash River, Indiana, shortly before March 10, 1926. The number was almost worn off the band.

MALLARD, No. 228,624, banded by H. S. Osler, at Lake Scugog, Ontario, on October 21, 1922, was killed at Blaney, South Carolina, on February 10, 1923.*

MALLARD, No. 230,070, banded by F. C. Lincoln, at Sanganois Club, Browning, Illinois, on November 16, 1922, was killed in the southwest quarter of Section 6, Township 40, Range 6, West of the 4th Meridian, Alberta, about November 2, 1925.

MALLARD, No. 230,469, ♂, banded by F. C. Lincoln, at Browning, Illinois, on November 22, 1922, was killed at Middle Lake, Saskatchewan, thirty miles north of Humboldt, on October 1, 1925.

MALLARD, No. 230,691, ♂, banded by F. C. Lincoln, at Sanganois Club, Browning, Illinois, on November 24, 1922, was killed in a trap at Poplar Point, on the Saskatchewan River, about fifteen miles from the Hudson's Bay Company Post at Cedar Lake, Manitoba, on April 30, 1925.

*U.S. Dept. of Agric. Bull., No. 1268, Oct. 16, 1924.

*U.S. Dept. of Agric. Bull., No. 1268, Oct. 16, 1924.

MALLARD, No. 230,797, ♂, banded by F. C. Lincoln, at Sanganois Club, Browning, Illinois, on November 25, 1922, was shot at Luck Lake, Saskatchewan, at or near Section 24, Township 24, Range 9, West of the 3rd Meridian, on October 8, 1925.

MALLARD, No. 230,804, banded by F. C. Lincoln, at Browning, Illinois, on November 25, 1922, was shot at Lake Francis, Manitoba, on October 17, 1925.

MALLARD, No. 231,062, ♂, banded by F. C. Lincoln, at Browning, Illinois, on November 28, 1922, was shot at Oxford House, Manitoba, approximately on May 3, 1923.*

MALLARD, No. 231,090, ♀, banded by F. C. Lincoln, at Browning, Illinois, on November 29, 1922, was shot at a place four miles north-west of Shoal Lake, Manitoba, and twenty-four miles west of Elphinstone, Manitoba, on October 5, 1925.

BLACK DUCK, No. 101,138, banded by H. S. Osler, at Lake Scugog, Ontario, on August 20, 1922, was shot at a place three miles south of Rockford, Michigan, on November 18, 1922.

BLACK DUCK, No. 101,140, banded by H. S. Osler, at Lake Scugog, Ontario, on August 20, 1922, was shot at Woodville, New York, on October 24, 1922.*

BLACK DUCK, No. 101,146, banded by H. S. Osler, at Lake Scugog, Ontario, on August 20, 1922, was shot at Waubaushene, Ontario, on October 13, 1922.*

BLACK DUCK, No. 101,191, banded by H. S. Osler, at Lake Scugog, Ontario, on August 24, 1922, was killed at Henry, Illinois, on October 29, 1922.*

BLACK DUCK, No. 101,270, banded by H. S. Osler, at Lake Scugog. Ontario, on August 31, 1922, was killed at Port Clinton, Ohio, on November 2' 1922.*

BLACK DUCK, No. 101,276, banded by H. S. Osler, at Lake Scugog, Ontario, on August 31, 1922, was shot at Sandusky Marshes, Ohio, on October 26, 1922.*

BLACK DUCK, No. 101,277, banded by H. S. Osler, at Lake Scugog, Ontario, on August 31, 1922, was re-caught at the same station, on September 5, 1922, and was killed at Wachapreague, Virginia, on November 15, 1922.*

BLACK DUCK, No. 101,280, banded by H. S. Osler, at Lake Scugog, Ontario, on August 31, 1922, was shot at Fremont, Ohio, on October 13' 1922.*

BLACK DUCK, No. 101,284, banded by H. S. Osler, at Lake Scugog, Ontario, on August 31, 1922, was killed at Port Penn, Delaware, on November 3, 1922.*

BLACK DUCK, No. 101,294, banded by H. S. Osler, at Lake Scugog, Ontario, on September 1, 1922, was killed in the marsh of Nanticoke River, Dorchester County, Maryland, on November 2, 1925.

BLACK DUCK, No. 207,504, banded by H. S. Osler, at Lake Scugog, Ontario, on September 2, 1922, was re-caught at the same station, on September 12, 1922, and was shot at Lake St. Clair, Ontario, on November 9, 1922.*

BLACK DUCK, No. 101,298, banded by H. S. Osler, at Lake Scugog, Ontario, on September 1, 1922, was shot in Kent County, Maryland, approximately on December 1, 1922.*

BLACK DUCK, No. 207,505, banded by H. S. Osler, at Lake Scugog, Ontario, on September 2, 1922, was shot at Pigeon Lake, Ontario, on October 20, 1922.*

BLACK DUCK, No. 207,548, banded by H. S. Osler, at Lake Scugog, Ontario, on September 10, 1922, was shot (?) in the same locality, on October 26, 1922.*

BLACK DUCK, No. 207,623, banded by H. S. Osler, at Lake Scugog, Ontario, on September 16, 1922, was killed at Port Clinton, Ohio, on November 14, 1922.*

BLACK DUCK, No. 207,634, banded by H. S. Osler, at Lake Scugog, Ontario, on September 18, 1922, was killed in Ashley County, Arkansas, on November 21, 1922.*

BLACK DUCK, No. 207,635, banded by H. S. Osler, at Lake Scugog, Ontario, on September 18, 1922, was re-caught at the same station, on September 24, 1922, and was shot at Coldwater, Ontario, on October 10, 1922.

BLACK DUCK, No. 207,644, banded by H. S. Osler, at Lake Scugog, Ontario, on September 19, 1922, was killed at Dunn, North Carolina, on November 17, 1922.*

BLACK DUCK, No. 207,766, banded by H. S. Osler, at Lake Scugog, Ontario, on September 22, 1922, was killed at Henry, Illinois, on November 19, 1922.*

BLACK DUCK, No. 207,781, banded by H. S. Osler, at Lake Scugog, Ontario, on September 22, 1922, was killed at Knotts Island, North Carolina, on November 10, 1922.*

BLACK DUCK, No. 207,784, banded by H. S. Osler, at Lake Scugog, Ontario, on September 23, 1922, was taken in a trap set for muskrats at Algoma, Ontario, approximately on May 8, 1923.*

BLACK DUCK, No. 207,794, banded by H. S. Osler, at Lake Scugog, Ontario, on September 23 1922, was shot at Rice Lake, Ontario, on November 4, 1922.*

BLACK DUCK, No. A.B.B.A. 37,478, banded by H. S. Osler, at Lake Scugog, Ontario, on Septembet 26, 1922, was shot at Bay of Quinte, Ontario, on October 23, 1922.*

BLACK DUCK, No. A.B.B.A. 37,497, banded by H. S. Osler, at Lake Scugog, Ontario, on September 27, 1922, was killed at a place fifteen miles south of Havre de Grace, Maryland, on November 11, 1922.*

BLACK DUCK, No. 207,908, banded by H. S. Osler, at Lake Scugog, Ontario, on September 27, 1922, was shot at Long Point, on the north shore of Lake Erie, Ontario, on November 6, 1922.*

BLACK DUCK, No. 207,911, banded by H. S. Osler, at Lake Scugog, Ontario, on September 27, 1922, was re-caught at the same station, on September 28, 1922, and was killed at Fishing Bay, Dorchester County, Maryland, on November 13, 1922.

BLACK DUCK, No. 207,968, banded by H. S. Osler, at Lake Scugog, Ontario, on October 2, 1922, was re-caught at the same station, on October 3 and 6, 1922, and was shot in the same locality, on October 26, 1922.*

BLACK DUCK, No. 207,957, banded by H. S. Osler, at Lake Scugog, Ontario, on October 1, 1922, was shot at Brighton, Ontario, on October 25, 1922.*

*U.S. Dept. of Agric. Bull., No. 1268, Oct. 16, 1924.

*U.S. Dept. of Agric. Bull., No. 1268, Oct. 16, 1924.

BLACK DUCK, No. 207,955, banded by H.S. Osler, at Lake Scugog, Ontario, on October 1, 1922, was shot at Mud Lake, on November 11, 1922.*

BLACK DUCK, No. 207,961, banded by H. S. Osler, at Lake Scugog, Ontario, on October 1, 1922, was shot at Bono, Ohio, on October 20, 1922.*

BLACK DUCK, No. 207,972, banded by H. S. Osler, at Lake Scugog, Ontario, on October 2, 1922, was re-caught at the same station, on October 7, 1922, and was killed in Jacks Bay, Calvert County, Maryland, during the month of January, 1926.

BLACK DUCK, No. 207,982, banded by H. S. Osler, at Lake Scugog, Ontario, on October 2, 1922, was killed at a place fifteen miles south of Houma, Louisiana, on December 12, 1922.*

BLACK DUCK, No. 207,989, banded by H. S. Osler, at Lake Scugog, Ontario, on October 4, 1922, was shot at Zephyr, Ontario, on October 28, 1922.*

BLACK DUCK, No. 207,996, banded by H. S. Osler, at Lake Scugog, Ontario, on October 4, 1922, was killed in the Savannah River, near Millettville, South Carolina, on December 30, 1925.

BLACK DUCK, No. 228,408, banded by H. S. Osler, at Lake Scugog, Ontario, on October 6, 1922, was shot at Rice Lake, Ontario, on October 12, 1922.*

BLACK DUCK, No. 228,413, banded by H. S. Osler, at Lake Scugog, Ontario, on October 7, 1922, was re-caught at the same station, on September 3, 1923, and was killed in the County of Accomac, Virginia, on November 17, 1925.**

BLACK DUCK, No. 228,420, banded by H. S. Osler, at Lake Scugog, Ontario, on October 7, 1922, was killed at Orland, Indiana, on November 5, 1922.*

BLACK DUCK, (?) No. 228,442, banded by H. S. Osler, at Lake Scugog, Ontario, on October 7, 1922, was killed at a place six miles north of Fort Valley, Georgia, on November 9, 1922.*

BLACK DUCK, No. 228,467, banded by H. S. Osler, at Lake Scugog, Ontario, on October 8, 1922, was shot at a place three miles north of Tilbury, Ontario, approximately on November 10, 1922.*

BLACK DUCK, No. 228,482, banded by H. S. Osler, at Lake Scugog, Ontario, on October 8, 1922, was shot at a place eight miles north of Massillon, Ohio, on October 27, 1922.*

BLACK DUCK, No. 228,499, banded by H. S. Osler, at Lake Scugog, Ontario, on October 10, 1922, was shot at Currituck Sound, North Carolina, on November 20, 1922.*

BLACK DUCK, No. 228,529, banded by H. S. Osler, at Lake Scugog, Ontario, on October 13, 1922, was shot at Long Point, Ontario, on November 10, 1922.*

BLACK DUCK, No. 228,544, banded by H. S. Osler, at Lake Scugog, Ontario, on October 13, 1922, was shot in the same locality, on October 20, 1922.*

BLACK DUCK, No. 228,550, banded by H. S. Osler, at Lake Scugog, Ontario, on October 13, 1922, was killed at the Aberdeen Proving Ground, Maryland, on November 11, 1922.*

BLACK DUCK, No. 228,578, banded by H. S. Osler, at Lake Scugog, Ontario, on October 20, 1922, was shot in the same locality, on November 3, 1922.

*U.S. Dept. of Agric. Bull., No. 1268, Oct. 16, 1924.
**C.F.N., XXXVIII, 1924, p. 93.

BLACK DUCK, No. 228,590, banded by H. S. Osler, at Lake Scugog, Ontario, on October 20, 1922, was killed at a place twenty miles south of Thomasville, Georgia, on November 23, 1922.*

BLACK DUCK, No. 202,527, banded by H. S. Osler, at Lake Scugog, Ontario, on November 23, 1922, was killed at Salamanca, New York, on November 27, 1922.*

GREEN-WINGED TEAL, No. 504,441, banded by E. A. McIlhenny, at Avery Island, Louisiana, on December 27, 1922, was found dead at the side of a wire fence, at Sundridge, Ontario, on May 18, 1923.*

BLUE-WINGED TEAL, No. 101,264, banded by H. S. Osler, at Lake Scugog, Ontario, on August 29, 1922, was killed in Section 16, Sauter Township, Walsh County, North Dakota, about September 24, 1925.

BLUE-WINGED TEAL, No. 207,556, banded by H. S. Osler, at Lake Scugog, Ontario, on September 13, 1922, was shot in the same locality, approximately on October 26, 1922.*

BLUE-WINGED TEAL, No. 207,559, banded by H. S. Osler, at Lake Scugog, Ontario, on September 13, 1922, was caught at Vivian Camp, Black Bayou, thirty-five miles north of Shreveport, Louisiana, on January 26, 1923. The band was removed from the Duck.

BLUE-WINGED TEAL, No. 207,590, banded by H. S. Osler, at Lake Scugog, Ontario, on September 14, 1922, was shot at Ithaca, New York, on October 13, 1922.*

BLUE-WINGED TEAL, No. 207,698, banded by H. S. Osler, at Lake Scugog, Ontario, on September 20, 1922, was killed at Lima Lake, Meyer, Illinois, during the month of October, 1925.

BLUE-WINGED TEAL, No. 504,391, banded by E. A. McIlhenny, at Avery Island, Louisiana, on December 21, 1922, was "found" at Sandy Lake, Manitoba, on May 15, 1923.*

PINTAIL, No. 102,473, banded by F. C. Lincoln, at Browning, Illinois, on March 8, 1922. Its band was found on the land at York Factory, Hudson Bay, Manitoba, on September 15, 1926.

RING-NECKED DUCK, No. 101,720, ♂, banded by E. A. McIlhenny, at Belle Isle Lake, Luoisiana, on February 21, 1922, was shot at Shellmouth, Manitoba, on October 22, 1922.*

BUFFLEHEAD, No. A.B.B.A. 43,985, ♀, banded by Verid Burtch, at Branshport, New York, on April 6, 1922, was found drowned in a herring net at Georgian Bay, near Collingwood, Ontario, on April 17, 1922.*

AMERICAN GOSHAWK, No. 202,406, imm., banded by Harry H. Felt, at Findlater, Saskatchewan, on August 4. 1922, was killed at Bostwick, Nebraska, on April 26, 1926.**

CROW, No. 201,618, banded by W. A. Oswald, at Shawbridge, Quebec, on August 26, 1922, was shot at Westmount, Quebec, on September 7, 1922.

ROBIN, No. 15,196, banded by Howard F. Cant, at Galt, Ontario, on May 10, 1922, was run over by an automobile and killed in the same locality, on May 27, 1922.*

ROBIN, No. 16,102, juv., banded by Philip F. Foran, on June 7, 1922, at Green Park, Hull, Quebec, was re-caught at the same station, on July 1, 1922, and later on the same day as killed by a cat, near the place where it was banded.*†

*U.S. Dept. of Agric. Bull., No. 1268, Oct. 16, 1924.
**"Bird Banding Notes," No. 19, May 29, 1926.
*†C.F.N.. XXXVIII, 1924, 0. 92.

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CONTENTS

	PAGE
Kindleia A New Genus of Cichlid Fishes from the Upper Cretaceous of Alberta. By David Starr Jordan	145
Hungarian Partridge vs. Sharp-Tailed Grouse. By P. A. Taverner	147
A Grosbeak Singing in a Thunder-Storm. By Anna E. MacLoghlin	149
Bird Notes from Algoma District, Ontario. By H. W. Fairbairn	150
The Hamilton Bird Protection Society Incorporated Report, 1926-1927. By J. Roland Brown	152
A Season in a Swallow House. By Lois R. Kingston	153
Notes and Observations:—	
Canadian Field-Naturalist Publication Fund—Receipts	154
The Partridge versus the Sharptail. By L. B. Potter	154
Three Toronto Records of the Hoary Bat. By L.L.Snyder	155
Death of Louis Agassiz Fuertes. By P.A.T.	155
A Mystery Band. By Hoyes Lloyd	155
Fifty Winter Birds of Northeastern United States, National Association of Audubon Societies, 1974 Broadway, New York	156
Work of the Canadian Section, The International Committee for Bird Protection	156
Book Review—The Fur Trade of Canada. By R. Owen Merriman	157
Official Canadian Record of Bird-Banding Returns	157

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*KINDLEIA A NEW GENUS OF CICHLID FISHES FROM THE UPPER CRETACEOUS OF ALBERTA**

By DAVID STARR JORDAN

ABSTRACT

Kindleia a new genus of fossil fishes, apparently allied to *Priscacara* Cope, but distinguished by the long jaws, with large blunt teeth in sockets is described. Named for Edward M. Kindle.

Type:—*Kindleia fragosa* Jordan new species, Cat. No. 8533, Geological Survey of Canada.

THE writer has received from Edward M. Kindle, Chief of the Division of Palæontology of the Geological Survey of Canada, several fragments, 60 to 70 in number, of a species of fish found by Mr. Charles M. Sternberg, in an ancient, dried-up pond of Upper Cretaceous age about 100 miles south west of Edmonton in the Province of Alberta. The locality is thus indicated by Mr. Sternberg:

"Upper Cretaceous about 150 feet below top of Edmonton beds, Locality, S.E. ¼ section 31, T. 34, R. 21 west of 4th principal meridian. Northwest of Rumsey, Alberta, 20 feet above uppermost of the two coal seams (Thompson Seam No. 12, Allan & Sanderson report").

The collector of this material states that "all of the specimens, numbering more than sixty, were found at the same level in sandy clay within a very small area and a careful search of the same horizon a few yards distant revealed no sign of any bones of this fish, which seems to indicate that it had been trapped in a small pond, the drying up of which caused death. Associated with the species described were two other species of fish, viz. *Myledophus bipartitus* Cope and *Diphyodus longirostria* Lambe. Disassociated bones of the crocodile, turtle, champsosaurs and several genera of dinosaurs were also found in the fish bed as well as in the surrounding rocks. Most of the dinosaurs which have been collected from the Edmonton formation come from a lower level than this fish bed, yet most of the genera seem to be represented in this and higher strata†"

A series of fragments which have been photographed is here presented. The bones preserved are very fragile. A part of the lower jaw (5) shows a long bone, moderately curved and provided with sockets for fourteen teeth. Another fragment (11) shows two of these teeth, large, thick at base, pyramidal in form, narrowed and bluntish at tip, set in sockets. A longer fragment (14), perhaps part of set pre-maxillary, is not curved and one end is toothless and angularly bent. This shows the marks or sockets of about 15 teeth, these much smaller than the teeth in (5) and no doubt belonging to a much smaller fish. Three other bones, (6) (8) and (9) each a broken fragment, seem to represent parts of the united lower pharyngeals, characteristic of all *Cichlid* fishes. These are marked by long, even, blunt teeth in sockets, not narrowed at tip. Two fragments have larger teeth than the others and must have belonged, with the jaw bone first mentioned, to a different individual. Two other fragments are marked by blunt vermicular ridges, very irregular and close-set. In one of these (2) these markings are very much coarser than in the other (1) and these probably indicate an older fish of the same species.

The description thus far refers to the series as photographed. These may be regarded as typical of the species, the bone of the lower jaw first mentioned (5) being the special type.

Numerous other specimens, about 60 in all, have been sent to me from the original locality. These belonged to at least three different individuals of the same species, distinguishable mainly by the size of the bones and of the sockets of the implanted teeth. These are in a single row except in one rather large example which shows an irregular second row, the very deep bone in which they are implanted being sharp edged on its base away from the teeth, both sides being marked by very low, irregular, zigzag edges. In all other fragments the sides of the jaw are smooth, and in all the lower edge of the lower jaw is acute. In all cases there is an irregular series of small foramina on the outer edge of the jaw (shown in 4) these vary in size and number (4) being the least

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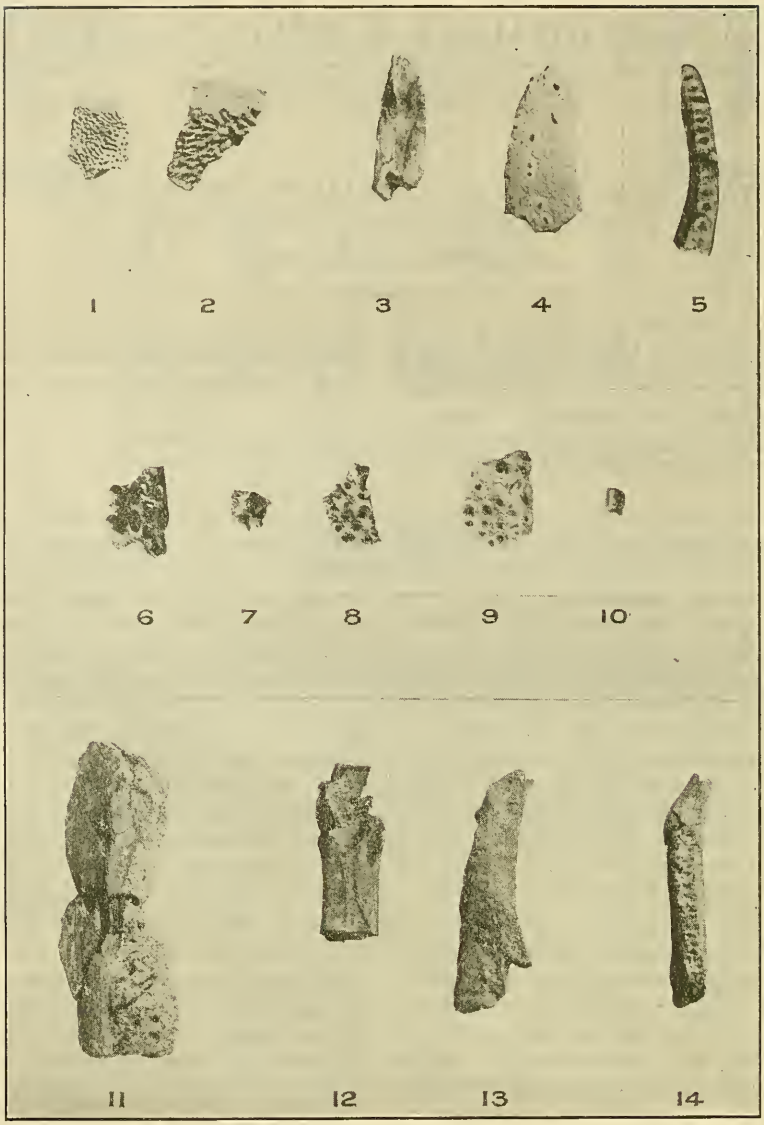
†Verbal statement by C.M. Sternberg.



EXPLANATION OF PLATE

Fig. 1-14—*Kindleia fragosa* n. sp. Natural size.

Figs. 1, 2 Head armature.

" 3, 4, 5 Inferior, exterior and superior views of lower jaw shown by three separate specimens.

" 5 Holotype or special type.

Figs. 6, 7, 8, 9 Fragments of united lower pharyngeals.

" 10 Tooth from lower pharyngeal.

" 11 Fragment of lower jaw.

" 12, 13, 14 Internal, External and inferior views of pre-maxillæ.

regular. In one fragment not figured, the teeth are more than twice as wide as in (5) which with (2) and (6) may have belonged to a much larger fish. The markings shown in (1) and (2) are repeated in several other fragments and are evidently part of the armature of the head, but just where they are placed is uncertain. They hardly seem to be opercular bones. The fragments here photographed represent the various kinds of bones, and so may be taken as typical.

Some 60 other fragments have also been received from Mr. Sternberg. These represent all the types shown in the plate indicating no important differences. The deep lower jaw, sharp edged below, is well shown, as are also the oblong evenly blunt teeth of the pharyngeals. The surface markings of (1) and (2) are well shown on various other fragments. These seem to mark sculpture on external bones but we fail to locate them. They much resemble head-sculpture of certain marine cat-fishes.

It is very remarkable that with so many fragments of *Kindleia fragosa* there is none belonging to the vertebral column and that there is no trace of any of the fins. The dentition is quite unlike that of any other fossil fish known to me. I place the new genus temporarily with the *Chichlidae*, because it has the lower pharyngeals united, and it is apparently a fresh water form. Both these characters are found in all the Cichlidae which abound in the streams of tropical America and Africa. But in all the Cichlids known to me the teeth are small and in more than one row and the bones of the head show no coarse granulations.

Of this enormous group, but one genus, Priscacara Cope (type *P. serrata* Cope) has been recognized as fossil. It differs from all the others in having teeth on the vomer "which like the jaw teeth are minute and simply conical," the jaws themselves much shorter than in *Kindleia*. On account of the presence of vemerine teeth, *Priscacara* has been lately taken as the type of a distinct family *Priscacaridae*. Six species of *Priscacars* are described from the Eocene (Green River Shales) of the state of Wyoming and a few neighbouring localities (Twin River, Manti.) A seventh species, (*P. liops*, Cope) is type of the genus *Cockerellites* Jordan, which differs from the others in the longer soft dorsal.

HUNGARIAN PARTRIDGE vs. SHARP-TAILED GROUSE

By P. A. TAVERNER

EVER since the successful acclimatizatiion of the Gray or Hungarian partridge on the west the battle has raged among sportsmen and naturalists as to the wisdom of the introduction. In general, the sportsman has lined up with the pros and the naturalist and nature lover with the cons. Both are probably a little prejudiced, one in favor of adding any sporting possibility to his opportunities, the other against disturbing the status quo or doing anything to interfere with native forms that he studies and is familiar with. Probably as far as prejudice goes, the honors are even.

The sportsman usually looks upon the naturalist as an impractical doctrinaire and the naturalist regards the usual type of sportsman as short sighted, superficial, ill-informed on the fundamentals of biological association and ignorant of what has happened outside of his own experience. There may be more than a modicum of truth in both these views. The naturalist may be overly cautious but it is easily demonstrable that the ordinary run of shooters know no more of the game they hunt than is necessary to outwit it at certain limited seasons of the year; in fact, with a few exceptions, they rarely know even the names of the species they shoot. There are certain brilliant exceptions on both sides of the question but taking it by and large, I think this reflects the general line-up and weight of authority.

One fact is self-evident, had the cautious naturalist of the present been in control in the past we might have escaped some of the devastating pests that now plague this once clean and conparatively pestless country. Practically all of our serious pests and plagues are introduced ones. Potato-bug, Gypsy-Moth, Corn-Borer, Sow and Russian Thistle, Black-head, Tuberculosis, Smallpox, English Sparrow, Starling, Rat, House mouse, Cockroach, and a thousand and one other ills that afflict our civilization are not indigenous to the country but introduced, often fortuitously in company with more desirable acquisitions. Many valuable importations have been veritable Pandora's boxes, releasing from control a multitude of evils and retaining but a single hope. It is the knowledge of these things and the realization of their application to present practice that makes the naturalist fearful of further unconsidered experiments carrying the same results. He has some grounds for his warnings and certainly cannot be dismissed as an ignorant alarmist.

On first sight it seems rather unlikely that the little Hungarian Partridge can do serious physical harm to the big, strong Sharp-tail or Prairie Chicken, yet we know that the race is, in the long run, not always to the swift nor the battle to the strong. Constant dripping of water wears away stone and, if the occurrences cited by Mr. Potter in the preceding paper are the general habit of a small but pugnacious and battle-trained race against a large but peaceably-inclined one that has had no racial experience in physical combat with competitors, the effects may be serious.

As a rule, or at least through summer and autumn, the two species do not seem seriously to compete with each other. The Partridge is then essentially a bird of the open fields while the Chicken is of the brush and cover. In winter, however, conditions are likely to be quite different, and when both species are driven by inclement weather to the shelter of the coulees or to circumscribed feeding grounds, the contact between them may be close and the competition for a definitely limited food supply may be keen. At such times and under such conditions, determined agressiveness may well turn the scale in favor of the smaller species. When food is less than the demand it is not the way of nature to pro-rate the supply according to the requirements between the weak and strong. In nature the strong get practically all and the weak get nothing. It is not a pretty thought for sentimentalists who rhapsodize over the beauties of nature but little birds in their nests do not agree and nature shows a calculating efficiency that would shame a pre-war Prussian. As economists tell us good money cannot continue in circulation with poor, so two species that closely compete with each other cannot occupy the same range at the same time, not even in numbers proportional to their adaptability to environment. Eventually one will entirely disappear while the other will increase under the obtained monopoly.

Beside direct physical conflict and the monopolization of food supplies at critical times of the year, there is another, and possibly a far graver, danger from introduced species; one that the naturalist is well aware of while the ordinary observer rarely gives it a thought—that of the introduction of communicable disease. Every race has its own special constitutional weaknesses and its own special immunities. These have been built up through age-long association with certain diseases and confer more or less resistance or tolerance towards the diseases the race has experienced and to no others. We know this well in the human race. Ailments that are regarded as childish affections in the white man have proved devastating plagues to natives to whom they are new. On the other hand, natives are often absolutely immune to such things as Malaria, Yellow-fever and other complaints that are deadly to the white men. The fact that natives can rarely survive close contact to white men without decimation is due not so much to the usually accredited results of self-indulgence and dissipation but to mumps, measles, tuberculosis, pneumonia, smallpox, influenza and other diseases. There is the same variation in racial resistance in lower life as in man. We are continually searching for strains and races of our common stock that will resist certain ills—disease, rusts, blights, fungus, etc.—and we are finding them, too. It is not, in many cases, that these individuals do not contract the ailment in question but they may have it in the most virulently transmittable form without experiencing any ill effects from it themselves. Typhoid Mary seemed perfectly healthy, yet wherever she went she left a trail of typhoid behind her. It is in these carriers that the greatest danger resides as no ordinary physical examination or quarantine reveals them.

That any form of life brought from afar with different racial history would have the same constitutional reaction to numerous diseases as has the local stock is almost too slight a chance to be considered. When the immunities and weaknesses weigh the scale against the new-comer, the introduction is unsuccessful, the species does not become acclimatized. This explains many of the failures we have experienced in such endeavors. If and when the balance is the other way about success may be achieved but it may be at the expense of native forms who have physiological factors brought against them that they have had no racial experience in combatting.

We cannot at this date definitely say that this has occurred in the case of the Hungarian Partridge in its relation to the Sharp-tailed Grouse but the wonder is greater if it has not than if it has. Certainly, given enough importations this is bound to occur sooner or later but only has to occur once to do the damage unto not only the third and fourth generations but for many more thereafter.

All our grouse are subject to disease epidemics. They rise in number over a series of years and then suddenly nearly disappear to repeat the cycle. This fluctuation in number is not due to overshooting for it occurs the country over, far in the wilds where shooters rarely go as well as close in about civilization. It is obviously a disease result, whether due to Old World disease introduced through poultry or not we know not but it may well be so, and the subject is being seriously studied. However it follows that all the disap-

pearance of native grouse should not be ascribed to contact with the Hungarian Partridge but it seems significant to the writer that, with considerable personal observation over a wide area of Partidge-occupied country, he has yet failed to see the Sharp-tail in contact with the Partridge recover its old maximum of number after one of these cyclic depressions. This may be merely a coincidence of geography or observation or it may represent the grim facts of the case—time only will tell this. In general, and the country over, this is a low year for grouse. It will be five or six years before we can expect another normal maximum season. If, when that time comes, the Sharp-tails reach their usual high peak numbers irrespective of association with the Partridge it will prove not that our alarms were unfounded but that we have blundered through a danger.

Of course all this discussion is now purely academic. The Hungarian Partridge is with us, probably to stay, and it will spread just as far as ecological conditions are favourable whether we like it or not. If it has introduced disease into native stock that mischief is done and is ineradicable now and even the total extermination of the original host would do no good now or at any succeeding date. However, the subject is of great interest and should be closely watched as a guide to policies of the future if for no other reason.

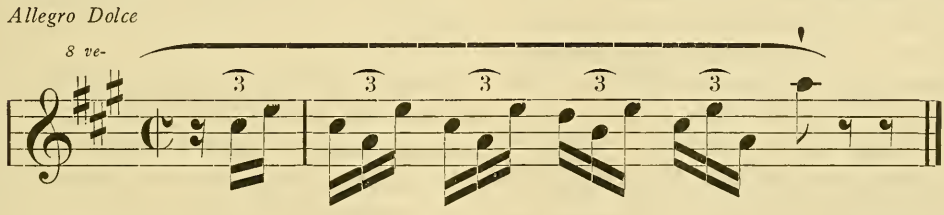
The disturbing thought is, that no experience of this sort in the now is of much help in the future. Warnings of evil become buried in past literature and unknown to succeeding advisors who have most weight in such matters. In spite of all the disastrous results of introductions in the past, the English Sparrow and the two Starlings in this country, the rabbit in Australia, the Minah in Hawaii and the dozens of other cases that could be cited, attempts at acclimatization and introduction go merrily on by local organizations who know not the dangers and pitfalls that the past has demonstrated. It is well that control of such work be considerably strengthened. There are undoubtedly forms of life to be found elsewhere in the world that would be valuable acquisitions to this country but the danger of their introduction is great and should not be entered upon without careful consideration as to whether the probable advantage is worth the risk.

A GROSBEAK SINGING IN A THUNDER-STORM

By ANNA E. MacLOGHLIN

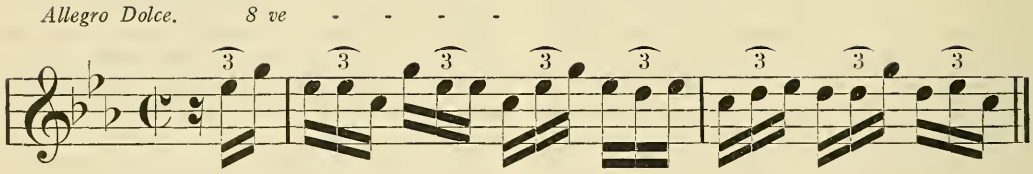
MOST birds stop singing during a very heavy rain, but on July 13th, 1927, at Camp Billie Bear, Muskoka, a Rose-breasted Grosbeak sang exquisitely throughout a severe thunder-storm which lasted three-quarters of an hour.

Being too far in the woods to turn back as the rain came on, I took shelter under a clump of bushes, when my attention was at once directed to the sweet singing of a Grosbeak. Crouched under the foliage there was little protection from the wet, and the rain beat down upon me, making it almost impossible to copy the song which ran:—

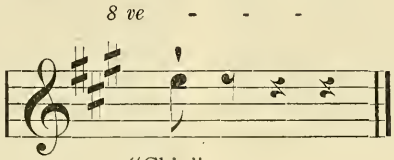


After singing a few times, he stopped, and thinking perhaps to make him begin again, I whistled back a feeble response. To my delight he answered me. Pausing again for a few seconds, I answered him back, and he again responded, flying all around me, and finally settling on a tree over my head, as though he were trying to locate me exactly.

He must have answered my whistle at least forty or fifty times, and then, as the storm cleared, he apparently became tired and flew away. Three days afterwards, while passing through the same place in the woods, I heard, apparently, the same bird, whistling the same song. After singing it a few times, he paused, then gave this refrain in a minor key:



N.B.—The Majority of songs of the Grosbeak which I have taken down, have been in the major key, but this bird sang apparently in both keys. He also omitted the "chip" or staccato note



"Chip"

which usually precedes the song.

BIRD NOTES FROM ALGOMA DISTRICT, ONTARIO

By H. W. FAIRBAIRN

DURING the past summer, I was attached to a Geological Field Party, stationed in the vicinity of the Spanish River, Algoma District. The country was inaccessible, and, in order to travel light, field glasses, among other things, were omitted from our equipment. Despite this handicap it was nevertheless possible to make some interesting notes and observations on the bird life of the district.

The following list makes no pretence of including all the species occuring in this area, but merely indicates these which came under direct observation during the season.

Podilymbus podiceps—PIED-BILLED GREBE.

Observed once during the summer.

Gavia immer—COMMON LOON.

The female has a distinctive "lame-duck" habit which I had not observed before. In the attempt to lead us away from her family, she would repeatedly rear herself up from the water and facing us, would fan the air vigorously with her wings. The glistening white breast made a very conspicuous object on the water.

Larus argentatus—HERRING GULL.

These birds were common on the lake formed above the power dam at High Falls on the Spanish River. They followed in the wake of the tug, engaged in rafting logs along the lake. They were apparently non-breeders, as no juveniles were seen by September 1st.

Mergus Sp. ?—MERGANSER.

Females with broods of nine or ten were frequently seen on the Spanish River. They were quite at home in swift water where paddling was difficult.

Botaurus lentiginosus—AMERICAN BITTERN

Fairly common.

Ardea herodias—GREAT BLUE HERON.

Found in any shallow muddy localities.

Actitis macularia—SPOTTED SANDPIPER.

Common summer resident.

Oxyechus vociferus—KILLDEER PLOVER.

Observed near the settlements.

Bonasa umbellus—RUFFED GROUSE.

This bird is still scarce even though the open season is of short duration.

Circus hudsonius—MARSH HAWK.

Frequents the open burned country.

Accipiter cooperi—COOPER'S HAWK.

Buteo borealis—RED-TAILED HAWK.

Falco sparverius—AMERICAN SPARROW HAWK.

The above three hawks were each identified once during the season.

Ceryle alcyon—BELTED KINGFISHER.

Common on all the larger streams.

Dryobates villosus—HAIRY WOODPECKER.

Probably this is the Northern Hairy Woodpecker—*D. v. leucomelas.*

Dryobates pubescens—DOWNY WOODPECKER.

Common.

Sphyrapicus varius—YELLOW-BELLIED SAPSUCKER.

Fairly common.

Colaptes auratus—YELLOW-SHAFTED FLICKER.

By far the commonest woodpecker. The large burned-over areas provide the necessary ground feeding, and also provide innumerable nesting-sites in the naked dead trees.

Antrostomus carolinensis—WHIP-POOR-WILL.

Common along large creeks and rivers.

Chordeiles virginianus—NIGHTHAWK.

Common.

Chaetura pelagica—CHIMNEY SWIFT.

In the absence of chimneys these birds nest in their original sites—hollow trees and clefts in rocks.

Archilochus colubris—RUBY-THROATED HUMMINGBIRD.

One observed twenty-five miles from the nearest settlement.

Tyrannus tyrannus—KINGBIRD.

Common summer resident.

Nuttallornis borealis—OLIVE-SIDED FLYCATCHER.

Less common than the kingbird, although this locality is well within its range.

Myiochanes virens—WOOD PEWEE.

Found commonly in the deep woods.

Cyanocitta cristata—BLUE JAY.

This and the next species are the chatterboxes of the north.

Perisoreus canadensis—CANADA JAY.

Less common than the Blue Jay, frequenting more inaccessible localities.

Corvus brachyrhynchos—AMERICAN CROW

Observed only around the settlements.

Dolichonyx oryzivorus—BOBOLINK.

A few were seen in grain fields near Webbwood.

Euphagus carolinus—RUSTY BLACKBIRD.

Observed several times in wet boggy country.

Quiscalus quiscula æneus—BRONZED GRACKLE.

Common resident.

Carpodacus purpureus—PURPLE FINCH.

Common resident.

Passer domesticus—HOUSE SPARROW.

Found around the settlements.

Astragalinus tristis—AMERICAN GOLDFINCH.

Fairly common in burned country.

Pœcetes gramineus—VESPER SPARROW.

Less common than in localities further south.

Zonotrichia albicollis—WHITE-THROATED SPARROW.

The commonest sparrow of the district.

Spizella passerina—CHIPPING SPARROW.

Not common.

Junco hyemalis—SLATE-COLOURED JUNCO.

Abundant breeder.

Melospiza melodia—SONG SPARROW.

To be found in all kinds of country.

Piranga erythomelas—SCARLET TANAGER.

Mr. Edward Kindle reported one at Webbwood.

Hirundo erythrogastra—BARN SWALLOW.

Found nesting in some of the lumber camps.

Iridoprocne bicolor—TREE SWALLOW.

The power dam at High Falls on the Spanish River has created a large reservoir extending about fifteen miles upstream. As a result there are many acres of drowned timber, and these swallows have found ready homes in the rotting trees.

Bombycilla cedrorum—CEDAR WAXWING.

Very common in the burned-over areas on account of the abundance of cherry trees.

Vireosylva olivacea—RED-EYED VIREO.

The most persistent songster in the woods.

Lanivireo solitarius—BLUE-HEADED VIREO.

One observed at close range.

Mniotilta varia—BLACK AND WHITE WARBLER.

Dendroica cœrulescens—BLACK-THROATED WARBLER.

Dendroica coronata—MYRTLE WARBLER.

Dendroica pennsylvanica—CHESTNUT-SIDED WARBLER.

Dendroica virens—BLACK-THROATED GREEN WARBLER.

The distinctive call of six notes is a familiar sound in the deep woods.

Seiurus aurocapillus—OVENBIRD.

A common summer resident.

Geothlypis trichas—MARYLAND YELLOW-THROAT.

No alder thicket is complete without this warbler.

Setophaga ruticilla—AMERICAN REDSTART.

The notes of the redstart, the black-throated green warbler, and the ovenbird were the most conspicuous warbler songs heard during the summer.

Toxostoma rufum—BROWN THRASHER.

One pair observed in July on the Spanish River.

Troglodyte aedon—HOUSE WREN.

Found in open burned country mostly.

Nannus hiemalis—WINTER WREN.

Observed only in the densest coniferous growth. Its song is one of the surprises of the northern woods.

Penthestes atricapillus—BLACK-CAPPED CHICKADEE.

Common everywhere.

Regulus satrapa—GOLDEN-CROWNED KINGLET.

Observed in migration.

Hylocichla fusescens—WILSON'S THRUSH.

This and the next species seem to prefer the open burned country.

Hylocichla guttata—HERMIT THRUSH.

A nest was discovered in a small poplar tree near the ground. Poplar is usually shunned as a nesting site.

Planesticus migratorius—AMERICAN ROBIN.

Common in most places.

Sialis sialis—BLUEBIRD.

Found in burned country where dead trees provide abundant nesting sites.

Four usually common summer birds which I did not note were the Phoebe, Red-winged Blackbird, Baltimore Oriole, and Catbird.

Also I failed to observe the Pileated Woodpecker, although the region would be an admirable one for this bird.

The above list does not do justice to the warblers particularly, which were very abundant during migration in the latter part of August. Without the use of field-glasses, however, it was diffiuult to identify some species, particularly the juveniles, and thus the above list is very brief.

THE HAMILTON BIRD PROTECTION SOCIETY INCORPORATED REPORT, 1926-1927

By J. ROLAND BROWN

THE following is a brief report of the above named Society for the year ending April 1927.

The usual activities of the Society have been carried on during the year, as in previous years. Five regular meetings have been held, when the following speakers were heard.

Last May Mr. W. E. Saunders, of London, Ont., Honorary President of the Society, spoke to us about "Native Sparrows."

Some of our junior members took part in the October meeting. A number of "Bird Essays" were read by the boys and girls, and a keen interest in bird study was shown.

In November our President, Mr. R. O. Merriman told us about the 44th stated meeting of the "American Ornithologists' Union" held in Ottawa, Canada.

Professor T. F. McIlwraith of Toronto University spoke to us in January. He gave us an interesting talk on the "Bella Coola" Indians and the Birds.

Mr. E. M. S. Dale of London, Ont., was at our March meeting and told us about the birds he had seen last summer while on a visit near Boston, Mass.

Two of the lectures were illustrated.

Last June a Field-Day was held at Oaklands Park when members of the Society were invited to take a box-lunch and spend an afternoon with the birds.

Spring migration lists of the birds have been compiled and at Christmas time a bird census was taken.

The Cancellation Stamp bearing the slogan "Protect the Birds and Help the Crops" was used again last Spring on all out-going mail, to advertise bird conservation.

For many years the Society has been working to have the Dundas Marsh set aside as a Bird Sanctuary. Just recently an order-in-council was passed making the marsh a Government Game Preserve.

A new feature for advertising bird protection was started last Spring, when our President

broadcasted "News from Birdland" every Saturday evening during the Spring Migration over Station C.K.O.C. Letters of appreciation have been received from many outside districts and in the city, showing that a great interest is being taken in this new phase of the work.

A SEASON IN A SWALLOW HOUSE

By LOIS R. KINGSTON

OUR HOME is on the second floor of a three-storied apartment house, about two blocks distant from the Rideau Canal. On May 9th I nailed a swallow-house to a maple tree not more than twelve feet from the balcony, placing it about eighteen feet from the ground, which brought it level with the balcony door. It proved to be an object to excite desire.

After an interval of several days, I noticed a pair of swallows diving about the box, and hastened out—only to see both fail in their attempt to make an entrance. The hole was too small. Perching upon the doorstep, the bird would poke his head through the opening and proceed to push with might and main. The sight was painful. Hastily securing a fret-saw I ran downstairs, and placing a ladder against the tree, I ascended, and in a short time had enlarged the opening. Before I had reached the ground the birds had passed within and taken possession.

For some time after this they appeared to be building, but in a half-hearted manner; taking in straws a couple of consecutive days, then desisting and disappearing for three or four. Finally, however, they began building in earnest about May 16th.

Then one day about two weeks later, I witnessed the last act of the common tragedy. Brooding season had set in. To-day, as my eye fell on it, the swallow-house seemed extraordinarily quiet, when a wren alighted upon the doorstep. Passing immediately within he reappeared with a mouthful of feathers. At the foot of the tree lay a heap of broken egg-shells.

Of course the swallows must have both been absent together, when the wren made his original entrance. Though doubtless now observing from a discreet distance, they evidently considered it too late to interfere. In the wren's absence an hour later, they returned to contemplate the scene of the wreckage. One is forced to surmise from this incident, as well as from their desultory habits of nest-building, that this particular pair were not the most faithful of homekeepers.

A couple of days later I noticed two pairs of swallows swooping about. The owners had apparently returned under escort. This time a thorough survey of the situation was made. One of the males, after circling about three times, came to rest on the doorstep, and after some moments' hesitation disappeared within. His mate hung suspended in mid-air close to the doorway, while the second pair looked on from the clothes-line which swung about six feet from the tree. Two or three minutes passed. Then the explorer emerged, and with a glad twitter from the female, the two flew a short distance away. Pair No. 2 repeated the same performance, then both pairs flew off together out of sight.

During the next few days the tenancy of the swallow-house seemed highly doubtful The wren, who considered it his own property now commenced busily carrying in sticks. Meantime, the swallows began flying in and out once more, remodelling with straws and feathers. At first I took it for granted the original pair had reclaimed their own, but soon I was forced to think otherwise. The female of this second pair was entirely bronze in colour, without the steel-green patches on neck, cheeks and rump, worn by the female of the original pair. This could only mean an exchange of mates by male No. 1, or a new couple altogether. Personally I am inclined to put the second pair down as the visitor friends of the previous day.

I wondered what the inside of that small house could look like with the wren stealing in with sticks each time he saw, from some hidden vantage point, both of his rivals absent together. After about four days of this, he gave up in their favour, and ceased his nest-building altogether. Since during the whole course of his escapade, he invariably appeared alone and unaccompanied, one is left to put the affair down as one of the frequent pranks of the male wren, with his passion for nest-building.

The second pair of swallows began building about June 5th. When brooding season came in due course, it was a pleasure to watch these two at their task. The female would be sitting quietly upon the eggs, her white breast showing through the aperture, when a flash of steely green would herald the arrival of her mate. Alighting upon the doorstep, he would put his bill through the opening, and make just once that soft re-soundless single "turn" of sound—the swallow

twitter. His lady would thereupon arise, dart out and past him, off into the blue—doubtless bound for the canal, their hunting-ground. When on duty, I noticed she always remained upon the eggs, fearful of allowing them to cool—while her help-meet frequently took holidays stretching his limbs and swinging upon the clothes-line; though at this, it must be marked, never was he more than six feet from the bird-house on which he kept an unfaltering watch the while. Very frequently the male continued his watch while his mate brooded within. She, on the other hand, was inclined to fly far away when not on duty. Plainly his idea of duty resolved itself into a guarding of his home from attack, hers to the ceaseless cherishing of the fragile life within the eggs. On those infrequent occasions when the female did act as outpost while her mate kept the eggs warm, she seemed nervous and twisty, always more anxious to see what was behind her than before. She betrayed great interest and curiosity regarding our movements upon the verandah—once climbing the clothes-line right to the balcony railing beside us, when cries of a small girl from within aroused her. I thought she would really stretch her small head off trying to peer through the open doorway. The male, on the other hand, apparently as free from curiosity as from fears, would sit complacently preening himself, or merely gazing contentedly before him into space, musing, and as it were, smoking his pipe.

One day the wren returned. With swift wary glances about him, he once more alighted upon the doorstep and thrust his head within. The next instant he withdrew it with such force that he literally reeled backward off the step, and disappeared in a hurry. Several times did he attempt to steal a march upon them, but the defence was always on duty. The intruder invariably retired discomfited.

The eggs were all hatched by July 3rd. A pair of field-glasses focused on the opening now revealed a succession of yawning "red-lanes"—nothing more. Later, when the feathers of the young were grown, parts of four heads could be seen at one time through the aperture. There was always one little fellow squatting in the foreground, keeping the others well away from the scenery. His bill resting on the threshold, he would gaze down, down, to the ground below, then up at the leafy roof above. His eyes were black and shining, his shirt-front was fluffier and of a snowier white than his parents'. He was altogether beautiful. At first I took him to be the Pushing One of the family, but later I observed the household in the act of rotation, when a brother or sister looking exactly the same took his place. Their father was a tireless hunter, and could not spare time to go further than the threshold to deposit each catch in its proper place before he was off to the chase again. His mate, however, never left the house without the pellet of compressed droppings between her mandibles—the result of careful house-scourings.

I am sorry to say I missed seeing the young birds make their first flight. All took their departure the same day, July 25th. Next day I took the swallow-house down from its perch, and lifted off the roof. On the floor at the back, some distance below the opening, was the nest of straw and feathers. The foundations of this must have been built by the original pair, for the wren, we knew, had certainly never gone further than the feather lining in his destructions. The intervening space leading uphill from the nest to the doorway, was jammed with twigs—doubtless the wren's contribution to the interior decorations.

NOTES AND OBSERVATIONS

CANADIAN FIELD-NATURALIST PUBLICATION FUND

Mr. J. L. Thacker, Little Mountain, Hope, B.C., $5.00.

THE PARTRIDGE VERSUS THE SHARPTAIL.—In the October, 1926, issue of the Canadian Field-Naturalist I expressed the opinion that the advent of the Hungarian Partridge was detrimental to our native Sharp-tailed Grouse. My remarks have since been criticized both by private correspondents and in *The Canadian Field-Naturalist* by Mr. T. E. Randall and Prof. W. Rowan. During the past twelve months, I have collected further evidence, which has not caused me to change my views. I furnish below the names of some of the persons who have given me first hand information on the subject. Mr. Robert Greel, rancher, of Eastend informs me that he has watched sharp-tailed grouse on their dancing grounds, then a number of partridges have arrived on the scene and driven the grouse off.

Mr. J. Bird, farmer, of Ravenscrag, a neighboring town, and formerly of Staveley, Alberta, tells me that at Staveley he frequently watched

encounters between the two species, in which the partridge invariably prevailed.

Mr. Neil Pratt, farmer, of Ravenscrag, and also at one time near Staveley, in a letter to me said—"I have your letter asking about the Hungarian Partridge. They have been quite numerous both here and on the Johnson place, but the one thing I noticed was that they are the sworn enemy of our prairie chickens." When asked later his reasons for writing thus he told me he had witnessed two partridges catch hold of a chicken by the neck feathers; and at Staveley he had also observed aggressive tactics on the part of the smaller bird. This bears out what I was told by Mr. Desillets, of Eastend, whom I quoted in my original article. He and two companions witnessed a partridge worrying a sharp-tail by holding on to the neck. Mr. Desillets vouches also for the following: In the spring of 1926 he was out for a stroll up one of the wooded coulees near Eastend in company with some friends. There they saw a partridge drive a sharp-tailed grouse off her nest and destroy the eggs.

Mr. Tom Ion, farmer, of Eastend, also says he has seen the partridge chasing grouse.

All these persons are well known to me, and I have no hesitation in believing what they say is true; and their evidence enables one to understand the many reports we hear, that the partridge is helping to drive out the native grouse. There are, of course, other factors bringing about the decrease of the latter. The increase in numbers of the Crow and the Magpie has become a serious menace to bird life of all kinds, and Mr. Randall's remarks regarding the use, or abuse, of motor cars by game hunters are much to the point.

Mr. Randall says: "The idea that the Pinnated Grouse is also a dangerous enemy of the Sharptail is even more absurd." In this connection I quote the late D. G. Elliott, who in his "Game Birds of North America" writes "The Sharptailed and the Pinnated Grouse often meet on the limits of their dispersion, but rarely mingle together, for they are deadly enemies and engage in desperate battles." Mr. Randall suggests that one of the real reasons for the prejudice against the partridge is that it is too "swift" and hard to hit. This should scarcely apply to us in Saskatchewan, for until this year the partridge has been on the protected list.

As a game bird no doubt the Hungarian Partridge is all that its advocates claim it to be. But there is a large, and I believe an increasing number of farmers, the writer included, who regard the prairie chicken with special affection, to be encouraged to come around the farm buildings, especially in winter when so few of our birds are with us. One man, who must be nameless, informed me privately that, indignant at the sight of the partridge pushing the prairie chicken off his farm, he employed somewhat irregular methods to rid his premises of the partridge; and since then the chicken have returned.—L. B. POTTER.

THREE TORONTO RECORDS OF THE HOARY BAT.—*Nycteris cinerea*, the Hoary Bat, is one of the rarest species to be found in Ontario. It is a migratory form, conspicuous because of its size (sixteen inches or more in wing expanse) but the number of records indicate that it is seldom identified or collected. Three specimens have been taken in the Toronto region during the present fall (1927). The first was secured at Erindale, near Toronto, on October 1, by R. V. Lindsay. The specimen was presented to the Royal Ontario Museum of Zoology where it is now preserved. The second was taken at Cedarvale, Toronto, on October 2, by C. Hope. This specimen is now in the collection of S. L. Thompson of Toronto. A third specimen was collected by C. Hope at Ashbridges Bay, Toronto, on October 23. This specimen was subsequently presented to the Museum.

The above mentioned dates are of interest in connection with a statement in "Life Histories of Northern Animals" by Seton, Vol. II, p. 1198, which I quote as follows: "The latest date in my Journal for the Hoary-Bat, at Toronto, is mid-September,"—L. L. SNYDER, Royal Ontario Museum of Zoology, Toronto.

American bird lovers will hear with regret of the untimely death of that delightful delineator of birds and charming personality, Louis Agassiz Fuertes. The sad event took place August 22nd, at Unadilla, N.Y., when Mr. Fuertes car was struck by a train on a grade crossing. He was instantly killed. Probably no American ornithologist will be more keenly missed. All of us will miss his beautiful pictures in current literature and we who knew him personally will miss his friendly wholesome presence more than we can say.—P.A.T.

A MYSTERY BAND.—The National Parks of Canada Branch, Department of the Interior, Ottawa, which is keeping the file of official Canadian bird banding records, has received a seamless aluminum band, inscribed "40. P.B. 1917," and a fragment of bone from Mr. R. Owen Merriman, 96 West Second Street, Hamilton, Ontario, with the information that the band and bone were found by Mr. John Baker, Centre Street, Kingston, Ontario, in the tilled rows of a market

garden during the summer of 1923. The bone, when picked up, was clean and dry and was ringed with the band.

It has been ascertained, through the courtesy of Dr. Alexander Wetmore, Assistant Secretary of the Smithsonian Institution, United States National Museum, Washington, D.C., that the bone is the distal end of the radius of a duck—probably a Greater Scaup. Dr. Wetmore says that, as the bone is a portion of the wing, it would appear that its association with the band was only casual, for although poultry keepers sometimes mark their birds by clipping a band through the wing, this is ordinarily fastened through the patagium, the membrane between the body and the forward part of the wing.

The band is not of the official series being used throughout Canada and the United States, and an endeavour is being made to trace its origin. The National Parks of Canada Branch would appreciate very much hearing from any person who has information concerning the placing of this band.—HOYES LLOYD.

FIFTY WINTER BIRDS OF NORTHEASTERN UNITED STATES, NATIONAL ASSOCIATION OF AUDUBON SOCIETIES, 1974 BROADWAY, NEW YORK, PRICE $1.00.—

There has just been issued a set of fifty post-card sized coloured pictures of winter birds of the northeastern United States, reproductions from special originals from the brush of Major Allan Brooks. On the back of each is a short interesting description of the bird pictured, prepared by Dr. Frank Chapman in his usual clear and concise manner. All are arranged in a neat container and admirably presented.

All the pictures are fully up to the usual Brooks standard and in some he has excelled himself and has made little gems of pictures. The reproduction by the four color process is particularly happy and the artist, the Association, the plate maker and the printer are to be congratulated at the combined result. The purity of tone in the skies, particularly in the difficult blues is specially to be commended. This is by far the best set of such picture-cards we have seen. They should be invaluable for educational work among children and beginners and we heartily recommend them to bird lovers. We are promised that similar sets of early and late spring migrants will be issued later. If the same standard is continued a truly remarkable set of American bird pictures will be produced.—P.A.T.

WORK OF THE CANADIAN SECTION, THE INTERNATIONAL COMMITTEE FOR BIRD PROTECTION. —About June, 1923, THE OTTAWA FIELD-NATURALISTS' CLUB, the Provancher Society of Natural History of Canada, and the Province of Quebec Society for the Protection of Birds, nominated representatives on the Canadian Section of this International Committee. Mr. P. A. Taverner and the writer were named as the representatives of THE OTTAWA FIELD-NATURALISTS' CLUB. Dr. Dery was named to represent The Provancher Society of Natural History of Canada, and L. McI. Terrill was named to repersent The Province of Quebec Society for the Protection of Birds. This Section named me Chairman and while the Section has not taken any spectacular steps it has kept closely in touch with protection work in Canada and has maintained contact with the representatives of other countries on the International Committee.

The International Committee, of which Dr. T. Gilbert Pearson is President, has published a report showing the work of this committee in the various countries of the world.

The following Canadian Societies are now represented on the Canadian Section, and, at present, have as representatives on the Committee the persons listed:—

Provancher Society of Natural History of Canada: Representative, Dr. D. A. Dery, 112 St. Joseph Street, Quebec.

Ottawa Field-Naturalists' Club: Representatives: Hoyes Lloyd, Department of Interior, Ottawa; H. F. Lewis, Department of Interior, Ottawa.

The Hamilton Bird Protection Society: Representative: Miss Ruby R. Mills, 26 Robinson Street, Hamilton, Ontario.

McIlwraith Ornithological Club: Representative: W. E. Saunders, London, Ontario.

The Toronto Field-Naturalists' Club: Representative: J. H. Fleming, 267 Rusholme Road, Toronto, Ontario.

Natural History Society of Manitoba: Representative: C. L. Broley, Bank of Montreal, Corydon and Ainsley, Winnipeg, Manitoba.

Province of Quebec Society for the Protection of Birds: Representative: W. S. Hart, P.O. Box 1185, Montreal, P.Q.

Natural History Society of British Columbia: Representative: A R. Sherwood, Victoria, B.C.

The Canadian Section is fully constituted and is ready at all times to co-operate with the International Committee or with the sections dealing with bird protection work in other countries. It is hoped that a considerable amount of good will result by exchange of ideas through this International Committee.—HOYES LLOYD, *Chairman, Canadian Section, The International Committee for Bird Protection.*

BOOK REVIEW

THE FUR-TRADE OF CANADA by H. A. Innis, Ph.D., Assistant Professor of Political Economy, University of Toronto. University of Toronto Library, Toronto: Oxford University Press, Canadian Branch MCMXXVII (Half-title: University of Toronto Studies, History and Economics—The fur-trade of Canada).

The close connection between the economics of the fur-trade and the problems of wild-life conservation gives this study of a Canadian industry an interest to naturalists as well as to the economists for whom it was written. This interest centres chiefly in the chapter on the production of furs. The growing demand for furs of all kinds, the growing scarcity of furs especially of the finer varieties, and the increased use of coarse furs are shown to act and react in a vicious circle, increasing the drain on wild-life. The difficulties of framing effective regulations for conservation, and the still greater difficulties of enforcing such regulations, are dealt with; and the way in which these difficulties are increased by competition within the fur-trade and by division of governmental authority is discussed. Other topics of the book include fur-farming, the manufacture of furs, and marketing organization, all being treated from the economic viewpoint. A bibliography adds to the value of the work.—R. OWEN MERRIMAN.

OFFICIAL CANADIAN RECORD OF BIRD-BANDING RETURNS.

Published by Authority of the National Parks of Canada Branch, Department of the Interior, Canada

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.

INSTALMENT No. 16 OF BIRD-BANDING RETURNS

RETURNS UPON BIRDS BANDED IN 1922

MALLARD, No. 102,013, banded by L. V. Walton, at Cuivre Island, near Peruque, Missouri, on January 19, 1922, was killed at Muskeg Lake in the Indian Reserve to the north of the Saskatchewan River, Section 47, Township 7, on September 15, 1926.

RETURNS UPON BIRDS BANDED IN 1923,

PIED-BILLED GREBE, No. 210,964, ad. ♀, banded by Herman Battersby, at Oak Lake, Manitoba, on May 31, 1923, was killed at the Slaughtersville Lake, near Slaughtersville, Kentucky, on June 16, 1926.

LOON, No. 201,486, banded by H. A. McGraw, at Altoona, Pennsylvania, on April 30, 1923, was found dead at Balmy Beach, Simcoe County, Ontario, on May 27, 1923.*

COMMON MURRE, No. 204,674, ad., banded by Harrison F. Lewis, at St. Mary's Islands Saguenay County, Quebec (Canadian Labrador) on July 23, 1923, was killed on the island on which it was banded, between June 1 and 12, 1925.

COMMON MURRE, No. 204,709, ad., banded by Harrison F. Lewis, at St. Mary's Islands, Saguenay County, Quebec (Canadian Labrador), on July 23, 1923, was killed on the island on which it was banded, between June 1 and 12, 1925.

COMMON MURRE, No. 5597, yg., banded by Harrison F. Lewis, on a small island near Cove Island, between Pointe au Maurier and Harrington, Saguenay County, Quebec (Canadian Labrador), on August 12, 1923, was killed in the vicinity of Pushthrough, Hermitage Bay, Newfoundland, on June 17, 1925.

COMMON MURRE, No. 5598, yg., banded by Harrison F. Lewis, on a small island near Cove Island, between Pointe au Maurier and Harrington, Saguenay County, Quebec (Canadian Labrador), on August 12, 1923, was killed at Greenspond, Newfoundland, on November 13, 1925.

KITTIWAKE, No. 67,423, yg., banded by a correspondent of Messrs. H. F. & G. Witherby, on the Farne Islands, Northumberland, England, on June 28, 1923. was killed at Horse Island, in the District of St. Barbe, Newfoundland, on August 12, 1924. Besides the number 67,423, the band bore the inscription "Inform Witherby High Holborn London".**

GLAUCOUS-WINGED GULL, No. 232,858. nestling, banded by Theed Pearse, at Mitlenatch, Gulf of Georgia, British Columbia, on August 12, 1923, was found dead at Lund, British Columbia, a town eighty-six miles north of Vancouver, on August 9, 1926. The bird had not been dead very long when it was found. It had probably eaten poison spread along the shore by residents to kill Blackbirds.

GLAUCOUS-WINGED GULL, No. 232,870, nestling, banded by Theed Pearse, at Mitlenatch, Gulf of Georgia, British Columbia, on August 12, 1923, was found dead on the beach at Blind Creek, Cortez Island, Strait of Georgia, British Columbia, on December 3, 1925.

HERRING GULL, No. 228,976, banded by Ernest Joy, at Wood Island, Grand Manan, New Brunswick, on August 24, 1923, was found dead on

* U.S. Dept. of Agric., Bull No. 1268, Oct. 16, 1924.

** C.F-N. XXXIX, 1925, p. 114.

a sandy point in Quantuck Bay, near Quogue, Long Island, New York, about July 5, 1926.

MALLARD, No. 200,208, banded by L. V. Walton, at Cuivre Island, Missouri, on January 8, 1923, was found dead at a place eight miles west of Saint Brieux, Saskatchewan, on May 19, 1923.*

MALLARD, No. 200,339, banded by L. V. Walton, at Cuivre Island, Missouri, on January 10, 1923, was shot at Lake la Plonge, Saskatchewan, on August 3, 1923.*

MALLARD, No. 101,997, banded by L. V. Walton, at Cuivre Island, Missouri, on January 15, 1923, was killed in a net at a place twenty-five miles north-east of Isle-a-la-Crosse, Saskatchewan, on May 3, 1923.*

MALLARD, No. 203,332, ♂, banded by John Broeker, at Portage des Sioux, Missouri, on January 24, 1923, was caught in a muskrat trap at a place eight miles east of The Pas, Manitoba, on May 1, 1923.*

MALLARD, No. 203, 385, ♂, banded by John Broeker, at Portage des Sioux, Missouri, on January 31, 1923, was killed on Peace River, Alberta, between Forts Vermilion and Chipewyan, on May 1, 1923.*

MALLARD, No. 203,387, banded by John Broeker, at Portage des Sioux, Missouri, on January 31, 1923, was shot in Section 32, Township 8, Range 32, West of the First Meridian, five miles north of Redvers, Saskatchewan, on October 25, 1925.

MALLARD, No. 203,392, banded by John Broeker, at Portage des Sioux, Missouri, on February 2, 1923, was shot at a place one and one-half miles south of the Big Arm, east of Liberty, on Last Mountain Lake, Saskatchewan, on October 3, 1925.

MALLARD, No. 203,414, ♂, banded by John Broeker, at Portage des Sioux, Missouri, on February 3, 1923, was shot at Buffalo Lake, about twenty-five miles north of Moose Jaw, Saskatchewan, on October 27, 1925.

MALLARD, No. 205,257, ♂, banded by L. V. Walton, at Cuivre Island, Missouri, on February 3, 1923, was shot on the C.P.R. quarter, southwest of 17, 42, 18, W. 3rd M., fourteen miles north and five miles east of Wilkie, Saskatchewan, on September 19, 1925.

MALLARD, No. 205,321, ♀, banded by L. V. Walton, at Cuivre Island, Missouri, on February 8, 1923, was captured at Lake Winnipegosis, Manitoba, on or about June 5, 1923.*

MALLARD, No. 203,524, banded by John Broeker, at Portage des Sioux, Missouri, on March 1, 1923, was shot at a place about six miles north east of Muenster, Saskatchewan, about October 21, 1925.

MALLARD, No. 205,553, ♀, banded by L. V. Walton, at Cuivre Island, Missouri, on March 2, 1923, was captured at Duck Lake, Saskatchewan, during the spring of 1923.*

MALLARD, No. 203,548, ♀, banded by John Broeker, at Portage des Sioux, Missouri, on March 4, 1923, was killed at Reindeer River, Saskatchewan, on May 10, 1923.*

MALLARD, No. 205,776, banded by L. V. Walton, at Cuivre Island, near Firma, Missouri, on March 14, 1923, was killed at Poplar Point, on the Saskatchewan River, about fifteen miles from the Hudson Bay Company Post at Cedar Lake, Manitoba, about the middle of October, 1925.

MALLARD, No. 205,808, ♂, banded by L. V. Walton, at Cuivre Island, Missouri, on March 19, 1923, was killed at Summerberry River, Saskatchewan, on May 4, 1923.*

MALLARD, No. 205,840, ♀, banded by L. V. Walton, at Cuivre Island, Missouri, on March 20, 1923, was caught in a spring trap set for rats at Pinehurst Lake, Alberta, on April 19, 1923.*

MALLARD, No. 202,618, banded by H. S. Osler, at Lake Scugog, Ontario, on August 27, 1923, was shot at Back Bay, Virginia, on November 2, 1925.

MALLARD (?), No, 296,413, banded by H. S. Osler, at Lake Scugog, Ontario, on September 29, 1923, was killed at New Inlet, North Carolina, on January 27, 1926.

BLACK DUCK, No. 204,924, banded by Arthur A. Allen, at Ithaca, New York, on March 25, 1923, was killed at Jumping Frog Creek, about fifteen miles south of the mouth of the Albany River, James Bay, Northern Ontario, on July 20, 1926.

BLACK DUCK, No. 202,539, banded by H. S. Osler, at Lake Scugog, Ontario, on August 24, 1923, was found dead at Beloeil Station, Quebec, during the first part of April, 1926. The bird had been killed by flying into a high wire fence.

BLACK DUCK, No. 202,684, banded by H. S. Osler, at Lake Scugog, Ontario, on August 31, 1923, was shot at Rice Lake, Ontario, on October 27, 1925.

BLACK DUCK, No. 296,204, banded by H. S. Osler, at Lake Scugog, Ontario, on September 18, 1923, was shot at Miller's Island, in the Patapsco River, just below Bay Shore Park, Baltimore County, Maryland, on December 1, 1925.

BLACK DUCK, No. 296,337, banded by H. S. Osler, at Lake Scugog, Ontario, on September 25, 1923, was killed near Browns Bridge, on the Chattahoochee River, nine miles west of Gainesville, Georgia, about December 19, 1925.

BLACK DUCK, No. 296,348, banded by H. S. Osler, at Lake Scugog, Ontario, on September 25, 1923, was shot on the property of The Turke Point Company, Norfolk County, Ontario, on October 19, 1925.

BLACK DUCK, No. 297,213, banded by H. S. Osler, at Lake Scugog, Ontario, on October 2, 1923, was killed at the Indian Bogs, Lake Scugog, Ontario, on October 10, 1925.

BLACK DUCK, No. 297,241, banded by H. S. Osler, at Lake Scugog, Ontario, on October 2, 1923, was killed at Moxleys Point, Potomac River, Maryland, on January 15, 1926.

BLACK DUCK, No. 297,338, banded by H. S. Osler, at Lake Scugog, Ontario, on October 4, 1923, was killed in the marshes of Broadwater Bay, Northampton County, Virginia, on December 23, 1925.

* U.S. Dept., of Agric., Bull., No. 1268 Oct. 16, 1924.

BLACK DUCK, No. 297,396, banded by H. S. Osler, at Lake Scugog, Ontario, on October 8, 1923, was killed on Chester River, near Chesapeake Bay, Kent County, Maryland, on December 14, 1925.

BLACK DUCK, No. 297,705, banded by H. S. Osler, at Lake Scugog, Ontario, on October 16, 1923, was killed at Cold Spring Inlet, Cape May, New Jersey, on December 3, 1925.

BLACK DUCK (?), No. 297,724, banded by H. S. Osler, at Lake Scugog, Ontario, on October 23, 1923, was caught in a steel trap on Elk River, eight miles west of Winchester, Franklin County, Tennessee, on January 15, 1926. The bird was dead when found.

BLACK DUCK, No. 297,736, banded by H. S. Osler, at Lake Scugog, Ontario, on October 25, 1923, was shot at Pigeon Lake, among the Kawartha Lakes, several miles from Bobcaygeon, Ontario, on September 6, 1926.

CROW, No. 209,653, nestling, banded by Theed Pearse, at Comox, Vancouver Island, British Columbia, on June 17, 1923, was shot at a place twenty-three miles from Victoria, British Columbia, on October 30, 1925.

BRONZED GRACKLE, No. 109,962, banded by Reuben Lloyd, at Davidson, Saskatchewan, on May 6, 1923, was found dead in the same locality, on May 21, 1923.*

RETURNS UPON BIRDS BANDED IN 1924

MALLARD, No. 321,773, banded by H. S. Osler, at Lake Scugog, Ontario, on October 31, 1924, was killed at Chickaney River, a small river north of the Albany River, Ontario, shortly before August 17, 1926.

BLACK DUCK, No. 323,179, banded by H. S. Osler, at Lake Scugog, Ontario, on September 29, 1924, was killed at Jumping Frog Creek, about fifteen miles south of Albany River, on the shore of James Bay, Northern Ontario, on July 15, 1926.

BLACK DUCK, No. 323,205, banded by H. S. Osler, at Lake Scugog, Ontario, on September 29, 1924, was killed at Guilford Creek, Virginia, on January 18, 1926.

BLACK DUCK, No. 323,228, banded by H. S. Osler, at Lake Scugog, Ontario, on October 1, 1924, was shot on Arnoldi Point, on the Jersey shore, Salem County, New Jersey, on November 11, 1926.

BLACK DUCK, No. 323,406, banded by H. S. Osler, at Lake Scugog, Ontario, on October 8, 1924, was killed at Strange Creek, on the Elk River, Braxton County, West Virginia, on December 1, 1924.

BLACK DUCK, No. 323,557, banded by H. S. Osler, at Lake Scugog, Ontario, on October 22, 1924, was killed by a resident of Wolfe Island, Ontario—no date given, but reported on December 13, 1925.

GREEN-WINGED TEAL, No. 297,863, banded by H. S. Osler, at Lake Scugog, Ontario, on September 15, 1924, was shot (?) on a lake twenty miles north of Lisco, Nebraska, about November, 12, 1925.

CROW, No. 227,806, nestling, banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on June 29, 1924, was captured on a farm about twenty-six miles south of Swift Current, Saskatchewan, on April 17, 1926. The band was removed from the bird, which was quite tame.

BRONZED GRACKLE, No. 19,449, ad. ♂ banded by Ralph E. DeLury, at 330 Fairmont Avenue, Ottawa, Ontario, on May 25, 1924, was found dead on a verandah on Bayswater Avenue, Ottawa, Ontario, on May 5, 1925.

BRONZED GRACKLE, No. 274,149, fledgeling, banded by George Lang, at Indian Head, Saskatchewan, on June 9, 1924, was taken from a cat at a place about seven miles west of the place of banding, on October 2, 1926.

EVENING GROSBEAK, No. 110,630, banded by M. J. Magee, at Sault Ste. Marie, Michigan, on March 23, 1924, was killed at St. Charles de Bellechasse, in the vicinity of Quebec City, Quebec, on March 9, 1926.

RETURNS UPON BIRDS BANDED IN 1925

HERRING GULL, No. 223,616, banded by H. F. Perkins, at Four Brothers Islands, Lake Champlain, on June 5, 1925, was found dead at Otterburn Park, St. Hilaire Parish, Rouville County, Quebec, on November 9, 1925.

HERRING GULL, No. 223,629, banded by H. F. Perkins, at Four Brothers Islands, Lake Champlain, on June 5, 1925, was found dead at Bout de l'Isle, at the east end of the Island of Montreal, Quebec, on November 22, 1925.

HERRING GULL, No. 385,595, banded by F. C. Lincoln, at St. James, Michigan, on June 27, 1925, was found dead at the mouth of the Pickerel River, where it empties into Georgian Bay, Ontario, on October 21, 1925.

HERRING GULL, No. 385,656, juv., banded by F. C. Lincoln, at St. James, Michigan, on July 2, 1925, was shot on Lake Eabemut, near the Albany River, Ontario, during the latter part of August, 1925.

HERRING GULL, No. 385,697, banded by F. C. Lincoln, at St. James, Michigan, on July 3, 1925, was shot at Red Deer Lake, near Wanup, Ontario about twenty-five miles east of Sudbury, between September 1 and 5, 1925.

HERRING GULL, No. 385,766, banded by F. C. Lincoln, at St. James, Michigan, on July 3, 1925, was found dead on the shore of Round Lake, Bonnechere River, Renfrew County, Ontario, on November 4, 1925.

HERRING GULL, No. 385,834, banded by F. C. Lincoln, at St. James, Michigan, on July 3, 1925, was killed at Oscalana Lake, about three miles from Oscalana, on the C.N.R., thirty-three miles above Parent, Champlain County, Quebec, on September 3, 1925.

HERRING GULL, No. 378,078, banded by F. C. Lincoln, at St. James, Michigan, on July 7, 1925, was found exhausted with a broken wing at Rivière au Renard, Gaspé County, Quebec, towards the end of September, 1925. The bird was killed by the gentleman who found it.

HERRING GULL, No. 386,086, banded by F. C. Lincoln, at St. James, Michigan, on July 8, 1925, was found seriously wounded in the St. Lawrence River, at Montreal, Quebec, on September 7, 1925. The bird died two days later.

* U.S. Dept., of Agric. Bull., No. 1268, Oct. 16, 1924

HERRING GULL, No. 225,219, yg., banded by D. A. Déry, at "Razades d'en bas", Temiscouata County, Quebec, on July 17, 1925, died after an operation performed on it at Pigeon Hill, Shippegan Island, Gloucester County, New Brunswick, on September 16, 1926.

HERRING GULL, No. 225,246, yg., banded by D. A. Déry, at "Razades d'en bas", Temiscouata County, Quebec, on July 17, 1925, was killed on the Indian Islands, Groswater Bay, Newfoundland Labrador, on August 28, 1925. Groswater Bay is another name for Hamilton Inlet.

DOUBLE-CRESTED CORMORANT, No. 333,112, banded by Gus. A. Langelier, at Long Pilgrim Island, off St. André de Kamouraska, Quebec, on July 3, 1925, was shot on the Kissimmee River, ten miles from Okeechobee, Florida, on December 12, 1925.

MALLARD, No. 309,663, banded by Frank W. Robl, at Ellinwood, Kansas, on February 9, 1925, was shot on a lake nine miles north-west of Star City, Saskatchewan, on October 20, 1925.

MALLARD, No. 305,335, ♂, banded by J. A. Munro, at Elk Lake, Vancouver Island, British Columbia, on February 23, 1925, was found dead in the same locality, on July 27, 1925. The bird had evidently been shot and had been dead for some time when it was found.

MALLARD, No. 305,342, ♀, banded by J. A. Munro, at Elk Lake, Vancouver Island, British Columbia, on February 23, 1925, was found dead in the same locality ,on July 27, 1925. The bird had evidently been shot and had been dead for some time when it was found.

MALLARD, No. 324,006, banded by L. V. Walton, at Cuivre Island, Firma, Missouri, on February 26, 1925, was shot at a place near Fillmore, Saskatchewan, on October 2, 1926.

MALLARD, No. 322,319, banded by Clarence E. Chapman, at Oakley, Berkeley County, South Carolina, on March 3, 1925, was shot for food at Cumberland House, Saskatchewan, about May 16, 1925.

MALLARD, No. 305,168, ♂, banded by John Broeker, at Portage des Sioux, Missouri, on March 11, 1925, was killed near Fort Vermilion, Alberta, about four hundred miles north of Edmonton, on June 10, 1925.

MALLARD, No. 324,037, banded by L. V. Walton, at Cuivre Island, Missouri, on March 16, 1925, was caught in a trap at a place about ten miles from the Hudson Bay Company Post at Cedar Lake, Manitoba, on May 3, 1926.

MALLARD, No. 300,550, banded by T. E. Musselman, at Scobey Lake, Missouri, on March 24, 1925, was caught in a rat trap in Section 5, Township 49, Range 8, Saskatchewan, on April 24, 1925.

MALLARD, No. 300,552, banded by T. E. Musselman, at Scobey Lake, Missouri, on March 24, 1925, was shot in the south part of Lake Manitoba, about fifteen miles north of Selkirk, Manitoba, in a marsh on the St. Peters Indian Reserve on October 28, 1925.

MALLARD, No. 305,184, ♂, banded by John Broeker, at Portage des Sioux, Missouri, on March 24, 1925, was shot at Lost River, which flows into Red Deer Lake, in Northern Manitoba, on September 19, 1925.

MALLARD, No. 324,058, banded by L. V. Walton, at Cuivre Island, Missouri, on March 24, 1925, was killed, evidently by coming in contact with roadside telephone wires, a few miles west of Russell, Manitoba, about April 30, 1926.

MALLARD, No. 300,636, banded by T. E. Musselman, at Scobey Lake, Missouri, on March 29, 1925, was shot at a place south of Qu'Appelle, Saskatchewan, on September 25, 1925.

MALLARD, No. 324,912, ♂, banded by Gussie Innes, at Kinalmeaky Farm, Headingly, Manitoba, on April 15, 1925, was shot at "Kings" Lake, four miles north-east of Melrose, Stearns County, Minnesota, on November 5, 1925.

MALLARD, No. 324,913, ♀, banded by Gussie Innes, at Kinalmeaky Farm, Headingly, Manitoba, on April 15, 1925, was killed at Weiner, Arkansas, on November 5, 1925.

MALLARD, No. 232,032, banded by Reuben Lloyd, at Davidson, Saskatchewan, on June 30, 1925, was shot on the Little La Plonge River, about three miles north of Beauval, Saskatchewan, on or about August 24, 1926.

BLACK DUCK, No. 322,367, banded by Clarence E. Chapman, at Oakley, Berkeley County, South Carolina, on March 16, 1925, was found dead in a fishing net at Hnausa, Manitoba, a small village on the west shore of Lake Winnipef, seventy miles north of Winnipeg, on October 17, 1925.

PINTAIL, No. 305,348, ♀, banded by J. A. Munro, at Colquitz, Vancouver Island, British Columbia, on February 16, 1925, was shot at Royal Oak, Vancouver Island, British Columbia, on November 9 ,1925.

PINTAIL, No. 367,040, banded by Frank W. Robl, at Ellinwood, Kansas, on March 5, 1925, was shot in the North Battleford District, Saskatchewan, about the second week of October, 1925.

RING-NECKED DUCK, No. 322,312, ♀, banded by Clarence E. Chapman, at Oakley, Berkeley County, South Carolina, on March 2, 1925, was shot at a place about twenty miles north of Thicket Portage, Manitoba, Mile 185, H.B.R., via The Pas, Manitoba, about May 20, 1925.

RING-NECKED DUCK, No. 322,337, banded by Clarence E. Chapman, at Oakley, Berkeley County, South Carolina, on March 8, 1925, was shot at Big Stone Lake, near Lac La Ronge, lying in Township 72, West of the Third Meridian, Saskatchewan, on June 1, 1925.

BLACK-CROWNED NIGHT HERON, No. 335,736, banded by E. H. Forbush, at Barnstable, Massachusetts, on June 17, 1925, was found injured in an oat field on Hazen Creek, about one mile from the Richelieu River, Quebec, on September 2, 1925. The bird died shortly after it was found.

BLACK-CROWNED NIGHT HERON, No. 335,570, banded by Allen Potter, at Barnstable, Massachusetts, on June 19, 1925, was found dead on the Bayonne River, five miles from Berthierville, Quebec, on September 15, 1925.

BLACK-CROWNED NIGHT HERON, No. 333,131, banded by Gus. A. Langelier, at Long Pilgrim Island off St. André de Kamouraska, Quebec, on July 4, 1925, was killed in a pine thicket about three miles from the Atlantic Ocean, in Accomac County, Virginia, on November 16, 1925.

BLACK-CROWNED NIGHT HERON, No.

368,335, fledgeling, banded by George Lang, at Indian Head, Saskatchewan, on July 15, 1925, was found dead on the edge of a slough, thirty miles south-east of Indian Head, Saskatchewan, on October 11, 1925.

BLACK-CROWNED NIGHT HERON, No. 368,404, fledgeling, banded by George Lang, at Indian Head, Saskatchewan, on July 15, 1925, was found dead in a small stream in Township 17, Range 14, West of the Second Meridian, Saskatchewan, during the month in which it was banded.

BLACK-CROWNED NIGHT HERON, No. 368,414, fledgeling, banded by George Lang, at Indian Head, Saskatchewan, on July 15, 1925, was killed in the eastern part of Carroll County, in the north-western part of Arkansas, on October 30, 1925.

CALIFORNIA QUAIL, No. 353,799, banded by J. A. Munro, at Cooper's Cove, Sooke, Vancouver Island, British Columbia, on January 9, 1925, was found dead in the same locality, on January 11, 1925.

RUFFED GROUSE, No. 227,849, ad., banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on March 14, 1925, was re-captured at the same station, on March 26, 1925, and was shot at a place about one mile north of the place where it was banded, on October 23, 1925.

RUFFED GROUSE, No. 227,850, ad., banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on March 14, 1925, was shot at a place one-half mile south of the place where it was banded, on October 24, 1925.

RUFFED GROUSE, No. 227,854, ad., banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on March 18, 1925, was shot at a place one-quarter mile south of the place where it was banded, on October 31, 1925.

FERRUGINOUS ROUGH-LEG, No. 235,819, fledgeling, banded by Charles M. Sternberg, at Red Deer River, west of Rumsey, Alberta, on July 2, 1925, was killed at a place thirteen miles north of Kimball, in Township 17, Range 55, West of the Sixth P.M., Banner County, Nebraska, on October 12, 1925.

PIGEON HAWK, No. 295,683, nestling, banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on July 5, 1925, was shot while it was chasing a Robin on the shore of Wyowasung Lake in Section 16, Range 15, Township 21, Municipality of Fort Qu'Appelle, Saskatchewan, on August 14, 1925.

HAIRY WOODPECKER, No. 259,105, ad., ♀, banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on January 13, 1925, was re-captured at the same station, on March 10, 1925, and was shot (?) at a place one and one-half miles north of the hamlet of Kuroki, Saskatchewan, during the early part of May, 1926.

FLICKER, No. 344,593, fledgeling, banded by George Lang, at Indian Head, Saskatchewan, on June 27, 1925, was found dead at a place one-half mile west of the place where it was banded, on August 11, 1925.

STELLER'S JAY, No. 262,155, nestling, banded by G. D. Sprot, at Mill Bay, Vancouver Island British Columbia, on May 15, 1925, was removed from the nest by a Crow, on May 18, 1925.

STELLER'S JAY, No. 262,156, nestling, banded by G. D. Sprot, at Mill Bay, Vancouver Island, British Columbia, on May 15, 1925, was removed from the nest by a Crow, on May 18, 1925.

STELLER'S JAY, No. 262,157, nestling, banded by G. D. Sprot, at Mill Bay, Vancouver Island, British Columbia, on May 15, 1925, was killed in the nest by a Crow, on May 18, 1925.

STELLER'S JAY, No. 262,158, nestling, banded by G. D. Sprot, at Mill Bay, Vancouver Island, British Columbia, on May 15, 1925, was removed from the nest by a Crow, on May 16, 1925.

OREGON JAY, No. 256,977, banded by G. B. Simpson, at Marble Bay, Lake Cowichan, British Columbia, on January 17, 1925, was re-captured at the same station on March 15, 1925, and was found drowned in a water barrel in the same locality, on April 14, 1925.

CROW, No. 209,670, nestling, banded by Theed Pearse, at a place near Comox, Vancouver Island, British Columbia, on June 12, 1925, was shot at Denman Island, British Columbia, about November 25, 1925.

CROW, No. 227,868, nestling, banded by J. R. Carter, at Muscow, Saskatchewan, on June 26, 1925, was poisoned at Craik, Saskatchewan—no date given, but reported on June 4, 1926.

BRONZED GRACKLE, No. 19,450, ad., ♂, banded by Ralph E. DeLury, at 330 Fairmont Avenue, Ottawa, Ontario, on April 5, 1925, was captured at 727 Cooper Street, Ottawa, Ontario on August 4, 1925. The bird had an injured leg, so the band was removed, and the bird liberated.

BRONZED GRACKLE, No. 314,281, ♀, banded by Hoyes Lloyd, at 406 Queen Street, Ottawa, Ontario, on April 12, 1925, was shot at Zuni, Virginia, on November 14, 1925.

BRONZED GRACKLE, No. 106,188, ad., ♀, banded by Ralph E. DeLury, at 330 Fairmont Avenue, Ottawa, Ontario, on May 20, 1925, was shot at a place one-half mile from the place where it was banded, on May 1, 1926.

BRONZED GRACKLE, No. 279,809, fledgeling, banded by George Lang, at Indian Head, Saskatchewan, on June 8, 1925, was found dead near the place where it was banded, on June 12, 1925.

BRONZED GRACKLE, No. 279,817, fledgeling, banded by George Lang, at Indian Head, Saskatchewan, on June 11, 1925, was killed by a cat in the same locality, on June 14, 1925.

BRONZED GRACKLE, No. 279,818, fledgeling, banded by George Lang, at Indian Head, Saskatchewan, on June 11, 1925, was killed by a cat in the same locality, on June 14, 1925.

BRONZED GRACKLE, No. 106,193, ad., ♂, banded by Ralph E. DeLury, at 330 Fairmont Ave., Ottawa, Ontario, on June 15, 1925, was shot "while fighting a couple of Robins" at a place one-half mile from where it was banded, on April 24, 1926.

BRONZED GRACKLE, No. 279,822, fledgeling, banded by George Lang, at Indian Head, Saskatchewan, on June 15, 1925, was found dead near the place where it was banded, on June 21, 1925.

BRONZED GRACKLE, No. 343,773, juv., partly albino, banded by A. Burton Gresham, at Winnipeg, Manitoba, on June 16, 1925, was found injured and later died at Transcona, Manitoba, about seven miles from where it was banded, on or about July 23, 1926.

BRONZED GRACKLE, No. 279,828, fledgeling, banded by George Lang, at Indian Head, Saskatchewan, on June 17, 1925, was killed by a cat in the same locality, on June 22, 1925.

PURPLE FINCH, No. 160,871, banded by M. J. Magee, at Sault Ste. Marie, Michigan, on June 23, 1925, was killed during a fight with a Sparrow in the same locality, on July 14, 1926.

SLATE-COLORED JUNCO, No. 136,708, ad., ♂, banded by Ralph E. DeLury, 330 Fairmont Ave., Ottawa, Ontario, on April 17, 1925, was found dead at the same station, on April 21, 1925. The bird had evidently been killed by a cat.

OREGON JUNCO, No. 27,608, banded by Theed Pearse, at Courtenay, Vancouver Island, British Columbia, on January 11, 1925, injured itself in a trap at the same station, and died on March 16, 1925.

OREGON JUNCO, No. 93,555, ♂, banded by G. D. Sprot, at Mill Bay, Vancouver Island, British Columbia, on March 24, 1925, was found dead at Shawnigan Lake, Vancouver Island, two miles west of the place where it was banded, on March 27, 1925.

SONG SPARROW, No. 146,161, banded by G. B. Simpson, at Marble Bay, Lake Cowichan, British Columbia, on January 18, 1925, was re-captured at the same station until March 19, 1925, and was found dead in the same locality, on April 14, 1925.

SONG SPARROW, No. 136,701, ad., ♂ (?), banded by Ralph E. DeLury, at 330 Fairmont Avenue, Ottawa, Ontario, on March 30, 1925, was re-captured at the same station until May 23, 1925, and was killed by a cat in the same locality, on May 24, 1925.

SONG SPARROW, No. 140,811. ad., banded by Claude E. Johnson, at 87 Cameron Street, Ottawa, Ontario, on April 23, 1925, was re-captured at the same station until May 8, 1925, and was killed by a cat on Ossington Avenue, Ottawa, Ontario, on June 6, 1925.

HOUSE WREN, No. 79,958, fledgeling, banded by Howard F. Cant, at Galt, Ontario, on July 4, 1925, was killed by a car in the same locality on July 27, 1925.

WHITE-BREASTED NUTHATCH, No. A 10,843, ad., banded by George W. Brett, at Owen Sound, Ontario, on January 10, 1925, was re-captured at the same station, on January 17, 1925, and was found dead at a place about one hundred yards from where it was banded, on February 3, 1925. It is thought that the bird was frozen to death.

ROBIN, No. 344,549, fledgeling, banded by George Lang, at Indian Head, Saskatchewan, on June 12, 1925, was killed by a cat in the same locality, on June 25, 1925.

ROBIN, No. 344,565, fledgeling, banded by George Lang, at Indian Head, Saskatchewan, on June 18, 1925, was found dead in the same locality, on July 31, 1925.

ROBIN, No. 344,600, fledgeling, banded by George Lang, at Indian Head, Saskatchewan, on June 30, 1925, was killed by a telephone wire in the same locality, on September 1, 1925.

INSTALMENT No. 17 OF BIRD-BANDING RETURNS

ADDITIONAL RETURNS UPON BIRDS BANDED IN 1925

BLACK GUILLEMOT, No. 114,716, juv., banded by Harrison F. Lewis, at Yankee Harbor, Saguenay County, Quebec, on August 5, 1925, was killed at Point aux Jambons, fifteen miles west of Seven Islands, Saguenay County, Quebec, on October 14, 1925.

GLAUCOUS-WINGED GULL, No. 232,804, nestling, banded by Theed Pearse, at North Mitlenatch, Gulf of Georgia, British Columbia, on July 25, 1925, was picked up dead at a place within six miles of Simoan Sound, which is situated about two hundred miles north of Vancouver, British Columbia, on December 1, 1925.

GLAUCOUS-WINGED GULL, No. 232,805, nestling, banded by Theed Pearse, at North Mitlenatch, Gulf of Georgia, British Columbia, on July 25, 1925, was found dead in a trap at Oke Over Arm Inlet, British Columbia, on February 21, 1926.

GREAT BLACK-BACKED GULL, No.309,583, juv., banded by Harrison F. Lewis, on Eastern Island, St. Mary Islands, Saguenay County, Quebec, on July 17, 1925, was killed at Cook's Harbor, St. Barbe District, Newfoundland, during the month of August, or early September, 1925.

GREAT BLACK-BACKED GULL, No. 334,-235, juv., banded by Harrison F. Lewis, at Boat Islands, Saguenay County, Quebec, on July 18, 1925, was shot in the Straits of Belle Isle, thirty miles south of Cape Norman, Newfoundland, about October 14, 1925.

GREAT BLACK-BACKED GULL, No. 334,-259, juv., banded by Harrison F. Lewis, at Boat, Islands, Saguenay County, Quebec, on July 18, 1925, was found dead on the western St. Mary Island, Saguenay County, Quebec, during the fall of 1925.

GREAT BLACK-BACKED GULL, No. 334,-264, juv., banded by Harrison F. Lewis, at Boat Islands, Saguenay County, Quebec, on July 18, 1925, was shot in the same locality, about September 10, 1925.

GREAT BLACK-BACKED GULL, No. 333,-023, juv., banded by R. W. Tufts, at Lake George, Yarmouth County, Nova Scotia, on July 21, 1925, was found dead on the shore of St. Mary's Bay, Meteghan River, Digby County, Nova Scotia, on November 27, 1925.

GREAT BLACK-BACKED GULL, No. 333,-028, juv., banded by R. W. Tufts, at Lake George, Yarmouth County, Nova Scotia, on July 21, 1925, was found dead at Lieutenant's Island, Wellfleet, Massachusetts, on November 15, 1925.

GREAT BLACK-BACKED GULL, No. 334,-339, juv., banded by Harrison F. Lewis, on Cormorant Rocks, Cape Whittle Sanctuary, Saguenay County, Quebec, on July 21, 1925, was killed at Cook's Harbor, St. Barbe District, Newfoundland, during the month of August, or early September, 1925.

GREAT BLACK-BACKED GULL, No. 334,-391, juv., banded by Harrison F. Lewis, at Wapitagun, Saguenay County, Quebec, on July 22, 1925, was picked up dead on the shore at Neil's Harbor, Nova Scotia, on October 12, 1925.

GREAT BLACK-BACKED GULL, No. 334,-016, juv., banded by Harrison F. Lewis, on Haystack Island, Wolf Bay, Saguenay County, Quebec, on July 26, 1925, was caught on a fish hook at Quirpon, on the north-east coast of Newfoundland, near St. Anthony, Newfoundland, on September 15, 1925.

GREAT BLACK-BACKED GULL, No. 334,-158, juv., banded by Harrison F. Lewis, on Murre Island, Wolf Bay, Saguenay County, Quebec, on July 27, 1925, was caught at Forteau, Straits of Belle Isle, Newfoundland Labrador, about ten miles beyond the boundary at Blanc Sablon, Quebec, on August 18, 1925.

GREAT BLACK-BACKED GULL, No. 334,-171, juv., banded by Harrison F. Lewis, on Murre Island, Wolf Bay, Saguenay County, Quebec, on July 27, 1925, was killed at Barge Bay, Labrador, Newfoundland, on August 22, 1925.

HERRING GULL, No. 309,551, juv., banded by Harrison F. Lewis, on Eastern Island, St. Mary Islands, Saguenay County, Quebec, on July 17, 1925, was killed in Northern Newfoundland, on September 16, 1925.

HERRING GULL, No. 309,553, juv., banded by Harrison F. Lewis, at Eastern Island, St. Mary Islands, Saguenay County, Quebec, on July 17, 1925, was killed in the St. Barbe District, Newfoundland, on October 2. 1926.

HERRING GULL, No. 334,256, juv., banded by Harrison F. Lewis, at Boat Islands, Saguenay County, Quebec, on July 18, 1925, was killed at Cook's Harbor, St. Barbe District, Newfoundland, during the month of August, or early September, 1925.

HERRING GULL, No. 334,326, juv., banded by Harrison F. Lewis, on Seal Islet, Pointe au Maurier, Saguenay County, Quebec, on July 20, 1925, was caught in a net and killed at Pearl Island, Lunenburg County, Nova Scotia, on October 6, 1925.

RING-BILLED GULL, No. 368,674, juv., banded by Harrison F. Lewis, at Pointe au Maurier, Saguenay County, Quebec, on July 20, 1925, was found dead on the Islands of Repentigny, L'Assomption County, Quebec, on September 28, 1925.

RING-BILLED GULL, No. 368,747, juv., banded by Harrison F. Lewis, at Pointe au Maurier, Saguenay County, Quebec, on July 20, 1925, was found dead on the island on which it was banded. on August 5, 1925. The cause of its death was not apparent.

RING-BILLED GULL, No. 368,795, juv., banded by Harrison F. Lewis, at Fog Island, Saguenay County, Quebec, on July 31, 1925, was found dead on the island on which it was banded, about August 14, 1925.

RING-BILLED GULL, No. 368,832, juv, banded by Harrison F. Lewis, on an island northeast of Fog Island, Fog Island Sanctuary, Saguenay County, Quebec, on August 1, 1925, was found dead on the shore of Long Island Sound, at Woodmont, Connecticut, on October 18, 1925.

RING-BILLED GULL, No. 368,869, juv., banded by Harrison F. Lewis, on an island northeast of Fog Island, Fog Island Sanctuary, Saguenay County,Quebec, on August 1, 1925, was found dead on the island on which it was banded, about August 14, 1925.

RING-BILLED GULL, No. 368,905, juv., banded by Harrison F. Lewis, on an island northeast of Fog Island, Fog Island Sanctuary, Saguenay County, Quebec, on August 1, 1925, was killed in the vicinity of Jacksonville, Florida, on December 24, 1925.

CASPIAN TERN, No. 368,787, juv., banded by Harrison F. Lewis, at Fog Island, Saguenay County, Quebec, on July 31, 1925, was found dead on the island on which it was banded, about August 14, 1925.

CASPIAN TERN, No. 368,789, juv., banded by Harrison F. Lewis, at Fog Island, Saguenay County, Quebec, on July 31, 1925, was found dead on the island on which it was banded, about August 14, 1925.

COMMON TERN, No. 370,292, banded by W. B. Purdy, at St. Clair Flats, Michigan, on July 20, 1925, was found dead in a fish net in Lake Erie, three miles south-east of Wheatley dock, Ontario, on August 8, 1925.

DOUBLE-CRESTED CORMORANT, No. 305,388, juv., banded by J. A. Munro, at Skunk Island Reef, Lake Manitoba, Manitoba, on July 17, 1925, was "taken up" at Old River, Mississippi, on October 19, 1925.

DOUBLE-CRESTED CORMORANT, No. 334,029, juv., banded by Harrison F. Lewis, on a rock near Haystack Island, Wolf Bay, Saguenay County, Quebec, on July 26, 1925, was shot at Napeague Bay, Long Island, New York, on October 17, 1925.

DOUBLE-CRESTED CORMORANT, No. 232,022, banded by Reuben Lloyd, at Last Mountain Lake, Saskatchewan, on August 1, 1925, was caught on a line at Lake Verret, Assumption Parish, Louisiana—no date given, but reported on October 26, 1925.

DOUBLE-CRESTED CORMORANT, No. 309,749, banded by Reuben Lloyd, at Last Mountain Lake, Saskatchewan, on August 1, 1925, was killed at Hutto, Texas, on the International and Great Northern Railroad, twenty-three miles north-east of Austin, Texas, on October 11, 1925.

DOUBLE-CRESTED CORMORANT, No. 309,756, banded by Reuben Lloyd, at Last Mountain Lake, Saskatchewan, on August 1, 1925, was killed at Winona, Missouri, on October 9, 1925.

MALLARD, No. 313,156, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on July 28, 1925, was shot in a cornfield, five miles west of Wheatland, Wyoming, on November 15, 1925.

MALLARD, No. 313,159, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on August 8, 1925, was shot in Section 28, Township 52, Range 26, West of the 4th Meridian, Alberta, on October 24, 1925.

MALLARD, No. 313,161, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on August 8, 1925, was killed at a place near Boise, Idaho, on December 20, 1925.

MALLARD, No. 313,173, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on August 9, 1925, was killed at a place about three miles south of Willis, and about ninety-four miles north of Galveston, Texas, on December 21, 1925.

MALLARD, No. 313,174, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on August 9, 1925, was killed on the South Loup River, at Stapleton, Logan County, Nebraska, on December 6, 1925.

MALLARD, No. 313,175, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on August 9, 1925, was shot in Section 18, Township 43, Range 16, West of the 4th Meridian, Alberta, on September 16, 1925.

MALLARD, No. 313,176, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on August 10, 1925, was shot in the Stony Plain District, Alberta, about September 15, 1925.

MALLARD, No. 313,177, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on August 10, 1925, was killed on the north-west quarter of Section 33, Township 57, Range 7, West of the 5th Meridian, Alberta, on September 18, 1926.

MALLARD, No. 313,183, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on August 10, 1925, was killed at a place about five miles north-east of Cass, Texas, on December 29, 1925.

MALLARD, No. 313,192, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on August 12, 1925, was shot on Besaw Lake, Illinois, on October 13, 1926.

MALLARD, No. 313,197, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on August 13, 1925, was killed on the Sabine River, in Wood County, Texas, on November 11, 1926.

MALLARD, No. 313,198, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on August 14, 1925, was shot on the south-west quarter of Section 5, Township 60, Range 1, West of the 5th Meridian, at Westlock, Alberta, about September 21, 1925.

MALLARD, No. 313,200, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on August 15, 1925, was killed on the Platt River, between Brush and Sterling, Colorado, on October 25, 1925.

MALLARD, No. 232,344, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on August 21, 1925, was killed at a place three miles east of Lac La Nonne, Alberta, on October 3, 1925.

MALLARD, No. 232,374, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on September 3, 1925, was shot in a grain field near Bittern Lake, Alberta, shortly before October 8, 1925.

MALLARD, No. 232,375, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on September 3, 1925, was shot at a place sixty-five miles north-west of Edmonton, Alberta—no date given but reported on October 10, 1925.

MALLARD, No. 232,378, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on September 3, 1925, was shot at a place near Denver, Colorado, about November 8, 1925.

MALLARD, No. 232,379, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on September 3, 1925, was killed in a pond on the Golden Rod Prairie, in the western part of Wharton County, Texas, on December 30, 1925.

MALLARD, No. 232,393, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on September 5, 1925, was shot on the Lodgepole Creek, five miles east of Kimball, Nebraska, on October 28, 1925.

MALLARD, No. 232,394, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on September 5, 1925, was killed in a slough at Caldwell, Idaho, on November 20, 1925.

MALLARD, No. 322,952, banded by Reuben Lloyd, at Davidson, Saskatchewan, on September 5, 1925, was shot in a cornfield just outside of the Sisseton Game Refuge, South Dakota, on October 22, 1925.

MALLARD, No. 323,728, banded by H. S. Osler, at Lake Scugog, Ontario, on September 21, 1925, was shot at Shoal Lake, Manitoba, about one hundred and eighty miles north-west of Winnipeg, Manitoba, on October 1, 1926.

MALLARD, No. 323,904, banded by H. S. Osler, at Lake Scugog, Ontario, on September 27, 1925, was killed at a place fifty miles below Fort McPherson, on the Mackenzie Delta, North West Territories, about May 27, 1926.

MALLARD, No. 323,906, banded by H. S. Osler, at Lake Scugog, Ontario, on September 27, 1925, was caught in a muskrat trap at a place near the 53rd parallel of latitude, on the north end of Lake Winnipegosis, Manitoba, on May 6, 1926.

MALLARD, No. 323,928, banded by H. S. Osler, at Lake Scugog, Ontario, on September 28, 1925, was killed at the Hallowing Point Club, Virginia, on November 9, 1925.

MALLARD, No. 309,786, banded by Reuben Lloyd, at Davidson, Saskatchewan, on August 9, 1925, was shot at Capitol Beach, Lincoln, Lancaster County, Nebraska, on October 20, 1925. The bird had a white ring around its neck.

MALLARD X WHITE ENGLISH CALL DUCK, No. 232,024, dark, banded by Reuben Lloyd, at Davidson, Saskatchewan, on August 9, 1925, was killed at Burlington, Coffey County, Kansas, on October 19, 1925.

MALLARD X WHITE ENGLISH CALL DUCK, No. 309,762, dark, banded by Reuben Lloyd, at Davidson, Saskatchewan, on August 9, 1925, was killed at Burlington, Coffey County, Kansas, on October 19, 1925.

MALLARD X WHITE ENGLISH CALL DUCK, No. 309,782, dark, banded by Reuben Lloyd, at Davidson, Saskatchewan, on August 9, 1925, was killed by a resident of Putnam, Illinois, about November 11, 1925.

MALLARD X WHITE ENGLISH CALL DUCK, No. 309,784, dark, banded by Reuben Lloyd, at Davidson, Saskatchewan, on August 9, 1925, was killed at St. Francis River, in Craighead County, Arkansas, on December 28, 1925.

MALLARD X WHITE ENGLISH CALL DUCK, No. 309,790, white, banded by Reuben Lloyd, at Davidson, Saskatchewan, on August 9, 1925, was shot at Pecan Lake, Arkansas County, Arkansas, on December 10, 1925.

BLACK DUCK, No. 323,640, banded by H. S. Osler, at Lake Scugog, Ontario, on September 6, 1925, was killed in Core Sound, North Carolina, during the first part of January, 1926.

BLACK DUCK, No. 323,721, banded by H. S. Osler, at Lake Scugog, Ontario, on September 19, 1925, was killed at Wolf River, Tennessee, shortly before January 7, 1926.

BLACK DUCK, No. 323,724, banded by H. S. Osler, at Lake Scugog, Ontario, on September 20, 1925, was shot in Scimmino Marsh, on the northern boundary of James City County, Virginia, on December 6, 1925.

BLACK DUCK, No. 323,725, banded by H. S. Osler, at Lake Scugog, Ontario, on September 20, 1925, was taken at Scioto River, four miles south of Circleville, Pickaway County, Ohio—no date given, but reported on November 18, 1925.

BLACK DUCK, No. 323,726, banded by H. S. Osler, at Lake Scugog, Ontario, on September 20,

1925, was shot at Long Point Island, Lake Erie, Ontario, on November 11, 1925.

BLACK DUCK, No. 323,729, banded by H. S. Osler, at Lake Scugog, Ontario, on September 22, 1925, was killed at Nimisila Creek, Franklin Township, Summit County, Ohio, on October 26, 1925.

BLACK DUCK, No. 323,768, banded by H. S. Osler, at Lake Scugog, Ontario, on September 24, 1925, was killed at Biggers, Arkansas, on December 12, 1925.

BLACK DUCK, No. 323,777, banded by H. S. Osler, at Lake Scugog, Ontario, on September 24, 1925, was shot on the Arundel Plantation, on the Pee Dee River, Georgetown County, South Carolina, on January 28, 1926.

BLACK DUCK, No. 323,783, banded by H S. Osler, at Lake Scugog, Ontario, on September 24, 1925, was shot on the North River near its entrance to Belmont Lake, about four miles east of Havelock, Ontario, on November 9, 1925.

BLACK DUCK, No. 323,789, banded by H. S. Osler, at Lake Scugog, Ontario, on September 24, 1925, was shot at Cedar Island, at the mouth of the Santee River, South Carolina, on December 21, 1925.

BLACK DUCK, No. 323,793, banded by H. S. Osler, at Lake Scugog, Ontario, on September 24, 1925. was killed at Currituck Sound, Dare County, North Carolina, on December 11, 1925.

BLACK DUCK, No. 323,794, banded by H. S. Osler, at Lake Scugog, Ontario, on September 24, 1925, was picked up dead in a marsh about two and one-half miles east of Oshawa, Ontario. about November 1, 1925. The bird had evidently been dead only a few hours and no cause of death was apparent.

BLACK DUCK, No. 323,797, banded by H. S. Osler, at Lake Scugog, Ontario, on September 24, 1925, was killed on the marshes of the Monroe Marsh Company, in the city limits of the City of Monroe, Michigan, on December 12, 1925.

BLACK DUCK, No. 323,799, banded by H. S. Osler, at Lake Scugog, Ontario, on September 24, 1925, was killed in the marshes on the Back River, on the western side of Chesapeake Bay between Yorktown and Fortress Monroe, Virginia, on January 21, 1926.

BLACK DUCK, No. 323,815, banded by H. S. Osler, at Lake Scugog, Ontario, on September 24, 1925, was killed in a marsh on the shore of Lake Erie, about twenty-five miles east of Toledo, Ohio, on November 13, 1925, and was reported as a Mallard.

BLACK DUCK, No. 323,819, banded by H. S. Osler, at Lake Scugog, Ontario, on September 24, 1925, was killed at Severn Post, Hudson Bay, Ontario, on September 10, 1926.

BLACK DUCK, No. 323,832, ♂, banded by H. S. Osler, at Lake Scugog, Ontario, on September 25, 1925, was killed on the hunting preserve of the Byrd Spring Rod and Gun Club, Hunstville, Alabama, on November 19, 1925.

BLACK DUCK, No. 323,833, banded by H. S. Osler, at Lake Scugog, Ontario, on September 25, 1925, was shot at Oshawa, Ontario, on November 11, 1925.

BLACK DUCK, No. 323,843, banded by H. S. Osler, at Lake Scugog, Ontario, on September 25, 1925, was shot at Connorsville, Indiana, on December 30, 1925, and reported as a Mallard.

BLACK DUCK, No. 323,847, banded by H. S. Osler, at Lake Scugog, Ontario, on September 25, 1925, was killed on the Oak Plantation, Winnabow, North Carolina, on December 15, 1925.

BLACK DUCK, No. 323,871, banded by H. S. Osler, at Lake Scugog, Ontario, on September 26, 1925, was killed in the marshes along Sandusky Bay, about three miles west of Port Clinton, Ohio, on December 23, 1925.

BLACK DUCK, No. 323,882, banded by H. S. Osler, at Lake Scugog, Ontario, on September 26, 1925, was killed by being hit on the head with a gun. as it jumped from a marsh at Erieau, Ontario, on November 4, 1925.

BLACK DUCK, No. 323,885, banded by H. S. Osler, at Lake Scugog, Ontario, on September 26, 1925, was killed in the Town of Cameron, Cameron Parish, Louisiana, on the Gulf of Mexico, on December 11, 1925.

BLACK DUCK, No. 323,886, banded by H. S. Osler, at Lake Scugog, Ontario, on September 26, 1925, was killed on Big Sandy Marsh, near Lake Ontario, in Jefferson County, New York, on October 26 or 27, 1925.

BLACK DUCK, No. 323,902, banded by H. S. Osler, at Lake Scugog, Ontario, on September 27, 1925, was shot at the marsh of the Bluff Shooting and Fishing Club, at the east end of Long Point, Lake Erie, Ontario, on November 10, 1925.

BLACK DUCK, No. 323,912, banded by H. S. Osler, at Lake Scugog, Ontario, on September 27, 1925, was shot in Beach Thoroughfare, Atlantic County, New Jersey, on January 1, 1926.

BLACK DUCK, No. 323,932, banded by H. S. Osler, at Lake Scugog, Ontario, on September 29, 1925, was shot on the Trent River, Ontario, three miles south of Havelock, Ontario, on October 20, 1925.

BLACK DUCK, No. 323,933, banded by H. S. Osler, at Lake Scugog, Ontario, on September 29, 1925, was shot at Long Point, Lake Erie, Ontario, on November 18, 1925.

BLACK DUCK, No. 323,952, banded by H. S. Osler, at Lake Scugog, Ontario, on September 30, 1925, was killed on the James River, at City Point, Virginia, on November 14, 1925.

BLACK DUCK, No. 323,953, banded by H. S. Osler, at Lake Scugog, Ontario, on September 30, 1925, was killed at Red River Bay, about twelve miles north of Naples, Louisiana, on the north side of Red River, on December 22, 1925.

BLACK DUCK, No. 323.960, banded by H. S. Osler, at Lake Scugog, Ontario, on October 1, 1925, was shot at Consecon, Prince Edward County, Ontario, on November 14, 1925.

BLACK DUCK, No. 323,966, banded by H. S. Osler, at Lake Scugog, Ontario, on October 2, 1925, was shot at the Liberal Shooting Reserve, adjoining Toledo, Ohio, on October 30, 1925.

BLACK DUCK, No. 323,976, banded by H. S. Osler, at Lake Scugog, Ontario, on October 2, 1925, was killed at Black Lake, three-quarters of a mile from the Tennessee River, near the mouth of Sautta Creek, Marshall County, Alabama, on December 4, 1925.

BLACK DUCK, No. 323,981, banded by H. S. Osler, at Lake Scugog, Ontario, on October 2, 1925, was killed at Norman's Point, on Eastern Bay, Maryland, about the middle of January, 1926,

BLACK DUCK, No. 323,987, banded by H. S. Osler, at Lake Scugog, Ontario, on October 3,

1925, was killed near Lawrenceville, Illinois, on December 26, 1925, and reported as a Mallard.

BLACK DUCK, No. 323,999, banded by H. S. Osler, at Lake Scugog, Ontario, on October 3, 1925, was shot at Hamilton, Ontario, on October 28, 1925.

BLACK DUCK, No. 389,306, banded by H. S. Osler, at Lake Scugog, Ontario, on October 3, 1925, was killed in a marsh south of Port Clinton, Ohio, on October 24, 1925.

BLACK DUCK, No. 389,308, banded by H. S. Osler, at Lake Scugog, Ontario, on October 3, 1925, was shot at Grenada Country Club Lake, three miles north-west of Grenada, Mississippi, on November 6, 1925.

BLACK DUCK, No. 389,309, banded by H. S. Osler, at Lake Scugog, Ontario, on October 3, 1925, was killed at a place near the St. Marys River, in the south-eastern part of Georgia, shortly before November 28, 1925.

BLACK DUCK, No. 389,311, banded by H. S. Osler, at Lake Scugog, Ontario, on October 3, 1925, was killed at Bloodsworth Island Game Preserve, on the east side of Chesapeake Bay, about ninety miles south south-east of Baltimore, Maryland, on November 13, 1925.

BLACK DUCK, No. 389,324, was banded by H. S. Osler, at Lake Scugog, Ontario, on October 4, 1925, and its band was found by a resident of Tylerton, Maryland, shortly before November 12, 1925.

BLACK DUCK, No. 389,326, was banded by H. S. Osler, at Lake Scugog, Ontario, on October 4, 1925, and its band was received by Professor B. A. Bensley, University of Toronto, Toronto, Ontario, on November 26, 1925, in a package addressed to "Biological Survey, Parliament Buildings, Queens Park, Toronto", and bearing a Canadian postage stamp. No information was given concerning the recovery of the bird.

BLACK DUCK, No. 389,328, banded by H. S. Osler, at Lake Scugog, Ontario, on October 4, 1925, was killed in the North Edisto River Marshes, Charleston County, South Carolina, on January 5, 1926.

BLACK DUCK, No. 389,342, banded by H. S. Osler, at Lake Scugog, Ontario, on October 5, 1925, was killed in the Tennessee River, near Half Moon Island, on January 18, 1926.

BLACK DUCK, No. 389,343, banded by H. S. Osler, at Lake Scugog, Ontario, on October 5, 1925, was shot at Goose Bay, at the St. Clair Flats, Michigan, on December 16, 1925, and reported as a Mallard.

BLACK DUCK, No. 389,348, banded by H. S. Osler, at Lake Scugog, Ontario, on October 5, 1925, was shot from a sneak boat at a place near the Bar Point light ship No. 21, on Lake Erie, near Amherstburg, Essex County, Ontario, on October 26, 1926.

BLACK DUCK, No. 389,349, banded by H. S. Osler, at Lake Scugog, Ontario, on October 5, 1925, was killed at the mouth of the Mississippi River, near Port Eads, Louisiana, on January 23 1926.

BALDPATE, No. 226,808, ♀, banded by Reuben Lloyd, at Davidson, Saskatchewan, on August 9, 1925, was killed in the southern part of Texas at a place known as Eagle Lake, which is about seventy-five miles due west of Houston, Texas, on December 18, 1925.

BALDPATE, No. 226,810, banded by Reuben Lloyd, at Davidson, Saskatchewan, on August 9, 1925, was shot at a place about nine miles south-west of Grand Island, Nebraska, on the Platte River, on October 18, 1925.

BLUE-WINGED TEAL, No. 293,471, banded by Reuben Lloyd, at Davidson, Saskatchewan, on August 9, 1925, was shot at a place about seven miles north-west of Burlington, Colorado, on September 22, 1925.

BLUE-WINGED TEAL, No. 323,647, banded by H. S. Osler, at Lake Scugog, Ontario, on September 9, 1925, was shot at Rice Lake, Gore's Landing, Northumberland County, Ontario, on the day on which it was banded, and was reported as a Marsh Blue-bill.

REDHEAD, No. 313,168, juv., banded by Paul E. Page, at Lac Ste. Anne, Alberta, on August 9, 1925, was shot at Sugar Lake, on the west shore of Lake Winniligosh, Minnesota, on October 15, 1925.

SCAUP DUCK, No. 388,501, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on September 19, 1925, was shot at Lebret, Saskatchewan, about October 7, 1295, and reported as a Canvas-back.

DOWNY WOODPECKER, No. 45,827, ad. ♀, banded by Ralph E. DeLury, at Ottawa, Ontario, on August 10, 1925, was re-captured in the same trap on September 9 and 14, 1925, and was found dead in the grass under an apple tree, one hundred feet from the trap, on September 15, 1925. It is thought that the bird was killed by a Red Squirrel.

DOWNY WOODPECKER, No. A39,374, ♀, banded by R. W. Tufts, at Wolfville, Nova Scotia, on September 19, 1925, was found dead in its nesting box in the same locality, on April 29, 1926. The bird had apparently been dead for some time when it was found.

BRONZED GRACKLE, No. 281,685, banded by Reuben Lloyd, at Davidson, Saskatchewan, on August 28, 1925, was found dead in the same locality, on May 6, 1926.

WHITE-THROATED SPARROW, No. 328,153, banded by A. Burton Gresham, at Winnipeg, Manitoba, on September 10, 1925, died from a hemorrhage of the brain, in the same locality, on September 11, 1925.

WHITE-THROATED SPARROW, No. 328,158, banded by A. Burton Gresham, at Winnipeg, Manitoba, on September 10, 1925, was killed by a cat in the same locality, on September 16, 1925

WHITE-THROATED SPARROW, No. 162,647, banded by K. Grant McDougal, at East Kildonan, Manitoba, on September 16, 1925, was re-captured several times at the same station until October 11, 1925 when it was found dead in the trap.

SLATE-COLORED JUNCO, No. 160,370, banded by Reuben Lloyd, at Davidson, Saskatchewan, on September 30, 1925, was found dead at Forest City, Iowa, on March 19, 1926.

BARN SWALLOW, No. 123,663, banded by Ernest Joy, at Wood Island, Grand Manan, New Brunswick, on August 10, 1925, had been injured and was found dead in a woodshed at Seal Cove, Grand Manan, New Brunswick, on June 3, 1926. It was reported as a Purple Martin.

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, and was caught in a mouse trap and killed in the same locality, on July 28, 1926.*

INSTALMENT No. 18 OF BIRD BANDING RETURNS

RETURNS UPON BIRDS BANDED IN 1923.

COMMON MURRE, No. 204,688, ad., banded by Harrison F. Lewis, at St. Mary Islands, Saguenay County, Quebec, (Canadian Labrador), on July 21, 1923, was re-captured and released uninjured at the same place, on July 17, 1926. Band No. 204,688 was re-placed by band No. 389,227.

COMMON MURRE, No. 204,665, ad. (a "Ringed" Murre, with distinct white eye-ring and white line behind the eye), banded by Harrison F. Lewis, on the western St. Mary Island, Saguenay County, Quebec (Canadian Labrador), on July 24, 1923, was re-captured and released uninjured on the same island, on August 2, 1926.

COMMON MURRE, No. 204,717, ad., banded by Harrison F. Lewis, at the western St. Mary Island, Saguenay County, Quebec (Canadian Labrador), on July 24, 1923, was re-captured and released uninjured on the same island, on July 17, 1925. Band No. 204,717 was re-placed by band No. 334,221. The bird was again re-captured and released uninjured at the same place, on August 2, 1926, band No. 334,221 being replaced by band No. 389,283.**

COMMON MURRE, No. 204,724, juv., banded by Harrison F. Lewis, on a small island near Cove Island, between Pointe au Maurier and Harrington, Saguenay County, Quebec (Canadian Labrador), on August 12, 1923, was shot at Greenspond, Newfoundland, on November 18, 1926.

SWAINSON'S HAWK, No. 233,105, juv., banded by Herman W. Battersby, at Oak Lake, Manitoba, on July 29, 1923, was captured in a gopher trap in the same locality, on July 4, 1926. The bird was kept in captivity until July 18, 1926, when it was released at Virden, Manitoba, eighteen miles west of the place where it was captured. Band No. 233,105 was re-placed by band No. 233,106.

RETURNS UPON BIRDS BANDED IN 1925

COMMON MURRE, No. 309,587, ad., banded by Harrison F. Lewis, on the eastern St. Mary Island, Saguenay County, Quebec, on July 17, 1925, was re-captured and released uninjured on the same island, on July 17, 1926.

COMMON MURRE, No. 309,600, ad., banded by Harrison F. Lewis, on the eastern St. Mary Island, Saguenay County, Quebec, on July 17, 1925, was re-captured and released uninjured on the same island, on August 4, 1926.

COMMON MURRE, No. 334,213, ad. (a "Ringed" Murre with white eye-ring and white line behind the eye), banded by Harrison F. Lewis, on the eastern St. Mary Island, Saguenay County, Quebec, on July 17, 1925, was re-captured and released uninjured on the same island, on July 17, 1926.

COMMON MURRE, No. 334,220, ad., banded by Harrison F. Lewis, on the western St. Mary Island, Saguenay County, Quebec, on July 17, 1925, was re-captured and released uninjured on the same island, on August 2, 1926.

COMMON MURRE, No. 334,223, ad., banded by Harrison F. Lewis, on the western St. Mary Island, Saguenay County, Quebec, on July 17, 1925, was re-captured and released uninjured on the same island, on August 2, 1926.

COMMON MURRE, No. 334,356, ad., banded by Harrison F. Lewis, on Cormorant Rocks, Cape Whittle Sanctuary, Saguenay County, Quebec, on July 21, 1925, was re-captured and released uninjured at the same place, on August 10, 1926. Band No. 334,356, was re-placed by band No. 201,425.

COMMON MURRE, No. 334,357, ad., banded by Harrison F. Lewis, on Cormorant Rocks, Cape Whittle Sanctuary, Saguenay County Quebec, on July 21, 1925, was re-captured and released uninjured at the same place, on July 3, 1926.

COMMON MURRE, No. 334,185, ad., banded by Harrison F. Lewis, on Flat Gull Island, Wolf Bay, Saguenay County, Quebec, on July 27, 1925, was re-captured and released uninjured on the same island, on August 11, 1926.

COMMON MURRE, No. 334,187, ad., banded by Harrison F. Lewis, on Flat Gull Island, Wolf Bay, Saguenay County, Quebec, on July 27, 1925, was re-captured and released uninjured on the same island, on August 11, 1926.

RAZOR-BILLED AUK, No. 368,624, ad., banded by Harrison F. Lewis, on the eastern St. Mary Island, Saguenay County, Quebec, on July 16, 1925, was re-captured and released uninjured on the same island, on August 4, 1926.

RAZOR-BILLED AUK, No. 368,627, ad., banded by Harrison F. Lewis, on the eastern St. Mary Island, Saguenay County, Quebec, on July 16, 1925, was re-captured and released uninjured on the same island, on August 4, 1926.

RAZOR-BILLED AUK, No. 368,646, ad., banded by Harrison F. Lewis, on the eastern St. Mary Island, Saguenay County, Quebec, on July 17, 1925, was re-captured and released uninjured on the same island, on August 4, 1926. Band No. 368,646 was re-placed by band No. 405,986.

RAZOR-BILLED AUK, No. 368,785, ad., banded by Harrison F. Lewis, on Flat Gull Island, Wolf Bay, Saguenay County, Quebec, on July 27, 1925, was re-captured and released uninjured on the same island, on August 11, 1926.

RAZOR-BILLED AUK, No. 224,274, ad., banded by F. W. Osborne, on the western St. Mary Island, Saguenay County, Quebec, on July 30, 1925, was re-captured and released uninjured on the same island, on August 5, 1926. Band No. 224,274, was re-placed by band No. 406,015.

MALLARD, No. 309,768, ♀, banded by Reuben Lloyd, at Davidson, Saskatchewan, on August 9, 1925, was re-captured in the same locality, on June 6, 1926.

MALLARD, No. 388,517, banded by Paul E. Page, at Lac Ste. Anne, Alberta, on October 7, 1925, was killed at La Garite Creek, about ten miles north of Centre, Sagauche County, Colorado, on December 10, 1295.

* C.F-N., XL, 1926, p. 162.
** C.F-N., XL, 1926, p. 159.

BLACK DUCK, No. 389,352, banded by H. S. Osler, at Lake Scugog, Ontario, on October 5, 1925, was killed at the head of Devil Lake, County of Frontenac, Ontario, on October 26, 1925.

BLACK DUCK, No. 389,358, banded by H. S. Osler, at Lake Scugog, Ontario, on October 7, 1925, was shot on a farm at the head of Sandusky Bay, eight miles north-east of Fremont, Ohio, on December 9, 1925.

BLACK DUCK, No. 389,368, banded by H. S. Osler, at Lake Scugog, Ontario, on October 7, 1925, was killed on the Nanticoke River, three miles south of Seaford, Delaware, on January 22, 1926.

BLACK DUCK, No. 389,372, banded by H. S. Osler, at Lake Scugog, Ontario, on October 7, 1925, was shot at Mud Lake, Ontario County, Ontario, about one hundred and forty miles north-east of Toronto, on October 13, 1925.

BLACK DUCK, No. 389,374, banded by H. S. Osler, at Lake Scugog, Ontario, on October 7, 1925, was killed at Eminence, Kentucky, on November 9, 1925.

BLACK DUCK, No. 389,375, banded by H. S. Osler, at Lake Scugog, Ontario, on October 7, 1925, was killed at a place near Charleston, South Carolina, on January 27, 1926.

BLACK DUCK, No. 389,377, banded by H. S. Osler, at Lake Scugog, Ontario, on October 7, 1925, was killed at Cold Creek, near Ashport, Tennessee, on December 28, 1925.

BLACK DUCK, No. 389,401, banded by H. S. Osler, at Lake Scugog, Ontario, on October 9, 1925, was killed at a place about one and one-half miles south of Lake City, Arkansas, on the St. Francis River, on January 17, 1926.

BLACK DUCK, No. 389,416, banded by H. S. Osler, at Lake Scugog, Ontario, on October 11, 1925, was killed at Myrtle Bay, a tributary of Cedar Island Bay, Carteret County, North Carolina, on November 2, 1925.

BLACK DUCK, No. 389,430, banded by H. S. Osler, at Lake Scugog, Ontario, on October 12, 1925, was shot at Back Bay, in the south-east part of Virginia, shortly before November 11, 1925.

BLACK DUCK, No. 389,431, banded by H. S. Osler, at Lake Scugog, Ontario, on October 12, 1925, was shot in the same locality, during the latter part of October, 1925.

BLACK DUCK, No. 389,443, banded by H. S. Osler, at Lake Scugog, Ontario, on October 12, 1925, was shot on Charlton Island, James Bay, North West Territories, on September 10, 1926.

BLACK DUCK, No. 389,455, banded by H. S. Osler, at Lake Scugog, Ontario, on October 13, 1925, was killed at a place about six miles south of the town of Fort Mill, South Carolina, on December 17, 1925, and reported as a Mallard.

BLACK DUCK, No. 389,457, banded by H. S. Osler, at Lake Scugog, Ontario, on October 13, 1925, was shot in the marshes of the Long Point Company, Port Rowan, Ontario, on November 14, 1925.

BLACK DUCK, No. 389,458, banded by H. S. Osler, at Lake Scugog, Ontario, on October 13, 1925, was shot at Point Pelee Marsh, Ontario, on November 5, 1925.

BLACK DUCK, No. 389,470, banded by H. S. Osler, at Lake Scugog, Ontario, on October 14, 1925, was caught in a muskrat trap at a place twenty-eight miles west of the town of Timmins, Northern Ontario, on May 9, 1926.

BLACK DUCK, No. 389,476, banded by H. S. Osler, at Lake Scugog, Ontario, on October 14, 1925, was killed at a place near Cobbs Island, Virginia, on December 26, 1925.

BLACK DUCK, No. 389,035, banded by H. S. Osler, at Lake Scugog, Ontario, on October 18, 1925, was killed at a place near the mouth of the Savannah River, Georgia, on December 24, 1925.

BLACK DUCK, No. 389,044, banded by H. S. Osler, at Lake Scugog, Ontario, on October 18, 1925, was found dead in a trap on the waters of Mud River, near Lewisburg, Logan County, Kentucky, on or about December 9, 1925.

BLACK DUCK, No. 389,047, banded by H. S. Osler, at Lake Scugog, Ontario, on October 18, 1925, was killed at Polk, Tennessee, on December 7, 1925.

BLACK DUCK, No. 389,048, banded by H. S. Osler, at Lake Scugog, Ontario, on October 18, 1925, was killed on Wolfiick Creek, Logan County, Kentucky, on December 25, 1925.

BLACK DUCK, No. 389,051, banded by H. S. Osler, at Lake Scugog, Ontario, on October 18, 1925, was killed in Trimble County, Kentucky, thirty-six miles above Louisville, on the Kentucky side of the Ohio River, on December 5, 1925.

BLACK DUCK, No. 389,052, banded by H. S. Osler, at Lake Scugog, Ontario, on October 18, 1925, was found in a crippled condition in the marshes on the property of the Winous Point Shooting Club, near Port Clinton, Ohio, on December 31, 1925. The band was removed from the bird.

BLACK DUCK, No. 389,067, banded by H. S. Osler, at Lake Scugog, Ontario, on October 18, 1925, was killed at Saw Mill Lake, Henry, Illinois, on November 10, 1925.

BLACK DUCK, No. 389,069, banded by H. S. Osler, at Lake Scugog, Ontario, on October 18, 1925, was shot at Long Point, Ontario, on November 10, 1925.

BLACK DUCK, No. 389,070, banded by H. S. Osler, at Lake Scugog, Ontario, on October 18, 1925, was shot on Hamilton Bay, Ontario, on November 10, 1926.

BLACK DUCK, No. 389,076, banded by H. S. Osler, at Lake Scugog, Ontario, on October 19, 1925, was killed at Currituck Sound, Waterlily, North Carolina, on November 16, 1925.

BLACK DUCK, No. 389,085, banded by H. S. Osler, at Lake Scugog, Ontario, on October 19, 1925, was shot at a place one mile north-west of Chesterville, Kent County, Maryland, shortly before January 18, 1926.

BLACK DUCK, No. 389,089, banded by H. S. Osler, at Lake Scugog, Ontario, on October 19, 1925, was killed at McGee Marsh, near Bono, Ohio, on the south shore of Lake Erie, on November 3, 1925.

BLACK DUCK, No. 389,091, banded by H. S. Osler, at Lake Scugog, Ontario, on October 19, 1925, was killed in the lower part of Arkansas County, Arkansas, on November 6, 1925, and reported as a female.

BLACK DUCK, No. 389,094, banded by H. S. Osler, at Lake Scugog, Ontario, on October 22, 1925, was shot on Barnegat Bay, three miles south of Mantoloking, New Jersey, on November 4, 1926.

BLACK DUCK, No. 389,095, banded by H. S. Osler, at Lake Scugog, Ontario, on October 22, 1925, was shot at Neilson Club Marsh, located at Venice, near Sandusky, Ohio, on November 3, 1925.

BLACK DUCK, No. 389,098, banded by H. S. Osler, at Lake Scugog, Ontario, on October 22, 1925, was killed in the marshes of Rondeau Provincial Park, near Morpeth, Ontario, on November 8, 1925.

BLACK DUCK, No. 389,101, banded by H. S. Osler, at Lake Scugog, Ontario, on October 22, 1925, was recovered at Big Miami River, two miles north of Troy, Ohio, on December 2, 1925.

BLACK DUCK, No. 389,103, banded by H. S. Osler, at Lake Scugog, Ontario, on October 22, 1925, was shot at Port Rowan, Ontario, on November 6, 1925.

BLACK DUCK, No. 389,117, banded by H. S. Osler, at Lake Scugog, Ontario, on October 22, 1925, was killed at Fernandina, Florida, on December 5, 1925.

BLACK DUCK, No. 389,104, banded by H. S. Osler, at Lake Scugog, Ontario, on October 24, 1925, was killed in Delaware County, Indiana, on December 23, 1925.

BLACK DUCK, No. 389,131, banded by H. S. Osler, at Lake Scugog, Ontario, on October 31, 1925, was shot at Susquehanna River, Pennsylvania, on November 3, 1925.

BLACK DUCK, No. 389,134, banded by H. S. Osler, at Lake Scugog, Ontario, on October 31, 1925, was shot in Milton Township, Wayne County, Ohio, on November 13, 1925.

BLACK DUCK, No. 389,142, banded by H. S. Osler, at Lake Scugog, Ontario, on October 31, 1925, was shot at a place about two miles south of Lake Ontario and about thirty miles east of Fort Niagara, New York, on November 26, 1925.

BLACK DUCK, No. 389,151, banded by H. S. Osler, at Lake Scugog, Ontario, on October 31, 1925, was killed at Sandusky, Ohio, on November 13, 1925.

CANADA GOOSE, No. 237,894, juv., banded by I. S. Adams, at La Batture aux Loups Marins, an island opposite L'Islet, Quebec, in the St. Lawrence River, fifty miles east of Quebec City, on October 14, 1925, was shot at Isle aux Oise, Quebec, about ten miles from the place where it was banded, on November 3, 1925. The parents of this Canada Goose were a pair of tame decoys. When the young bird was banded and released, ti immediately joined the wild geese.

COOT, No. 223,728, banded by Mrs. E. F. Chilcott, at Woodward, Oklahoma, on October 20, 1925, was caught in a rat trap on Big Trout Lake (Creen Lake), about three miles north of Red Deer Lake, Saskatchewan, on May 10, 1926.

DOWNY WOODPECKER, No. 45,831, ad., ♀, banded by Ralph E. DeLury, at Ottawa, Ontario, on November 29, 1925, was re-captured at the same station, on December 15, 1925. The dird had been injured, presumably by a Red Squirrel, and it was found dead on December 16, 1925.

CHIMNEY SWIFT, No. 35,497, banded by F. G. Hall, at Milton, Wisconsin, on May 26, 1925, flew into a house at Rydal Bank, Ontario, about June 14, 1926.

BALTIMORE ORIOLE, No. 242,000, ♂, banded by Paul Kuntz, at Lot 75, East Kildonan, Manitoba, on June 22, 1925, was captured at 140 Luxton Avenue, Winnipeg, Manitoba, on August 17, 1926.

GOLDFINCH, No. A26,299, banded by Mrs. Louis H. Emmons, at Knollwood, Dover, Massachusetts, on April 5, 1925, was captured at Thetford Mines, Quebec, on June 7, 1926. The bird was kept in captivity until June 15, 1926, when it was released still wearing its band.

WHITE-CROWNED SPARROW, No. 123,870, banded by Mrs. Edwin E. Thompson, at Indianapolis, Indiana, on May 3, 1925, flew into a basement during a snow storm at Doucet, Quebec, on May 20, 1926.

HOUSE WREN, No. A8985, ad., banded by R. H. Carter, Jr., at Muscow, Sakatchewan, on June 5, 1925, was re-captured at the same nest, on July 18, 1926.

CHICKADEE, No. A8967, ad., banded by R. H. Carter, Jr., at Muscow, Saskatchewan, on February 11, 1925, repeated until March 12, 1925, was re-captured at the same station, on December 21, 1925, and repeated on December 27, 1925; and was re-captured at the same station, on June 6, 1926.*

CHICKADEE, No. 50,708, banded by C. A. Patriquin, at Wolfville, Nova Scotia, on April 20, 1925, was re-captured at the same station, on December 9, 1926.

CHICKADEE, No. A39,311, ad., banded by A. L. Holm, at Otto, Manitoba, on November 30, 1925, repeated until December 11, 1925, and was killed by a cat in the same locality, on December 22, 1925.

CHICKADEE, No. A39,312, ad., banded by A. L. Holm, at Otto, Manitoba, on November 30, 1925, repeated until December 2, 1925, and was killed by a cat in the same locality, on January 27, 1926.

RETURNS UPON BIRDS BANDED IN 1926

HERRING GULL, No. 457,078, banded by Clarke C. Miller, at Gravelly Island, Delta County, Michigan, on July 13, 1926, was killed on tide water on the bank of the Albany River. Ontario, on September 8 ,1926.

MALLARD, No. 409,405, banded by F. C. Lincoln, at Bath, Illinois, on January 8, 1926, was found dead at a place forty miles north of Oak Lake, Ontario, on the English River, on April 15, 1926.

MALLARD, No. 409,433, banded by F. C. Lincoln, at Bath, Illinois, on January 8, 1926, was shot on the Pipestone Creek, seven miles north of the town of Reston, Manitoba, on November 9, 1926.

MALLARD, No. 409,505, banded by F. C. Lincoln, at Bath, Illinois, on January 8, 1926, was shot at a place near Manitoba Point, Lac Seul, on the boundary line between Kenora and Patricia Districts, Ontario, about the end of April, 1926.

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* C.F-N., XL, 1927, p. 163

MALLARD, No. 409,529, ad., ♂, banded by F. C. Lincoln, at Bath, Illinois, on January 8, 1926, was shot at a place two miles south of Adanac, Saskatchewan, located approximately at Latitude 52° 30′, Longitude 109°, on November 2, 1926.

MALLARD, No. 105,004, banded by Clarence E. Chapman, at Oakley, South Carolina, on February 12, 1926, was killed on Isle à la Crosse Lake, Saskatchewan, on October 3, 1926.

MALLARD, No. 305,266, banded by John Broeker, at Portage des Sioux, Missouri, on March 12, 1926, was shot at a place sixteen miles south of Windthorst, Saskatchewan, on Section 15, Township 11, Range 6, West of the 2nd Meridian, on October 21, 1926.

MALLARD, No. 300,646, banded by T. E. Musselman, at Scobey Lake, Missouri, on March 15, 1926, was shot on the south-west quarter of Section 24, Township 18, Range 9, West of the 3rd Meridian, Saskatchewan, on November 3, 1926, and reported as a male.

MALLARD, No. 300,667, banded by T. E. Musselman, at Scobey Lake, Missouri, on March 17, 1926, was shot at a place five miles north of Rapid City, Manitoba, on October 2, 1926.

MALLARD, No. 300,700, ♀, banded by T. E. Musselman, at Scobey Lake, Missouri, on March 20, 1926, was caught in a muskrat trap at a place near the west end of the Turtle Mountain Forest Reserve, Manitoba, on or about April 1, 1926.

MALLARD, No. 418,256, banded by F. W. Robl, at Ellinwood, Kansas, on April 12, 1926, was shot in the south-western part of Manitoba, on September 28, 1926.

MALLARD, No. 379,975, juv., banded by J. A. M. Patrick, at a place near Yorkton, Saskatchewan, on July 24, 1926, was shot at the head of Long Lake, four and one-half miles south of Yorkton, on September 13, 1926.

MALLARD, No. 379,911, juv., banded by J. A. M. Patrick, at a place near Yorkton, Saskatchewan, on July 26, 1926, was shot at Section 23, Township 23, Range 4, West of the 2nd Meridian, near Yorkton, Saskatchewan, on September 15, 1926.

MALLARD, No. 388,559, juv., banded by Paul E. Page, at Lac Ste. Anne, Alberta, on August 24, 1926, was shot at a place thirty miles from Edmonton, at Riviére Qui Barre, Alberta, on September 4, 1926.

MALLARD, No. 322,988, juv., ♂, banded by Bert Lloyd, at Davidson, Saskatchewan, on September 23, 1926, was shot in a cornfield in Township 115, Range 65, of Hand County, South Dakota, on November 10, 1926.

BLACK DUCK, No. 105,010, banded by Clarence E. Chapman, at Oakley, Berkeley County, South Carolina, on February 13, 1926, was killed by some animal, probably a mink, on a small creek in the Township of Haldimand, County of Northumberland, Ontario, about fifteen miles from Lake Ontario, on April 21, 1926.

EUROPEAN WIDGEON, No. V 20.14 P. Skovgaard, Viborg, Denmark, banded at Hraunsland, Iceland, on July 2, 1926, was captured at Hawk Point, Cape Sable Island, Nova Scotia, shortly before December 10, 1926. (See Note at foot of Returns.)

TEAL, No. 379,972, banded by J. A. M. Patrick, at Yorkton, Saskatchewan, on July 24, 1926, was shot at Heimdal, North Dakota, on September 16, 1926.

SHOVELLER, No. 367,854, juv., banded by J. A. Briggs, at Victoria Plains, Saskatchewan, on July 7, 1926, was shot at a place fifteen miles east of Regina, Saskatchewan, on October 1, 1926.

SHOVELLER, No. 379,915, juv., banded by J. A. M. Patrick, at Yorkton, Saskatchewan, on July 26, 1926, was shot in south-eastern South Dakota, near Lennox, about twenty-one miles south-west of Sioux Falls, on November 3, 1926.

CANADA GOOSE, No. 202,143, banded by A. G. Taylor, for Hoyes Lloyd, at the Experimental Farm, Ottawa, Ontario, on August 3, 1926, was shot at Galena, Kent County, Maryland, on December 29, 1926. This bird was sent to Ottawa by Jack Miner, Kingsville, Ontario, on May 6, 1926, and had left the Experimental Farm by December 4, 1926.

BLACK-CROWNED NIGHT HERON, No. 368,449, juv., banded by George Lang, at Indian Head, Saskatchewan, on June 12, 1926, was shot in a thinly wooded section of mid-west Texas, on October 19, 1926.

BLACK-CROWNED NIGHT HERON, No. 406,132, juv., banded by George Lang, at Indian Head, Saskatchewan, on June 26, 1926, was killed at a place a couple of miles west of Fort Smith, Arkansas, on the Arkansas River, in Oklahoma, during the week of November 1 to 7, 1926.

PECTORAL SANDPIPER, No. 171,979, ad., banded by J. Robert Morton, at North Kildonan, Manitoba, on August 17, 1926, was found dead in a shore bird trap at the same station, on August 20, 1926. The water had risen and the bird was drowned.

MARSH HAWK, No. 292,538, juv., banded by W. J. Low, at Metis, Quebec, on June 29, 1926, was killed in the district of Grand River, County of Gaspè, Quebec, on or about August 21, 1926.

FLICKER, No. 267,033, juv., banded by Dan Patton, at Midnapore, Alberta, on June 26, 1926, was found dead at the same place, on July 18, 1926.

FLICKER, No. 399,985, juv., ♂, banded by Basil Colbran, at Windsor, Nova Scotia, on July 9, 1926, fell from a tree and was found in a dazed condition in the same locality, on July 10, 1926. The bird died shortly after it was found.

FLICKER, No. 399,744, juv., banded by George Lang, at Indian Head, Saskatchewan, on July 13, 1926, was found dead at a place one-half mile west of the banding station, on July 13, 1926.

STELLER'S JAY, No. 265,706, juv., banded by G. D. Sprot, at Mill Bay, British Columbia, on May 30, 1926, repeated until September 21, 1926, and was killed in the same locality, on November 20, 1926.

STELLER'S JAY, No. 265,709, juv., banded by G. D. Sprot, at Mill Bay, British Columbia, on July 15, 1926, was shot at a place one-half mile north of the banding station, on September 12, 1926.

CROW, No. 406,597, juv., banded by J. Robert Morton, at Springfield, Manitoba, on June 6, 1926, was killed in the immediate vicinity of Winnipeg, Manitoba, on July 26, 1926.

RED-WINGED BLACKBIRD, No. 412,092, juv., banded by P. S. Walker, on the North Arm of the Fraser River, at Point Grey, British Columbia, on May 17, 1926, was found in a seine net in the

same locality, on June 8, 1926. The bird died three days later.

BRONZED GRACKLE, No. 463,183, ad., banded by W. Philip Gerald, at Fredericton, New Brunswick, on June 12, 1926, was shot in a cornfield at Amesbury, Massachusetts, shortly before November 6, 1926.

SAVANNAH SPARROW, No. 171,971, ad., banded by J. Robert Morton, at North Kildonan, Manitoba, on August 8, 1926, repeated until August 17, 1926, and was found dead with one wing torn off in a trap at the same station, on August 18, 1926. It is thought that the bird was killed by a cat.

SWAMP SPARROW, No. A63,206, ad., banded by Bert Lloyd, at Davidson, Saskatchewan, on May 11, 1926, was found dead at a place about thirty feet from the banding station, on May 12, 1926.

BARN SWALLOW, No. A42,441, juv., banded by Basil Colbran, at Windsor, Nova Scotia, on July 3, 1926, was found dead at the same place, on July 8, 1926.

WHITE-BREASTED NUTHATCH, No. A23,-071, banded by Mrs. A. G. Mathers, at Middleboro, Massachusetts, on February 22, 1926, was caught by a cat at St. George, New Brunswick, on April 23, 1926.

ROBIN, No. 412,096, juv., banded by P. S. Walker, at Vancouver, British Columbia, on May 21, 1926, was found dead at the same place, on June 12, 1926.

ROBIN, No. 344,686, juv., banded by George Lang, at Indian Head, Saskatchewan, on June 13, 1926, was killed by a cat in the same locality, on July 12, 1926.

ROBIN, No. 399,699, juv., banded by George Lang,at Indian Head, Saskatchewan, on June 21, 1926, was found dead near the place where it was banded, on July 17, 1926.

BLUEBIRD, No. A65,134, banded by J. R. Morton, at East Kildonan, Manitoba, on June 26, 1926, was found dead in a school yard, two blocks from the place where it was banded, on July 10, 1926.

EUROPEAN WIDGEON CROSSES FROM ICELAND.—Mr. Harrison F. Lewis, Chief Federal Migratory Bird Officer for Ontario and Quebec, had sent to him by his mother, who lives in Nova Scotia, a newspaper clipping which read as follows:

"CAPTURED BIRD HAS DANISH BAND

Special to The Morning Chronicle

YARMOUTH, Dec. 10, 1926.—Two young men of Hawk Point, Cape Sable Island, have just captured a strange bird which they call a wood-duck, and on the leg of it is a metal tag bearing the inscription 'V 20.14 P. Skovgaard, Viborg, Denmark'."

Upon communicating with the Royal Danish Consul-General for Canada and Newfoundland, at Montreal, the National Parks of Canada Branch has secured the very interesting information that the banded bird was a European Widgeon (*Anas penelope*), banded at Hraunsland, Iceland, on July 2, 1926.

Mr. Skovgaard has asked a number of questions concerning the recovery of the bird which he was instrumental in having banded, and concerning the presence of this species in Canada, and he will be furnished with all the information available.

Where the birds of this species which occur in North America had their nesting grounds has long been a moot point, and I believe no nest of the species has been found in North America. This banding return, besides being the first transatlantic duck record and, I think, the first return upon a banded European Widgeon for this continent, points significantly to the probable nesting place of the examples of the species which winter in Eastern North America.—HOYES LLOYD.

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CONTENTS

	PAGE
The Woodlice or Oniscoidea of Canada (*Crustacea, Isopoda*). By E. M. Walker	173
A Tale of Four Crows. By Norman Criddle, Treesbank, Manitoba	179
The Love Song and Flight of the Woodcock (*Philohela minor*). By Henry Mousley	183
Notes and Observations:—	
A Blanding's Turtle Lays Its Eggs. By J. Roland Brown	185
Blue Geese in Essex County, Ontario. By Manly F. Miner	185
Regarding Jack Miner's Crow Trap. By Manly F. Miner	185
Occurrence of Kumlien's Gull and the Iceland Gull at the Island of Anticosti, Quebec. By Harrison F. Lewis	185
The Tufted Titmouse at Toronto. By Stuart L. Thompson	186
Hudsonian Godwit (*Limosa haemastica*) at Hamilton. By Jas. L. Baillie, Jr., *Royal Ontario Museum of Zoology*, Toronto	187
White-Crowned Sparrow at Toronto. By Stuart L. Thompson	188
Notes on the European Starling at Kamouraska, Quebec, in 1927. By Willie LaBrie	188
First Observations of the European Starling in the Vicinity of Quebec, P.Q. By R. Meredith	188
Smooth Perennial Sow Thistle at Ottawa. By H. Groh	188
Book Review:—	
Mushrooms and Toadstools. By H. T. Gussow and W. S. Odell	189
Life Histories of North American Wild Fowl and North American Marsh Birds. By Arthur Cleveland Bent	189
Official Canadian Record of Bird-Banding	191

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The Canadian Field-Naturalist

VOL. XLI OTTAWA, ONTARIO, NOVEMBER, 1927 . No. 8

THE WOODLICE OR ONISCOIDEA OF CANADA (*Crustacea, Isopoda*)

By E. M. WALKER.

THE terrestrial Isopoda, or Oniscoidea, variously known as woodlice, sowbugs, pillbugs or slaters, have never been favourites with collectors and the paucity of published data relating to the Canadian species is plainly indicated in a recent article by Frits Johansen,[1] in which a full summary is given of our present knowledge of the distribution of this group in the territory indicated in the title. Definite records of nine species are brought together in this paper and of these but six are from Canada and most of them from very few localities. These species are *Ligyda pallasi*, *Oniscus asellus*, *Porcellio scaber*, *P. rathkei*, *P. spinicornis* and *Cylisticus convexus*.

Since Johansen's paper was published two species have been added to the Canadian fauna by A. R. Fee[2], viz., *Trichoniscus papillicornis* and *Ligidium gracile*, the former being one of the species previously known from Alaska.

As the present writer has given some attention to the Oniscoidea during recent years and has gathered a number of additional records, including those of species hitherto unknown from Canada, it has seemed worth while to make these available for the student, fragmentary as they are. To stimulate further interest in the subject a key to the genera and species represented in our fauna is given and this is made as simple as seems compatible with usefulness and accuracy, with the omission, as far as possible, of technical terms.

In regard to the general distribution of terrestrial isopods in Canada we believe that certain statements made in Richardson's admirable treatise[3] and in Johansen's paper (loc. cit.) are misleading. Records of certain species from Alaska, Labrador and Greenland as well as from the United States naturally give the impression that such species are probably generally distributed in Canada, *Porcellio laevis*, e.g., has been recorded from Unalaska, in the Aleutian Islands, and is said by Richardson to be world-wide in distribution, a statement which is repeated by Johansen. Richardson's records, however, with this one exception, point to a distribution in North America well to the south of the international boundary, the most northerly localities mentioned being Cincinnati, O. and Washington, D.C. The majority of the localities are in the southern and southwestern states and throughout the tropical regions of both hemispheres, and although it occurs throughout the greater part of Europe, it is, according to Budde-Lund[4] "especially found in cellars beneath bakeries, or in other place where a rather high and uniform temperature prevails, sometimes also in refuse-heaps close to the towns." I cannot believe that *P. laevis* is native to Alaska. I have searched in vain for it in Canada, although it very probably occurs here as an introduced form when the proper conditions of warmth and moisture obtain.

Another species whose distribution is said to be world-wide is *Porcellio scaber*, and Johansen concludes his account of its range with the sentence "There is every reason to believe that this species is found all over Canada and Alaska right up to the limit of trees." Certainly the records from Hopedale, Labrador, St. Paul Island, Alaska, Greenland, Iceland and Kamchatka seem to support this view, but it will be noticed that these are all maritime localities. Its occurrence inland in the north is by no means certain. In Ontario it occurs abundantly on Long Point, Lake Erie, rarely at Toronto, and apparently not at all at any distance from the Great Lakes.

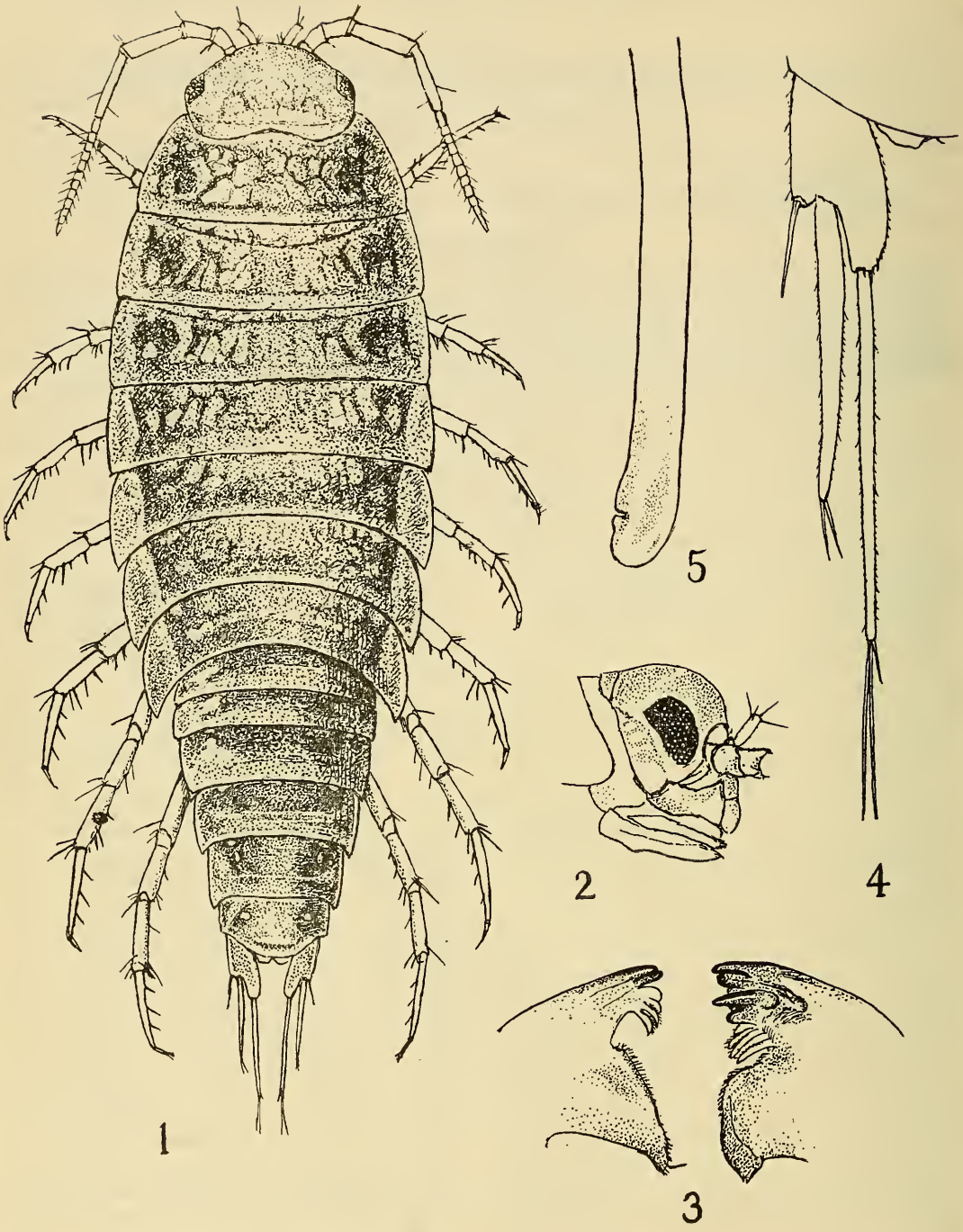
Porcellio rathkei, the common sowbug of eastern Canada, is abundant all through the settled parts of the eastern provinces, greatly outnumbering all other species together, yet its range apparently does not extend far into the Canadian Zone. I have searched in the most favourable-looking places in northern Ontario and Quebec (Lake Nipigon, Lake Abitibi, Godbout) but found no traces of this or any other land isopod. While I

[1] "On the Woodlice (*Oniscoidea*) occurring in Canada and Alaska," (*Canadian Field-Naturalist* XL, No. 8, November, 1926).

[2] "The Isopoda of Departure Bay and vicinity, with descriptions of new species, variations, and colour notes," (Contributions to Canadian Biology and Fisheries, New Series, Vol. III, No. 2, 1926).

[3] Richardson, Harriet. "A Monograph of the Isopoda of North America," (Bull. U.S. Nat. Museum, No. 54, 1905).

[4] Quoted by Sars, G.O., in "An Account of the Crustacea of Norway, Vol. III, Isopoda, p. 182."



am not prepared to state with finality that no species of Oniscoidea occur in these northern regions of the interior, the evidence thus far gained points to the probability of this conclusion. Indeed, from the manner of occurrence of most of our species I am inclined to believe that all our Oniscidae are introduced, and that our only native forms belong to the Ligydidae and Trichoniscidae.

Key to Families, Genera and Species of Oniscoidea found in Canada.

The following key is adapted in part from those of Richardson (loc. cit.) but is greatly simplified. To those who are not familiar with the external anatomy of the group, some explanation of terms may be useful.

The "antennae" are the large or second pair of feelers as distinguished from the "antennules" or first pair. They are also called "second antennae" and "outer antennae." The flagellum of the antennae is the terminal series of small segments, borne by the peduncle. The peduncle of the antennae consists of the first five segments which are larger than those of the flagellum. The uropoda are the last pair of appendages, borne at the end of the abdomen. Its peduncle is a single basal segment.

1. Flagellum of antennae with many segments (10+), head below the eyes not produced into lobes visible in dorsal view, mandibles with a well-developed molar expansion .....Fam. LIGYDIDAE, 2

1*a*. Flagellum of antennae with not more than 5 segments; head below each eye produced into a lobe which is visible (except in *Armadillidium*) in a dorsal view.....4

2. Basal segment of uropoda not produced into a process at the inner distal angle, the branches equal in length; last segment of abdomen large with distinct lateral parts; large forms found on the sea shore..... .....*Ligyda* (*L. pallasi*)

2*a*. Basal segment of uropoda produced into a process at the inner distal angle, the branches unequal in length and thickness; last segment of abdomen small with lateral parts obsolete; rather small forms found in damp woods.....*Ligidium*, 3

3. Eyes much longer than broad, each composed of about 60 parts; inner branch of uropoda about one-sixth longer than outer branch, the two terminal setae about half as long as the inner branch; western..... .....*L. gracile*

3*a*. Eyes about as broad as long, each composed of about 100 facets, inner branch of uropoda about two-thirds longer than outer branch, the two terminal setae scarcely one-fourth as long as the inner branch; eastern..... .....*L. longicaudatum*

4. Mandibles with a distinct molar expansion; eyes minute with very few facets; both branches of uropoda styliform; small forms 4 mm. or less in length..... .....TRICHONISCIDAE, 5

4*a*. Mandibles without a distinct molar expansion; eyes with numerous facets; the adults usually over 10 mm. in length.....7

5. Body sculptured dorsally with longitudinal rows of tubercles. Segments of thorax separated laterally by distinct notches; abdomen not abruptly narrower than thorax, with well developed side plates... .....*Haplophthalmus* (*H. danicus*)

5*a*. Body not sculptured dorsally with longitudinal rows of tubercles; segments of thorax not separated laterally by distinct notches; abdomen abruptly narrower than thorax with very small lateral parts..*Trichoniscus*, 6

6. Surface smooth; front of head straight with small lateral lobes; last three segments of peduncle of antennae without tubercle-like papillae.....*T. pusillus*

6*a*. Surface covered with low tubercles; front of head somewhat produced with a slight median emargination, lateral lobes large; last 3 segments of peduncle of antennae bearing tubercle-like papillae along their inner margins.....*T. papillicornis*

7. Uropoda extending beyond last segment of abdomen, the apex of which is angular; antennae longer than the first 3 thoracic segments; animal (except *Cylis icus*) incapable of rolling itself into a ball..... .....ONISCIDAE, 8

7*a*. Uropoda not extending beyond last segment of abdomen, the apical margin of which is truncate; antennae shorter than the first 3 segments of the thorax; animal able to roll itself into a ball.....ARMADILLIDIIDAE *Armadillidium*, 14

8. Flagellum of antennae with 3 segments; abdomen with well-developed side-plates, not abruptly narrower than thorax..... .....*Oniscus* (*O. asellus*)

8*a*. Flagellum of antennae with 2 segments.....9

9. Abdomen abruptly narrower than thorax, the side plates small; antero-lateral lobes of head inconspicuous..... .....*Metoponorthus* (*M. pruinosus*)

9*a*. Abdomen not abruptly narrower than thorax, the side plates well developed; antero-lateral lobes of head prominent.....10

10. Body very convex, the animal capable of rolling itself into a ball; surface smooth.. .....*Cylisticus* (*C. convexus*)

10*a*. Body moderately convex, the animal incapable of rolling itself into a ball, surface usually roughened.....*Porcellio*, 11

11. Surface of body smooth; frontal lobe of head conically produced; first segment of flagellum of antennae longer than second segment (not yet recorded).....*P. laevis*

11*a*. Surface of body roughly granulated or tuberculate; frontal lobe of head rounded....12

12. Body grey without spots (except in var. *marmorata*); surface very rough with tubercles elevated and well-defined; segments of flagellum of antennae about equal in length; inner face of right mandible with 4-5 penicils, of left mandible with 7-8 penicils.....*P. scaber*

12*a*. Body with spots; surface less rough; the tubercles rather low and not well-defined; segments of flagellum of antennae unequal; inner faces of both mandibles with 4-5 penicils.....13

13. Second and third joints of antennae keeled on the outer face, the keel in each case produced distally into a distinct tooth; first segment of flagellum longer than second; colour yellowish-grey with conspicuous spots arranged in longitudinal series, the head and middle part of abdomen blackish; in fresh specimens a double row of conspicuous yellow patches along middle of thorax.... ..... *P. spinicornis*

13*a*. Second and third joints of antennae keeled but without distinct projecting distal teeth; first segment of flagellum slightly shorter than second; colour very variable, but the head and abdomen not conspicuously darker than other parts, and the submedian double row of yellow patches absent..*P. rathkei*

14. Head truncate in front, without median emargination, and not surpassed by the epistome. Outer branch of uropoda posteriorly truncate.....*A. vulgare*

14*a*. Head with a small V-shaped notch in front, and surpassed by the epistome, which extends some distance in front. Outer branch of uropoda posteriorly rounded..... ..... *A. quadrifrons*

1. *Ligyda pallasi* (Brandt).

Brandon Island, Departure Bay, Vancouver Island, B.C., July 17, 1913, abundant on steep rocky shore. Prince Rupert, B.C., June 10-16, 1926, under loose flat stones on rocky shore of a sheltered bay, not very common.

The characters by which this species is separated from *L. oceanica* (L.) of the Atlantic are inaccurately stated by Richardson. The branches of the uropoda in *L. pallasi* are one-fifth instead of one-eighth as long as the entire body from the tip of the terminal abdominal segment. In *L. oceanica* the branches of the uropoda are not four times but only a little more than twice as long as the peduncle, their proportions being correctly shown in Sars' excellent figures. Stimpson's figure of *L. pallasi*, reproduced by Richardson, is relatively broader than any specimen that I have seen, although the largest females are considerably broader in proportion than the males and smaller females. The majority of specimens taken have a form and appearance more like Sars' figure of *L. oceanica* than Stimpson's figure of *L. pallasi*, but a comparison of specimens of the two species at once reveals the longer uropoda of *oceanica*, with longer and slenderer branches.

2. *Ligidium gracile* (Dana).

Departure Bay, V.I., July 13, 1913, not uncommon under pebbles at the edge of a small brook. Prince Rupert, B.C.. June 10-21, 1926, abundant under dead leaves and damp bark in rich woods

These specimens agree with the brief descriptions of *L. tenue* Budde-Lund (1855) as well as that of *L. gracil* (Dana) (1885). In Richardson's key they run definitely to *L. tenue*, but *L. gracile* is separated from this and other species on the basis of the inner branch of the uropoda being "tipped with setae" instead of being "furnished with two long apical bristles." These two expressions mean the same, except that the number of bristles or setae is specified in the latter case. The description of *L. tenue* is very brief but the important characters of the uropoda agree well with those of the British Columbia specimens. The abundance of this form in northern British Columbia and the apparent absence of any other species is strong evidence of its identity with *L. tenue*, which comes from Alaska. On the other hand the more detailed descriptions and figures of *L. gracile*, which comes from California, fit our species admirably, so that I feel confident that *L. tenue* and *L. gracile* are synonymous, the latter name having priority. *L. gracile* has been recently recorded from Departure Bay by Fee (loc. cit.).

In order to minimize further difficulties in the study of western material in this genus and to give definitely the characters of the species to which our records belong I have drawn the figures in the accompanying plate. They will also serve to bring out the differences between this species and the eastern *L. longicaudatum*.

3. *Ligidium longicaudatum* Stoller.

De Grassi Point, Lake Simcoe, Ont., July 26, 1915, a few specimens under wet pebbles at edge of small stream; Aug., 1915, a single specimen in wet moss in swamp; Sept 2, 1927, 7 young individuals in swamp near edge of creek. Near Richmond Hill, Ont., April 23-May 7, 1927, numerous under dead leaves and rubbish in permanently wet spots in a wood, on rich black humus; Credit River, Ont., near the Dundas highway, Oct. 19, 1926, common on a springy bank in a wood.

These specimens agree with Stoller's description of *L. longicaudatum*, the only species authentically known from eastern North America (Schenectady, N.Y.), since the American records of *L. hypnorum* have been discredited by Budde-Lund.

Stoller's figure, however, is not a satisfactory representation of the species which we have found. The specimen drawn was evidently contracted and the antennae appear somewhat too long, though they do vary considerably in length.

This is probably the species to which the record of *L. hypnorum* from Niagara belongs. We

believe it to be probably the only *Ligidium* in eastern Canada, if not in eastern North America.

L. longicaudatum differs from *L. gracile* in the somewhat broader form of the body with a shorter abdomen, longer antennae, larger and rounder eyes and longer inner branch of the uropoda, which is furnished with relatively shorter setae.

These two species of *Ligidium* inhabit similar situations, being apparently most at home in very wet places in woods. *L. longicaudatum* seems to be local. The only spots where I have found it abundantly are permanently wet from the presence of springs, but, on account of the slope of the land, are never flooded. I believe that such conditions are probably essential in the habitat of *L. longicaudatum*.

4. *Trichoniscus pusillus* Brandt.

St. Andrews, N.B., July 12, 1923, 8 specimens; Humber Valley, Toronto, April 8, June 2, 1927, abundant; near De Grassi Point, Lake Simcoe, Ont., June, 1927, abundant.

This small species was fairly common at St. Andrews under stones in the bed of a small forest stream which had nearly dried up. In the Humber Valley it is abundant under leaves and rubbish in damp spots in the woods, particularly in the rich black humus at the foot of the slopes. At Lake Simcoe it is also locally abundant under damp logs in the woods close to the margin of a creek and on the lake beach nearby. It is usually numerous when it occurs and moves with considerable rapidity.

Richardson records *T. pusillus* from North America but mentions no definite localities.

5. *Trichoniscus papillicornis* Richardson.

This species, originally described from a single specimen taken at Seldovia, Cook Inlet, Alaska, has recently been recorded by Fee (loc. cit.) from Hammond Bay, B.C., where a single individual was taken from a tide-pool.

6. *Oniscus asellus* Linnaeus.

Toronto, Ont., April-November; Hemmingford, Que., July 18, 1927.

I first noticed this species at Toronto about 12 years ago in one of the Rosedale ravines. Since then it has become common in the city in gardens and sometimes in cellars. It appears to be restricted to the environs of the city and I believe that it has been introduced into this locality within comparatively recent years. At Hemmingford I found it under stones and boards in a yard where there was a large refuse heap.

Richardson records it also from Niagara, Ross[5] from London and Johansen from Quebec city. It is also reported from Newfoundland and Greenland and is widely distributed in Europe and the eastern United States.

7. *Metoponorthus pruinosus* (Brandt).

De Grassi Point, Lake Simcoe, Ont., August 1924. A few specimens were found in a manure pile, together with *Porcellio rathkei*. I have not succeeded in finding it again.

This is the first Canadian record of this species, although it is widely distributed in other parts of the world.

8. *Porcellio scaber* Latreille.

St. Andrews, N.B., July 1923, under driftwood and logs on the sea-shore; Belleville, Ont., June 24, 1927, five specimens (J. L. Hart); near Toronto, Ont., April 17, 1927, one specimen; Long Point, Lake Erie, Ont., under bark and logs along the edge of marshes near the beach; Departure Bay, Vancouver Island, B.C., common; Victoria, B.C., common (Norma Ford).

This is the common wood-louse on the coast region of British Columbia, but I did not find it at Prince Rupert, where I spent three weeks during June, 1926. Dr. Norma Ford, who collected it at Victoria, found several specimens of the spotted form (var. *marmorata*). None of this form are represented in a long series from Long Point, Ont.

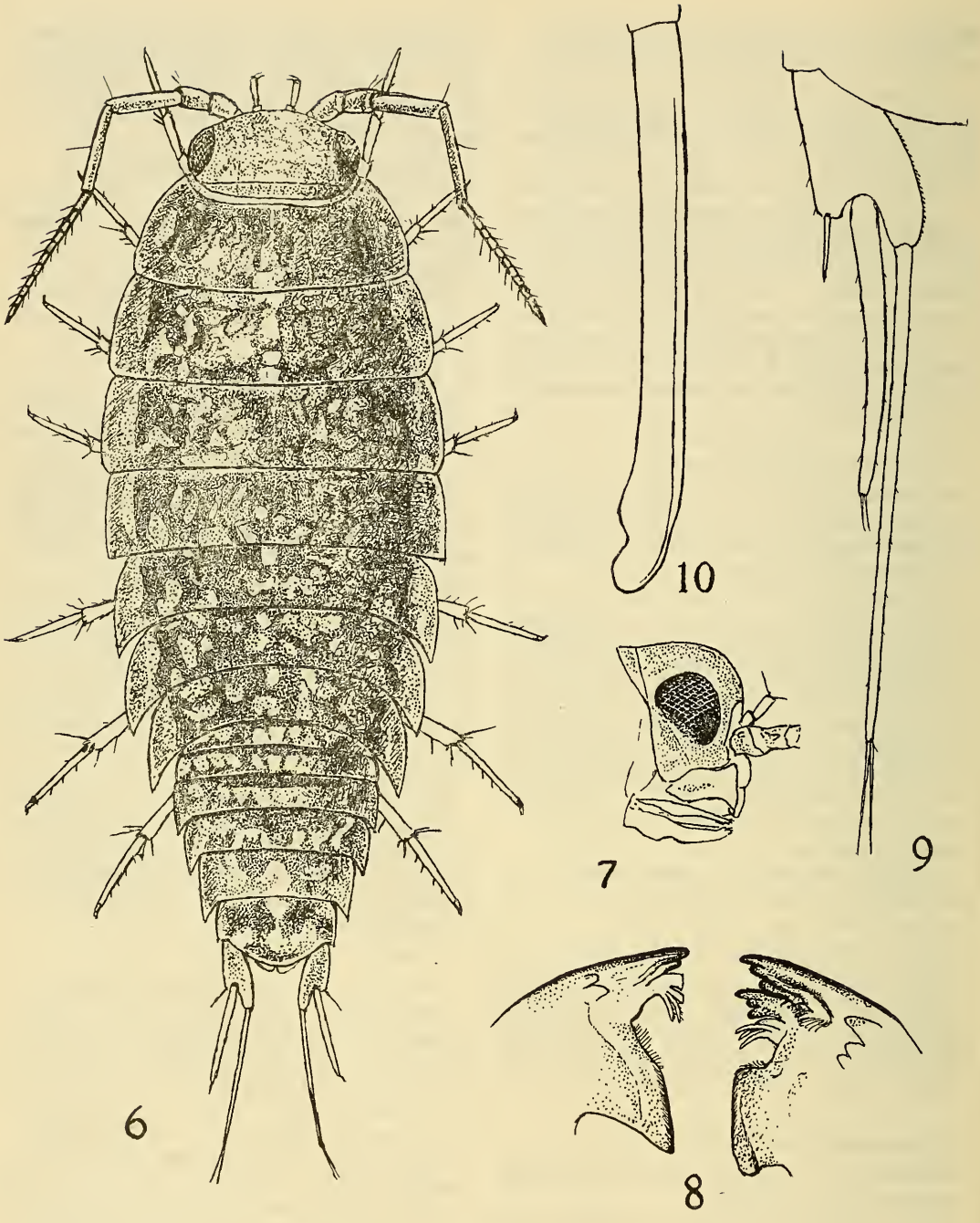
This species has been recorded from various other localities on both the east and west coast of Canada (vide Johansen, l.c.) and seems to be mainly a maritime species in this country. It is apparently rare at Toronto, north of which I have never found it.

10. *Porcellio rathkei* Brandt.

Generally distributed in the settled parts of the eastern provinces. Sydney, N.S., July 23, 1914; St. Andrews, N.B., June-July, 1923; Campobello Island, N.B., July 7, 1923; Quebec; Montreal; Covey Hill and Hemmingford, Que., July 17, 18, 1927; Eastman, Que., July 20, 1927; Belleville, Ont., June 24, 1927, (J. L. Hart); Toronto, throughout the year; Credit River, Aug. 22, 1926; Long Point, Lake Erie, Ont., June, 1927, very abundant; De Grassi Point and Barrie, Lake Simcoe, abundant; Galt, Ont., (M. Pettigrew); Camperdown, Ont., (Norma Ford); Sparrow Lake (J. L. Hart); Brockville, July 24, 1927; Ottawa (Johansen).

This very variable species is the common wood-louse of the east and greatly outnumbers all

[5] Ross, W. A., Report on Insects of the Year, Div. No. 7, Niagara District, 44th Ann. Rep. Ent. Soc., Ont., 1914, pp. 23-25.



Figs. 1 to 5, *Ligidium gracile* (Stimpson). 1, adult female; 2, right lateral view of head; 3, ventral view of distal part of mandibles; 4, left uropod; 5, male gonostyle.

Figs. 6 to 10, *Ligidium longicaudatum* Stoller. 6, adult female; 7, right lateral view of head; 8, ventral view of distal part of mandibles; 9, left uropod; 10, male gonostyle.

other species taken together. It is abundant under damp boards, logs, stones and decaying leaves, in rotten wood, refuse and manure piles, in woods as well as in gardens and fields. It is frequently absent, however, in dense forests and appears to be confined to the more or less settled districts. I failed to find it in the Lake Nipigon district, at Lake Abitibi and at Godbout, Que., on the north shore of the lower St. Lawrence. I am inclined to the belief already expressed, that it is, like most of our wood-lice, an introduced species.

11. *Porcellio spinicornis* Say.

Hemmingford, Que., July 18, 1927, a few specimens under rubbish and boards in a yard; Belleville, Ont., June 24, 1927 (J. L. Hart); Toronto, Ont., May 24, 1921 (Stuart Thompson); Parkdale, Toronto, under bricks in a yard (Norma Ford); Humber Valley, May 22-27, 1927, under limestone blocks in the shade of bushes, very local. Also recorded from Niagara by Stuxberg, and Rockcliffe, Ont., by Johansen.

This distinctly marked species is apparently not rare, although decidedly local.

12. *Cylisticus convexus* (De Geer).

Hemmingford, Que., July 12, 1927; Brockville, Ont., July 24, 1927; Belleville, Ont., June 24, 1927 (J. L. Hart); Toronto ,Ont., May-Nov. 29, Humber Valley, May 27, 1927, abundant; De Grassi Point, Lake Simcoe, June-Aug., 1927; Long Point, Lake Erie, Ont., June 2-9, 1927 (S. Logier, EM.W.).

Next to *Porcellio rathkei* this is the commonest of the larger wood-lice in eastern Canada and is widely distributed, although very much more local than the last-named species. It is found under wood and stones, often in comparatively dry situations, where it may be quite abundant, but it also occurs in rotten logs, in refuse-heaps and in vegetable gardens, in both urban and sylvan localities. It is our only outdoor species which can roll itself into a ball.

13. *Armadillidium vulgare* (Latr.).

Toronto, April 24, 1927, in kitchen sink, perhaps introduced with vegetables; in greenhouse of University Botanical Department, and outside in vicinity of same; one dead specimen found on outside stone steps of Library Building. Professor A. B. Klugh tells me has taken it in greenhouses at Kingston. It has also been reported by Ross (l.c.) as a troublesome species in greenhouses at London, Ont.

This species is evidently not a native of Canada and is apparently only accidentally found outside of greenhouses or their immediate vicinity. It is another of the species miscalled "world-wide" by Richardson.

14. *Armadillidium quadrifrons* Stoller.

Reported by Ross from greenhouses at London, Ont., where it was associated with *A. vulgare* and *Oniscus asellus*. Also recorded from greenhouses at Schenectady, N.Y., by Richardson.

A TALE OF FOUR CROWS

By NORMAN CRIDDLE, Treesbank, Manitoba.

I wish it to be understood at the outset that this tale is not a contentious one. Whether crows are wise or foolish, harmful or useful are questions which may safely be left for others to decide. For myself I am content. in the words of Kipling to "Let a plain tale suffice."

On June 19, 1926, a neighbour called up over the telephone to offer us four nestling crows. A consultation at the laboratory resulted in Mr. R. M. White, a fellow worker, fetching the birds home and thereafter he and I took charge of them.

What wretched little objects those orphans were that first evening. They had been roughly poked from their nest with a pole and as suddenly found themselves in the clutches of their arch-enemy—man. Perhaps, under the circumstances, it was no wonder that they crouched with fear or that apprehension was depicted in their every glance.

Fear still lurked in their eyes when I went to feed them next morning and it was necessary to pry their beaks open in order to get the food in. They ate, however, when once it was in their mouths, and one more bold than the rest uttered a faint squawk of satisfaction. A second attempt to feed them later on proved that they were still bent on a hunger strike but this was not so stubbornly maintained as before and the gurgling sound which accompanied the swallowing of food was less subdued than formerly and more indicative of satisfaction. But oh! what a change was manifested an hour later. Then four gaping mouths and a chorus of harsh cries enthusiastically greeted my approach and for a time the birds could not be fed fast enough to satisfy their

requirements. Much of the fear of man was now gone and thereafter we had four of the most interesting pets that it has ever fallen to my lot to rear.

We named our new charges Satan, Imp, Demon and Hoppy, the three first because they conformed to the average citizen's belief in crow characters, the last because of a broken leg which the bird had sustained when rudely poked from its nest. At first we tied coloured string to the leg of each as a mark of recognition, later their characters became sufficiently distinctive to dispense with these, though all were eventually banded.

When first obtained our new pets were scarcely half grown and their large heads combined with very short tails did not exactly suggest either good looks or activity, yet within two days Satan had managed to climb on the edge of his * cage and in less than a week he had flown to a fence rail some 20 feet away but being unable to stop when he got there he landed rather ignominiously on the ground beyond. Demon, steadier in temperament, was a day behind his venturesome companion in leaving home and poor Hoppy, being lame, was the last to do so.

Before long the obvious desire of the youngsters to roost amid the trees was acceded to, though we had some misgivings the first night whether they would return to the feeding place, but this fear proved to be groundless for on going down to the laboratory at five o'clock next morning, all were found collected around the old cage and my approach was greeted with the utmost enthusiasm. The habit of retiring to the trees at sunset and returning at sunrise to the feeding ground, now became a regular custom. The birds had also become quite reconciled to their new surroundings and were now almost as often on our heads or shoulders as on any other perch. It was soon after this period of their upbringing that an incident arose which completely changed the disposition of Imp. One morning a large band of adult crows were returning from mobbing an owl and spying Imp proceeded to give him a severe lecture on what we imagined to be the iniquities of man. At all events, the youngster got on the ground among them and whether they tried to pick him up or merely to punish him is unknown but he had blood upon his head when rescued and evidently was thoroughly frightened. He never afterwards seemed to have the same confidence in us, for while he still came to be fed and occasionally perched on our heads he did so with far less assurance and as time went on he grew more suspicious and less tame.

The cries of old crows were always heeded by the juveniles and even in the midst of feeding, a warning call from one of the two adults around the barn yard would immediately cause them to stop and frequently induce a hasty retreat amid the trees.

Scarcely a week had passed from the time they were captured before these young crows began to carry bits of straw, chips and bark and before long they were devoting much time to hiding all sorts of objects. These, at first, were merely shoved out of sight but later on the birds exercised much greater care in their secretion. Berries formed the principal articles used in this pastime, especially the brightly coloured kinds. The crows would fill their beaks and throats with as many as they could hold and then proceed to store them in some convenient hiding-place. This might be under a clump of grass, down a hole or amid our clothing. Demon, in particular, always had an eye for a human subject on which to play his pranks; a favourite trick of his was to fly on my arm, partly pull out my pocket handkerchief, empty his throat full of berries into the pocket and then carefully shove the handkerchief back into place on top of them. The impishness with which he looked up into my face when he had accomplished this feat, is beyond description. At other times the objects to be disposed of were shoved down our necks. Perhaps the height of this form of amusement was attained one evening when Demon, who had been busily engaged tearing a mouse to bits, suddenly flew with the remnants on to the shoulder of my friend, J. B. Wallis, and proceeded to hide the rodent down our visitor's neck.

The practice of hiding things seemed at first to be a mere idle pastime but as the birds grew older and began to feed themselves, the storing of food appeared to have more purpose in it. Moreover the birds were now much more methodical in going about the work; for whereas they at first, simply shoved an object out of sight they now covered it carefully with material which might be gathered some feet away, or, if it was hidden beneath a plant the leaves were carefully drawn down so that no portion of it remained visible.

It naturally became of importance to discover how much of this hidden food was recovered and with that object in view I made careful note of several of the birds caches; as a result I observed several times the bird's return to the hidden morsels. Imp, on one occasion was noted to return and eat some bread which he had hidden

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* I have used the masculine gender in referring to the crows, not because we could distinguish the sexes but for the sake of convenience. In reality, it is probable that at least one of them was a female.

approximately seven hours before, on another occasion Satan uncovered a bit of meat hidden four hours before. while Demon became thoroughly mystified at not being able to find a previously concealed morsel; not knowing, as I did, that one of his companions had stolen it. These are but three examples of many which we observed and since they fully coincide with observations which were made on the habits of adult crows they leave no doubt in my mind that food is hidden with a view to its ultimate recovery.

The love of destructiveness seems to be a dominant character and in this, as in several other habits, young crows strongly remind one of young puppies. Brightly coloured flowers nearly always attract them and because of this it became almost impossible for any length of time, to wear one in my buttonhole. On spying such a flower one of the birds would immediately fly on my shoulder and then either pull the blossom to bits or stow it away in my pocket.

One great delight in early life was to destroy the garden flowers and the more we attempted to preserve a certain plant the greater would be the bird's efforts to secure it. Once, in particular, Mr. White tried to guard a flower of rarity which Demon as persistently sought to destroy. The trial of perserverance was a long one but eventually the bird flew to another part of the garden and Mr. White satisfied with apparent victory, returned to the laboratory. He had hardly done so, however, before the bird was back on the spot where it speedily completed the work of destruction. We eventually taught these crows that they were not to pull the flowers up and a warning after this was usually sufficient to prevent further molestation, but they frequently looked up into our faces when so warned as if attempting to gauge whether it was safe to disobey. Demon would utter a short cry of objection at times that was quite human in its suggestiveness.

On June 27, on being provided with a pan of water, one of the crows dipped his beak in it and at once flapped his wings in imitation of bathing. Shortly afterwards all were induced to approach the water the result being a thorough wash all round. From this it is evident that washing is an instinctive act because it is certain that these birds had never seen sufficient water to bathe in before. It was seldom after this that they did not wash at least twice daily and before long they had learned to utilize the bird-trough where bathing and playing in the water became a regular pastime.

For pure innocent mischief it is difficult to imagine any living creature more adept than young crows, there is much of playfulness as well as a gentleness in this which strongly recalls the actions of young puppies. Demon, for instance, would look up suddenly from some piece of mischief, fly to my shoulder and with an indescribable worrying note proceed to pinch my ear, not hard, but with the obvious object of having a little bit of fun. At another time he would run his beak through my hair, or hopping on my head do his best to dislodge the button from my cap. This button was always an object of attraction and each bird at different times had tried to remove it; this after many efforts they finally succeeded in doing. Another little trick of which they were very fond was to pull the cap off my head but as the attempt was often made with a bird standing upon it the result was that both fell off together. Just once in a while a crow standing on my head would strike me with two or three quick hard blows, on being told to stop it would usually do so, but once Demon hearing the command mischievously gazed over the side of the cap and then returned to see what the effect of a few more blows would be.

The power of flight brought many new joys to the possessors. One could see that the birds revelled in the new freedom. All sorts of tricks were performed and any living object from a swallow to a chicken was chased. To a casual observer this flying after other birds might easily have brought condemnation on the pursuer but as a matter of fact these crows were incapable at that time of killing even a mouse and we easily saw that the chasing was done for amusement. To see a half grown chick running in fright was evidently a source of joy but when one more bold than the rest turned at bay the chaser would stop as if recognising that there was no more fun to be got in that direction. On one occasion Satan on flying after some chickens suddenly found himself confronted by the formidable head of the flock and for once in his life he discovered what it was to be chased. A comedy that was repeated many times consisted of one of the crows getting on the top of our Tree Swallow nesting-box, whereupon the owners would dart at it in quick succession, passing the crow's head like a flash. This the intruder stood as long as he could, uttering angry cries and attempting to bite at his tormentors, but the scene invariably terminated by the crow either dropping to the ground or beating a hasty retreat.

Our pets had now learned to recognise us at a distance, they had also a very good idea of where we spent the night. The result was that they nearly always flew to meet us as we left the house and with cries of hunger, rode on our backs to the feeding ground. They also began to follow us

during our excursions to nearby fields and often alighted on our heads at the most unexpected moments.

Evening, above all other times, was when our crows were most inclined to be sociable and seldom a day passed that we did not at that time have them in our company. It was on one of these evenings that Satan in great alarm flew into my arms and I discovered that he had inadvertently got into a swarm of ants and that they were savagely biting him. The quietness with which he permitted me to remove the ants seemed clearly to indicate that he had purposely flown to me for aid.

There could hardly have been greater differences in character than those exhibited in these four crows. Imp though worthy of his name, was always distrustful and became more so as he advanced in age. Satan was of a nervous temperament and easily frightened but apart from that distinctly companionable. Hoppy, always at a disadvantage due to a badly set leg, was not as mischievous as Demon but he relied more on our protection and showed less inclination to leave us. Demon was always sociable and he had a far greater faculty for learning. He would come when called by name, stop in the midst of some mischief when admonished and rub his beak or head against our faces as much as to say "We are really friends." Which indeed we were. Poor Demon! He left us with a flock of companions in late August and was shot at Pond Creek, Oklahoma on January 15, 1927. Thus with apologies to Shakespeare we might say; The evil that crows do lives after them, the good is oft interred with their bones. So let it be with Demon.

These crows, among ourselves, were always very companionable and they usually remained in close company. Occasionally a small squabble would occur, as a rule over some morsel of food or a plaything, but it was seldom even under extreme circumstances that a beak was used viciously. On such an event occurring, however, the defender quickly called for quarter, quite often throwing itself on its back. These little fights seldom lasted more than a few seconds and the contenders were always the best of friends as soon as the point at issue had been settled.

We could never induce the birds to talk nor to attempt to utter the simplest words. All, however, indulged in a series of guttural notes which were continued without intermission for several minutes. These could be interpreted as efforts of singing, or talking, but to me their origin seemed very similar in construction to the meaningless noises made by children. Each of the birds uttered a similar series of notes and I have frequently heard wild crows engaged in like manner.

The food which these nestlings found most palatable consisted of a mixture of bread, and raw meat, steeped in water. This was fed to them with a spoon and it was administered so long as they opened their beaks for its reception. Having satisfied their appetites the birds usually flew into the trees where they remained until hunger suggested more food when they flew to the door-step of the laboratory and called lustily to be fed.

Grasshoppers, cutworms and other soft-bodied creatures were all relished provided they were motionless but the birds flatly refused to eat these when they wiggled. By weighing the food we discovered that the average daily amount consumed by all four consisted of approximately 26 ounces but if more food was taken on one day the birds would require less the next.

On one occasion we endeavoured to discover the birds' daily capacity for cutworms, but after five hours during which time they ate 552, we gave up the attempt owing to lack of material. On another day two were selected for an experiment with white grubs (*Phyllophaga sp.*) but again we ran out of insects after the birds had consumed 121 in about the same time as on the previous occasion.

The desire to drink did not become a regular habit until the birds had also learned to feed themselves. This doubtless explains why nestlings will not eat dry food and it also accounts for the habit which the parents have of moistening much of the food in water before serving it to their offspring.

Early in August our birds began to forage extensively for themselves and it was then that several ripe tomatoes and a few melons were destroyed, partly I suspect, in a spirit of investigation—or was it sheer mischief?—though the former at least were partly utilised as food. Some bitter aloes placed on the semi-eaten fruit apparently acted as a sufficient deterrent.

From an examination of disgorged pellets we learned that two fruits, Choke-cherry and Dogwood, formed at that time a large portion of the food, wheat also had been taken in some quantity and immature corn evidently formed an item that was much relished.

The habit of ejecting pellets of undigested seeds combined with that of hiding others, must be an important factor in the dispersal of these and there is no question that many an isolated clump of wild fruit trees owes its origin to crows.

The disgorging of pellets comes on quite suddenly and without any conscious effort on the part of the bird. On such occasions a crow might be in the midst of some activity when it would all at once become quiet, blink its eyes, or perhaps close them as if in sleep. There was an obvious lack of attention to surroundings amounting almost to unconsciousness which was observable at no other time. The process only required a minute or two and the bird became immediately active on its completion. I have known three pellets to be ejected in quick succession.

It may be mentioned here that crows suffer from several parasites and at times a disease, during the summer months, carries them off in numbers. Two pests were found to trouble our birds, the most important being a species of louse which we controlled with Pyrethrum powder. The second was a black-fly (*Simulin forbesi Mall.*) which burrowed in between the feathers and sucked the birds' blood.

Perhaps a word might be said here as to whether young crows—and this applies to other birds as well—are taught by their parents and if so to what extent. We all know that barnyard fowls, when brought up by foster parents, while invariably uttering the notes characteristic of their kind, do learn to recognise the cries of their guardians and the latter likewise, to understand theirs.

Crows can undoubtedly be taught many small things but when it comes to major characters these are all instinctive. I am convinced, for instance, that the cries of warning and their recognition are part of the birds' inheritance and I believe this applies to all other cries. The idea often expressed, that birds suffer because they have not been taught by their parents to fear, is to say the least exaggerated. Unnatural confidence can, of course be installed by artificial surroundings which would be prevented by natural ones but these conditions can be brought about quite apart from the parents teaching. The following illustration will indicate what I mean:—

On one occasion, soon after learning to fly, our crows spied a collie dog which they had never seen before. They immediately became violently alarmed, uttered loud cries of warning and hastily flew into the neighbouring trees. The incident is all the more striking from the fact that the two semi-tame crows frequenting the barnyard, were not at all concerned with the dog's movements. The fear and alarm cries of the young birds were therefore wholly voluntary. Experience, on the other hand, taught them that the dog was harmless and by degrees they became less afraid of him.

It is highly probable, too, that these young crows had never been taught to fear hawks, yet they kept up an incessant watch for them invariably stopping in their occupation when one was seen and remaining motionless until the suspected enemy had disappeared in the distance.

As autumn advanced our crows remained more and more often away from home and it was evident that they were now mixing with the larger flocks frequenting the nearby territory. Late August is the time when most young crows leave their parents and it was perhaps natural that our pets, which doubtless looked upon us somewhat in the light of parents should separate themselves from us at that time. Imp was the first to depart, he left on August 27. Satan and Demon vanished on September 5 and Hoppy on the sixth. The last named, however, returned on September 10. He was less tame than formerly and seemed very much excited. He permitted me to stroke him and repeatedly perched on my head. He soon flew to the accustomed feeding place and took a meal out of the old can. He remained with us on and off until September 17, then after the usual breakfast, he rose into the air and with a few parting calls, moved off in a south-westerly direction.

We had hoped that at least one of the birds would return the following spring but this was not to be and to date, with the exception of Demon we have never heard again of our pets.

THE LOVE SONG AND FLIGHT OF THE WOODCOCK Philohela minor

By HENRY MOUSLEY.

POSSIBLY, the most recent literature on this subject appears in the March number of the "Wilson Bulletin," for 1927, and in the "Birds of Massachusetts and other New England States," 1925, by Mr. Forbush. In the former, Mr. Loring W. Turrell recounts his experience, and in the latter, those of Mr. Harry Higbee and Mr. James MacKaye are given, all of which differ as to the tine occupied by the birds from first "taking off," to the first "peent" after their return to earth. In the first named account, Mr. Turrell says one minute or less.

Mr. MacKaye says that the average of ten flights by two different birds was 1 minute 15 seconds, whilst Mr. Higbee contents himself by saying

that the time "seemed" to be about five minutes!

It was this variation in time, coupled with the further field of investigation the subject seemed to offer, that once more drew my attention to the matter, having had very little opportunity when residing at Hatley (as already recorded in my various papers on the "Birds of Hatley," *Auk*, vols. XXXIII-XLIV, 1916-27), of witnessing these evening serenades of the Woodcock, owing to the scarcity of the birds in those parts, where formerly they had been more plentiful. Here, in Montreal, however, matters have been very different, owing to the ideal conditions existing within a short radius of the city, where young second growths—more especially of birch—are prevalent, affording the birds ideal nesting grounds. No more inspiring spectacle can be witnessed than this love song and flight of the Woodcock, when in the dusk of evening, in ever diminishing spirals, the bird ascends to a height of some two or three hundred feet, at first, with vibrant whistling sound or notes, changing later to twittering ones before reaching the summit of its flight, and yet again, to those clear, liquid, gushing notes—the love song proper—as the bird volplanes to earth in great sweeps, dropping suddenly at the last—when all sound ceases—to usually within a few yards of the place from which it had arisen, to commence once again, those strange nasal "peents," always the prelude to another aerial flight.

From the accounts already quoted, the greatest number of times the bird calls whilst on the ground, is given as forty only, but this may be due to the fact of the observers not being on the ground—which is not clear—when the performances first commenced, which was the case in my observations, the first of which took place on April 16, 1927, near St. Lambert, on the south shore of the St. Lawrence River. The bird in this instance first left the ground at 7.15 p.m. standard time, after having given the "peent" notes 154 times! Previous to the second flight, they were rendered 41 times, but the bird did not ascend, merely flying over our heads—there was a party of us—when no doubt we were detected, the moon being at its "full" at the time. This ended my first experience, the bird not rising again during our stay on the ground. Better luck, however, attended us the following evening at Chambly Canton, some fifteen miles further south of St. Lambert. Here the bird rose at 7.10 p.m., after having given the "peent" notes 139 times, following this up with eight further flights, the average number of "peent" notes each time, before rising, being 13. The longest time the bird was in the air, was 48 seconds, and the shortest, 40 seconds, the average coming out as 43 seconds the moon again of course being at its "full." On one occasion the female flew near her mate, when he immediately took wing and followed her. My third, and last experience was again near St. Lambert, on May 21 the bird on this occasion rising at 7.43 p.m., after having given its "peent" notes 128 times the time occupied rendering them being 13 minutes or an average of 10 to the minute. Following this initial flight, were twelve others with an average of 15 "peents"—the least 3, the greatest 34—each time before rising the average time in the air of each flight occupying 49 seconds, the shortest being 45, and the longest 55 seconds—before the bird again reached the ground. The moon on this occasion was near the middle of the last quarter. I have mentioned these phases of the moon because I think they may have a good deal to do with the number of "peent" notes the bird utters on the ground, before rising for the initial flight, a dusky evening inducing an early ascent and consequently, a less number of these strange notes, whilst a bright, clear evening, would prolong them, the bird delaying its ascent until twilight should appear, a thing far off on such nights, so that at last, perforce, it has to ascend. What comfort we derive from these surmises and deductions of the actions of birds when, perhaps, more often than not, they are very wide of the mark! However, so far as I am aware, no such number of these "peent" notes have ever before been recorded. Summing up my experiences then, the number of these notes may vary from 3, to 154, the time uttering them lasting from 19 seconds, to 16 minutes, whilst, the number of flights each evening ranged from 9, to 13, the birds remaining in the air from 43 to 55 seconds, a great contrast to Mr. Higbee's "seeming" five minutes.

In conclusion, my best thanks are due to those kind friends who shared in my vigils, and helped in checking the records.

NOTES AND OBSERVATIONS

A BLANDING'S TURTLE LAYS ITS EGGS.—On the evening of July seventeenth at Camp Teetonkah, Port Maitland, Ontario, a Blanding's Turtle (*Emys blandingii*) began at seven thirty p.m. preparations for laying its eggs. It chose a sand hill about ten feet above the level of the Feeder to the old Welland Canal which is inhabited by turtles of this species. The hill was about a half mile from the Feeder.

It planted its fore feet in the sand and with its hind feet, using them alternately, gradually hollowed out a hole. The hole at first was only the width of its foot, about an inch wide. It would put its left foot in, scrape around the inside of the hole, then lift out the sand turning its foot sideways in the form of a scoop. Now it would put its right foot in and repeat the action. Counting slowly, it took between twelve and fifteen counts from the time it placed its foot in the hole until it took it out again. The hole gradually became bigger until it measured five inches in depth, two inches wide at the top and four inches wide at the bottom.

The turtle didn't seem to mind company. From the time it began to dig until it finished laying its eggs there was an average of ten boys watching the performance. The boys, including myself, were lying face down within a foot of the turtle's tail.

While digging the last part of its hole it put so much energy into the work that its jaws clicked under the strain.

At eight twenty p.m. it stopped digging and rested with its right foot in the hole.

At eight twenty-six, after a great deal of exertion, it laid its first egg. At eight twenty-eight the second, at eight thirty the third, eight thirty-one and a half the fourth, eight thirty-three the fifth.

At eight thirty-eight it changed its feet, putting its left hind foot in the hole. It used the foot in the hole to move the eggs into position so that the others could be placed deeper.

At eight thirty-eight and a half it laid its sixth egg. At eight forty its seventh, at eight forty-three and a half its eighth, at eight forty-five and a half its ninth, at eight forty-seven and a half its tenth egg.

Again at eight fifty-one and a half it changed its egg-placing foot.

At eight fifty-three and a quarter it laid its eleventh and last egg.

After taking a rest of three-quarters of a minute it began to slowly scrape sand from the inside of the hole on to the eggs, using its hind feet alternately. Then it took both feet out of the hole and began scraping sand into it with them, alternately. When it had got some in, it would pack it down and then put more in and pack that down until it finally had the hole filled up and the sand well packed. The last egg was three inches below the surface of the sand. The turtle required one hour and thirty-nine minutes to satisfy itself that the eggs were safely stowed away. It very very slowly moved away from the nest, packing the sand as it moved.

At ten twenty-three p.m. it crawled away toward the Feeder.

During the whole process it never once saw the hole it dug nor the eggs it laid.

It rested five times while packing the eggs.—J. ROLAND BROWN.

BLUE GEESE IN ESSEX COUNTY, ONTARIO.—Three Blue Geese visited the Miner Sanctuary on November 18, 1927. These were the first birds of this species to be seen in this vicinity in the fall, so far as I am aware.—MANLY F. MINER.

REGARDING JACK MINER'S CROW TRAP.—Jack Miner's Crow Trap has proven a success here on the Jack Miner Bird Sanctuary. As we have nothing to sell or commercialize here on the sanctuary, we have given full plans and specifications of crow trap to the United States government, and all parties interested enough to the extent of building and erecting one, can get blue prints FREE OF CHARGE upon making application for same to the Biological Survey, Dept. of Agriculture, Washington, D.C., to whom we gave full information, and they have made blue prints to distribute free to all interested parties. We caught as high as 510 crows in crow trap in one catch.—MANLY F. MINER.

OCCURRENCE OF KUMLIEN'S GULL AND THE ICELAND GULL AT THE ISLAND OF ANTICOSTI, QUEBEC.—On the afternoon of May 21, 1927, the steamship *Nayarit*, on which I was a passenger, spent about an hour at anchor in Ellis Bay, Anticosti, Quebec. The day was fine, with bright sunshine. Many Gulls were flying about, or resting on the water near the ship, and, as it was easily seen that there were several different species among them, I studied them carefully. In order to obtain as good views of them as possible through my binoculars of X6 power, I procured some stale bread from the accommodating cook on the ship, and threw pieces of this bread on to the water from time to time from the overhanging stern. Transfer of passengers, mails, and freight was taking place well forward

on the ship, and had attracted to that vicinity all the deck idlers except myself, so that when the Gulls flew close about the stern or alighted on the water beside it, or even under it, to pick up bits of bread, they found the immediate vicinity quiet, and, unalarmed, came very close to me, usually below the level of my eye. Because of these unusual conditions of observation, I was able to observe their appearance in great detail, both when they were flying and when they were floating on the water. By husbanding my supply of bread, and throwing out a small piece at a time, I was able to have the same birds pass again and again before and below me, as if in repeated review, so that features that were not clearly noted in one observation could be re-examined until a satisfactory description of them had been recorded.

About 20 Herring Gulls and 3 Ring-billed Gulls were easily identified, but there were with them some 10 Gulls without black on their wings that were more difficult to make out with certainty. Some of them were seen to be in immature plumage, and hope of identifying these specifically by sight examination was given up. Two birds that appeared to be in mature plumage, with clear pearly mantles, and with no dark markings on the wings, were compared carefully with the Herring Gulls, and were seen to be of practically the same size, but with smaller yellow beaks, each of which had a distinct dark band just back of the tip. These were considered to be Iceland Gulls. This species has been recorded from Anticosti in autumn and winter by Schmitt,* but apparently this is the first record of it there in spring.

Two other Gulls were studied even longer than the Iceland Gulls. They were similar in size to the Iceland Gulls, and, like them, they had the pearly mantles of maturity. Their beaks were smaller than those of the Herring Gulls. One bird's beak was clear yellow, with no dark or red mark visible. The other bird's beak was chiefly yellow, but showed a dark mark on the lower mandible just back of the tip. The feet of these birds were flesh color. Their outspread wings, as they flew below me, showed on each of the four outer primaries an area on the outer web that was dark, but not black, and that did not extend to the tip of the feather, which was white in each case. The dark markings were somewhat more pronounced on the bird with the clear yellow bill than on the other bird.

Of course, I suspected that these two birds were Kumlien's Gulls, but I had had no previous acquaintance with that species, and did not at the moment recall the exact nature of its primary-pattern. My ornithological text-books were not available, as those that I was taking with me on this trip were in my baggage, in the hold of the steamer. So I looked at these Gulls with great care, and wrote in my notebook, as I watched them, all the details that I was able to observe. Finally, I made in my notebook a sketch of one of their wings, as it appeared outspread, so as to supplement my written statements of the appearance and position of the dark areas on the primaries.

When, a few days later, I was able to consult Dr. Frank M. Chapman's "Handbook of Birds of Eastern North America," and Mr. P. A. Taverner's "Birds of Eastern Canada," my belief that these two Gulls were Kumlien's Gulls was further strengthened by the correspondence between their descriptions of that species and the notes and sketch that I had made.

In September, after my return to Ottawa, I showed my sketch to Mr. P. A. Taverner, without telling him the story related above, and asked him to what species of Gull belonged the wing represented in the sketch. He answered at once, "Kumlien's." Since then I have examined specimens of Kumlien's Gull in the ornithological collection of the National Museum of Canada, and have consulted additional descriptions of the species in standard ornithological works. All these investigations and comparisons lead only to the one conclusion, namely, that the two Gulls that I observed at Ellis Bay, Anticosti, and described and sketched in the belief that they were probably Kumlien's Gulls were actually of that species.

As there does not appear to be any previous record of the presence of that species at Anticosti, I feel justified in recording these events as the first known occurrence of Kumlien's Gull (*Larus kumlieni*) at Anticosti, Quebec.—HARRISON F. LEWIS.

*Monographie de l'Ile d'Anticosti. Paris, 1904, p. 292.

THE TUFTED TITMOUSE AT TORONTO.—The long barren-looking stretch of sand that extends from the eastern gap along the Toronto water front has always been a source of interesting observations, not only to the sportsmen of the last generation but the bird-lovers of this. Many rare records of shorebirds, birds of prey and song-birds have been credited to this somewhat uninviting locality. This month another was added—the occurrence of the Tufted Titmouse (*Baeolophus bicolor*). This bird has been recorded at Point Pelee by Mr. W. E. Saunders and within the last two or three years by Mr.

Merriman at Hamilton but the following is the first record of the bird's occurrence at Toronto.

November 27, 1927, dawned dull and gloomy. The previous night had been foggy and at 8 a.m. it was raining. James L. Baillie and I started out amid the rain questioning whether or not to go afield on such an unpromising, not to say disagreeable, morning. We arrived at the beach to find the rain still falling, but as there seemed to be some chance of the weather clearing up we decided to stay and see our program through. There had been one record of Richardson's Owl at Toronto this fall and, as the areas wooded with willow and poplar along the lake-shore bed always produced owls, we were hoping to add another Richardson's Owl record to the first.

The owl hunt could scarcely be called a success to-day. We noted only one Long-eared and one Snowy Owl all morning. No Saw-whets, no Screech, no Short-eared, no Barred and no Great Horned Owls were seen, although all these species have been seen at various times in this locality. Nor did we add any Richardson's Owl records.

As we were searching amid the willow tangles our attention was attracted by a couple of small birds and a very unusual chickadee note. Instead of the normal "Chick a chick-a-dee-dee-dee" it might be written "Chick a chick a-quay-quay-quay." The first part was identical with the note of the Black-capped Chickadee, the second louder, harsher and more nasal. The next moment I realized I was looking at a bird which had no black throat and Baillie who was also watching the bird from a different angle called attention to the fact that it wore a crest. There was no doubt about its being the Tufted Titmouse.

The bird was very restless and active. It changed perches several times and disappeared, then reappeared, sat some 15 feet up in a slender willow, paused long enough to permit us to see its markings clearly, uttered its call, flew and vanished again into the thicket. This was an observation, which, though certain enough, was all too brief to be satisfactory. We saw it clearly, we knew what we had seen and now the bird was gone.

Before us stretched many acres of leafless bush. There was but one thing to do, work our way through all this searching on every side for a small restless, elusive bird. Shortly after, some 300 yards away, we heard the note of a flock of Chickadees. This was promising at least, for it seemed the Tufted Tit ought to be in their company, if relationship meant anything in nature. As we approached the unmistakable note of the Tit was again heard. We examined every Chickadee and the few Kinglets around us, as they moved amid the maze of twigs, for the bird which had no black throat and a crest. We found him—and he favoured us admirably. As if aware of our eagerness he perched himself about 8 feet above the ground and remained quiet and often motionless, for nearly five minutes, while we were 18 feet distant—as measured later—studying him at leisure. We saw his every marking clearly, even noticing a couple of shreds of insect-food he had neglected to wipe off his bill. Throughout this "interview" he was silent except that twice he uttered a thin, very high-pitched "see-see-see" which was barely audible. I am unable to account for this long duration of what was to us the most accommodating restfulness on his part.

Suddenly, as though waking from sleep, he took after the vanishing Chickadees and, as we followed, we disturbed a Long-eared Owl—and decided it worth trying for a better view. In searching for the owl we became separated so that some 20 minutes later, when alone, I found probably the same flock of Chickadees. I looked for the Tit at once. Here he was, quite at home as I expected. I called Baillie and together we had an interesting observation which lasted some time and extended over several hundred yards of ground. This time the bird moved frequently, of but remained more or less connected with the Chickadee flock—in the flock but not of it, as it were. He often broke away from them, flying ahead to a chosen tree, then working back till he found himself among them again, or lingering behind as they moved on. We followed him in all these movements, moving quickly, then leisurely, keeping him in sight all the while. He was not a shy bird for we were often within a few yards of him, but his restless activity made it appear that he was avoiding us. His actions did not differ greatly from his black-capped cousins. He clung chickadee-like to the ends of twigs and pecked at the under side of limbs. Although he decidedly suggested the close relationship existing, with the Chickadees I believe I could detect a somewhat heavier movement in his poses. He favoured us several times with his unmistakable note and soon became surrounded by the flock as it moved along and was lost to us.—STUART L. THOMPSON.

HUDSONIAN GODWIT (*Limosa haemastica*) AT HAMILTON.—In view of the scarcity of published records for this bird in Ontario, it seems worthy to record a specimen received by the Museum in December, 1925, through Mr. Harrison F. Lewis. This bird, which is in the winter plumage,

was shot in the vicinity of Hamilton, by A. King, in the fall of 1925.—JAS. L. BAILLIE, JR., *Royal Ontario Museum of Zoology*, TORONTO.

WHITE-CROWNED SPARROW AT TORONTO.—It is well to look flocks of birds over closely even if we feel reasonably sure of their identity, for there is always the chance of there being a stranger present. On December 11, 1927, while observing birds at the Lake Shore at Toronto, I noticed a sparrow among a flock of Tree Sparrows which appeared and acted differently. This bird had, it seemed, brown patches on its head instead of a brown cap and its bill was a much brighter color than that of any of the Tree Sparrows. But when I looked for the breast-spot characteristic of the species there was nothing I could be sure about in this stranger. Its breast was not clear grey nor streaked, nor had it any one spot. I called Jas. Baillie, who was some distance off, telling him I fancied I had found a White-crowned Sparrow. Together we followed the bird from bush to bush and after many views, more or less clear, we were convinced it was nothing else. Finally when we collected the bird all doubts vanished. The specimen is now in the Royal Ontario Museum. It proved to be a female, first year plumage, well marked, but the breast soiled to a dirty blackish grey and the tail feathers somewhat worn. Just how long this belated migrant would have remained is, of course, impossible to say, but it was in good condition with a fair amount of fat and judging from its activity was quite at home among the Tree Sparrows, whose numbers also included one Song Sparrow. The only note uttered was a quiet "tseep" which though feeble was sufficiently distinct to help arouse my suspicions from the first.—STUART L. THOMPSON.

NOTES ON THE EUROPEAN STARLING AT KAMOURASKA, QUEBEC, IN 1927.—At Kamouraska the European Starling made its first reappearance for 1927 on March 30, a mild day. Three Starlings spent that day, as well as March 31 and April 1, in a search for food on the ground near houses, after the fashion of the European House Sparrow. Later they disappeared.

It was not until May 4 that they appeared again, this time in little groups of two to six individuals each, which stayed in the vicinity until May 27. On June 11 and 30, I observed a little flock of a dozen of them at St. Pascal, Kamouraska County.

Later, on July 16, I saw a flock of twenty of them, among which appeared to be several young. Young birds seemed to increase in numbers from that time to August 14, when I saw 75 young and adult Starlings together, after which they disappeared again until September 29. On and after the latter date they were to be seen again, in small flocks containing from 10 to 20. One might even see as many at times as 50 together, in company with the Crows, which had already assembled in numerous flocks for their autumn migration.

The Starling seemed to return southward with the last of the Crows, November 9 and 13, since when I have not seen them here.—WILLIE LABRIE.

FIRST OBSERVATIONS OF THE EUROPEAN STARLING IN THE VICINITY OF QUEBEC, P.Q.—At noon on January 22nd, 1927, Dr. D. A. Dery saw a male European Starling (*Sturnus vulgaris*) near Beauport, a short distance north-east of Quebec City. The day was bright and warm and the bird was basking in the sunlight as it rested on a twig of an alder bush on a little slope beside a brook.

On March 6th, 1927, I set out to look for this species in the suburbs of Quebec City, and, to my astonishment, found a flock of between forty and fifty individuals.

They were along the banks of the St. Charles River near Scott's Bridge. I suppose they were feeding on the refuse from the snow dumps in the locality, although when I saw them they were in a clump of alders, from which they flew into a big elm. About one-half of the flock came down on the south side of a small hill which was bare of snow and fed there for a long while, so that I had a good opportunity to examine them through my glasses and to identify them without chance of any mistake. These are the first individuals of the Starling that I have seen.—R. MEREDITH.

SMOOTH PERENNIAL SOW THISTLE AT OTTAWA.—On August 6, 1926, an area of about a square rod, in a vacant lot in Ottawa West, was found infested with this notorious scourge of the middle West. It had previously been collected by Dr. M. O. Malte in 1922 at Billings Bridge, but not recorded. While these appear to be the first reports of its occurrence at Ottawa, it is being discovered in the course of weed survey work at many points in eastern Canada. In one locality in North Renfrew this summer, it proved to be even more plentiful than the glandular sow thistle, so prevalent in Ontario and eastward.

The differences between these two sow thistles appear to be merely varietal, in which case the smooth one should be known as *Sonchus arvensis* L. var. *glabrescens* Gunth.—H. GROH.

BOOK REVIEW

MUSHROOMS AND TOADSTOOLS. AN ACCOUNT OF THE MORE COMMON EDIBLE AND POISONOUS FUNGI OF CANADA. *By H. T. Gussow and W. S. Odell. Published by direction of the Honourable W. R. Motherwell, Minister of Agriculture, Ottawa, 1927. 4to., 274 pages, 128 plates, two coloured. Price $1.00.*

The authors are to be congratulated on having produced a handsome book which will be of much interest and assistance both to beginners who would like to know something of the higher fungi and to the more experienced who have studied mushrooms and toadstools already for some years.

The work is illustrated with 128 quarto plates which are reproductions of photographs most of which were made by Mr. G. G. Clarke, Chief of the Photographic Division of the Geological Survey, from specimens collected by Mr. Odell on his many excursions to woods and meadows in the neighbourhood of Ottawa. The photographs are excellent and will doubtless prove of great help in the identification of species.

The description of species treated have been drawn up in as simple language as possible with the object of enabling the reader to distinguish the different species without the use of the compound microscope; and all the technical terms employed are explained in a glossary at the end of the book.

The publication of the work under discussion will provide for the general public an account of most of the larger and more common edible and poisonous fungi occurring in Canada. A glance at the plates shows that among the species described are not only numerous Gill Fungi but also Tooth Fungi, Fleshy Pore Fungi, Coral Fungi, Earth Stars, Puffballs, Stinkhorns, Saddle Fungi, Morels, and Cup Fungi. The authors point out that in respect to mushrooms and toadstools "distrust, superstition and dread are rife," and all this they endeavour to combat by a clear presentation of facts. The reader is first introduced to the nature, general structure, development, and classification of fungi and given some hints on how fungi should be collected and studied; then, in some 200 pages, he is provided with a description of genera and species; and, finally he is supplied with a discussion of fungi as food, the preparation of fungi for the table, poisoning by fungi, and mushroom culture. The two most deadly fungi, namely, the Fly Agaric and the Death Angel, are well illustrated in Plates 1 and 2 by coloured drawings made by Mr. Gussow.

Gussow and Odell's "Mushrooms and Toadstools" break new ground so far as Canada is concerned and break it very effectively; but, in view of a possible second edition of the work at some time in the future, it may be suggested that a few of the plates, e.g. of *Pleurotus ostreatus* (the Oyster Fungus), *Panus stypticus*, and perhaps *Armillaria mellea* (the Honey Fungus), should be replaced by others showing more typical specimens of the fungi, and it may also be suggested that an endeavour should be made to include in the book such common tree fungi as *Polyporus betulinus* and *Fomes fomentarius*, so frequently seen on Birch trunks, and some other of the larger *Fomes* species, e.g. *F. officinalis* (the Chalky Quinine Fungus) which the ancients knew as *agaricum*.

The work is offered for sale at the nominal price of $1.00, so that for this small sum anyone interested in fungi or in natural history generally can make a valuable addition to his library.—A.H.R.B.

LIFE HISTORIES OF NORTH AMERICAN WILD FOWL, BY ARTHUR CLEVELAND BENT. *Bulletin 130, Smithsonian Institution, United States National Museum. Washington, Government Printing Office, 1925.*

LIFE HISTORIES OF NORTH AMERICAN MARSH BIRDS, BY ARTHUR CLEVELAND BENT. *Bulletin 135, Smithsonian Institution, United States National Museum. Washington, Government Printing Office, 1926.*

These two valuable and admirably illustrated volumes continue the series of volumes of life histories of North American birds from Mr. Bent's pen and maintain the high standards previously set. Six volumes of the series have now been published.

The fifth volume (Bulletin 130) describes the life histories of the Anatidae, from the American Golden-eye to the Trumpeter Swan, the other North American species of the Anatidae having been dealt with previously in the fourth volume. The sixth volume contains accounts of the life histories of North American Herons, Storks, Ibises, Cranes, Rails, Coots, and Gallinules, and the American Flamingo.

In these volumes the author has followed the same general plan that was adopted in the previous numbers of the series. The distribution paragraphs in volume six were, however, compiled by Frederick C. Lincoln, with the records of the Biological Survey at his disposal, while

the statements of egg measurements and egg dates in this volume were prepared by F. Seymour Hersey from a very large number of data obtained from various sources. Of the life history accounts in volume six, five were written by Dr. Charles W. Townsend, one by Rev. P. B. Peabody, and one by Thomas E. Penard. The remainder were prepared by Mr. Bent, who in both volumes, draws not only upon his own wide experience, but also includes many important contributions from the published and unpublished writings of others. The general result is pleasing and useful, and leads the ornithological public to live in hope of the appearance of additional volumes of the series in the near future.

It may be of especial interest to readers of the *Naturalist* to know that a large part of the account of the life history of the Barrow's Golden-eye is from the pen of the well-known Canadian ornithologist, J. A. Munro.

It is twice stated that the Old-squaw no longer nests on the southern coast of the Labrador Peninsula, and the reader is told that Audubon's account of this species breeding there is now ancient history. This, happily, is not quite correct. In the summer of 1924 Charles F. Haultain, of Port Hope, Ontario, while stationed at Bradore Bay, Quebec, for bird protection purposes, saw a female Old-squaw with a brood of young on a small lake within a mile of the lake where Audubon observed the young of this species in 1833. The reviewer has repeatedly seen individual Old-squaws of both sexes in summer on the little lake where Mr. Haultain made this observation, and has seen them also in the nesting season at a number of points along the coast to the westward, as far as Whale Head. On June 28, 1927, Howard H. Cleaves and the reviewer watched four drake Old-squaws courting a female of their kind in Anse aux Dunes, close to Bradore Bay. According to some of the local hunters of Kegashka Bay, about thirty miles east of Natashquan, Quebec, Old-squaws nest in fair numbers not very far inland (north) from that place.

It is to be hoped that the statement that "Eiders are shot in winter off the Maine coast from blinds among the rocks off the islands and occasionally from boats" is, in fact, out-of-date.

The remark is made that the Surf Scoter no longer breeds regularly in southern Labrador, as in Audubon's time. This is probably not the case. Surf Scoters are present all summer in that region and are stated by resident trappers to nest about ponds and lakes a short distance back from salt water. Apparently the young generally remain inland until well grown, but a group of young Surf Scoters, about three-fourths grown, which retreated by swimming because, it seemed, they were not yet able to fly, was seen at very close range by the reviewer at Wapitagun, Saguenay Co., Quebec, on August 27, 1925.

The statement that Greater Snow Geese migrate overland across New England to the Gulf of St. Lawrence should be altered to read "to the River St. Lawrence," as the area in the southern part of the Province of Quebec where these Geese customarily rest and feed on migration, as the account mentions a few lines farther on, is on the St. Lawrence River about twenty-five miles below Quebec city, and about two hundred miles from the Gulf of St. Lawrence. Snow Geese are very rarely seen on the Gulf.

The description of the breeding range of the Great Blue Heron as including Anticosti Island and Godbout, Quebec, appears to have been based on an erroneous statement published elsewhere, and to lack the necessary supporting evidence.

These are just a few minor points that chance to relate to the area with which the reviewer is most familiar, and which are set down here simply for the purpose of making generally available the most accurate information relating to these matters that is at hand. All are agreed as to the general value of these volumes, but in such a great work some slight errors are bound to creep in, and if these are noticed and the truth set forth in print by active workers in the various areas concerned, it does seem as though the cause of science, of sound knowledge set in order, should benefit.—H.F.L.

OFFICIAL CANADIAN RECORD OF BIRD-BANDING RETURNS.

Published by Authority of the National Parks of Canada Branch, Department of the Interior, Canada

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 accidently 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.

* * *

The following returns upon birds, banded by Mr. Jack Miner, at Kingsville, Ontario, have been gathered from various sources and are now made a part of the Canadian Record, with Mr. Miner's consent.

Mr. Miner started banding Canada Geese in 1915. This was the year he began inscribing his bands with verses of Scripture. Until 1922 he had only succeeded in catching and tagging 109. In a lecture given in Ottawa on February 27, 1923, Mr. Miner stated as follows: "Sixty bands from geese have been returned to me—forty-two from Hudson Bay; one from Hamilton Inlet; one from Illinois; twelve from North Carolina; and one from Maryland. Bands from ducks have been returned to me from as far East as Long Island; as far South as Louisiana; and as far North as Central Manitoba; but, as yet, returns are very few from West of the Mississippi River."

The publication of Mr. Miner's bird banding returns was discussed with him on February 23, 1927, and on this occasion he prepared the following statement: "Seventy-five geese, out of the one hundred and nine banded up to 1922, are now reported as killed—only one reported as far West as the Mississippi River. Between 1922 and 1924 I tagged approximately four hundred geese, making in all up to 1924 approximately five hundred birds; and three more were reported near the Mississippi River; one as far West as North Dakota. But in 1925 and 1926 I tagged two thousand, and in November and December, 1926, alone, nineteen were reported in Missouri, Illinois and Indiana. This will prove to the satisfaction of any thinking person that God and man can change the migrating route of the fowls of the air. I also have five reported killed in Quebec in the last two years, which must be five hundred miles east of my home. For the last two years my map shows that I have more tags from along the Mississippi River than from the Southern Atlantic Coast, where returns first started coming from. In other words, I am drawing them from East and West, as well as from North and South, but up to the present, the one from North Dakota is the farthest West. One glimpse of the three maps I have showing the migration of the geese from my home

1. Up to 1922,
2. Up to 1924,
3. Up to 1926,

will convince any person that the sanctuary plan is a sure way of controlling our birds, and that we must no longer treat them as wild, but as our migratory chickens. The maps can not be reproduced, as I am going to use them in a book which I am preparing myself."

KINGSVILLE, ONTARIO

MALLARD:—

One female, named Delilah, banded on December 5, 1912, returned on March 18, 1913, raised a family and migrated in the fall; returned on March 21, 1914, raised a family and migrated in the fall; returned on March 13, 1915, had photograph taken and migrated in the fall; returned in 1916; returned in 1917, had no family—new tag put on her; returned on March 25, 1918, raised a family of twelve, and migrated during the month of September, 1918.

One banded in 1918, was recaught and double tagged in December, 1922; and was re-caught on November 28, 1924.

One banded in 1919, was re-caught and double tagged on November 28, 1924. (See later return from Alberta).

Two, banded in 1919, were re-caught and double tagged on November 28, 1924.

One banded in 1921, was re-caught on November 28, 1924.

Two, banded in 1922, were re-caught on November 28, 1924.

DUCK:—

Six, banded in 1914, returned in the spring of 1915 before March 28th.

Out of fifty-three, banded in the fall of 1915, nearly half returned during the spring of 1916.

Out of fifty-four, banded in the fall of 1916, two migrated and returned three times; one had part of its foot shot off.

CANADA GOOSE:—

Two, banded in 1917, were re-caught in a different net on April 22, 1922.

One banded in 1918, was re-captured about April 21, 1926.

One banded in 1918, was re-caught and re-tagged on April 6, 1927.

Twenty-five, banded in 1921, returned during the spring of 1922.

Several, banded in 1922, were re-caught on November 17, 1926.

Several, banded in 1923, were re-caught on November 17, 1926.

One banded in 1923, was re-caught and re-tagged on April 6, 1927.

One banded in 1923, was re-caught on April 15, 1927.

Five, banded in 1924, were re-caught and re-tagged on April 6, 1927.

One banded in 1924, was re-caught on April 15, 1927.

Two, banded on April 22, 1925—bands returned on November 23, 1925.

Several, banded in 1925, were re-caught on November 17, 1926.

One banded in 1925, was re-caught on April 15, 1927.

Fourteen, banded in 1926, were re-caught and re-tagged on April 6, 1927.

Nine, banded in 1926, were re-caught on April 15, 1927.

Thirteen were re-captured on November 26 1926.

Ten, banded on April 6, 1927, were re-caught on April 15, 1927.

NEWFOUNDLAND LABRADOR

CANADA GOOSE:—

One killed at a place called Sabascashieu, on the north side of Lake Melville, toward the head of the Lake, Newfoundland Labrador—reported October 7, 1921.

ALBERTA

MALLARD:—

One banded in the fall of 1916, was shot in Alberta, during the fall of 1917, and the recovery reported by a resident of Earlie, Alberta.

One male, banded in the fall of 1917, was caught in a rat trap at a place about twelve miles west of the Great Waterways Railway Mile 166, north of Lac la Biche, on the Cow River running out of Cow Lake in unsurveyed land, Tp. 74, Rge. 11, about Sec. 10, W. 4th M., on April 3, 1923. (This was one of three Mallard drakes banded at the same time; one was killed the same fall in the South, and one in Louisiana on November 23, 1921).

One banded in 1919, was re-caught and double tagged on November 28, 1924, and was killed at a place called by the Indians "Stink River," north-east of Birch Mountains and west of the Athabasca River—reported August 4, 1926.

One killed on Behan Lake, A. & G.W. Railway, about fifty miles north of Lac la Biche, about the end of May, 1923.

One killed near Fort Chipewyan, in the spring of 1926.

MANITOBA

MALLARD:—

One banded in 1917, was shot at Moose Lake, on September 27, 1919.

One killed at Island Lake, which is reached after a seven-day canoe trip from Norway House on the north end of Lake Winnipeg, on April 28, 1921.

DUCK:—

One banded in 1917, was shot on Moose Creek, near the Hudson Bay Post on Moose Lake, north of latitude 53.45, longitude 100.25, on April 7, 1921.

NORTHWEST TERRITORIES

CANADA GOOSE:—

One banded in the spring of 1918, was killed on the north-east point of Charlton Island, James Bay, on May 9, 1918.

One banded in April, 1918, was shot on the Belcher Islands, Hudson Bay—reported in the fall of 1920.

One banded in April, 1918, was shot in Baffin Land, in the summer of 1923.

One banded on April 24, 1919, was killed on the Belcher Islands, Hudson Bay, on April 28, 1919.

One killed in Baffin Land—reported in 1919.

Three killed on the Belcher Islands, Hudson Bay—reported April 21, 1920.

Three, banded in April, 1923, were killed on the Belcher Islands, Hudson Bay, sixty-five miles north-west of the Hudson Bay Company's Great Whale River Post, Quebec—reported December 13, 1923.

Two killed (?) on the Belcher Islands, Hudson Bay—reported March 28 1923.

One killed on Charlton Island, James Bay—reported July 26, 1923.

One killed on Twin Islands, James Bay, about the first week in August 1924.

Two killed (?) on the Belcher Islands, Hudson Bay, in the summer of 1924.

Eleven killed on the Belcher Islands, Hudson Bay—one or two in the spring of 1924 and the remainder in the fall of 1924.

SPECIES UNKNOWN:—

One killed on the Belcher Islands, Hudson Bay—reported September 3, 1925.

ONTARIO

MALLARD:—

One female, named Helen, banded on December 5, 1912, was shot at Mitchell Bay, Lake St. Clair, on December 6, 1912.

One female, named Polly, banded on December 5, 1912, returned on March 10, 1913, raised a family and migrated in the fall; returned on March 14, 1914, raised no family and migrated in the fall; returned on March 16, 1915, with part of beak shot off, had photograph taken, but did not migrate in the fall; and was shot during the month of April, 1916.

One banded in 1917, was shot at Cedar Creek, on September 26, 1918, by a resident of Kingsville.

One killed on Walpole Island, on September 14, 1917.

One male, named Theodore Mulberry, banded on July 14, 1919, left in August 1919, and was shot at Cedar Creek, on September 1, 1919, by a resident of Kingsville.

One, banded in 1919, was killed in Leamington marsh, on October 26, 1920.

One male, banded in November, 1921, was caught in a muskrat trap on a small inland lake near Lake of the Woods, on April 24 1923.

One taken at Whitefish Bay, Lake of the Woods, on October 24, (?) 1926.

BLACK DUCK:—

One killed on Walpole Island, on September 14, 1917.

One, banded in 1925, was killed at East Pens, Hudson Bay, on July 10, 1926.

DUCK:—

One, banded in 1917, was killed at Big Creek—reported October 27, 1917, by a resident of Amherstburg.

One, banded in 1917, was shot in a marsh—reported November 3, 1919, by a resident of Amherstburg.

One killed probably near Amherstburg—reported November 20, 1918.

One, banded in 1919, was shot in the St. Ann's Shooting and Fishing Club marsh, St. Clair Flats, on October 31, 1919.

One, banded in 1919, was shot in a marsh—reported November 3, 1919, by a resident of Amherstburg.

Two shot probably near Windsor, on November 20, 1919.

One, banded in 1921, was shot in a marsh in Malden Township, Essex County, on December 3, 1921.

One, banded in the fall of 1925, was shot at Rondeau, on December 10, 1925.

CANADA GOOSE:—

One, banded in the spring of 1918, was killed at Hannah Bay, south of James Bay, on April 28, 1918.

One, banded in April, 1918, was shot at Fort Albany, James Bay, a few months after it was banded. This was the first goose return reported to Mr. Miner from the west side of James Bay.

One killed at Albany, James Bay, in May, 1918, before May 22nd.

One killed about thirty miles west of Moose River, along the coast of James Bay, in April, 1921

One, banded in the spring of 1922, was shot "up the Kwataboahegan River, about one hundred miles from Albany Post," on April 27, 1927.

Four, banded on December 5, 1922, were killed at the mouth of the Moose River, James Bay, in May, 1923, before May 14th.

One, banded on April 22, 1923, was killed at Hannah Bay, south of James Bay, on April 25. 1923.

One, banded on April 22, 1923, was killed at Salt Water Lake, near James Bay, on April 28, 1923.

One, banded in 1923, was killed one mile northeast of Desaulniers, on December 7, 1923.

One, banded in the spring of 1923, was shot "up the Kwataboahegan River, about one hundred miles from Albany Post," on April 19, 1927.

One killed on the south side of the Albany River, James Bay—reported May 25, 1923.

One killed between Moose and Albany on the coast of James Bay, in May, (?) 1923.

One killed on Nomansland Point, between Albany and Moose Rivers, James Bay, on August 31, 1923.

One killed at Hannah Bay, James Bay, on April 28, 1924.

One, banded in the spring of 1925, was killed about fifteen miles up the Albany River from James Bay, on May 30, 1927.

One, banded in the fall of 1925, was shot at Willow Beach, on December 11, 1925.

One, banded in the fall of 1925, was shot one-half mile north of Kingsbridge, on the Blue Water Highway, Township of Ashfield, Huron County, about five hundred yards from Lake Huron, on November 15, 1926.

Two killed at "Bushy Tree," Canoes River, south of the Albany River, on May 15, 1925.

One recovered at Moose River Post, James Bay, in the spring of 1925.

One killed "at a creek named Chikaney to the north of the Albany River"—reported June 9, 1925.

Five killed at the mouth of the Lawabiskau River, south of the Albany River, James Bay—reported June 18, 1925.

One killed at Moose River Post, James Bay, in the fall of 1925.

One, banded in the spring of 1926, was killed forty-five miles south of the Canadian National Railway, Fauquier, on November 2, 1926.

One, banded in the spring of 1926, was killed on the shore of James Bay, about twenty miles south of the Albany River, on April 19, 1927.

One, banded in the spring of 1926, was shot at Canoes River, south of the Albany River, on June 1, 1927.

One, banded in the fall of 1926, was killed on the shore of James Bay, about twenty miles south of the Albany River, on April 19, 1927.

One, banded in the fall of 1926, was shot at Nettichi Creek, a few miles south of the Albany River, on April 20, 1927.

One, banded in the fall of 1926, was shot "up the Kwataboahegan River, about one hundred miles from Albany Post," on April 27, 1927.

One killed at Trout Lake, twenty-five miles north of the Canadian Pacific Railway, Missanaibee (?), on April 30, 1926.

One killed "up inland about twenty miles up the Lawabiskau River, James Bay," on April 30, 1926.

One killed at Moose River Post, James Bay on May 1, 1926.

One killed on the south shore of the mouth of the Albany River, James Bay, on May 5, 1926.

One killed at Nettichi, south of the Albany River, James Bay, on May 6, 1926.

One killed at Nettichi, south of the Albany River, James Bay, on May 7, 1926.

One killed at Fishing Creek Lake, on the north of the Albany River, about fifty miles from its mouth, James Bay, on May 8, 1926.

One killed sixty miles from the mouth of the Kapiskau River, James Bay, on May 10, 1926.

Two killed "about twenty-five miles up the Canoes River," James Bay, on May 10, 1926.

Two killed at Nettichi, south of the Albany River, James Bay, on May 10, 1926.

One killed on the Winnipegomatawa River, James Bay, on May 12, 1926.

One killed "about twenty-five miles up the Canoes River," James Bay, on May 13, 1926.

One killed on the North River, the name given to the north channel of the Albany River, on May 14, 1926.

One killed about fifty miles up the Canoes River, a small river a few miles to the south of the Albany River, on May 14, 1926.

One killed about twenty miles up the Canoes River, James Bay, on May 18, 1926.

One killed on the Albany River, about thirty-five miles from its mouth, James Bay, on May 19, 1926.

Two killed on Chickaney River, James Bay, in May, 1926.

One male caught about thirty-five miles "up Partridge Creek," a small river running into James Bay, just East of Moose River, on July 7, 1926.

One shot near James Bay, shortly before October 18, 1926, and reported by a resident of Cochrane.

One ♂ wounded and taken alive "on what is called the Klondike, a river and series of flats lying east of the Blue Water Highway and Lake Smith, a few miles south of Grand Bend"—reported December 5, 1926.

One, banded in the spring of 1927, was found dead, apparently not wounded, at the mouth of the Saugin River, in the Abitibi Reserve, on Lake Abitibi, Ontario, six miles from La Reine, Abitibi Territory, Quebec—reported May 8, 1927.

SPECIES UNKNOWN:—

Five recovered—reported by a resident of Moose Factory, James Bay, in the summer of 1926.

Ten evidently killed in Hannah Bay, south of James Bay, reported June 7, 1927.

QUEBEC

CANADA GOOSE:—

One, banded in 1915—the first Canada Goose banded by Mr. Miner—was shot a few miles south of the Hudson Bay Company's Post at Eastmain, James Bay, on April 15, 1915.

One killed at Comb Hills, a point on the coast of James Bay, about forty miles south of the Hudson Bay Company's Post at Fort George, in the middle of October, 1915.

One, banded in the fall of 1916, was killed on Hudson Bay, by a hunter of Fort George, James Bay—reported October 11, 1922.

Two killed to the south of Fort George, James Bay, in the spring of 1916.

One male, named Sir John Moore, banded in the fall of 1917 with two bands, left in December; returned on March 19, 1918; went North on April 25, 1918; and was killed at James Bay, in May, 1918.

One female, banded in the fall of 1917, left in December; returned on March 19, 1918; went North on April 25, 1918; and was killed at James Bay—reported June 26, 1918.

Three, banded in the fall of 1917, left in December; returned on March 19, 1918; went North on April 25, 1918; and were killed at James Bay—reported June 26, 1918.

NOTE.—Six Canada Geese, five of which are covered by the above five records, arrived at Mr. Miner's place in one group on October 10, 1917, and gave such plain evidence of attachment to one another at the time they were being banded, that it is altogether probable they were a single family, consisting of two old birds and four young. One of the young was killed in Maryland during the following winter, as noted in Mr. Miner's returns from Maryland, but it is very interesting to observe that the two old birds and the three other young were seen at Mr. Miner's farm on northward migration, on March 19, 1918, and that these five birds were still in company with one another when killed near Fort George, James Bay.

One, banded in 1917, was killed thirty miles north of Eastmain, James Bay, in October, 1918.

One, banded in the fall of 1917, was shot on the east side of Hudson Bay, in May, 1924.

Two killed at James Bay, about the end of April, 1917—reported by a resident of Fort George.

One, banded in the spring of 1918, was killed thirty miles north of Rupert House, James Bay—reported June 20, 1918.

One, banded in 1918, was killed near Cape Jones, between Hudson and James Bays, in the fall of 1918.

One, banded in the fall of 1918, was killed at Fort George, James Bay, in the fall of 1926.

Two shot in the vicinity of Fort George, James Bay, in May, 1918.

One, banded in 1921, was killed on the St. Lawrence River, at Ste. Croix, Lotbiniere County, on September 28, 1922.

One, banded in the spring of 1922, was shot at Cape Dufferin, on the east coast of Hudson Bay—reported August 31, 1925.

Two, banded in 1922, were killed at Fort George, James Bay, in the fall of 1926.

Two, banded in the spring of 1922, were "presumably" shot by hunters residing on the coast of James Bay, approximately fifty miles south of Fort George, in the fall of 1926.

One shot on the Ottawa River between Ottawa and Montreal, thirty miles above Montreal, in October, 1922 (?).

NOTE.—Out of the one hundred and nine Canada Geese, banded from 1915 to 1922, thirty-nine were killed on the east side of Hudson and James Bays, prior to January 19, 1925.

One, banded early in 1923, was shot in latitude 59.5, longitude 79.5, in September, 1925.

Two, banded in 1923, were killed at Montmagny, in October, 1925.

Four, banded in 1923, were killed at Fort George, James Bay, in the fall of 1926.

"Presumably" two, banded in the spring of 1923, were killed in the Great Whale River district, Hudson Bay—reported March 22, 1927.

Five killed in the vicinity of Fort George, James Bay—reported July 25, 1923.

Several killed—reported by a missionary on the east coast of Hudson Bay.

NOTE.—Out of the approximately four hundred Canada Geese, banded from 1922 to 1924, thirty were shot on the east side of Hudson and James Bays, prior to January 19, 1925.

One, banded in April, 1924, was shot in latitude 58.15, longitude 78, about July 16, 1925.

One, banded in 1924, was shot at Cape Dufferin, on the east coast of Hudson Bay—reported August 31, 1925.

One, banded in the spring of 1924, was shot near McKamick, on October 8, 1925.

One, banded in the spring of 1924, was killed on the coast of James Bay, about ten miles north of Eastmain—reported December 14, 1925.

Two, banded in the spring of 1924, were killed at Fort George, James Bay, in the fall of 1926, before November 22nd.

"Presumably" one, banded in the fall of 1925, was killed in the Great Whale River district of Hudson Bay—reported March 22, 1927.

Two killed at Port Harrison, latitude 58.30, longitude 78.30, Hudson Bay, in the spring of 1925.

Six shot in the locality of Fort George, James Bay, in 1925, before September 16th.

"A few" killed at James Bay, two in July, 1925, and the remainder in the spring of 1926—reported by a resident of Rupert House, James Bay.

Two, banded in the spring of 1926, were killed at Fort George, James Bay, in the fall of 1926, before November 22nd.

Two, banded in the spring of 1926, were "presumably" shot in the fall of 1926, by hunters residing on the coast of James Bay, approximately fifty miles south of Fort George.

"Presumably" two, banded in the spring of 1926, were killed in the Great Whale River district of Hudson Bay—reported March 22, 1927.

One, banded in the fall (?) of 1926, was "presumably" shot by a hunter residing on the coast of James Bay, approximately fifty miles south of Fort George, in the fall of 1926.

One killed in the vicinity of Macamic, on May 4, 1926.

Two killed in the vicinity of Macamic, shortly before May 5, 1926.

Two killed at Fort George, James Bay, on May 10, 1926.

SASKATCHEWAN

MALLARD:—

One killed ten miles south-west of Humboldt, shortly before April 29, 1922.

DUCK:—

One, banded in the fall of 1916, was shot near Englefeld, shortly before September 20, 1917.

One shot at Dubuc (?), on November 3, 1923.

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CONTENTS

PAGE

Discovery of the Nest of the Marbled Murrelet (*Brachyramphus marmoratus*) in tbe Queen Charlotte Islands, British Columbia. By Solomon John Darcus..... 197

Formica Sanguinea Takes the Trail. By Mina Pamela Cole..... 199

Notes and Observations:—

Fishes Collected in Chamcook Lake, New Brunswick. By T. B. Kurata..... 202

Western Ragweed to the Eastward. By H. Groh..... 202

Asclepias Tuberosa L. in the Ottawa District. By H. Groh..... 202

The Spread of *Axyris Amarantoides* L. By H. Groh..... 202

Official Canadian Record of Bird-Banding Returns..... 203

INDEX TO VOLUME XLI..... 208

The Canadian Field-Naturalist

VOL. XLI OTTAWA, ONTARIO, DECEMBER 1927 No. 9

DISCOVERY OF THE NEST OF THE MARBLED MURRELET (Brachyramphus marmoratus) IN THE QUEEN CHARLOTTE ISLANDS, BRITISH COLUMBIA.

By SOLOMON JOHN DARCUS.

THE complete account of my search for the breeding quarters of the Marbled Murrelet is a long story, so I shall go over my preliminary observations on the species briefly.

Previous to 1923 my knowledge of the sea birds of the North Pacific was very slight.

In the summer of that year I went to reside at Bamfield, on the west coast of Vancouver Island, and there had ample opportunity of observing the sea birds in the neighboring waters.

Barkley Sound, with its numerous islands, is a paradise for the ornithologist, and it was there that I first made the acquaintance of the Marbled Murrelet. During the summer months it is the commonest sea bird in the Sound.

Throughout the summer I used to observe it fishing in the waters of the Sound and the neighboring inlets, and I believed at the time that I should find the species nesting on some of the islands in the Sound, but, although I visited many of these islands, I could find no evidence of the nesting of this bird.

Often, when camped on an island during the summer months, I would hear the call notes of the species at night, as it flew towards the mountains on the north shore of Barkley Sound.

During the summer of 1925 I spent six weeks in an attempt to solve the mystery.

Going to Tofino, which is about forty miles north of Bamfield, and from which point the approach to the mountains, towards which I had heard the Murrelets flying, is more accessible, I spent some days in the salt water inlets in that vicinity, observing this species.

While camping on Bare Island, an island some miles off shore, I observed the Marbled Murrelets about one hour after sunset, flying towards the

Cox Island taken from Puffin Cliff, Langara Island, June 8th, 1927

mountains on the main shore of Vancouver Island. This flight continued until sunrise. The birds would rise from the water some miles out at sea, and appeared to obtain their elevation before flying towards the mountains.

On June 27th, 1925, I set out by canoe for Kennedy Lake, a large lake some miles inland, which can be reached by canoe from salt water. As it was necessary to ascend the lower reaches of the river, which flows from the lake, at high tide, I began the ascent of the river at 2.00 a.m. on June 28th. At that hour it was not yet daylight, and the upper atmosphere was foggy. As I was passing up the river I could hear the call notes of the Marbled Murrelets as they flew high overhead for the mountains.

On the night of June 28th I camped on a sandy shore beside the lake, and throughout the night also I heard the call notes of this species, as the birds passed overhead towards the mountains.

The next day, June 29th, was spent in searching for the most accessible mountain peaks. Several Marbled Murrelets, all adult birds, were seen on the lake.

Having chosen a peak to ascend, I began the ascent on the morning of the 30th, reaching the summit, at an elevation of 4,600 feet, after six hours of stiff climbing. Here the snow in the hollows was still deep, but the cliff faces were bare and too steep to explore without the aid of a rope.

After spending about six hours on the summit, I made the descent to the lake again, leaving the breeding quarters of the Marbled Murrelet still undiscovered, although I felt certain the species was nesting on those inaccessible cliff faces.

The following summer, 1926, I decided to visit the Queen Charlotte Islands, in the hope of finding more accessible breeding quarters of this species there.

On May 22nd I left Vancouver, accompanied by the veteran ornithologist, Rev. C. J. Young. Arriving at Massett, Graham Island, on May 25th, I noted that Marbled Murrelets were very common in the inlet there.

A few days were spent in observing and photographing the Semipalmated Plovers that nest in the vicinity of Massett, but on June 9th I went by boat to Langara Island, in exploring which I spent some days. Marbled Murrelets were seen daily near the shore of the island, but no nest was found. If a few pairs of this species were breeding on Langara Island, it would have been very difficult to discover their burrows among the thousands of burrows of the other burrow-nesting species breeding there.

However, I obtained a clue to a breeding colony of Marbled Murrelets on a smaller island close by, finding on this island a dead Marbled Murrelet and also some wings of the species in the eyrie of a Peale's Falcon. As the Falcon usually catches its prey either entering or leaving the nesting burrows during the early hours of the morning, I concluded that there was a nesting colony of Marbled Murrelets in the vicinity.

I now believe that at that time, June 21st, most, if not all, of the young Marbled Murrelets had left their nesting burrows. Several young Marbled Murrelets were seen in the sea close to the island. These had still some down adhering to their plumage and no doubt were not long out of the nest.

A few days later I returned to Vancouver, leaving the mystery still unsolved, but having decided that I would return to this island earlier in the following year.

This year, 1927, I left Vancouver for the Queen Charlotte Islands on April 7th, arriving at Massett April 10th, and leaving that place almost immediately for Langara Island. I was accompanied by a friend, Mr. Wesley E. Burtch, of Penticton, British Columbia, who had decided to spend his holidays with me on the Queen Charlotte Islands. His assistance in handling ropes and helping me in making landings was invaluable.

The weather became stormy after our arrival at Langara Island, so that it was some days before we could make a landing on the island where I believed the Marbled Murrelets were breeding.

On April 29th, the sea being calm, but the weather cold and much snow on the ground, we landed on the desired island, but obtained no results that day. I may mention that this island is literally honey-combed with the nesting burrows of Ancient Murrelets, Cassin Auklets, and Fork-tailed and Leach Petrels. The cliffs on the outer side of the island are very steep and, on account of the melting snow, were very slippery, so I was obliged to abandon temporarily my attempt, and to postpone it to await drier conditions.

On May 14th we again visited this island and this time, after some hours of climbing on the steep cliff faces, I was rewarded by discovering the breeding colony of Marbled Murrelets. On this occasion I secured three fresh eggs, one from each of three burrows, the birds being taken from the burrows with the eggs. The burrows were about two hundred feet above the sea, and were at least six feet deep. In each case, when I reached the nesting chamber, the bird retreated farther up the burrow. The nest was in a side

chamber, off the main burrow, and was made of dry grass, and leaves.

The next day, May 15th, I visited the island again, securing another Marbled Murrelet's egg from a deep crevice in the rock. This egg I scooped from the crevice with a stick, as it was beyond the reach of my arm. The bird flew out to sea.

There were, I think, about twenty pairs of Marbled Murrelets in this colony, but there may have been more, as parts of the cliff face I did not reach. Apparently the birds in this colony were just beginning to lay at the time when I collected these eggs. I think that the date on which most of them would have had eggs would have been about May 20th.

There is some variation in the markings of the eggs, but the ground color in all four specimens is the same, white. Two of the eggs are thickly spotted with fine spots of black and brown. The third egg is streaked lightly, with black and brown markings, and the fourth egg is heavily marked with the same. All the eggs were fresh when collected. There is practically no variation in the size of the eggs, which is $2\frac{1}{8}$ by $1\frac{1}{4}$ inches. These eggs are all in my collection.

I think that the reason why the nest of the Marbled Murrelet has not been discovered before is the difficulty of access to the places where these birds nest. I believe this species breeds along most of the British Columbia coast, and that most of the breeding colonies are in the coast mountains at an altitude of about four thousand feet, but that towards the northern extremity of its range it breeds at lower altitudes on almost inaccessible cliff faces.

FORMICA SANGUINEA TAKES THE TRAIL.

By MINA PAMELA COLE

SCIENTISTS of the old world watching the bee, spider and ant, find in the lives of these tiny insects, material for fascinating tales. Insect life in our own country is just as marvelous but we need the time and the will to get acquainted with it, eyes trained to see, hearts that will try to understand and interpret into human language the things seen.

Not long ago in Central Alberta, I had the great good fortune to discover an army of ants on the march. It was the second day of August in a very hot, dry summer. The day had been perfect—still, warm and almost cloudless when happening to stray into the garden at about half past five in the afternoon, I noticed a number of ants on a path in the flower garden. It was an unusual place for ants to be in such numbers as there was no large ant hill near. All of the ants were hurrying in the same direction while at least two thirds of them were carrying burdens nearly as large as themselves. So numerous were the ants that I had to leave the path to avoid crushing them as I walked. It soon occurred to me that it might be worth while to move along beside them and try to find out where they were going in such desperate haste with what appeared to be all their household goods and chattels. After a few moments it dawned upon me that I was witnessing a very unusual as well as very interesting phenomenon for I realized that this must be a veritable army on the march either returning from a foray or migrating to a new home.

Keeping carefully to one side and moving with the stream of ants, I went forward till I came to the end of the path, crossed the lawn and a lane, coming finally to a little dry pasture field where I found the head of the line This vanguard consisted of a number of somewhat larger red ants, unencumbered, each having a vague resemblance to a German officer in full military array. These and the other ants of the army were of the species *Formica sanguinea* said to be in the habit of making frequent raids on black ant hills for the purpose of acquiring slaves or servants.

Next returning to the point where I first discovered it, I traced the stream of ants back along the path by some shrubs, across a narrow cabbage patch, through a twenty-foot rhubarb plantation to a small field of potatoes. The ants were emerging from the field, just as numerous, just as hurried as the division first encountered.

Making my way through the potatoes, another patch of rhubarb and a narrow strip of oats I came to the end of the garden enclosure where, just marching out from under the fence, came the rear-guard of the army, these last stragglers hurrying and scrambling as zealously as the crack troops at the head of the line.

The scene of the march was the garden previously mentioned which consisted of a long narrow strip of land running along beside a wood. The vegetables were arranged in rows running crosswise so that the ants were forced to make the difficult march across the rows or go through the wood with its very rough, sloping ground and thick underbrush. Even in the garden the

marching was much more trying than if done over prairie ground. The path was used wherever at all convenient while the lawn and field offered a fair trail.

Subsequent measurements showed that the marching column was about one hundred and ten yards in length. The ants marched, while under observation, some three yards more than that. The direction taken was due west facing the afternoon sun except where short detours were made to avoid obstacles or to take advantage of a beaten track. On the whole the route followed was straight as a bee line. The time required for the rear-guard to march from the fence to shelter was exactly three hours. During that time the ants marched approximately one-fifteenth of a mile which would make the average rate of speed one forty-fifth of a mile per hour or nearly two feet per minute.

The army moved in loose marching order, the width of the column varying from one and a half to three or four feet according to the nature of the ground. While travelling through rough places and over the grass, the ants spread out, each individual apparently seeking the easiest track for himself. On the paths they closed in so that all took advantage of the smooth road.

Taking the length of the line, the average width and estimating the number of ants to the square foot at from one hundred and fifty to one hundred and seventy-five, I arrived at the conclusion that from sixty to seventy thousand ants took part in the march. That is without counting the black ants which they carried as captives.

For about two-thirds of the red army were struggling along under the weight of live black ants or pupae in little oblong white cases. The blacks belonged to the species *Formica fusca* and their younger brothers and sisters in the pupa cases were almost as large as the red carriers. In fact a red soldier with his burden looked most amusingly like a man trying to carry a rolled up mattress. It is probable that the blacks were young ones from a recent swarm. None that I saw had wings.

Thinking that perhaps dead blacks were being carried home to replenish the larder of the reds, I picked up a soldier who immediately dropped his victim in my hand, the black ant thus set free, began to run about in lively fashion showing that it must have been caught and carried as gently as a cat deals with her kittens. When the two ants were replaced on the ground, the red at once seized the black and hurried off to rejoin his comrades on the march.

I then caught another soldier and took him a couple of yards to the left of the line, there after keeping him a minute in my hand, I carefully set him down. This ant also returned without delay to the column, not going directly to the right but travelling at an angle which would give him the shortest road to his former comrades. This ant evidently knew his place in the line as well as the route to be followed.

Coming back again to the head of the line, I found the leaders turning somewhat sharply to the right and climbing up hill to where, half hidden in the shrubbery, lay an old ant hill badly broken into by the hoofs of animals using the pasture. This hill was the destination of the army for that night at least.

Between the comparatively smooth pasture land and this ant hill there was rough ground thickly overgrown with wild rose bushes broken down so that many dead branches were scattered over the ground. These branches bristled with sharp dry thorns. The red ants, nothing daunted, dragged the precious white satin pupa cases helter-skelter through these entanglements, over other obstructions and up to the doors of the hill. Ordinary pieces of white satin treated so would have been in tatters. Thus it would appear that the pupa cases were made to withstand wear and tear since they seemed none the worse as a result of this rough treatment.

When the leading ants arrived at the nearer entrances of the hill, heads of little black slaves popped out as if to welcome them home. Apparently the blacks were there to usher the weary red soldiers to chambers for rest and food. To my great surprise, most of the ants, now evidently very weary, refused to go in by the nearer doors even though black ants came out and caught at them, but staggered on and up over the hill to other doorways where other attendants awaited their arrival. This happened so often that I was forced to conclude that each red warrior knew which entrance he must use in returning to the hill.

Arrived at last at the proper door, the exhausted marchers refused to yield up their burdens to the waiting blacks who, reaching out welcoming arms for pupae and live black brothers, had to drag in with these the weary red robbers.

Meanwhile the rest of the army, in spite of very apparent weariness and haste, was coming up in good order. All turned aside at the same place and marched up the hill where each sought and found his appointed entrance. There was no confusion, no undue haste, no crowding of the doorways, not a minute's delay for any individual. One by one the army poured into the barracks

through its many entrances where there seemed to be always a patient little black on the watch to welcome and assist the next arrival.

For three long hours the march went on while I kept guard at the hill or moved along the flanks of the army, until at half past eight, just three hours after my first discovery of the army, the last ants came staggering in, slowly turned from the bee-line previously followed and painfully as if foot-sore and weary, dragged themselves and their precious burdens through the rose bushes up the slope to the hill, the late comer quite as particular as the first arrival about finding and using his own chosen doorway.

Finally no more ants came to the hill. I went back along the line of march but could find not even one soldier left spent and weary by the road-side. The whole army consisting of so many thousands, had completed its expedition, secured its booty and was safe under shelter for the night. So well had the troop movements been timed that the very latest straggler entered the hill a little before the sun set. Out of all the marching host, I found only one left dead on the trail with feet turned up to the quiet evening skies.

When, next morning about nine o'clock, I returned to the hill, there was little activity in evidence, though a few black ants ran aimlessly about, no red ones were in sight. The day was Sunday but I did not succeed in finding out whether the red soldiers enjoyed a Sabbath rest after the hard march or whether they rose early and again took to the trail, resuming the journey. I could not be sure about what happened to the army because I was away from home for the two succeeding weeks. On subsequent visits to the hill, I learned little more. A few red and black ants kept careless guard there in the sun, they were not active and left the hill as it had been before.

If the army proceeded on its march in the same direction it would soon encounter difficulties in the shape of the dry bed of a stream with very steep banks followed by the numerous tracks at the entrance of the railway yards. I knew of no large ant hill either in the direction from which they came or that in which they travelled. There were hills however, deep down in the woods which may have been the destination of the marching column.

It was of course impossible to find out at what hour the march had begun. If the ants were migrating because of the drought, they may have set out at any time previous to five thirty when I first noticed them. On the other hand if they were returning from a raid as seems most likely, they probably marched at least eight hours and possibly the whole day, taking the trail at their utmost speed without rest or food and in most cases heavily burdened.

There are a number of interesting observations to be made concerning this bit of ant activity. First there was the skill with which the road had been chosen and laid out so as to take advantage of man-made tracks, while keeping in the main to the bee line. I wondered whether they were following a trail known and used by former generations of their race in making raids or if scouts had been sent out to make road surveys and locate points of attack. Next there was the timing of the movement—the day chosen was not too warm, there was neither rain nor wind to interfere with or hinder the expedition from which it would appear that the ants possessed a certain amount of weather wisdom and exercised foresight, so that all the army was safe under shelter before the sun set. The endurance of the ants was a marvelous thing. In all the three hours of my watching I saw none lagging, no throwing away of the heavy burdens, no straying from the line of march. There were no pauses for rest or food but each ant made all possible speed while discipline appeared perfect though only a few individuals acted as officers.

Again the difficulties of the way should be taken into consideration. What great persistence must have been required to force the ants through huge dark forests of rhubarb, to carry them over the passes of the mountainous potato patch, to drag them through barriers made of the great thorny trunks of dead rose trees, which considering the size of the ants must have been much more formidable to them than barbed-wire entanglements were to men. What a wonderful example of good organization of forces! The weather chosen was all that could be desired, the march completed before the sun set, the road passable and the best possible, while confusion and disorder were practically eliminated even on the army's arrival at the barracks where so many thousands had to effect an entrance and be tucked away for the night.

One wonders whether such expeditions are common incidents in the life of an ant colony or if the story of such a raid successfully carried out, goes down in the folk stories and annals of these clever little people, an achievement to be referred to with pride and to be held up as an example to the young, of the endurance, courage and prowess shown by the older generations of the race.

NOTES AND OBSERVATIONS

FISHES COLLECTED IN CHAMCOOK LAKE, NEW BRUNSWICK.—During the spring of 1925, Mr. E. B. S. Logier and I spent some time on Chamcook Lake preparing a series of sebago salmon of various sizes for exhibition in the Royal Ontario Museum of Zoology. In connection with this work a number of other species of fishes were collected. There are few places around the shore where seining is possible and the species taken may not therefore be all that occur.

Chamcook Lake consists of a chain of three or four lakes connected by short streams and draining into St. Andrew's Bay by a stream about two miles in length. There is a dam at the outlet of the lowermost lake. The latter, the largest in the chain is over a mile long and nearly a mile wide.

Sebago Salmon (*Salmo salar sebago*) are said to occur naturally in this lake. Atlantic Salmon fry have been planted more or less regularly for some time. Following are the numbers planted in recent years:

1918	50,000
1919	50,000
1923	20,000
1924	40,000
1925	50,000

Lake trout or togue (*Cristivomer namaycush*) are quite common. A specimen 38 inches in length and 35 pounds in weight was secured. The eel (*Anguilla rostrata*) is very common. The Smelt (*Osmerus mordax*) is also a common species. Suckers (*Castostomus commersonnii*) are very numerous. A male 9 inches in length taken May 20 had tubercles on dorsal and caudal fins such as characterize this species at spawning time. The Lake Chub (*Couesius plumbeus*) is also rather common. The shiner (*Notropis cornutus*) is found but is less common than the preceding species. Two species of sticklebacks (*Pungitius pungitius*) and (*Gasterosteus aculeatus*) are both found in considerable numbers, the latter being somewhat the more numerous. A few specimens of the sunfish (*Eupomotis gibbosus*) were also secured.—T. B. KURATA, *Royal Ontario Museum of Zoology.*

WESTERN RAGWEED TO THE EASTWARD.—The perennial Western Ragweed (*Ambrosia psilostachya* D.C. in current manuals; *A. coronopifolia* T. & G. in North American Flora) has been regarded as a plant of "Ill. and Wisc. to the Saskatchewan, westw. and southwestw." (Gray's Manual). According to North American Flora, 1922, it also occurs in Michigan, and is introduced in Connecticut.

That these statements are inadequate is becoming increasingly apparent with the progress of the Canadian Weed Survey, instituted by the Division of Botany, Central Experimental Farm, Ottawa. The plant has been collected in Ontario, to the north of Michigan at Franz (Groh, 1925), and to the east in Lambton County (Mitchell, Ont., Nat. Sc. Bul., 1912; Dodge, 1914; Groh, 1924). There is a still earlier record of its occurrence at Galt, Ont. (Herriot, Ont. Nat. Sc. Bul., 1910). Other records from my surveys of the past five years are Gravenhurst, Madawaska, Eganville, Pembroke, Renfrew, Sand Point and Carp. These extend the range right to the Quebec boundary, and this year the first Quebec record was secured. Strange to say, this was in the remote Saguenay River district, and in an out-of-the-way location there. A couple of miles west of the town of Chicoutimi, I left the river road and crossed through fields to a wooded height, to find a number of patches scattered about in a gravelly clearing.

Some of the colonies referred to above are obviously introduced, but others have considerable appearance of being indigenous. This is true particularly of those discovered along our northern borders where in several instances they were away from town and in quite natural surroundings.—H. GROH.

ASCLEPIAS TUBEROSA L. IN THE OTTAWA DISTRICT.—On July 25, 1926, Mr. H. T. Gussow, Dominion Botanist, reported that Butterfly-weed was growing on the sand dunes of Constance Bay, twenty-five miles up the Ottawa river; and in August of this year I was able to re-locate and collect specimens, since there was no evidence of any previous record for the district. This was only a few minutes walk from the spot where *Polygonella articulata* (L.) Meisn. was collected in 1925, (C.F.N., Vol. XL, No. 1) indicating that here is a corner of our territory that might well repay some further exploration.—H. GROH.

THE SPREAD OF AXYRIS AMARANTOIDES L.—In *Rhodora* for October 1927, Prof. M. L. Fernald calls attention to the spread of *Axyris amarantoides* (Russian Pigweed) in America from Manitoba and North Dakota where it is said to have been "for some years." It is perhaps worth while to point out that it has been known in Manitoba for over 40 years, having been reported by Fletcher from a "roadside, ten miles west of Winnipeg, Man., 1886." (Cat. Can. Pl., Macoun, Part V.).

In the Herbarium of the Division of Botany, Central Experimental Farm, Ottawa, there is a specimen of this weed collected by Miss J. Bostock in 1926, from as far northwest as the Peace River district. There are Ontario specimens collected by the writer at Ottawa, 1923; Kingston, 1924; Hearst and Golden Lake, 1925. In the Ontario Agricultural College Herbarium, Guelph, Ont., are specimens collected at Guelph in 1918 and 1921.

In the course of a survey of the Lake St. John and Saguenay River districts of Quebec during the third week of September, 1927, I found *Axyris* to be established in at least half a dozen places from St. Felicien and Roberval at the upper end, to Chicoutimi and Port Alfred on the Saguenay; and one plant was collected also at Tadoussac at the mouth of the Saguenay River during a few minutes ashore. No other eastern occurrences to my knowledge, have as much appearance of real naturalization as these. While some of the plants were merely associated with construction operations, in other places they had infested gardens, and in two instances were the predominant weed over small areas. In a developing region like this it is probable that infestation could be traced to importation of western feed during railway and other construction.—H. GROH.

*OFFICIAL CANADIAN RECORD OF BIRD-BANDING RETURNS**

Published by Authority of the National Parks of Canada Branch, Department of the Interior, Canada

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 accidently 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.

* * *

The following returns upon birds, banded by Mr. Jack Miner, at Kingsville, Ontario, have been gathered from various sources, and are now made a part of the Canadian Record, with Mr. Miner's consent.

ALABAMA

MALLARD:—

One male, banded in 1916, was killed in one of the small bays that abound around Mobile, Alabama, in December, 1916.

One female, banded in 1916, was killed in one of the small bays that abound around Mobile, Alabama, in December, 1916.

One, banded in 1917, was killed on the Tennessee River, nead Decatur, Alabama, on December 13, 1917.

One was killed at Crescent Lake, about seven miles from Montgomery, Alabama, in December, 1921.

One male was apparently killed about one mile from Point Rock, Alabama, on March 3, 1923.

One male, banded in the fall of 1925, was killed within twelve miles of Florence, Alabama, on January 4, 1926.

One female, banded in the fall of 1925, was killed thirteen miles south-west of Huntsville, Madison County, Alabama, on November 27, 1926.

BLACK DUCK:—

One, banded in 1915, was killed in one of the small bays that abound around Mobile, in December, 1916, before December 18th.

One male was killed in Bay Grass, six miles from Mobile East, on January 7, 1918.

DUCK:—

One, banded in 1915, was killed at Muscle Shoals, Tennessee River, on January 3, 1917.

One, banded in 1917, was killed in Woods Bluff Swamp, on Tombigbee River, on November 10, 1917.

One, banded in 1917, was killed in the vicinity of Shorter, on December 28, 1921.

One was killed on Coosa River, in Chilton County, shortly before January 23, 1918.

One was killed on a lake belonging to the Crescent Lake Country Club, about six miles from Montgomery, in the last week of December, 1921,

One was killed in the Tennessee River, near Madison, on January 28, 1923.

One, banded in 1925, was killed near Stevenson (?), on December 1, 1925.

SPECIES UNKNOWN:—

One was killed at Cullman, shortly before December 17, 1917.

ARKANSAS

MALLARD:—

One male, banded in 1919, was killed near Holly Grove, in February, 1920, before February 23rd.

One male, banded in 1921, was killed on Scrub Grass Lake, five miles north-west of Snow Lake, Desha County, on December 21, 1922.

One, banded in 1921, was killed at Big Lake, on December 27, 1922.

One female, banded in 1921, was shot at Jacobs Lake, Arkansas County, about sixty-five miles from England, on January 31, 1925.

One male, banded in the fall of 1925, was killed at Flag Lake, three miles from Gillett, on December 4, 1925.

BLACK DUCK:—

One was killed on Big Lake, on November 1, 1916.

One female, banded in 1921, was killed on Porter Lake, Phillips County, within one-half mile of the Mississippi River, on December 17, 1921.

DUCK:—

One female was killed about six miles from Ulm, Prairie County, on December 27, 1921.

One was killed near Higginson, about January 15, 1922.

One, banded in 1924, was killed near Stuttgart, on January 25, 1926.

CANADA GOOSE:—

One, banded in the fall of 1925, was killed by a resident of Grand Lake, on January 20, 1926.

COLORADO

MALLARD:—

One was found by a resident of Fort Morgan—reported March 31, 1924.

DELAWARE

BLACK DUCK:—

One, banded in 1919, was caught in a muskrat trap at Lewes, on January 15, 1922.

CANADA GOOSE:—

One, banded in the fall of 1924, was killed by a resident of Frankford, about three miles from the Maryland boundary line, near Fenwicks Island Lighthouse, on January 6, 1925.

One was killed by a resident of Smyrna, in January, 1924.

One was captured by a resident of Middletown—reported January 7, 1927.

FLORIDA

MALLARD:—

One female, banded in 1916, was shot on Lake Miccosukee, about twenty miles south of Thomasville, Georgia, and ten miles north of Monticello, Florida, on January 30, 1920.

One female was killed on Lake Miccosukee, Jefferson County, on December 18, 1924.

DUCK:—

One was killed by a resident of Boynton, on January 1, 1927.

CANADA GOOSE:—

One, banded in the spring of 1926, was captured on November 23, 1926, and the recovery reported by a resident of St. Marks.

One, banded in the fall of 1926, was shot on Goose Island, off the Florida coast, on December 1, 1926.

One was killed at St. George Island, four days after it was banded—reported on December 13, 1926.

GEORGIA

DUCK:—

One female was killed in the Oconee River swamps, on December 22, 1916.

One was killed by a resident of Oconee—reported January 24, 1923.

CANADA GOOSE:—

One, banded in the fall of 1925, was killed on the Coosawatee River bottom lands about seven miles north-east of Calhoun, Gordon County, on January 7, 1926.

One was killed in a swamp near the waterworks pond at Athens—reported November 4, 1926.

DOVE:—

One was shot on a farm two miles north of Doerun, Colquitt County, on January 20, 1923.

ILLINOIS

MALLARD:—

One female, banded in 1916, was shot on the grounds of the Peru Gun Club, on September 26, 1917.

One female, banded in 1917, was "brought in" from the Mississippi River, about seven and one-half miles south of Burlington, Iowa, on December 11, 1918.

One, banded in 1917, was killed on the Illinois River, near Chillicothe, on December 4, 1920.

One female, banded in 1919, was found in a muskrat trap in the marshes of the Senachwine Club, at Putnam Club, in the spring of 1921 before March 8, 1921.

One, banded in 1921, was caught and released by a resident of Sesser, on April 25, 1922. It had been crippled.

One male, banded in 1921, was killed in a pond on the Mississippi Bottom, in the south quarter of Pike County, on November 20, 1922.

One male was killed in the valley of the Wabash River, commonly called the "Wabash Bottoms," New Haven Township, Gallatin County, the latter part of December, 1921.

One male, banded in the fall of 1925, was caught, had its picture taken and was double tagged with band No. 405,466 of the United States Bureau of Biological Survey, at Lima Lake, on March 24, 1927.

DUCK:—

One, banded in 1917, was killed in the woods in Saugamon Valley, about nine miles north-east of Beardstown, Cass County, on December 6, 1917.

One, banded in 1918, was killed in Henderson County, near latitude 41, longitude 91, on March 15, 1919.

One was killed at Elizabethtown—reported April 5, 1920.

One, banded in 1921, was killed on the Ohio River, near Cave-in Rock, on December 29, 1922.

CANADA GOOSE:—

One, banded in 1918, was killed on Bumbguard Bar, on the Mississippi River, near Miller City, on December 20, 1921.

One, banded in the fall of 1924, was killed in a cornfield on the banks of the Mississippi River, one-half mile from Cache—reported January 25, 1925.

One male, banded in the fall of 1924, was killed by a resident of Oblong—reported December 29, 1925.

One, banded in the fall of 1925, was killed in Jasper County, in December, 1925.

One, banded in the fall of 1925, was captured by a resident of Wolf Lake—reported January 19, 1926.

One, banded in 1925, was killed by a resident of Carlyle, on October 5, 1926.

Three, banded in the fall of 1925, were killed on a sandbar in the Mississippi River, near the mouth of the Ohio River, on November 11, 1926.

Two, banded in the fall of 1925, were killed at the Island Club, about twenty miles from Cairo, on December 14, 1926.

One was killed by a resident of Cache—reported February 12, 1925.

One was crippled, captured and used as a decoy on the Mississippi River, at Cairo—reported February 13, 1925.

One, wearing two bands, was killed in a cornfield adjoining the shooting property of Claude E. Clinton, Fayville, on December 28, 1925.

One, banded in the spring of 1926, was killed at the Island Club, about twenty miles from Cairo, on December 14, 1926.

One, banded in the fall of 1926, was killed about four miles up the Ohio River from Brookport, across the river from Paducah, Kentucky, on December 28, 1926.

One, banded in the fall of 1926, was killed on the Hamburg Farm, in Union County—reported December 30, 1926.

One found dead by a resident of Cairo, on the banks of the Mississippi River, on January 30, 1926.

One was shot by a resident of Catlin, during the early part of December, 1926.

INDIANA

MALLARD:—

One female, banded in 1916, was killed on the Ohio River near Evansville, on March 3, 1919.

One male, banded in the fall of 1925, was shot on the banks of the Wabash River, about thirteen miles south of LaFayette—reported March 24, 1926.

DUCK:—

One, banded in 1915, was captured by a resident of Shelbyville, in May, 1916.

One, banded in 1916, was killed by a resident of Memphis, during the first week of March, 1917.

One was killed on the pond of Rush Boone, in Boon Township, Harrison County, on February 10, 1917.

One, banded in 1919, was killed at the junction of the Big Maine River with the Ohio River, on the overflowed bottoms, on December 2, 1919.

One, banded in 1921, was shot about five miles east of Auburn, in DeKalb County, on December 23, 1921.

One was killed on the Wabash River near Montezuma, about March 6, 1923.

CANADA GOOSE:—

One, banded in the spring of 1921, was captured alive by a resident of Lacrosse, in the fall of 1922. It had been shot through the wing.

One, banded in the fall of 1924, was killed by a resident of Medora—reported February 2, 1926.

One, banded in the fall of 1925, was killed on the Wabash River, Graysville, Sullivan County, during the last part of the season of 1925.

One, banded in the fall of 1925, was killed three miles west of Leesburg, on November 9, 1926.

One, banded in 1925, was killed by a resident of Washington, on November 15, 1926.

One, banded in the fall of 1926, was killed on the Wabash River, fifteen miles below Terre Haute, on November 27, 1926.

One, banded in the fall of 1926, was shot by a resident of Lafayette, on December 6, 1926.

One, banded in the fall of 1926, was captured alive by a resident of Vallonia, on the White River, on December 25, 1926. It had a broken wing and was being kept in captivity in a chicken park.

One, banded in the fall of 1926, was killed in a large pond flooded by the Ohio River during high water stages, New Amsterdam, on December 31, 1926.

SPECIES UNKNOWN:—

One, banded in 1917, had its band found by a resident in Michigan City—reported April 2, 1918.

One was evidently recovered by a resident of Evansville, who reported on March 6, 1919, that he had received Mr. Miner's address in a very queer way.

IOWA

DUCK:—

One was probably killed—reported by a resident of Redding, Ringgold County, on August 9, 1923.

One female, banded in the fall of 1925, was shot in Buckeye Township, Hardin County, on November, 14, 1926.

KANSAS

MALLARD:—

One female, banded in 1921, was killed about twenty-five miles north-west of Wichita, on December 7, 1923.

KENTUCKY

MALLARD:—

One female, named Susan, banded on December 5, 1912, returned badly crippled in wing and leg on March 30, 1913; migrated in the fall; and was shot by a resident of Paris, on February 27, 1914.

One, banded in the fall of 1925, was killed probably near Woodburn, Warren County, on December 1, 1925.

BLACK DUCK:—

One female, banded in 1915, was killed on Eighteen Mile Island, on December 19, 1916.

One female, banded in 1921, was killed twenty-two miles below Cincinnati, Ohio, on the Kentucky side of the Ohio River, on December 22, 1921.

DUCK:—

One, banded in 1915, was killed in 1915, and the recovery reported by a resident of Owenton.

One, banded in 1915, was killed on an island six miles east of Louisville, on December 14, 1919.

One male, banded in 1916, was caught on the Barren River, two miles below the mouth of the Gasper River, about twenty miles below Bowling Green, on March 18, 1917.

One, banded in 1916, was shot near Stamping Ground, on the waters of the North Elkhorn Creek, a tributary of the Kentucky River, in March, 1917.

One was evidently recovered by a resident of Sanders—reported June 13, 1916.

One was killed at Lebanon—reported July 24, 1916.

One, banded in 1917, was killed on the waters of Fleming Creek, in Fleming County, on December 10, 1917.

One was killed on Elkhorn Creek, seven miles from Frankfort, on or about February 14, 1917.

One was killed—reported by a resident of Louisville, on March 15, 1917.

One was captured alive about two miles from Danville, in Boyle County, shortly before March 25, 1920. It had been wounded and had lost its left eye.

One was killed in Grant County, in February, 1921.

One was caught in a steel trap and found dead on the Chaplin River near Harrodsburg, on December 25, 1921.

One was killed by a resident of Pembroke—reported January 4, 1922.

One male was captured about one hundred miles south of Evansville, Indiana, in Western Kentucky, on January 14, 1922.

One was killed two miles north-east of Hardinsburg, Breckenridge County, on February 8, 1922.

One male was killed by a resident of Somerset, on February 20, 1922.

One was killed on Green River, in the western part of Kentucky—reported March 10, 1922.

One, banded in the spring of 1926, was killed at a pond in Crofton, on April 15, 1927.

CANADA GOOSE:—

One was killed at the mouth of the Ohio River, on December 4, 1923.

One, banded in the fall of 1925, "fell into the hands" of a resident of Carrsville, Livingston County, on December 30, 1925.

One, banded in the fall of 1926, was killed in a field about three and one-half miles north-west of Leitchfield, on December 27, 1926.

SPECIES UNKNOWN:—

One was evidently recovered by a resident of Paris—reported June 4, 1920.

LOUISIANA

MALLARD:—

One, banded in 1913, was killed at Gueydan, in January, 1915, before January 19th.

One male, banded in 1917, was killed in the marshes around Bayou Dupont, in the Barataria Section, on November 10, 1918.

One male, banded in the fall of 1917, was killed at Lake Misere, Cameron Parish, on November 23, 1921. It was one of three Mallard males banded at the same time; one was killed the same fall in which it was banded, in the South, and one was killed in Alberta on April 3, 1923.

One male was killed on Cross Lake, about eight miles north-west of Shreveport, in Caddo Parish, on December 24, 1919.

One male was shot on Mallard Bay, near Lake Arthur—reported December 19, 1922.

BLACK DUCK:—

One, banded in 1917, was killed in Bayou Cocodrie, on January 12, 1918.

One, banded in 1917, was killed at the mouth of the Mississippi River, on the Gulf of Mexico, on November 15, 1918.

DUCK:—

One, banded in 1914, was shot at Gueydan.

One was killed in a small swamp four miles south of Baton Rouge, shortly before December 26, 1916.

One, banded in 1921, was recovered in South Louisiana, in November, 1924, and the recovery reported by a resident of Glenmore.

One was killed at Branch, on January 9, 1923.

One was killed—reported by a resident of New Orleans, on January 25, 1923.

MARYLAND

MALLARD:—

One male was killed by a resident of Tylerton, on November 15, 1916.

One male was killed in Lloyd's Creek, near Betterton, on December 29, 1917.

BLACK DUCK:—

One male, banded in 1917, was killed by a resident of Lower Marlboro, in March, 1918, before March 26th.

CANADA GOOSE:—

One male, banded in the fall of 1917, left in December, and was captured on March 1, 1918—reported by a resident of Kennedyville, Kent County.

One, banded in the spring of 1922, was killed on November 14, 1925—reported by a resident of Edgewood.

One, banded in 1923, was killed at the mouth of Middle River, Baltimore County—reported November 23, 1923.

One was captured alive and released by a resident of Tylerton, Somerset County, on January 12, 1923.

MASSACHUSETTS

CANADA GOOSE:—

One, banded in 1923, was killed in a pond in the town of Norwell, about twenty miles south of Boston, on October 26, 1926.

MICHIGAN

MALLARD:—

One was probably killed near the mouth of the Sault Ste. Marie River, on April 24, 1917.

One was shot at the mouth of the Thames River, on October 26, 1917, and the recovery reported by a resident of Detroit.

One male, banded in 1919, was shot in the marsh of the Erie Shooting Club, about eleven miles south of Monroe, on November 13, 1919.

One was killed in a marsh in the Township of Berlin, Monroe County, opposite the mouth of the Detroit River, on September 16, 1919.

One male, banded in 1921, was shot on a marsh of the Point Mouillee Shooting Club, Rockwood, Wayne County, on September 30, 1921.

One male was killed at Odian Island Marsh, on November 20, 1923.

BLACK DUCK:—

One was killed at the Point Mouillee Shooting Club, Wayne County, near the mouth of the Haron River, on October 13, 1916.

One was killed at Point Mouillee Bay, on Lake Erie, on November 22, 1917.

DUCK:—

One was killed on Point, Mouillee Marsh, Monroe County, Lake Erie on December 4, 1916.

One, banded in 1917, was shot by a resident of Munith—reported November 8, 1917.

One, banded in 1917, was killed on the Pottawatomie Duck Club grounds, on the Kalamazoo River, near Saugatuck, the day before Thanksgiving Day, November, 1917.

One was shot by a resident of Chelsea, on September 17, 1917.

One was caught by a resident of St. James, on July 31, 1920.

One was killed on the Chippawa River—reported October 23, 1926.

CANADA GOOSE:—

One was shot by a resident of Holland, in the fall of 1922.

One, banded in the fall of 1925, was shot in a field at Monroe, on December 21, 1925.

One, banded in the fall of 1925, was shot near Manchester, on November 14, 1926.

One, banded in the fall of 1925, was killed in a cornfield in New Buffalo, Berrien County, on December 3, 1926.

MINNESOTA

MALLARD:—

One, banded in 1916, was shot in Rice Lake, Cass County, near Remer, on October 22, 1923.

One, banded in 1917, was killed by a resident of Breckenridge, in the fall of 1918.

One, banded in 1919, was captured and apparently afterwards killed at Zimmerman, on November 14, 1920.

DUCK:—

One, banded in 1916, was shot near Glencoe—reported September 22, 1917.

One was recovered—reported by a resident of Brainerd, on September 28, 1917.

SPECIES UNKNOWN:—

One had its band found by a resident of Ray, some time before November 30, 1920.

MISSISSIPPI

MALLARD:—

One was recovered—reported by a resident of Cedar Bluff, December 24, 1917.

One, banded in 1921, was killed on Fairchild Island, Adams County, Natchez, on January 7, 1922.

One female, banded in 1922, was killed one mile north of Belzoni, in Humphries County, on December 25, 1922.

One was killed on a small pond by a resident of Ellisville, on December 19, 1922.

DUCK:—

One was killed on the Tombigbee River, on December 20, 1916—reported by a resident of Smithville.

One, banded in 1917, was killed in the swamps of the Yalobusha River, about ten miles west of Jackson, in February, 1918.

One female was killed by a resident of Rosedale, on November 22, 1917.

One was killed on the Yalobusha River, County of Grenada, on February 5, 1918.

One, banded in 1921, was killed on Lake Jackson, in Washington County, on November 22, 1924.

MISSOURI

MALLARD:—

One female was killed on the Missouri River, on December 21, 1918—reported and killed by a resident of Carrollton.

One male was killed by a resident of Bragg City, on January 23, 1923.

BLACK DUCK:—

One female was killed in New Madrid County—reported January 10, 1916.

CANADA GOOSE:—

One, banded in the fall of 1922, was killed by a resident of New Madrid, on November 18, 1923.

One, banded in the spring of 1924, was killed in Mississippi County, on or about December 20, 1924.

One, banded in the fall of 1924, was killed near Cape Girardeau, on December 25, 1925.

One, banded in 1924, was killed by a resident of Commerce—reported January 8, 1926.

One, banded in the fall of 1925, was killed on the Missouri side of the Mississippi River, directly across from 36th Street, Cairo, Illinois, on December 28, 1925.

One, banded in the fall of 1925, was killed near the Mississippi River, in a wheat field ten miles from Charleston—reported February 24, 1926.

One was killed on a farm, five miles north of Charleston, Mississippi County, on January 30, 1925, approximately.

Two were killed—reported by a resident of Charleston, on January 27, 1927.

INDEX

TO

VOLUME No. XLI

The Canadian Field-Naturalist

1927

THE GRAPHIC PUBLISHERS, LIMITED

OTTAWA

Acanthis linaria linaria 92
linaria rostrata.... 92
Accipiter sp..... 13
Accipiter cooperi..... 150
velox..... 7
Acer Negundo..... 49
Acerates lanuginosa.... 52
viridiflora lanceolata..... 51
Achillea lanulosa..... 53
millefolium..... 31, 51
Acipenser rubicundus... 127
sturio..... 127
Actaea rubra..... 50
Actitis macularia..... 150
Adamsia Rondeletii.... 101
Agaricus campestris.... 128
Agastache Foeniculum.. 53
Agelaius phoeniceus arctolegus..... 7
Agoserus cuspidata..... 51
glauca..... 51
Agriculture, Dept. of, Saskatchewan, review of report of Game Commissioner for year ending April 30th, 1926.. 20
Agrostemma Githago... 53
Alcock, F. J., article by 115
Alectoris rufa rufa..... 100
Alfalfa..... 62
Algae.....84, 133
Blue-green..... 78
Alisma plantago-aquatica..... 53
Allium reticulatum..... 50
stellatum..... 54
Alnus incana..... 48
Alona guttata..... 131
Alpestris.....62, 91, 92
Amaranthus retroflexus. 54, 62
Ambloplites rupestris... 128
Ambrosa coronopifolia. 202
psilostachya..... 202
Ameiurus lacustris..... 127
nebulosus..... 127
vulgaris..... 127
Amelanchier..... 42
spicata..... 49
Amesia.....1, 28, 30
gigantea..... 1
latifolia.....1, 3, 4, 6 28, 29, 30, 31
latifolia forma alba 30, 31
latifolia forma monotropoides..... 30
latifolia forma variegata..... 31
rubiginosa.....2, 3, 29, 31
Ami, H. M., article by. 112
Amnicola limosa..... 60, 61
Amnicolidae..... 60
Amorpha macrophylla.. 52
Amphicarpa monoica... 31
Amphipoda..... 110
Anabaena flos-aquae... 84
Anatidae..... 189
Anchiceratops..... 70
Ancylidae..... 60
Androsace occidentalis.. 48
Anemone canadensis... 51
cylindrica..... 51
multifida..... 50
patens Wolfgangiana 48
virginiana..... 31
Anemone, Tall..... 31
Anguilla rostrata..... 202
Anodonta grandis footiana..... 60
Antennaria..... 19
aprica..... 49
campestris..... 49
microphylla..... 51
Antrostomus carolinensis..... 151
Ants.....100, 101, 102, 182, 199, 200, 201
Anuraea cochlearis..... 84
cochlearis var. macrocantha..... 84
Anurea codhlearis..... 84
Aphanizomenon flos-aquae..... 84
Aphis..... 85
Aplexa hypnorum..... 60, 61
Aplodinotus grunniens.. 128
Aplopappus spinulosus. 54
Apocynum androsa emifolium..... 52
cannabinum..... 52
Aquilegia canadensis... 31, 51
Arabis brachycarpa.... 49
glabra..... 51
hirsuta..... 50
Holboellii..... 49
Aralia nudicaulis..... 50
Archilochus colubris.... 151
Arctonetta fischeri..... 32
Arctostaphylos uva-ursi. 49
Ardea herodias..... 150
Arenaria lateriflora..... 50
Argyrosomus tullibee... 128
Armadillidiidae..... 175
Armadillidium..... 175
quadrifrons.....176, 179
vulgare.....176, 179
Arnica..... 19
Arnott, Dr. D. H., article by..... 12
Artemisia anaphalodes.. 55
biennis..... 55
caudata..... 54
dracunculoides..... 55
frigida..... 55
ludoviciana..... 55
Asclepias ovalifolia..... 52
speciosa..... 54
tuberosa..... 202
verticillata..... 52
Aster..... 31
Aster angustus..... 53
commutatus..... 54
laevis..... 54
Lindleyanus..... 54
novae-angliae..... 55
paniculatus..... 54
ptarmicoides..... 54
puniceus..... 54
umbellatus..... 54
Asterionella formosa.... 84
Astragalinus tristis..... 151
Astragalus adsurgens... 51
bisulcatus..... 50
canadensis..... 53
caryocarpus..... 49
flexuosus..... 51
hypoglottis..... 49
neglectus..... 51
Athene noctua mira.... 100
Auk, Great..... 87
Razor-billed.....75, 167
Auklet, Cassin..... 198
Aurochs..... 45
Avocet.....78, 79, 80, 82
Axyris amarantoides... 202

Baeolophus bicolor..... 186
Baillie, Jas. L., Jr., articles by.....12, 187
Bajkoo, Alexander, article by..... 84
Baldpate.....15, 78, 80, 81, 82, 83, 110, 166
Barber, R. E., article by 14
Bass, Calico..... 128
Green Rock..... 128
Large-mouth Black 128
Small-mouth Black 128
White..... 128
Bat, Hoary..... 155
Bauer, Miss G., article by..... 12
Bees, Honey..... 30
Beetles, carib..... 109
Bent, Arthur Cleveland, review of his "Life Histories of North American Wild Fowl" and "Life Histories of North American Marsh Birds"..... 189
Betula fontinalis..... 49
glandulosa..... 49
papyrifera..... 49
Betony, Wood..... 31
Bidens cernua..... 55
frondosa..... 54
Birch..... 184
Bird, Boatswain..... 38, 39
Man-o'-war..... 39
Birds, land..... 75
sea..... 75
Bird Banding.....16, 17, 89, 114, 139, 155
Bird-banding returns 66, 94, 141, 157, 191, 203
Bird Notes from Algoma District, Ontario... 150
Bison.....45, 46, 47, 67
Bison, alleni..... 46
alticornis..... 67
antiquus..... 46
bison..... 46
crassicornis..... 46, 47
ferox..... 46
latifrons..... 46
occidentalis..... 46
sivalensis..... 45
Bissett, E. D., article by 127
Bittern, American..... 150
Bittersweet, Climbing.. 31

Blackbird.....13, 75, 109, 110
Brewer's. 10, 103, 109, 110
Red-winged 7, 8, 109, 110, 152, 170
Rusty..... 151
N.W. Red-winged.. 10
Yellow-Headed.... 109
Blackhead..... 128
Bloodroot..... 31
Blue-berries..... 112
Bluebird 8, 40, 41, 42, 43, 44, 111, 152, 171
Eastern..... 41
Mountain 40,42,43,44,109
Bobolink..... 151
Boleosoma nigrum..... 128
Boltonia asteroides..... 54
Bombycilla cedrorum... 151
Bonasa umbellus..... 150
umbellus togata... 7
Booby..... 38, 39
Boreogadus saida..... 65
Bosmina longirostris...85, 131
Botaurus lentiginosus.. 150
Botryococcus brauni... 84
Bovinae..... 45
Brachiceratops..... 72
Brachyramphus marmoratus..... 197
Brant..... 75
Brassica arvensis..... 51
nigra..... 51
Brauneria angustifolia. 53
Brontotherium..... 21
Brown, M. Jean, article by..... 85
Brown, J. Roland, articles by.....152, 185
Brown, W. J., articles by.....93, 131
Buckwheat..... 112
Buffalo..... 45, 47
Wood..... 45
Buffalo Fish, Common. 128
Small-mouth..... 128
Buffle-head....10, 15, 110, 144
Bullhead, Common..... 127
Bunting, Lazuli..... 109
Snow.....9, 11, 12, 13, 14, 62, 75
Burbot..... 128
Buteo borealis..... 150
platypterus..... 7
Butterfly.....101, 102
Large Blue..... 101
Butterfly-weed..... 202
Buttons, Spanish..... 31

Calcarius lapponicus... 62
Calendar of Flowers, A. 48
Calla palustris..... 51
Caltha palustris..... 49
Calvert, E. W, article by 13
Camel..... 46
Camelina dentata.....50, 114
microcarpa..... 50
sativa..... 50
Campanula aparinoides. 54
rotundiflora..... 52
Canadian School of Prehistory in France.. 112
Canvas-back.....11, 15, 83
Capsella Bursa-pastoris 49
Cardamina pennsylvanica..... 51
pratensis..... 50
Cardinal..... 11
Caribou..... 45, 47
Carpiodes velifer..... 128
Carpodacus purpureus.. 151
Cartwright, B. W., article by..... 17
Castilleja coccinea..... 50
sessiliflora..... 50
Castostomus commersonnii..... 202
Catbird.....76, 108, 109, 152
Catfish, Channel..... 127
Common..... 127
Dark..... 127
Great Lake..... 127
Long-jawed..... 127
Spotted..... 127
Stone..... 127
Cathartes aura septentrionalis..... 65
Catostomus catostomus 104, 128
commersonii..... 128
griseus..... 128
Cats..... 58
Cattle, domestic..... 45
Celastrus scandens..... 31
Centaurea nigra..... 31
Centrossaurus..... 72
apertus..... 70
Cerastium arvense..... 49
nutans..... 50
Ceratops..... 69, 70
montanus..... 67, 70
Ceratopsia.....69, 70, 72
Ceratopsidae..... 67
Cerchneis s. sparveria.. 7
Ceryle alcyon..... 151
Chaetura pelagica..... 151
Chamaerhodos erecta... 51
Champsosaurs..... 145
Chasmosaurus.....69, 70, 72
belli.....67, 68, 69, 70
Chenopodium album... 62, 92
capitatum..... 49
Cherry, Choke 31, 108, 109, 182
Chewink..... 64
Chichlidae..... 147
Chickadee 11, 12, 13, 14, 76, 90, 91, 94, 169, 187
Black-capped 8, 9, 11, 12, 13, 14, 15, 103, 152
chestnut-backed...10, 110
Hudsonian..... 8, 12
Long-tailed..... 15
Mountain.....15, 110
Chicken, Prairie 20, 87, 90, 99, 100, 148, 155
Chicory..... 31
Chimaphila umbellata. 53
Chlorophyceae..... 84
Chordeiles virginianus. 151
Christmas Bird Census Returns, 1926..... 9
Chrysopsis villosa..... 51
Chub, Flatheaded..... 128
Lake..... 202
Chydorus sphaericus... 131
Cichorium Intybus..... 31
Cicuta maculata..... 53
Circaea alpina..... 54
Circus hudsonius..... 150
Cirsium arvense..... 53
discolor..... 54
Drummondi..... 52
foliosum..... 19
minganense..... 19
undulatum..... 53
Cladocera.....130, 133
Clark, T. H., article by. 45
Clathrocystis aeruginosa..... 84
ochraea..... 84
Clover, Sweet..... 62, 88
Cochliopa lubrica..... 59
Cochliopidae..... 59
Cockerellites..... 147
Cod, Arctic..... 65
Coelosphaerium kutzingianum..... 84
Coenurus serialis..... 113
Colaptes auratus..... 151
Cole, Mina P., articles by.....90, 199
Collins, W. H., article by 133
Columbine, Wild..... 31
Comandra livida..... 51
Richardsiana..... 49
Compositae..... 19, 48
Conringia orientalis....51, 114
Concerning August Bird Life in the Okanagan Valley, British Columbia, 1926.... 108
Convolvulus sepium.... 53
spithamseus..... 51
Cook, C. D., article by. 12
Coot.....10, 15, 66, 169, 189
American..... 10
Copepoda..... 84
Copepods..... 133
Corallorrhiza maculata. 31, 51
striata..... 51
trifida..... 50
Coral Root, Large..... 31
Coregonus clupeiformis103, 128
labradoricus..... 128
quadrilateralis..... 128
tullibee..... 103
Cormorant.....102, 103, 104, 105, 106, 108
Double Crested..7, 8, 102, 105, 107, 160, 163
Corn.....109, 110
Field..... 109
Golden Bantam.... 109
Corn-borer..... 147
Cornus canadensis..... 51
stolonifera..... 31, 50
Corvus brachyrhynchos 151
corax principalis... 7
Corydalis aurea..... 49
Corylus americana..... 48
rostrata..... 48
Cottus pollicaris..... 128
Couesius dissimiliis..... 128
plumbeus..... 202
Cowbird..... 103
Coyotes..... 21

Crab..... 38, 39
Hermit..... 101
Crane.....101, 189
Sandhill..... 101
Whooping..... 20
Crataegus coccinea?.... 50
Crayfish..... 106
Creeper, Brown.....8, 11, 12, 13, 110
Rocky mountain.. 15
Crepis biennis..... 52
runcinata..... 52
Crickets.....109, 110
Criddle, Norman, articles by...40, 48, 137, 179
Cristivomer namaycush 128,202
Crocodile..... 145
Chroococcus limneticus 84
Croococcus limentreus.. 84
Crossbill.....15, 64, 110, 132
American..... 11
White-winged..... 8, 131
Crossley, Frank, article by..... 12
Crow.....8, 9, 10, 11, 13, 15, 43, 86, 103, 110, 144, 155, 159, 161, 170, 179, 180, 181, 182, 183
American.....15, 151
Cuckoo..... 75
Black-billed..... 103
Curlew, Eskimo..... 87
Hudsonian..... 139
Cuscuta Gronovii..... 54
Cusk, Lake..... 128
Cutworms..... 182
Cyanocitta cristata..... 151
Cycloloma atriplicifolium..... 54
Cyclops..... 84
bicolor..... 84
viridis var. americanus..... 84
Cylisticus convexus.....173, 175, 179
Cymopterus acaulis.... 48
Cypripedium candidum. 51
hirsutum..... 53
parviflorum..... 51
pubescens..... 51
Cysticercus pisiformis.. 113

Dace..... 128
Dale, E. M. S., articles by 10, 64
Daly, R. A., review of his "Our Mobile Earth"..... 115
Daphnia..... 84
longispina..... 84
longispina var. hyalina form. mendotae 85
magna..... 130
pulex.....84, 85, 130
Darcus, Solomon John, article by..... 197
Darter, Black-sided.... 128
Gunther's..... 128
Johnny..... 128
Northern..... 128
Day in the Woods, A... 131
de Puyjalon, L. H., article by..... 139
Deer, Mule..... 111
Dendroica coeurulescens 151
coronata..... 151
pennsylvanica..... 151
virens..... 151
Destruction of Birds by Lighthouses in the Provinces of Ontario and Quebec..... 55, 75
Details of the Release of the Hungarian Partridge (Perdix perdix) in Central Alberta..... 98
Diaptomus..... 84
oregonensis..... 84
Diatomaceae..... 84
Dickson, G. H., article by..... 15
Dinobrion stipitatum... 84
Dinosaur.....72, 145
Horned.....67, 68, 69, 71
Diphyodus longirostria. 145
Discovery of the Nest of the Marbled Murrelet (Brachyramphus marmoratus) in the Queen Charlotte Islands, British Columbia..... 197
Disporum lanuginosum. 50
Do Birds Practice Their Songs?..... 63
Dodecatheon Meadia... 50
Dogs..... 58
Dogwood..... 182
Dolichonyx oryzivorus.. 151
Dore..... 128
Dove..... 39
Mourning.....11, 109
Downey, Miss H. E., article by..... 12
Draba caroliniana..... 48
nemorosa..... 48
Dracocephalum parviflorum..... 51
Drosera rotundifolia.... 54
Drum, Fresh Water.... 128
Drum-fish, Lake..... 128
Dryobates pubescens... 151
villosus..... 151
villosus leucomelas. 151
Duck....20, 39, 78, 80, 82, 83, 191, 192, 195, 203, 204, 205, 206, 207
Black....8, 66, 75, 95, 96, 97, 98, 141, 142, 143, 144, 158, 159, 160, 164, 165, 166, 168, 170, 192, 203, 204, 205, 206, 207
Crow..... 104
Eider....31, 32, 34, 35, 38
Eskimo..... 32
King..... 32
Laying..... 32
Lesser Scaup..... 94
Long-tailed..... 13, 14
Ring-necked....10, 66, 97 144, 160
Scaup.....66, 95, 142, 166
Duck, Sea..... 32
White English Call. 164
Wood..... 75
Ducks and Drakes..... 32
Dymond, J. R., article by..... 65

Eagle, Bald..... 10
Golden..... 14
Northern Bald..... 10
Earliest Recorded Observations on American Birds, The.. 38
Echinocystis lobata.... 53
Eel..... 202
Eider.....31, 32, 33, 34, 35, 36, 37, 38, 75, 190
American...32, 33, 34, 35
King.....32, 33, 34, 90
Northern.....32, 33, 34
Pacific.....32, 33, 34
Spectacled..... 32
Steller's..... 32
Elaeagnus argentea.... 50
Elephant..... 46
Elk.....126, 127
Ellisia Nyctelea..... 50
Elm..... 103
Elodea canadensis..... 59
Emerton, J. H., article by..... 88
Empetrum atropurpureum..... 20
Emys blandingii..... 185
Endodontidae..... 59
Eoceratops..... 69
canadensis..... 69
Epilobium adenocaulon. 53
angusticolium..... 53
Epipactis, Broadleaved. 3
Epipactis..... 1, 30
atropurpurea..... 2
atrorubens..... 2
dunensis..... 2
gigantea..... 1
Helleborine..... 6
latifolia.....1, 2, 3, 4, 29, 30, 31
latifolia forma alba. 30
latifolia forma variegata..... 31
leptochila..... 2
leptochila var. dunensis..... 1
leptochila var. vectensis..... 1
ovalis..... 2
palustris..... 2
purpurata..... 2
repens ophioides... 54
rubiginosa..... 2
viridiflora..... 2
Ereunetes pusillus..... 7
Erigeron asper..... 50
canadensis..... 58
compositus var. multifidus..... 19
glabellus..... 54
philadelphicus..... 51
pumilus..... 52
ramosus..... 52

Erigeron, uniflorus..... 19
Erimyzon sucetta oblongus..... 128
Erysimum asperum.... 50
parviflorum..... 51
Esox Americanus..... 128
lucius..... 103
Masquinongy..... 128
Etheostoma boreale.... 128
Eubranchipus..... 60
Gelidus.....132, 133
Eucalia inconstans....104, 128
Euconulus chersinus polygyratus..... 59
Eupatorium purpureum. 54
Euphagus carolinus.... 151
Euphorbia virgata..... 50
Euphyllopoda..... 132
Eupomotis gibbosus.... 202

Fairbairn, H. W., article by..... 150
Falco sparverius..... 150
Falcon, Peale's..... 198
Fall Bird Notes from the Eastern Shore of Lake Superior..... 7
Fargo, Wm. G., article by..... 7
Farley, Frank L., article by..... 12
Fern, Bracken..... 31
Ferrissia parallela..... 60, 61
Fifty Winter Birds of Northeastern United States, National Association of Audubon Societies.... 156
Finch..... 75
Cassin's Purple....15, 109
Purple.....8, 11, 12, 13, 14, 15, 151, 162
Rosy..... 14
Fir..... 110
Flagellata..... 84
Flamingo, American.... 189
Flicker.....10, 11, 12, 13, 40, 43, 75, 94, 161, 170
Boreal..... 103
Red-shafted.....15, 109
Yellow-shafted.... 151
Flies..... 85
Flycatcher..... 75
Acadian..... 75, 76
Alder.....8, 75, 76, 109
Crested..... 103
Hammond's..... 109
Least.....8, 75, 76, 103
Olive-sided. 8, 92, 110, 151
Wright's..... 109
Yellow-bellied 8,75,76,131
Flying-fish..... 39
Formica fusca..... 200
sanguinea..... 199
Formica Sanguinea Takes the Trail.... 199
Fossil Bison Skull from Yukon Territory, A 45
Fossils . .21, 45, 46, 47, 67, 123
Foxtail, Green..... 62
Fragaria glauca..... 49
Fragaria, virginiana.... 49
Fragilaria crotonensis.. 84
Fraxinus pennsylvanica lanceolata..... 49
Fresh-water Cladocera from the East Shore of Hudson and James Bays..... 130
Fresh-water Fish of Manitoba..... 127
Fringillidae..... 13
Fuertes, Louis Agassiz, obituary of..... 155
Fungus.....101, 189
Further Observations on Canadian Fresh-water Crustacea Made in 1926..... 132

Gadwall..... 61, 78
Gaillardia aristata..... 52
Galium boreale..... 51
trifidum..... 52
triflorum..... 52
Gallinule..... 189
Florida..... 98
Gannet..... 142
Gasterosteus aculeatus. 202
Gastropoda..... 59
Gates, Prof. R. Ruggles, article by..... 23
Gaura coccinea..... 51
Gavia immer..... 150
immer immer..... 139
Genitana affinis..... 54
Gentiana Amarella acuta..... 54
Andrewsii..... 55
crinita..... 55
procera..... 54
puberula..... 55
Genus Amesia in North America, The..... 1, 28
Geothlypis trichas..... 152
Geranium Bicknellii.... 51
Geum macrophyllum... 52
triflorum..... 49
Gilea linearis..... 53
Glycyrrhiza lepidota... 53
Gnats..... 76, 85
Goat, Rocky Mountain. 126
Godwit, Hudsonian.... 187
Marbled....78, 80, 81, 82
Golden-crowned Kinglet—American Redstart..... 93
Golden-eye.....10, 13, 15
American....9, 10, 11, 12, 13, 14, 189
Barrow's.....110, 190
Goldenrods..... 31
Gold-eye, Western..... 128
Goldfinch.....11, 12, 13, 14, 15, 103, 169
American.....14, 151
Pale.....15, 109
Gonyodiscus cronkhitei anthonyi..... 59
Goodyera..... 1
Goose..... 20
Blue..... 185
Goose. Canada, 61, 78, 169, 170, 191, 192, 193, 194, 204, 205, 206, 207
Greater Snow..... 190
Gormley, Liguori, article by..... 13
Goshawk..... 10, 11
American..... 144
Western..... 10
Grackle, Bronzed....8, 11, 94, 103, 151, 159, 161, 166, 171
Grape, Fox..... 31
Grasshoppers....100, 109, 182
Grebe, Eared..... 78, 83
Holboell's.....10, 15, 110
Horned.....8, 10, 15, 110
Pied-billed.....10, 110, 150, 157
Western..... 10
Grindelia squarrosa.... 54
Groh, H., articles by..188, 202
Grosbeak.....64, 149, 150
Black-headed..... 109
Evening.....11, 13, 14, 109, 110, 159
Pine.....9, 11, 12, 13, 14
Rose-breasted....103, 149
Western Evening.. 15
Grosbeak Singing in a Thunder-Storm, A. 149
Grouse.....75, 87, 99, 100, 148, 149
Canada Ruffed.... 9, 13
Grey Ruffed..... 15
Oregon Ruffed..... 10
Pinnated..... 155
Ruffed....7, 8, 11, 13, 14, 20, 87, 103, 150, 161
Sage..... 14
Sharp-tailed....11, 14, 87, 148, 154, 155
Guillemot, Black..... 162
Gull.....39, 58, 61, 76, 80
Black-backed..... 13
California..61, 78, 80, 110
Franklin's..... 78, 83
"Freak" Ivory..... 17
Glaucous-winged..10, 157, 162
Great Black-backed 12, 14, 34, 94, 162, 163
Herring....7, 8, 10, 11, 12, 13, 14, 15, 97, 105, 150, 157, 159, 160, 163, 169, 186
Iceland.....185, 186
Ivory..... 17
Kumlien's.....185, 186
Ring-billed....7, 8, 12, 13, 14, 61, 78, 80, 96, 110, 163, 186
Sea..... 75
Short-billed..... 10
Small..... 75
Gussow, H. T., review of his "Mushrooms and Toadstools, An account of the More Common Edible and Poisonous Fungi of Canada"..... 189

Gull Colonies on Lake Newell, Alberta.... 61
Gypsy-moth..... 147

Habenaria bracteata... 50
clavellata..... 51
dilatata..... 54
hyperborea..... 49
obtusata..... 53
Habits of the Mountain Bluebird in Manitoba..... 40
Hadropterus aspro..... 128
guntheri..... 128
Hagworm..... 111
Hamilton Bird Protection Society IncorporatedReport1926-1927, The..... 152
Haplophthalmus danicus 175
Harkin, J. B., article by 113
Haw, Black.....108, 109
Hawk.....9, 13, 15, 183
American Rough-legged..... 14
American Sparrow. 150
Broad-winged....7, 8, 103
Cooper's.....43, 150
Duck..... 10
Marsh...62, 103, 150, 170
Night..... 8
Pigeon.....110, 161
Red-tailed 11,103,109,150
Sharp-shinned....7, 8, 43, 131, 132
Sparrow.7, 8, 42, 103 110
Swainson's.....110, 167
Hawthorn.....31, 109
Hedysarum boreale.... 53
Helenia deflexa..... 54
Helenium autumnale... 54
Helianthemum candense 53
Helianthus giganteus... 54
Maximilani..... 54
petiolaris..... 54
pumilus?..... 54
scaberrimus..... 54
Heliopsis scabra..... 52
Helleborine..... 1
longipetala..... 30
Helleborine, Bastard... 3
Hemlock, Ground..... 112
Hepatics..... 20
Heracleum lanatum.... 51
Heron.....10, 75, 189
Black-crowned Night....94, 160, 161, 170
Great Blue.9, 11, 150, 190
N.W. Coast..... 10
Heuchera hispida..... 51
Hieracium canadense... 54
Hirundo erythrogastra. 151
History of Our Humming Bird..... 85
Horned Dinosaur Group in the National Museum of Canada... 67
Horse.....45, 46, 47
Houstonia longifolia.... 49
Howitt, H., article by.. 14
Hoyti..... 62

Hummingbird..... 85
Black-chinned..... 109
Ruby-throated.... 8, 151
Rufous..... 109
Humulus Lupulus..... 54
Hungarian Partridge vs. Sharp-tailed Grouse 147
Hurlburt, W. E., article by..... 15
Hylocichla fusescens.... 152
guttata..... 152
Hymenoptera..... 100
Hyodon alosoides..... 128
chrysopis..... 128
tergisus..... 128
Hybognathus argyritis. 128
nuchalis..... 128
Hybopsis storerianus... 128
Hypoxis hirsuta..... 50

Ibis..... 189
Ichthymyzon castaneus. 127
Ictalurus punctatus.... 127
Ictiobus bubalus..... 128
cyprinella..... 128
Impatiens pallida..... 54
Innis, H. A., Ph.D., review of his "The Fur-Trade of Canada". 157
International Committee for Bird Protection, The—Work of the Canadian Section.. 156
Iridoprocne bicolor..... 151
Iris versicolor..... 52
Isia Isabella..... 30
Isoetaceae..... 18
Isopoda..... 173
Ivy, Poison..... 31

Jack-fish..... 128
Jack-pine..... 110
Jay, Black-headed..... 110
Blue.....8, 9, 11, 12, 13, 14, 15, 75, 151
Canada.....8, 11, 75, 151
Gray..... 10
Oregon..... 161
Rocky Mountain.. 110
Steller's...10, 66, 161, 170
Johansen, Frits, article by..... 132
Johnstone, M., article by 12
Jordan, David Starr, article by..... 145
Journal of the American Museum, Vol. XXVI, No. 5, review of..... 21
Juday, Chancey, article by..... 130
Junco..... 10, 11
Oregon.....10, 162
Shufeldt's.....15, 109
Slate-coloured...8, 11, 13, 15, 75, 103, 151, 162, 166
Junco hyemalis..... 151
Juncus balticus var. littoralis..... 20
subtilis..... 20
Juncus, Vaseyi..... 20
Juniper, Ground..... 112
Juniperus horizontalis.. 48
sabina..... 49

Killdeer.....10, 64, 78
Kindleia.....145, 147
fragosa.....145, 146, 147
Kindleia, A New Genus of Cichlid Fishes from the Upper Cretaceous of Alberta. 145
"King Bird"..... 32
"King Duck"..... 32
Kingbird.....8, 43, 65, 75, 103, 108, 109, 151
Kingfisher..... 8, 10
Belted.....75, 151
Western Belted.... 10
Kinglet..... 187
Golden-crowned. 8, 10, 11 13, 93, 110, 152
Ruby-crowned.. 8, 10, 109, 110
Western Golden-crowned.....10, 15, 109
Kingston, Lois R., article by..... 153
Kittiwake..... 157
Knot..... 78, 80
Kurata, T. B., article by 202

LaBrie, Willie, article by 188
Lactuca campestris..... 53
canadensis..... 53
pulchella..... 53
spicata..... 54
Lamarckiana..... 25
Lamarckiana-biennis... 25
Lamb's-quarters..... 92
Lampetra Wilderi..... 127
Lamprey, Brook..... 127
Northern..... 127
Lanivireo solitarius..... 151
Lapponicus..... 62
Laportea canadensis.... 53
Lappula deflexa americana..... 52
echinata..... 51
Lark..... 75
Eastern Horned... 62
Horned.....7, 8, 14 62, 91
Hoyt's Horned..... 62, 91
Northern..... 91
Larus argentatus..... 7, 150
delawarensis..... 7
pumlieni..... 186
Lathyrus maritimus.... 20
ochroleucus..... 50
palustris..... 52
venosus..... 52
Lawrence, A. G., article by..... 11
Ledum groenlandicum.. 50
Lepachys columnaris... 53
Lepidium apetalum.... 49
Lesquerella arenosa.... 49
argentea..... 49

Lewis, Harrison F., articles by.....9, 31, 55, 75, 114, 185, 189
Liatris punctata..... 54
scariosa..... 54
Lichen..... 103
Ligidium.....175, 177
gracile.....173, 175, 176, 177, 178
hypnorum..... 176
longicaudatum...175, 176, 177, 178
tenue..... 176
Ligyda oceanica..... 176
pallasi.....173, 175, 176
Ligydidae.....174, 175
Lilium philadelphicum andinum..... 52
Limnetis brachyurus... 133
gouldii..... 133
Limosa haemastica..... 187
Ling.....104, 106
Lake..... 128
Linnaea borealis..... 51
Linum Lewisii..... 51
rigidum..... 53
sulcatum..... 52
Lithospermum angustifolium..... 50
canescens..... 49
Lloyd, Hoyes, articles by....73, 89, 111, 126, 135, 138, 139, 140, 155, 156, 171
Lobelia Kalmii..... 53
spicata..... 53
Lomatium orientale.... 48
Lonicera glaucescens... 50
oblongifolia..... 51
Longspur, Lapland..... 13, 62
Loon.....8, 12, 15, 139, 157
Common..... 150
Pacific..... 10
Red-throated..... 10
Losh..... 128
Lota maculosa.....104, 128
Love Song and Flight of the Woodcock, Philohela Minor, The. 183
Lucius lucius..... 128
Luxury-Symbiosis..... 101
Lychnis Drummondi... 51
Lycopociaceae..... 18
Lycopodineae..... 19
Lycopodium clavatum var. laurentianum forma furcatum.... 18
var. megastachyon forma furcatum.... 18
var. subremotum... 18
var. subremotum forma frondescens. 19
var. subremotum forma frondosum.. 18
var. subremotum forma furcatum.... 19
Lycopodium complanatum var. canadense 19
var. elongatum.... 19
var. elongatum forma simplex..... 19
Lycopodium flabelliforme var. ambiguum..... 19
var. ambiguum forma proliferum.. 19
Lycopodium obscurum var. dendroideum forma exsertum.... 19
var. dendroideum forma exsertum-furcatum..... 19
var. dendroideum forma monostachyon..... 19
var. dendroideum forma proliferum.. 19
Lycopodium sabinaefolium var. patens... 19
var. superfertile... 19
Lycopodium tristachyum var. Habereri.. 19
var. laurentianum. 19
Lycopus americanus.... 53
lucidus..... 55
Lycosa asivak..... 88
pictilis..... 88
quinaria..... 88
Lygodesmia juncea..... 53
Lymnaea columella castra..... 60, 61
lanceata..... 60, 61
megasoma..... 60, 61
stagnalis appressa.. 59, 61
stagnalis sanctaemariae..... 59, 61
Lymnaeidae..... 59
Lysimachia thyrsiflora. 52

MacLoghlin, Anna E., articles by.....63, 149
MacLoghlin, Mrs. F. E., article by..... 12
Macnamara, Charles, article by..... 13
Macoma balthica..... 124
Magpie.....11, 12, 14, 15, 155
Maianthemum canadense..... 50
Mallard.....10, 35, 78, 80, 95, 96, 97, 98, 110, 138, 142, 143, 157, 158, 160, 163, 164, 167, 169, 170, 191, 192, 195, 203, 204, 205, 206, 207
Malvastrum coccineum. 51
Mammoth..... 46, 47
Maple, Manitoba..... 103
Marie-Victorin, Frère, review of his "Etudes floristiques sur la region de la Saint-John"..... 20
Marie-Victorin, Frère, review of his "Les Lycopodinées du Québec et leur formes mineures".. 18
Marie-Victorin, Frère, review of his "Sur Quelques Composées Nouvelles rares ou critiques de Québec oriental..... 19
Martin, Purple..... 103
Maskinonge..... 128
Mastodon..... 46
Mathemeag..... 127
McMillan, Dr. & Mrs. G. O., article by... 12
Meadowlark..... 13
Western.....10, 103
Melosira..... 84
granulata..... 84
varians..... 84
Melospiza melodia..... 151
Mentha canadensis..... 53
Menyanthes trifoliata.. 50
Meredith, R., article by 188
Merganser.....7, 15, 150
American.....8, 9, 10 11, 12, 13, 14
Hooded..... 10
Red-breasted....10, 13, 15
Mergus americanus.... 7
Mergus sp.?..... 150
Merriman, R. Owen, articles by....92, 140, 157
Methy..... 128
Metic..... 32
Metoponorthus pruinosus.....175, 177
Mice..... 58
Microcystis aeruginosa. 84
ochraea..... 84
Micronetta maritima.... 88
Micropterus dolomieu.. 128
Salmoides..... 128
Mills, Miss Ruby R., article by..... 12
Mimulus glabratus..... 52
ringens..... 53
Minah..... 149
Miner, Manly F., articles by..... 185
Mink..... 58
Minnow.....84, 128
Blunt nose..... 128
Bull..... 128
Flathead..... 128
Great..... 128
Poor..... 128
Silver..... 128
Storer's..... 128
Straw-coloured.... 128
White..... 128
Mitella nuda..... 50
Mniotilta varia..... 151
Mockingbird..... 139
Mollusca..... 110
Molluscs from the Lake Brereton District, Manitoba..... 59
Monarda mollis..... 53
Monoclonius..... 72
belli..... 69
canadensis..... 69
nasicornus..... 69, 72
Monolepis Nuttalliana.. 51
Monotropa uniflora.... 30, 54

Moon-Eye. 128
Shad. 128
Mosses. 20
Moth. 76
Yellow Bear. 30
Tiger. 30
Mouse, House. 147
White-footed. 65
Mousley, Henry, articles by. 1, 28, 101, 183
Moxostoma anisurum. . . 128
aureolum. 104, 128
lesueri. 128
Moyac. 32
Moynak. 32
Mozley, Alan, articles by. 59, 84
Multiceps serialis. 113
Mullet. 104, 106, 108, 128
Munro, J. A., articles by 15, 61, 65, 77, 102, 108
Murre, California. 10
Common. 157, 167
Murrelet, Ancient. 198
Marbled. 10, 197, 198, 199
Musculium securis. 60, 61
Mushrooms. 128, 189
Mushroom Growing by An Amateur. 128
Muskellunge. 128
Muskrats. 21, 137
Myiochanes virens. 151
Myledophus bipartitus. . 145
Myrmica scabrinodis. . . 102
Mystery Band, A. 155
Myxophyceae. 84

Nannus hiemalis. 152
hiemalis hiemalis. . . 9
Nash, Charles W., obituary of. 135
National Museum of Canada. 133
Neff, W. G., article by. . 14
Neslia paniculata. 51
Nighthawk. 103, 151
Nomiades arion. 101
Nostoc commune. 84
Note on the Discovery of the Champlain Fauna on Lake St. John, Quebec, Canada. 123
Notholca longispina. . . . 84
Notropis. 59, 84
atherinoides. 104, 128
blennius. 128
cornutus. 128, 202
Hudsonius selene. . . 128
jejunus. 128
scopifer. 128
Noturus flavus. 127
Nuthatch. 14
Red-breasted. 8, 13, 14, 15, 103, 110
Slender-billed. 15
White-breasted. . 9, 11, 12, 13, 14, 15, 162, 171
Nuttallornis borealis. . . 151
Nycteris cinerea. 155
Nymphaea advena. 52

Oak. 103
Observations on the Double-crested cormorant (Phalacrocorax auritus) on Lake Manitoba. . . . 102
Octopus. 101
Octopus vulgaris. 101
Odell, W. S., article by. . 128
Odell, W. S., review of his "Mushrooms and Toadstools. An Account of the More Common Edible and Poisonous Fungi of Canada". 189
Oenothera. 23
agari. 24, 25
argillicola. 25
biennis. 53
eriensis. 26, 27
grandiflora. 25
muricata. 26
pallida. 53
parviflora. 26
serrulata. 52
Official Canadian Record of Bird-banding Returns. 66, 94, 141, 157, 191, 203
Old Squaw. 11, 12, 75, 190
Olivaceous Miller's Thumb. 128
Olor columbianus. 92
Oniscidae. 175
Oniscoidea. 173, 174, 175
Oniscus asellus. 173, 175, 177, 179
Onosmodium hispidissimum. 52
Ophryoxus gracilis. 131
Opuntia polyacantha. . . 54
Orchid. 101
Orchis lingua. 30
rotundifolia. 51
spectabilis. 31
Orchis, Showy. 31
Oriole, Baltimore. 75, 103, 152, 169
Bullock's. 108, 109
Orobanche fasciculata. . 51
ludoviciana. 54
Orthocarpis luteus. 53
Orthoptera. 100
Osier, Red. 31
Osmerus mordax. 202
Osmorhiza longistylis. . . 51
Osprey. 8, 94
Ostracods. 133
Otocoris. 91
alpestris alpestris. . . 7, 62
alpestris hoyti. 62
Oven Bird. 8, 76, 151
Owl. 9, 66, 100, 180
Barred. 8
Great horned. 10, 11, 13, 103
Hawk. 11
Horned. 14
Long-eared. 187
Pigmy. 15, 110
Richardson's. 187
Owl, Screech. 10, 11, 12, 14, 15, 66
Snowy. . . 11, 12, 13, 14, 15
Oxalis stricta. 51
Oxen. 45
Oxybaphus hirsutus. . . . 53
nyctagineus. 52
Oxyechus vociferus. 150
Oxytropis deflexus. 52
gracilis. 52
Lamberti. 51
splendens. 53

Pagophila alba. 17
Pagurus calidus. 101
Paid-up Members of the Ottawa Field-Naturalists' Club, May, 1927. 116
Palmer, E. F., article by 15
Pardosa galcialis. 88
Parnassia caroliniana. . . 54
palustris. 53, 114
Parrots. 40
Partridge. 87, 101
California. 98
European. 87
European Grey. . 15, 86, 90
Grey. 87, 100, 147
Hungarian. . 14, 90, 98, 99, 100, 112, 147, 148, 149, 154, 155
Red-legged. 100
Passer domesticus. 12, 151
Passerculus sandwichensis savanna. 9
"Passing Birds". 32
Peanut, Hog. 31
Pearse, Theed, article by 10
Pediastrum boryanum. . 84
Pedicularis canadensis. . 31
lanceolata. 54
Pelecypoda. 60
Pelecypods. 123, 124
Penthestes atricapillus. . 152
Pentstemon albidus. . . . 51
gracilis. 52
Perca flavescens. 103, 128
Perch. 59, 103, 106
Pike. 103, 128
Trout. 128
Yellow. 128
Percopsis guttatus. 128
Perdix perdix. 90, 98
Perisoreus canadensis. . . 151
Petalostemum candidum 53
purpureum. 53
villosum. 54
Petasites sagittatus. . . . 49
Petrels. 75
Fork-tailed. 198
Leach. 198
Pewee. 114
Western Wood. . . . 109
Wood. 75, 76, 151
Phalacrocorax auritus auritus. 7
Phalarope, Northern. . . 110
Pheasant. 11, 87
(Chinese). 10
English. 13

Pheasant, Ring-necked.. 15, 87
Phlox Hoodii..... 49
Phoebe.....75, 98, 152
Say's..... 109
Phormia azurea..... 111
chrysorrhea..... 111
Phyllophaga sp..... 182
Phyllopoda..... 85
Physidae..... 60
Picea canadensis..... 49
Pickerel..84, 103, 104, 106, 108
Banded..... 128
Yellow..... 128
Pigeon, Passenger..... 87
Pigweed..... 62
Russian..... 202
Pike.....59, 103, 105, 106, 108, 128
Pike-perch..... 128
Pillbug..... 173
Pimephales notatus.... 128
promelas..... 128
Pine.....108, 110
Pintail.....66, 78, 80, 81, 82, 83, 95, 110, 144, 160
Pipit, American..... 8
Piranga erythomelas... 151
Pisidium adamsi..... 60
roperi..... 60, 61
Pitcher Plant..... 60
Plancton.....84, 130
Planesticus migratorius. 152
Planorbidae..... 60
Planorbis antrosus striatus..... 60, 61
campanulatus..... 60, 61
exacuous..... 60, 61
hirsutus..... 60, 61
parvus..... 60, 61
umbilicatellus..... 60, 61
Plantago major..... 52
Platygobio gracilis..... 128
Plover..... 75
Black-bellied..... 78
Killdeer.....110, 150
Semi-palmated...110, 198
Podilymbus podiceps... 150
Polanisia graveolens.... 53
Polita hammonis..... 59
Polyarthia platyptera... 84
Polygala paucifolia..... 49
senega..... 51
verticillata..... 55
Polygonatum commutatum..... 52
Polygonella articulata.. 202
Polygonum Convolvulus 53
Muhlenbergii..... 53
Polyphemus pediculus.. 131
Polysticta stelleri..... 32
Pomoxis sparoides..... 128
Pœetes gramineus..... 151
Poplar..103, 105, 108, 109, 110
Populus balsamifera.... 48
deltoides..... 49
tremuloides..... 48, 49
Porcellio..... 175
laevis.....173, 175
rathkei..173, 176, 177, 179
scaber.....173, 175, 177
spinicornis...173, 176, 179
Potamogeton..... 59, 78
Potato-bug..... 147
Praticola..... 62
Prenanthes alba..... 54
racemosa..... 54
Primula farinosa..... 51
mistassinica..... 49
Priscacara.....145, 147
liops..... 147
serrata..... 147
Priscacaridae..... 147
Production of Eider-down in Canada... 31
Programme of Field Work of National Museum of Canada 133
Protocalliphora splendida..... 111
Protoceratops..... 70, 72
Protozoa..... 85
Prunella vulgaris..... 31, 52
Prunus nigra..... 49
pennsylvanica..... 49
pumila..... 49
virginiana..... 31, 50
Psalliota campestris...128, 129
Psedera vitacea..... 53
Psoralea argophylla.... 53
esculenta..... 52
Ptarmigan, Rock.....10, 100
Pteretis nodulosa..... 20
Pteridium latiusculum.. 31
Publication Fund, Canadian Field-Naturalist.....65, 154
Publications Received.. 98
Pungitius pungitius.... 202
Pupillidae..... 59
Pygosteus pungitius.... 128
Pyrola chlorantha..... 53
elliptica..... 53
incarnata..... 52
secunda..... 52

Quail.....90, 112
California..... 161
Quercus macrocarpa.... 50
Quiscalus quiscula aeneus..... 151

Rabbits.....113, 149
Jack..... 21
Rabiforcado..... 39
"rabo de junco"..... 38
Raccoons..... 58
Ragweed..... 62
Western..... 202
Rail..... 189
Virginia..... 75
Randall, T. E., article by..... 86
Ranunculus acris..... 52
delphinifolius..... 49
lymbalaria..... 51
Macounii..... 51
rhomboideus..... 48
sceleratus..... 50
Raspberry, Purple Flowering..... 31
Rat..... 147
Raven, Northern.....7, 8, 10
Redhead.....15, 166
Red Horse.....104, 128
Northern..... 128
White-nosed..... 128
Redpoll.....9, 11, 12, 13, 14, 64, 92
Common..... 92
Greater..... 92
Redstart.....76, 103
American...8, 93, 109, 152
Redwing, Thick-billed.. 103
Regulus satrapa..... 152
Robin.....8, 10, 11, 12, 13, 64, 65, 76, 94, 103, 109, 144, 162, 171
American..... 152
Western..... 15
Report of Annual Meeting..... 16
Report of Council, 1926, Ottawa Field-Naturalists' Club..... 15
Rhamnus alnifolia..... 50
Rhus Toxicodendron... 31
Toxicodendron radicans..... 52
typhina..... 31
Ribes floridum..... 50
hudsonianum..... 49
oxyacanthoides.... 49
setosum..... 49
triste..... 49
Robinson, E., article by 11
Roccus chrysops..... 128
Rosa acicularis..... 51
blanda..... 51
Johannensis..... 20
pratincola..... 52
Rosebushes..... 108
Ross, Edna G., article by..... 14
Ross, Verna M., article by..... 14
Rotatoria..... 84
Rough-leg, Ferruginous. 161
Rowan, William, article by..... 98
Rubus arcticus..... 50
idaeus aculeatissimus..... 51
odoratus..... 31
triflorus..... 50
Rudbeckia hirta..... 53
laciniata..... 54
Rue, Tall Meadow..... 31
Rumex crispus..... 52
persicarioides..... 54
venosus..... 50

Sagittaria latifolia..... 20, 54
Salix amygdaloides..... 49
cordata..... 48
discolor..... 48
longifolia..... 50
lucida..... 49
petiolaris..... 48
rostrata..... 49
serissima..... 49
uva-ursi..... 48
Salmo salar ouananiche. 128
Salmo salar sebago..... 202

Salmon, Land-locked... 128
Sebago..... 202
Salvelinus fontinalis.... 128
Sanctaemariae..... 59
Sand Roller..... 128
Sanderling..... 78
Sandpiper..... 39, 40
Baird's. 78, 79, 80, 81, 110
Eastern Solitary... 110
Least..... 80
Pectoral..... 170
Red-backed..... 10
Semi-palmated...7, 8, 110
Spotted.....8, 110, 150
Stilt.....:78, 110
Western Solitary... 110
Sanguinaria canadensis. 31
Sanicula marilandica... 52
Saponaria Vaccaria..... 52
Sapsucker, Red-naped.. 109
Yellow-bellied..... 8, 151
Yellow-breasted.... 103
Sarracenia purpurea.... 52, 60
Saskatoon berries..... 42
Sauger.....104, 106
Grey..... 128
Saunders, W. E., articles by. .64, 86, 87, 90, 91, 138
Saxicava arctica..... 124
Scaup..... 10, 11
Greater..... 10
Lesser.....61, 78, 80, 83
Scirpus..... 59, 60
Scoter, American..... 10
Surf.....10, 190
White-winged..... 10, 61, 80, 83
Scott, R. C., article by.. 11
Scrophularia marilandica..... 53
Scutellaria galericulata. 53
lateriflora..... 53
Sea-anemone..... 101
Season in a Swallow House, A..... 153
Segmentina crassilabris. 60, 61
Seiurus aurocapillus.... 151
motacilla..... 140
Self-heal..... 31
Senecio canus..... 50
indecorus..... 19
integerrimus..... 50
manitobensis..... 49
palustris..... 50
pauciflorus..... 19
plattensis..... 50
pseudaureus..... 50
pseudo-Arnica..... 19
resedifolius..... 19
vulgaris..... 50
Serapias..... 1
Helleborine..... 1, 2, 3
hirsuta..... 30
laxiflora..... 30
lingua..... 30
longipetala..... 30
Setaria viridis..... 62
Setophaga ruticilla..... 152
Sharptail.....100, 148, 149
Sheep, Rocky Mountain 126, 140
Sheephead..... 128
Shepherdia argentea.... 49
Shepherdia, canadensis.. 48
Shiner.....106, 128, 202
Lake..... 104
Shoreyer..... 32
Shoveller.....78, 80, 82, 170
Shrike, Northern.....9, 11, 12, 13, 14
Sialis sialis..... 152
Silene antirrhina..... 52
noctiflora..... 52
Simocephalus vetulus... 130
Simpson, G. Buchanan, article by..... 10
Simulin forbesi Mall.... 183
Siskin..... 15, 64
Pine.....9, 12, 13, 14
Sisymbrium Hartwegianum..... 52
incisum..... 50
Sisyrinchium angustifolium..... 49
Skunk..... 139
Slater..... 173
Sloth, Giant..... 46
Smelt..... 202
Smilacina stellata..... 50
Smilax herbacea..... 51
Smith, A. G., article by. 111
Smith, Miss E., article by..... 12
Smith, J., article by.... 111
Snails..... 101
Snake..... 112
Snipe..... 75
Wilson's..... 66
Snowberry..... 108
Snowflake..... 11, 12
Snyder, L. L., articles by.....90, 155
Solanum triflorum..... 52
Solidago canadensis.... 54
decumbens..... 54
graminifolia..... 54
memoralis..... 54
missouriensis..... 53
puberula var. expansa..... 19
puberula var borealis..... 19
rigida..... 54
rugosa..... 54
Solitaire, Townsend's..15, 109
Somateria mollissima... 32
mollissima dresseri. 32
spectabilis..... 32, 90
v-nigra..... 32
Some Plancton Organisms from Lake Brereton, Manitoba 84
Some Random Notes on our Club and its Publications..... 73
Some Rare Birds at Strathroy, Ontario. 62
Sonchus arvensis..... 53
arvensis L. var. glabrescens..... 188
Soper, J. Dewey, article by..... 10
Sowbug..... 173
Sparrow.....43, 75, 109
Chipping.....8, 75, 151
Sparrow, Clay-coloured. 64, 103
Dakota Song..... 103
English.....10, 11, 13, 14, 147, 149
Fox.....10, 66, 131
Gambel's.....109, 110
Grasshopper. 75, 76, 88, 89
House....9, 13, 15, 41, 43, 94, 99, 100, 151
Leconte's..... 103
Lincoln's....8, 75, 76, 110
Nelson's..... 103
Rusty Song....10, 15, 109
Savannah.....8, 9, 12, 13, 14, 103, 171
Song. 8, 10, 11, 12, 13, 64, 75, 108, 151, 162, 188
Swamp.....64, 171
Tree.....10, 11, 12, 13, 14, 15, 87, 188
Vesper.....62, 75, 151
Western Chipping.. 109
Western Lark..... 109
Western Savannah. 109
Western Vesper...103, 109
White-crowned....76, 103, 169, 188
White-throated. 8, 151, 166
Yellow-winged..... 88
Spawn Eater..... 128
Sphaeriidae..... 59, 60
Sphagnum..... 60
Sphyrapicus varius..... 151
Spiders..... 88
Spilosoma virginica.... 30
Spiraea salicifolia..... 53
Spiranthes cernua..... 4
Romanozoffiana.... 4, 54
Spizella pallida..... 64
passerina..... 151
Spruce.....103, 112
Black.....60, 132
Squirrel.....43, 113
Stachys palustris..... 53
Stagnalis..... 59
Starling.....9, 11, 12, 13, 14, 15, 99, 147, 149
European.....13, 188
Statement of the Financial Standing of the Ottawa Field-Naturalists' Club, 1925-26..... 17
Statement Reserve Fund Committee..... 17
Staurastrum leptocladum..... 84
Steironema ciliatum.... 53
quadriflorum..... 53
Stellaria longipes..... 50
Stephanodiscus..... 84
niagarae..... 84
Sternberg, Charles M., article by..... 67
Stickleback.....106, 202
Brook.....104, 128
Nine-spined..... 128
Stizostedion canadense.. 104
canadense griseum 128
vitreum.....84, 103, 128
Strobilops affinis..... 59

Sturgeon, Common..... 127
Lake..... 127
Sturnus vulgaris..... 188
Succinea ovalis..... 59
Succineidae..... 59
Sucker.....59, 108, 202
Chub..... 128
Common White.... 128
Gray..... 128
Long Nosed..... 104
Northern.....104, 128
Quillback..... 128
Small-mouth..... 128
White..... 128
Sumach, Staghorn..... 31
Sunfish..... 202
Surirella elegans..... 84
Sutton, George Miksch, article by..... 139
Swallow.....75, 153
Bank..... 109
Barn.....103, 139, 151, 166, 171
Cliff..... 109
Northern Violet-green..... 109
Rough-winged.....61, 109
Tree.....103, 109, 110, 151, 181
Swan, Trumpeter..... 189
Whistling..... 92
Swift, Chimney....8, 151, 169
Vaux..... 109
Symphoricarpus occidentalis..... 52
racemosus..... 52

Tabellaria fenestrata... 84
Tale of Four Crows, A.. 179
Tamarack.....60, 131
Tanager, Scarlet....75, 76, 151
Western..... 109
Taraxacum erythrospermum..... 49
officinale.....49, 114
Tarr, Ralph S., review of his "New Physical Geography"... 18
Taverner, P. A., articles by.....147, 155, 156
Teucium occidentale... 54
Thacker, T. L., article by..... 38
Thalictrum dioicum.... 50
polygamum..... 31, 52
Thaspium aureum..... 50
Thermopsis rhombifoloa 51
Thistle, Canada..... 61
Glandular Sow.... 188
Russian..... 147
Smooth Perennial Sow..... 188
Sow..... 147
Thlaspi arvense..... 49
Thompson, Stuart L., articles by 13, 88, 186, 188
Thyme, Wild..... 102
Thymus serphyllum.... 102
Tiger, Sabre-tooth..... 46
Tilia americana..... 54
Tintinopsis..... 85
Titmouse, Tufted.....186, 187
Tmeticus alatus..... 88
Toadstools..... 189
Tofieldia glutinosa..... 52
Togue..... 202
Tolmachoff, I. P., article by..... 123
Torosaurus..... 70
Touladi..... 128
Towhee.....10, 108, 109
Oregon..... 10, 66
Townsendia exscapa.... 49
Toxostoma rufum..... 152
Trachodon mirabilis.... 67
Tragopogon pratensis... 51
Transfers of Elk for Restocking..... 126
Triceratops..... 70
Trichoniscidae.....174, 175
Trichoniscus..... 175
papillicornis..173, 175, 177
pusillus.....175, 177
Trientalis americana.... 50
Triglochin palustre..... 51
Trillium cernuum..... 50
Troglodyte aedon..... 152
Trout, Brook..... 128
Great Lake..... 128
Grey..... 128
Lake..... 202
Salmon..... 128
Tryoni..... 60
Tufts, R. W., articles by.....17, 65, 90
Tule..... 110
Tullibee.....103, 106, 128
Turner, Mr. and Mrs. B. F., article by... 12
Turnstone, Ruddy..... 78
Turtle..... 145
Blanding's..... 185
Two New Species of Oenothera..... 23
Twomey, Arthur, article by..... 12

Ulmus americana..... 20, 48
fulva..... 20
Unionidae..... 60
Urtica gracilis..... 52
Urus..... 45
Utricularia macrorhiza. 59
vulgaris americana. 52

Van Tyne, Josselyn, article by..... 7
Veery..... 76
Verbena bracteosa..... 54
hastata..... 51
Veronica americana.... 50
peregrina..... 49
Vespa germanica..... 30
maculata..... 30
Viburnum Lentago..... 31, 51
Opulus americanum 51
pubescens..... 53
Vicia americana..... 50
sparsifolia..... 50
Viola blanda..... 50
canadensis..... 49
Viola, conspersa..... 49
nephrophylla..... 49
Nuttallii..... 49
pedatifida..... 49
pubescens..... 50
renifolia..... 49
sororia..... 49
Viper..... 111
Vireo, Blue-headed...8, 75, 76
151
Cassin's..... 109
Philadelphia.....8, 75, 76
Red-eyed.....8, 75, 76
103, 109, 151
Western Warbling.. 109
Vireosylva olivacea..... 151
Vitis riparia?..... 31
vulpina..... 53
Von Engeln, O. D., review of his "New Physical Geography"..... 18
Vulture, Turkey..... 65

Walker, E. M., article by..... 173
Warbler.....75, 76, 109, 131
Audubon's.....109, 110
Bay-breasted...75, 76, 103
Black and White... 8, 151
Blackburnian..... 8, 76
Black-poll..... 75, 76
Black-throated.... 151
Black-throated Blue.....8, 75, 76
Black-throated Green.....8, 76, 151
Canada..... 8
Canadian..... 76
Cape May..... 75, 76
Chestnut-sided...8, 75, 76, 151
Connecticut..... 8, 76
Macgillivray's..... 109
Magnolia.....8, 75, 76
Mourning..... 76
Myrtle..... 8, 151
Nashville..... 128
Orange-crowned... 109
Palm..... 8
Pine..... 8, 136
Tennessee.....8, 75, 76, 103, 131
townsendi..... 109
Townsend's..... 110
Wilson's..... 8, 76
Yellow.8, 75, 103, 108, 109
Wasp, Black..... 30
Yellow Jacket..... 30
Waterfowl Sickness at Lake Newell, Alberta, 1925-1926, The. 77
Waterlilies..... 59
Water-thrush, Louisiana 140
Northern..... 8, 76
Waxwing..... 15
Bohemian..11, 14, 15, 109
Cedar....8, 11, 13, 14, 98, 103, 108, 109, 151
Weasels.....21, 43, 58
Whale..... 39

Wheat.....109, 112
Whip-poor-will.....103, 151
Whitefish.....103, 106
Common.....103, 128
Labrador..... 128
Mongrel..... 128
Round..... 128
Widgeon..... 10
European.....170, 171
Willet, Western..... 78
Willis, R. B., article by. 112
Willow, Sand-spit..... 108
Wood, A. A., articles by 62, 92
Woodchucks..... 58
Woodcock.....17, 18, 183, 184
Woodlice or Oniscoidea of Canada (Crustacea Isopoda) The.. 173
Woodpecker..... 7, 75
American Three-toed..... 13
Arctic Three-toed 8, 12, 13
Woodpecker, Batchelder's 109
Downy....8, 9, 11, 12, 13, 14, 15, 103, 151, 166, 169
Hairy....9, 11, 12, 13, 14, 15, 110, 151, 161
Harris'..... 10
Lewis'..... 109
Northern Downy... 13, 14
Northern Hairy...13, 103, 151
Northern Pileated.. 9, 13
Pileated..8, 11, 14, 15, 152
Red-headed..... 10, 13
Rocky Mountain Hairy..... 15
Wren.....41, 43, 44, 153, 154
Bewick's..... 88
Carolina.....88, 138, 139
House.....43, 103, 152, 162, 166, 169
Long-billed Marsh. 15, 87
Short-billed Marsh. 103
Vigors's..... 10
Western House.... 109
Wren, Winter..8, 9, 10, 88, 152
Wright, J. F., articles by..... 15, 16

Yak..... 45
Yarrow..... 31
Yellow-legs..... 75
Greater..... 110
Lesser.....78, 110
Yellow-throat..... 110
Maryland.....76, 152

Zebu..... 45
Zizanis..... 60
aquatica..... 59
Zizia cordata..... 50
Zonitidae..... 59
Zonitoides arborea..... 59
Zonotrichia albicollis... 151
Zooplancton..... 84
Zostera marina..... 124
Zygadenus chloranthus. 53

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