

1919

VOL. XXXIII

1920

The Canadian Field-Naturalist

Being Volume XXXV
of the Transactions of
the Ottawa Field-
Naturalists Club

Organized March, 1879

Incorporated March 1884

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THE CANADIAN FIELD-NATURALIST

VOL. XXXIII.

APRIL, 1919.

No. 1.

INTRODUCTORY.

With the March, 1919, issue, THE OTTAWA NATURALIST, the official organ of the Ottawa Field-Naturalists' Club, ceased to exist under that name. THE OTTAWA NATURALIST had a long and honourable career. Like all similar publications it had its trials, its ups and downs, financial troubles, etc., but it weathered all storms and appeared fairly regularly during its thirty-two years of existence. In its pages are to be found many articles of great scientific value and we would like to have space to remind our readers of at least some of the more important of the contributions which it presented. With the increase in its size, improvement of paper, specially prepared articles, etc., Vol. XXXII, certainly may be regarded as an excellent production and one which has brought forth many words of encouragement from its readers.

This, the April issue of the organ of the club appears under a new name—THE CANADIAN FIELD-NATURALIST. Such a change was intimated in the April, 1918, issue of THE OTTAWA NATURALIST, and at the recent annual meeting of the Club, held

on March 18, 1919, the same was duly approved. This change in name will not, of course, affect in any way the spirit of the publication. Such change only reflects its widened sphere of influence. We hope it will develop along improved lines and ultimately be accepted as the organ not only of The Ottawa Field-Naturalists' Club, but of similar organizations throughout Canada. There is an excellent opportunity for the naturalists of Canada to assist in building up this publication and making it truly representative of Canadian scientific research. The popular side will, of course, not be overlooked. Special efforts will be made to make it useful to amateur naturalists, teachers and the public generally.

The subscription price for the present volume which will contain six issues, namely for the months of April, May, September, October, November and December will be \$1.00. Thereafter the volumes will consist of nine issues each volume beginning with the January number; the subscription price of each volume will be increased proportionately.

NOTES ON THE CASPIAN TERN (*STERNA CASPIA*) AND THE PARASITIC JAEGER (*STERCORARIUS PARASITICUS*) IN MANITOBA.

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Island faunæ, ever an interesting field in ornithology, become particularly attractive in continental areas where lake islands afford the only suitable breeding grounds for certain water birds.

The following observations refer to a small but interesting island in the northern part of Lake Winnipeg visited on July the 9th and 13th, 1918, where a colony of Caspian Terns (*Sterna caspia*) was found. No record of this species breeding in Manitoba has hitherto been published. A specimen of Parasitic Jaeger (*Stercorarius parasiticus*) was also secured and constitutes the first inland record for this province.

Through the courtesy of the Riverton Fish Company, of Riverton, Man., the authors were enabled to make the journey—a round trip of some 500 miles—from Hnausa to Berens Island. The objects of the trip were first to study if possible, breeding colonies of White Pelicans (*Pelecanus erythrorhynchos*) and second, to gather some idea of the biological conditions on the northern portion of the lake. The original intention to make Reindeer Island the base proved impracticable and a camp was established at Swampy Bay, Berens Island, where the Riverton Fish Company maintained a large fishing station. We desire to express

our warm appreciation of the sympathetic assistance afforded by the men at the stations, particularly by Mr. Johnny Jonasson. Berens Island was chosen mainly because of the possibility that White Pelicans would be found breeding on Pelican Island which lies some four or five miles west of Berens Island.

Pelican Island lies approximately in longitude $95\frac{1}{2}$ and latitude $52\frac{1}{2}$ and is a typical, rocky lake island, some ten to fifteen acres in extent. Between Pelican Island and the northern shore of the lake, there are no islands and so its north coast meets the full force of the waves raised by the winds sweeping across this 100 miles of open water. Lake Winnipeg with its area of over 8,000 square miles, is very dangerous owing to its quick changes from calm to storm and fishermen familiar with the whole lake, declare this region between Pelican and Berens Islands to be the worst. The shores of Pelican Island are extremely rocky—there are no sand beaches—and a landing from a rowboat requires cautious management even in calm weather. The island is partly wooded with birch, ash, etc., but inland the ground is depressed in a basin-like central hollow, overgrown with marsh vegetation. A barren tongue of land juts out from the east side of the island forming a shingle spit.

THE TERNERY.

The first time the authors approached the island in a skiff, flocks of birds were observed resting on the eastern point, while with prism binoculars, Herring Gulls and Terns could be distinguished everywhere along the shingle spit and adjacent shore. Two young Herring Gulls, still in natal down, ran down the beach to the water as the boat reached land. One of these was captured. The uproar among the birds caused by the landing increased when the shingle spit was reached. Numerous deserted Herring Gulls' nests, substantially built of vegetable debris, lined the edge of the grass zone or were scattered over the bare pebbles and everywhere were the remains of pellets disgorged by the gulls. No eggs were found until the zone of vegetation had ended, when, passing out onto the bare eastern spit, a densely populated ternery was discovered. Over this space were between 200 and 300 occupied nests, frequently almost touching, each containing one or two eggs. After a brief survey of the ternery, a low hiding blind was erected and left for the birds to return to the colony.

On returning later, the whole colony was seen to be still on the wing, shrieking and screaming above the breeding ground. The cause was soon revealed. In the midst of the colony was a fisherman methodically gathering the eggs from the nests. The old fellow could scarcely understand English and after much difficulty, it was explained that some of the

nests were to remain undisturbed. The birds were now so thoroughly alarmed that an hour spent in the hiding-tent in the hope of photographing them proved vain and the remaining hour or so of light was expended in examining and photographing the nests and eggs. An adult Caspian Tern was collected together with some clutches of eggs. A fair portion of the colony had not been disturbed. It was hoped that the next visit would find the owners of these nests back at the task of incubation and so the hiding-tent was left in position, as carefully concealed as possible.

On July 13, Pelican Island was re-visited. The birds were observed as before, resting on the rocks and along the shore. On approaching the breeding ground, the usual alarm of the parent birds was not in evidence and closer examination showed that every remaining egg had been destroyed—evidently by crows (*vide infra*) and on the whole spot not a single occupied nest remained. A specimen of Parasitic Jaeger and two still occupied Herring Gull nests were also discovered during this visit.

Reference to the published records of Manitoban birds yielded only an isolated record of the Caspian Tern. It is not mentioned by Bell (3) nor by E. Thompson Seton (11 and 12) and is recorded only by Nutting (6) whose record is cited by Preble (7). Nutting collected a single Caspian Tern on Lake Winnipeg at the mouth of the Saskatchewan river in 1892. The A.O.U. Check List (1) says of the Caspian Tern: "Range nearly cosmopolitan" but gives few North American breeding records, viz: "Great Slave Lake, Klamath Lake, Oregon, on islands of northern Lake Michigan, on coast of Southern Labrador, and also on coasts of Texas, Louisiana, Mississippi and (formerly) Virginia". The discovery of such a colony in Lake Winnipeg is, therefore, of unusual interest.

Although there are no published records of the species breeding in Manitoba, we have reason to believe that it was previously recognized by Mr. Eric Dunlop, since killed in action in France, a naturalist who in 1914 and 1915 collected in northern Lake Winnipeg for the Carlisle Museum, Carlisle, England. Dunlop is said to have found the Caspian Tern breeding on the west coast of Reindeer Island, but, unfortunately, his records are not available. While in the north, the authors met with Dunlop's chief guide, Capt. Goodman, who through his work with Dunlop had become acquainted with many of the birds. Capt. Goodman stated that in 1914 the Caspian Terns were found breeding only on the west shore of Reindeer Island and had not been noted anywhere else although numerous islands, including Pelican Island, were then visited.



1. Pelican Island. The shingle spit upon which the ternery was situated is visible in the foreground of the island.

2. Young Herring Gull. The rocky character of shore adjacent to the ternery is here shown. July 8, 1918.

3. Caspian Tern's nest showing remarkable variation in eggs of single clutch. Also exceptional in its employment of drift to form a "nest".

4. Typical nest of Caspian Tern. Note entire absence of vegetable nesting materials.

The Caspian Terns' nesting ground was a compact area situated on a slope of the shingle spit and measured only some 20 yards by 30 yards. The ternery sloped from some 10 to 12 feet above lake level at the highest point down to some four feet above lake level at the lowest point. In this space were well over 200 nests. Somewhat over 400 eggs were noted and exact measurements taken of 46 of them. A small, peculiar pond to the west of, and some 10 yards from the boundary of the ternery, contained a few water plants and algae and was well populated with large frogs (*Rana pipiens*). This pond showed every evidence of being much visited by the birds. Between 600 and 800 adult Caspian Terns must have been observed on the first visit, the birds resting on the stones along the shore, fishing off-shore or flying together with Herring Gulls and Common and Forster Terns above the island. The stomach of the individual shot contained remains of small fish. The identity of the species was first suspected from the size and shape of the eggs, later determined by close range observation from the hiding-tent and finally confirmed by the finding of dead specimens and the shooting of an adult female.

The nest frequently consisted of mere depressions in the shingle, absolutely no vegetable or other materials being utilized. In some other instances, grass bents, dead rushes, bits of drift, etc., were gathered together forming a rude, basin-shaped structure. Thus the type of nest appears to resemble most closely that of Lesser Tern (*Sterna minuta*) (9) and not that of the Common Tern (*Sterna hirundo*) (10) which most frequently builds quite a noticeable nest of gathered materials. The deserted and much better constructed nests of Herring Gulls were occasionally used by the Caspian Terns, apparently no additions or alteration being made by the new tenants. In no case did the number of eggs in a nest exceed two. Frequently, there was only one egg, usually fresh, in a nest. It is of interest that Van Winkle (5) records three as the usual number of eggs per nest on the Gravel Gull Islands, Lake Michigan, whereas we found that in some cases where there were two eggs in the nest, they were both in such an advanced stage that there would have been ample time for the third egg to have been laid had three been the normal number of the clutch.

The eggs exhibited a considerable range of variation in color, size and type of marking, but destruction by the fishermen and the crows prevented the taking of a series of measurements similar to those made by Rowan, Parker and Bell (10) as was originally intended. The measurement of a char-

acteristic series of 46 eggs was fortunately secured, from which the following data were obtained:

Average length, 63.59 m.m.; average breadth, 43.84 m.m.; greatest length, 72.00 m.m.; shortest length, 56.00 m.m.; greatest breadth, 46 m.m.; least breadth, 41.00 m.m.

The two eggs of a clutch sometimes differed considerably, though a sufficient number were not examined to allow of satisfactory statistical treatment. Thus: in clutch No. 33 the two eggs were 70 x 46 and 67 x 45 m.m.; in clutch No. 23 the two eggs were 66 x 45 and 63 x 43 m.m.

Like differences were found also in color, for in one nest one egg was of a pale blue background with a few very faint spots, while the second was heavily spotted and blotched with black upon a brown background. The eggs that were opened and examined exhibited every stage of development from practically no incubation, the primitive streak stage, through to large embryos. The majority, however, were fresh. None seemed less than a week from hatching.

THE PARASITIC JAEGER.

The Parasitic Jaeger (*Stercorarius parasiticus*) of which a specimen was found on July 25 on the north end of Pelican Island, is also a bird of some interest as it is the first record for this area. The Canadian Catalogue of Birds (Macoun, 5) gives the following record for Hudson Bay: "a specimen of the melanistic form (of *Stercorarius parasiticus*) taken at Fort Churchill, Hudson Bay, 1845 (Dr. Gillespie, Jr.)" Preble (7), however, records the species as occurring on the coast of Hudson Bay, below Cape Eskimo in 1900. Both of these, however, are on the sea-coast and at least 500 miles north of Pelican Island. The two other members of this strange genus, the Pomarine Jaeger (*Stercorarius pomarinus*) and the Long-tailed Jaeger (*S. longicaudus*) have been recorded for Manitoba, the former on Hudson Bay (Preble, 7) and the latter once from Aweme, Man., May, 1903, by Mr. Norman Criddle (Macoun, 1909) and also once from Clandeboye, Man., October, 1902, by Atkinson (2).

The specimen of Parasitic Jaeger which the authors discovered was lying dead on the rocky ground above the drift line in the midst of a deserted Herring Gull colony. The individual was an example of the white phase. From the situation and appearance of the bird it is possible that it had been killed by Herring Gulls while poaching on the colony, a fate several times recorded for this species.

OTHER BIRDS.

The following observations were made concerning other species of birds noted on Pelican Island: HERRING GULL (*Larus argentatus*). This species

had practically completed breeding. Over 300 deserted nests and but four occupied nests were discovered—three with well-grown young and one with eggs.

RING-BILLED GULLS (*Larus delawarensis*) were noted in company with the last species.

FORESTER'S TERNS (*Sterna forsteri*) and COMMON TERNS (*Sterna hirundo*) were numerous, almost equalling the Caspian Terns in numbers. The gulls and terns all consorted together freely.

BLACK TERNS (*Hydrochelidon nigra surinamensis*) were entirely absent although they are quite numerous in the south end of Lake Winnipeg.

WHITE PELICAN (*Pelecanus erythrorhynchos*) were not noted, although excreta and two humeri were found. However, the species was regularly observed fishing in Swampy Bay, five miles from Pelican Island, so it probably is a frequent visitor here also.

SCAUP DUCKS (*Marila marila* or *M. affinis*) were observed, five or six individuals together, resting on the water not far offshore from the ternery.

MALLARD (*Anas boschas*) were observed and one adult female collected.

WHITE-WINGED SCOTERS (*Oidemia deglandi*) are frequently caught and drowned in the fishermen's nets. They probably visit Pelican Island frequently.

Two or three LEAST SANDPIPERS (*Pisobia minutilla*) were observed on the beach.

LESSER YELLOW-LEGS (*Totanus flavipes*) were seen feeding along the water-edge.

A PECTORAL SANDPIPER (*Pisobia maculata*) was shot out of a flock of five feeding near the ternery.

Several SPOTTED SANDPIPERS (*Actitis maculata*) were found feeding along the shore.

NIGHT HAWKS (*Chordeiles virginianus*) were noted at Swampy Bay and very probably inhabit Pelican Island. None was observed probably because both visits were made during daylight hours.

CROWS (*Corvus brachyrhynchos*) were common on the island. When the ternery was first visited, the crows gathered near at hand to watch the proceedings. When the second visit was paid, the crows were disturbed from the area of the ternery itself, where they were engaged in eating the Caspian Terns' eggs. The crows appear to feed largely upon the dead fish cast up by the water and they were constantly observed patrolling the shores in search of such food. Nests were found in considerable numbers.

SAVANAH SPARROWS (*Passerculus sandwichensis savanna*) were in song and apparently breeding near the ternery.

CEDAR WAXWINGS (*Bombycilla cedrorum*) were common in the trees on Pelican Island. They were

still in flocks and had not yet, apparently, begun nesting.

RED-EYED VIREOS (*Vireosylva olivacea*) were noted here as they were on every island and bit of the wooded shore the authors visited during the whole trip.

YELLOW WARBLERS (*Dendroica aestiva aestiva*) were common and breeding.

BLACKBURNIAN WARBLERS (*Dendroica blackburniae*) were noted and were in full song.

The discovery of the Caspian Tern Colony on Pelican Island is especially interesting in the light of our knowledge of the distribution of this bird. The A. O. U. Check list (1) gives the winter range of this species as "South Atlantic and Gulf Coasts". To and from this region, logically, the Pelican Island terns must each year journey; yet there is not a single record of a Caspian Tern being collected in Central or Southern Manitoba. The route of migration that would seem most reasonable is that down the Red-River-Mississippi Valley chain, yet this absence of records proves fairly conclusively that the Caspian Terns do not regularly or in numbers, traverse this path. The alternative suggestion is a migration route by way of Hudson Bay, thence to the Atlantic coast and thence southward. The Pelican Island and Reindeer Island colonies might thus possibly be explained as an invasion of this species from Hudson Bay, these islands—the outliers of the numerous islands including Berens Island—being the first of the group upon which the species has established itself. The birds in going to their winter range, still probably use the old route of invasion and travel circuitously out by way of Hudson's Bay and the Atlantic coast. Analogous to this might be cited the case of the Bobolink (*Dolichonyx oryzivorus*) which, according to Cooke (4) has invaded Utah by extending its range far westward, then southward yet in returning to its winter home in southern Brazil, the Utah bobolinks do not go directly, but move along their old invasion route, i.e., they first journey northward, then eastward, then they turn south to their distant winter range. It is conceivable that in the case of the bobolink, a frequenter of damp meadows, its choice of route is partly, perhaps largely, determined by following such suitable localities and therefore it does not cross the arid regions to the south and southeast of the points reached in its new advance. Indeed it is only since the extension of irrigation in certain parts of Utah that it has made its appearance there. Whereas the Caspian Tern, having once got into the lake region has practically an unbroken inland water system over which it could return to the south.

The Pelican Island colony is declared by the

fishermen, who recognize the Caspian Tern to be a new bird on the lake, to date within the last few years. Indeed the earliest definite information regarding it was their report that three years previous to our visit, a wolf crossed to Pelican Island from Swampy Bay and destroyed all eggs and young birds in the colony. The species was not found by Dunlop when he visited the island in 1914 and it is hardly possible that he could have missed it had it been there. Capt. Goodman stated that, on Reindeer Island, Dunlop found the Caspian Terns breeding as late as mid-August.

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DOUGLAS FIR SUGAR

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Much interest has recently been aroused over what appears to be phenomenal deposits of sugar on the leaves of Douglas fir (*Pseudotsuga taxifolia*) in certain areas of British Columbia. Although Douglas fir sugar has been known to the Indians of the dry-belt for many years, its occurrence seems to have been overlooked by the numerous surveyors and others who have travelled in the province; at least, in-so-far as the writer is aware, no record has been made of its occurrence previous to 1915, when an illustration appeared in the British Columbia Botanical Office Report for the year 1914, showing a branch of Douglas fir laden with white masses of sugar. This photograph was prepared from specimens received from Mr. Jas. Teit, of Spence's Bridge, B.C., who, in connection with his ethnological work on the plants used as food by the British Columbia Indians, wished to have an explanation of the deposits; Mr. Teit also forwarded samples of Douglas fir sugar to Dr. E. Sapir of the Geological Survey of Canada, who had the samples analyzed.

During the summer of 1917, when the European conflict caused an increase in the cost of living and the introduction of measures to economize sugar, interest in this phenomenon was renewed and intensified by the appearance of a glowing account supplied to one of the Vancouver newspapers by some irresponsible contributor. As a result, a number of people became quite enthusiastic regarding

this "new" discovery and hastened to ascertain its commercial possibilities.

In view of the fact that many people in Canada are interested in the phenomenon, and at the request of Mr. Teit, the writer consented to give a summary of what is known regarding Douglas fir sugar and the factors influencing its exudation as deposits on the leaves. All the information relating to the distribution and habitats of sugar-bearing Douglas firs was supplied by Mr. Teit who, being resident in the heart of the dry-belt and having an intimate knowledge of the Indians of the interior, was best able to secure the necessary data.

It appears that Douglas fir sugar cannot be relied on as an annual crop. Some years it is abundant, other years little or none is found. It is therefore regarded by Indians as an extra, rather than a necessary part of their food supplies, but when available in quantity it is collected and may be kept for future use.

NOT THE WORK OF INSECTS.

Previous to having seen the specimens, the writer suspected that the sugar had been produced as an exudation on the leaves through punctures made by insects possibly aphides; such as is said to occur on *Tamarix mannifera* which, when attacked by a *Coccus*, yields a kind of mucilaginous sugar—the manna of Mt. Sinai; but information to the effect that only healthy trees produced the sugar and that such trees were practically free from insects,

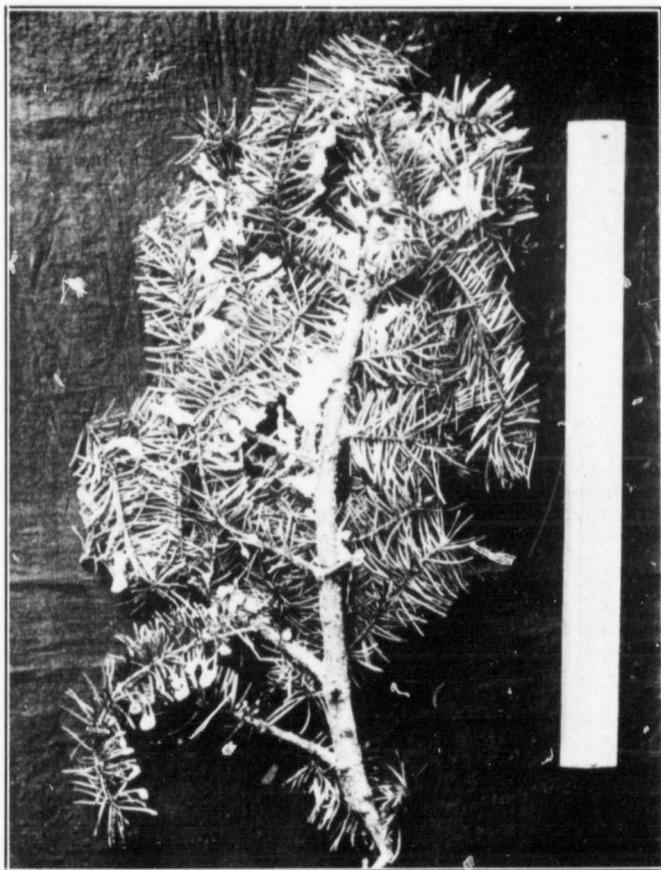
with the exception of such as were feeding on the sugar, led one to suspect that the sugar might be related to the manna of commerce, obtained from several species of ash (*Fraxinus*) as an exudate which assumes the form of flakes or fragments.

When specimens were received, however, in the summer of 1914, it was seen that none of the previously recorded sugars corresponded with the pe-

and pending the results of the analysis which was then being carried out by Dr. F. T. Shutt, Dominion Chemist, at Ottawa.

APPEARANCE OF THE SUGAR.

The sugar appears as white masses varying in size from $\frac{1}{4}$ of an inch to $1\frac{1}{2}$ or 2 inches in diameter. The smaller masses are formed like white drops at the tips of single leaves, occasionally two or three



Branch of Douglas fir laden with white masses of sugar.
(From B. C. Bot. Office Rep., 1914.)

culiar masses formed by Douglas fir. A careful search for information as to its chemical analysis revealed nothing to show that even its occurrence was known. On account of its interest and novelty at the time, the photograph in the Botanical Office Report was supplied to record its occurrence and illustrate the phenomenon, pending an investigation into the circumstances under which it was formed,

leaf-tips are imbedded in larger drops, while the largest masses are usually scattered irregularly over the leaves and branchlets.

The sugar tastes decidedly sweet, passing temporarily into a pasty consistency during dissolution in one's mouth; it is completely soluble. When collected it is quite hard and dry, with no tendency to be sticky. A slight rain is sufficient to dissolve the

sugar off the trees, and patches of recrystallized sugar may then be found at the base of trees or on the ground. Frequently, however, in this situation it does not recrystallize but may be found in a fluid or semi-fluid condition which is attractive to flies and other insects. Sometimes, as above mentioned, insects feed on the sugar while still on the trees, and it is reported that bears go after it, causing the breakage of many branches.

EXUDATIONS BY OTHER PLANTS.

As is well known, many plants have structures known as water-pores, situated usually at the tip or apex of the leaves, and, in the case of lobed leaves, often at the tips of the lobes or teeth along the margin. Occasionally when the root-pressure is very active, so much water is forced up into the plant that the leaves become gorged with water which escapes through these water-pores—comparable to a kind of safety valve. Most people are familiar with the drops of water at the tips of grass leaves in the morning after a hot dry summer day and a cool, clear night, giving origin to the Scotch saying, "Ilka blade o' grass keeps its ain drap o' dew".

In some localities, where the soil is calcareous, minute white incrustations of lime are found around the water-pores; these incrustations may be found on grasses, and are of common occurrence on certain species of Saxifrages which show them on every tooth along the margin of the leaves, such incrustations are small, and are only formed under certain ecological conditions, in which temperature of the soil and atmosphere, and water content of the soil are important factors.

FACTORS INFLUENCING EXUDATION OF SUGAR.

A review of the distribution, and various factors influencing the production of sugar by Douglas fir, will prove of especial interest to physiological and ecological botanists, to whom the phenomenon will serve as a splendid illustration of the influence of environment on a plant which under ordinary conditions in British Columbia does not exude sugar.

DISTRIBUTION.

The region in which sugar-bearing Douglas firs are most abundant, lies between the 50th and 51st parallels and between 121°-122° long. This includes the driest and hottest part of the dry-belt of British Columbia. Within this area they are rather common in the Thompson valley west of the mouth of the Nicola river, also near the junction of the Thompson and Fraser rivers at Lytton; they have been found a little above Lilloet in the Fraser valley, but according to present information are not known to occur north of Clinton in this region.

About 10 miles north of the apex of the angle formed by the junction of the Thompson and

Fraser rivers, lies Betani valley, at an altitude of between 3,500 and 4,000 feet, some years sugar is comparatively abundant on trees in this region; the geology and flora is very different from that of the adjacent Thompson or Fraser valleys; here one may find sugar-bearing Douglas firs growing on the southern and south-western slopes having the greatest sun exposure. The soil produces a thick covering of grass and other vegetation, indicating a plentiful supply of available soil moisture; differing in this respect from the dry gravelly southern and south-western slopes of the main valleys of the Fraser and Thompson.

Suitable habitats are found at intervals over a considerable area of the dry-belt regions, in addition to samples received from the north and south sides of the Thompson river near Spence's Bridge, Douglas fir sugar has been reported from around Kamloops and Savona, also from the Nicola and Similkameen valleys, and is said to be found in the southern part of Okanagan valley. In-so-far as the chief of the Kootenay Indians is aware, it is not known in the Kootenay country although it is reported by an Indian as being found in eastern part of Washington state, United States.

HABITATS.

The habitats in which sugar-bearing firs are found, are usually on gentle slopes facing east or north in that region of the dry-belt where the Douglas fir is encroaching on the dry-belt flora. The trees are in comparatively open areas with abundant exposure to the sun.

SOIL MOISTURE.

As a rule, sugar is not found on trees situated on fully exposed southern or western slopes, nor on areas where Douglas fir forms a dense forest. Southern and western slopes, exposed to the full heat of the sun, dry out much sooner than ground gently sloping to the east or north; the greater abundance of soil moisture in the latter is a point to be kept in mind.

ABUNDANT SUNSHINE.

In the region above mentioned the descending zone of the Douglas fir and the ascending zone of yellow pine overlap, so that the trees are well exposed to the sun, not being so crowded as to limit the foliage to a narrow crown, as happens in dense forests. An abundance of leaves exposed to the sun will result in an abundant formation of carbohydrates during the day; under ordinary conditions these carbohydrates would be removed from the leaves and transported to growing tissues or storage tissues during the night. This normally takes place in most plants, including Douglas fir in its natural habitat in the coast area where it forms dense forests of gigantic trees.

TEMPERATURE OF SOIL AND AIR.

In the dry-belt area it is evident that Douglas fir trees are exposed to the sun for a greater number of hours per day, the soil and atmosphere is warmer, the forests are more open, with freer circulation of air, than Douglas fir forests in the coast area.

MAXIMUM ROOT-PRESSURE.

It appears then that in years when Douglas firs are fully exposed to a long succession of hot, cloudless days in midsummer, and provided with the requisite soil conditions (i.e., temperature and available water) the trees gradually accumulate an excess of carbohydrates during the many hours daily exposure to sun, the increasing temperature of the soil enables the cells of the roots to maintain or increase their activity during the night, which in dry-belt regions in midsummer is very short, and during which root-pressure is at its maximum.

DRY ATMOSPHERE.

When night comes on, the chlorophyll-containing guard-cells have ceased photosynthesis, the guard-cells become isotonic (i.e., of equal concentration) with the surrounding cells, and the stomata close; so that even during warm nights little evaporation can take place from leaves so well protected with cutin. As a result of the increased root-pressure and cessation of transpiration the leaves become gorged with water in which the sugar—formed by the re-conversion of starch into sugar—is dissolved and exuded as drops at the tips of the leaves. The warm dry atmosphere at that time of the year causes the rapid evaporation of the water, leaving the sugar in the form of drops of various sizes as a deposit at the tip. Occasionally two or three such drops come in contact with each other and fuse to form one large drop, frequently they become so large that they fall from the leaf tips onto the leaves or branches below; a succession of these large drops cause the formation of the larger irregular deposits referred to above.

There is no doubt about the exudation of the sugar from the leaf-tips; deposits may be found in all stages, from mere traces up to large drops, in some cases just dried as they were about to fall.

With a knowledge of the ecological conditions under which Douglas fir exudes sugar, one can understand why it may be rare or absent in some years; one or two dull, cool, or wet days would suffice to alter one or more of the factors which play a necessary part in promoting its exudation. A dull day would enable the tree to utilize much

of the excess sugar or store it as starch or other reserve food. A cool day would diminish the activity of the sugar forming cells in the leaves, and by lowering the temperature of the soil would lessen the activity of the roots, thus diminishing the root-pressure and exudation of water, while a wet day and subsequent evaporation from the soil would more effectually lower both the soil and atmospheric temperatures. Other factors would be affected, but the above summarizes the main points.

ANALYSIS OF THE SUGAR.

The results of Dr. Shutt's analysis of two samples—one supplied in 1914, the other in 1917—indicate a high degree of constancy of composition of Douglas fir sugar.

The preliminary analysis made in 1914 gave the following results:

Total sugars after hydrolysis	-----	96.25%
Reducing sugars	-----	23.3

The analysis of the 1917 sample furnished the following data:

Total sugars after hydrolysis	-----	91.91
Reducing sugars	-----	24.86
Foreign matter, etc., insoluble in water		.64
Moisture	-----	7.00

Subsequent to the analysis, a contribution* from the Carbohydrate Laboratory of the Bureau of Chemistry, U.S. Department of Agriculture, Washington, D.C. a laboratory especially equipped for the examination of saccharine substances, reports a complete analysis of the same product.

A summary of their findings is as follows:

"The sample of Douglas Fir manna yielded about 50% of pure crystalline melezitose, and there is evidence that the manna contains sucrose and some reducing sugar probably a mixture of glucose with a smaller quantity of fructose. The percentage composition of the sample of dry manna that we examined was approximately:

Melezitose	-----	75.83%
Sucrose	-----	2.9%
Reducing Sugars	-----	11.5%"

Melezitose is an extremely rare trisaccharide of the formula $C_{18}H_{32}O_{16}$ which on hydrolysis yields glucose and turanose, the latter is very difficultly hydrolysed to glucose and fructose but in the conventional methods of sugar analysis, the only product of hydrolysis having direct reducing action is glucose.

*The Occurrence of Melezitose in a Manna from the Douglas Fir, by C. S. Hudson and S. F. Sherwood (Journal of the American Chemical Society, Vol. XL, No. 9, 1918).

MUSEUMS AS EDUCATIONAL INSTITUTIONS.

BY M. Y. WILLIAMS.

Ask the average Canadian to name our educational institutions and it is scarcely likely that "Museums" would be included in the list. Ask a dweller in New York City the same question, and if he omitted "Museums" he would show that he failed to appreciate the advantages at his very doors.

Modern pedagogy recognizes the importance of studying objects rather than the description of objects; the modern museums display, in instructive and attractive manner, things gathered from the great and wonderful world around us. We have primary and secondary schools, and higher up are the colleges and universities, but museums include among their attending students the toddling infant, and the grey-haired patriarch.

Let us consider some few of the things which great museums have to teach us. One of the newest as well as one of the greatest of the museums on this continent, is the American Museum of Natural History, situated in New York City. Its exhibits are multitudinous and truly impressive. Who can view understandingly the wonderful mounted specimens of the reptilean monsters of the dim geologic past, without having a broader, more profound, more accurate view of the brief moment of time in which we live? Who can stand before those creations of art, the background bird groups, without having a better understanding and appreciation of the beauties of our bird life in its natural setting? Such work is as truly the work of the artist, as are paintings and statues! The wonderful array of minerals and the priceless collections of gems and precious stones illustrate the best that the rocks have to reveal. As wanderers from outer space, there are to be seen some of the largest meteorites known. Among them are included Peary's wonderful specimens from Greenland, one of which is as large as an explorer's tent.

And what of the National Museum at Washington? Few will fail to recall the wonderful groups of American aboriginals, transfixed as it were near their habitations in the midst of their daily tasks, with their implements, and food supplies nearby; nor can the fine groups of African game animals be forgotten, including rhinoceros, buffaloes and lions, collected by Colonel Theodore Roosevelt.

From the Field Museum of Natural History, Chicago, the visitor carries away a better understanding and clearer picture of African antelope, hyenas, zebras and leopards in their natural habitat than pages of descriptive writing could have given.

The Milwaukee Public Museum takes the visitor back to the days of early colonial life in America, and depicts a street scene, say in Massachusetts, with small frame houses, homemade furniture, dove cotes, and people dressed in simple homespun. Fine groups of mammals and birds and many other exhibits are there, but the colonial village is unique.

The New York State Museum at Albany illustrates in wonderfully realistic form, the early fish-like creatures of the geologic past, and one of the earliest trees known from fossil remains. The Iroquois Indian groups, prepared from Indian models, under the direction of a Mohawk Indian, perpetuate the memories of Indian life as it was when Champlain was founding Canada.

And there are other great museums at Pittsburg, Brooklyn, Boston, Philadelphia, and elsewhere, all teaching their lessons to the visitor. Volumes could be written descriptive of them, each writer depicting those exhibits which appeal to him most.

It must not, however, be supposed that the public exhibits make up the entire museum, nor that all specimens are placed on exhibit. Great as is the popular educative value of exhibits, many specimens must also be preserved for comparison and study by specialists and research students. Zoological specimens generally fade when placed on exhibit, and groups of mammals, birds and insects have to be replaced by new material from time to time. So it happens that for every specimen on exhibit hundreds or in many cases thousands of valuable specimens may be carefully stored away, where they are available for study, or to replace other exhibits.

Besides the exhibitions and the special researches carried on by modern museums, lecture halls are provided, where members of the staff lecture to students from schools and colleges and to the public in general.

So far reference has been made to the museums of the United States only; let us now turn to the museums of Canada. Among these are the provincial Museum of British Columbia, at Victoria, the Banff Park Museum, the Redpath Museum of Natural History at McGill University, Montreal, the Museum of the Natural History Society of New Brunswick at St. John, the Royal Ontario Museum at Toronto, and the Geological Survey Museum housed in the Victoria Memorial Museum at Ottawa.

The British Columbia Museum is particularly mentioned by visitors because it contains a complete collection of the game animals of the province. The Banff Museum appeals to tourists because of its

game exhibits. The Redpath Museum contains a variety of collections, dating back over many years, and is a storehouse of valuable study material for McGill University. The Museum of the Natural History Society of New Brunswick, at St. John, emphasizes the direct instruction side of museum work, and, although possessed of limited resources, with the co-operation of the railways, places timely exhibits before the people by means of museum cars.

The Royal Ontario Museum at Toronto has, within the last six or seven years, assumed the leading position in Canada on account of its exhibits. It contains a number of very interesting features, among which are its collections of oriental arms and armor, its antique furniture and musical instruments and its well arranged collections of minerals and invertebrate fossils.

Our national institution, the Geological Survey Museum housed in the Victoria Memorial Museum at Ottawa, contains the exhibits long housed on Sussex street, including all the collections made by the Geological Survey since its founding by Sir William Logan in 1842. The collections of Indian clothing, weapons, works of art, and utensils are very complete and fine, and could not be replaced. The herbarium represents collections from all parts of the country. The zoological collections contain specimens of most of the species of the vertebrate fauna of Canada and in some lines it is very complete. About 13,000 bird skins are catalogued and carefully stored for study, and the game and fur-bearing mammals are represented by many specimens.

It is in palæontology, however, that the Geological Survey Museum ranks especially high. All the type specimens described by the noted Canadian palæontologists, Elkanah Billings and J. F. Whiteaves (that is the specimens which were first studied and upon which the species were founded) are contained in the invertebrate collection, along with the types of more recent workers, and thousands of valuable specimens gathered from all parts of Canada during 75 years of exploration. In vertebrate palæontology, many fine specimens represent the huge creatures of past geologic ages, and the Cretaceous dinosaurs from the Red Deer Valley of Alberta form a collection second only to that of the American Museum of Natural History, New York. These were obtained during the past six years by the veteran collector, Charles H. Sternberg and his sons, and were being described by the late Lawrence M. Lambe.

There are also the ores and minerals of Canada, of which we may be justly proud. Specimens have been collected from all parts of the country and a very good display of these is now being placed on exhibit in the economic museum of the Geological Survey, at 227 Sparks street.

It is not to be supposed, however, that because of the collections already made, that nothing is left to be done. A museum must be a growing concern like all other institutions that possess life and a future. Dr. W. T. Hornaday has said that the British Museum surpasses all other museums because a devoted nation has for generations collected trophies and specimens for it from all corners of the earth. It remains for Canadians to give their Museum such support that it may be made and kept, an object of sustained national pride.

Specialists have been appointed to take charge of the various divisions of natural history and a fair start had been made in arranging public exhibits when the Parliament Buildings were burned. The Museum building was needed for Parliament and all museum material had to be hurriedly packed and stored. Thus, so far as the public is concerned there has been no National Museum for the past three years. The preparation of exhibits has continued but has been much curtailed by lack of space. Plans are ready however for placing many fine exhibits in the halls as soon as the building is once more made available for museum purposes.

Let us picture to ourselves what the museum may some day be like. The Ethnological hall is intact and with its wealth of aboriginal material may be reopened on short notice. The hall of fossil vertebrates may be quickly rearranged, so as to display its huge reptilian monsters, early mammals, birds, and fishes—altogether a suggestive chapter of the geologic past. The wonderful collection of fossil shell fish and other inhabitants of the early seas when arranged according to formations and biologic groups will be one of the best assemblages of its kind in America. The contemplated bird group, representing the avifauna of southwestern Ontario (the extreme southern tip of Canada), should fascinate all bird lovers. Musk ox, moose, polar bear, beaver and other groups of our big game and fur bearing mammals are planned and some are partly executed. These with scenic backgrounds and natural accessories, should be a source of education and delight to all lovers of nature, and to sportsmen especially. For the miner and mineralogist there will be systematic collections of minerals and rocks, models of mining camps, and maps and plans of mines. For the botanist there is the herbarium, for the entomologist the insect collections and so on.

In short, with the specialists who are in charge and with the nucleus of a great collection already on hand, effective, popular support expressed through Parliament is all that is needed to make our museum in the near future something to be proud of, an educational institution, teaching effectively all branches of the natural history of Canada.

THE BIRDS OF SHOAL LAKE, MANITOBA.

BY P. A. TAVERNER.

(Continued from page 164 of THE OTTAWA NATURALIST, Vol. XXXII.)

103. *BLACK-BILLED CUCKOO, *Coccyzus erythrophthalmus*.
Job reports seeing this species on the western side of the lake on June 27 to 30, 1912. We saw none in 1917 though we heard rumors of cuckoos having nested in the vicinity. In 1918 the Black-bill appeared on June 14, after which Young noted a few birds almost daily to August 1.
104. BELTED KINGFISHER, *Ceryle alcyon*.
Strangely enough, on the borders of such a fine lake we saw no kingfishers in 1917, though Young reports one on May 2, 1918. The Ward brothers say that in previous years there were always a few about, and Seton reports a specimen taken by Miller Christy on May 15, 1887. The only explanation of their present absence seems to be the lack of fish caused by the extreme alkalinity of the lake at its present level.
105. *HAIRY WOODPECKER, *Dryobates villosus*.
Rather rare. Only two seen during the spring visit and one in September of 1917. Young noted the species, in 1918, in limited numbers, from June 3 to Sept. 26, taking juveniles but recently from nest, so it doubtless breeds in the vicinity. Five of our specimens are clearly referable to *D. v. leucomelas* though one, Sept. 22, 1917, falls slightly short of *leucomelas* measurements.
106. *DOWNY WOODPECKER, *Dryobates pubescens*.
Several seen during the spring of 1917, but none in the autumn. Observed by Young in 1918 in small numbers from May 3 to Sept. 12.
107. *YELLOW-BELLIED SAPSUCKER, *Sphyrapicus varius*.
Next to the Flicker the commonest woodpecker. Several nests were found and the species was still present during the fall visit in 1917 and to the end of September, 1918.
108. RED-HEADED WOODPECKER, *Malanepres erythrocephalus*.
Though we have no substantiating evidence, the Ward brothers declare that they have seen one or two individuals. There should be but little mistake with such a showy and strongly marked species.
109. *FLICKER, *Coleptes auratus*.
Very common and breeding. Still present in 1918 to date of leaving Oct. 2. Young says that through September they were very busy feeding on ant hills.
110. *NIGHTHAWK, *Chordeiles virginianus*.
Very common in 1917. First arrival May 18. One seen on Sept. 17, but none thereafter that year.
- The specimens taken seem to be *virginianus*. One is nearly light enough to be regarded as *hesperis* but as it can be watched by individuals from New Brunswick and central Ontario, I hesitate to so identify it.
111. *RUBY-THROATED HUMMINGBIRD, *Archilochus colubris*.
Quite common throughout the spring visit of 1918 and noted by Young occasionally in 1918 from June 1 to end of August.
112. *WHIP-POOR-WILL, *Antrostomus vociferous*.
Heard in 1917 nearly every night during the spring visit and once in the autumn, on Sept. 17. Young only observed it once on June 6 in 1918, but his difficulty in hearing would prevent his noting it very often.
113. *KINGBIRD, *Tyrannus tyrannus*.
First seen in 1918 on May 18; very common by the 29th. On Sept. 18 a flock of six were seen. Common in 1918 from May 17 to Sept. 10.
114. *PHOEBE, *Sayornis phoebe*.
One taken by Young, on Aug. 30, 1918, is our only record.
115. *CRESTED FLYCATCHER, *Myiarchus crinitus*.
In 1917 only one was seen, June 1. In 1918, Young noted it twice in early June, three times in July, and once in September. The Ward brothers say that in 1916 Frank McGiffon took a set of eggs locally.
116. OLIVE-SIDED FLYCATCHER, *Nuttallornis borealis*.
In 1917 one reported on June 5 and one taken on the 14th. In 1918 Young noted several on June 4 to 9, and again a single bird on Aug. 17.
117. *WOOD PEWEE, *Myiochanes virens*.
Our only record for this species consists of two specimens taken by Young on June 18 and July 2, 1918. The former is a female and had an egg ready to lay, thus verifying the species as a breeder in the locality.
118. *YELLOW-BELLIED FLYCATCHER, *Empidonax flaviventris*.
One taken on Maple Island above the Narrows on May 30, 1917. As sight records unsupported by the ear are unsatisfactory in regard to the smaller flycatchers, citing the specimens taken by Young in 1918 is probably the better way of reporting his experience. He took specimens of this species on June 4 and Aug. 15.

119. *TRAILL'S FLYCATCHER, *Empidonax trailli*.

First seen on May 9, becoming almost common by the 14th. In 1918 Young took one on June 8. All specimens are referable to the Alder Flycatcher, *E. t. alnorum*.

120. *LEAST FLYCATCHER, *Empidonax minimus*.

In 1917 first seen on May 23. By the 30th they were common in all the bluffs. Young's experience in 1918 seems about similar. He took specimens from May 30 to July 31.

121. *HORNED LARK, *Otocoris alpestris*.

In 1917 very common during the spring visit, but only a few present in the autumn. In 1918, Young found them consistently common throughout his stay from late April to early October. On April 24 he found a large flock (100) in company with Lapland Longspurs. He obtained one specimen from it, a well-marked *O. a. alpestris*. All other birds taken are *O. a. praticola*. It is worth while noting, as a caution against taking assumed breeding dates as evidence of nesting, that only six days after the taking of the above evident migrant *alpestris* nearly fully fledged young of *praticola* were collected. Thus local birds had young out of the nest before more northern nesters had left for their breeding grounds.

122. MAGPIE, *Pica pica*.

The Ward brothers say that the Magpie occasionally occurs about Shoal Lake. They recall one seen in July and two in June, 1904. May 21, 1918, William Ward reported seeing one near camp, and a few days later Frank Ward had exceptional opportunities of watching another at Gimli on the shores of Lake Winnipeg, some forty miles east of us.

123. BLUE JAY, *Cyanocitta cristata*.

In 1917 fairly common in spring but not noted during the autumn visit. In 1918 Young noted the species until Sept. 28.

124. CANADA JAY, *Perisoreus canadensis*.

Said by the Ward brothers to be a winter visitor, coming sometimes as early as September, but less numerous of late years.

125. RAVEN, *Corvus corax*.

Said by the Ward brothers to be fairly common during hard winters.

126. *AMERICAN CROW, *Corvus brachyrhynchos*.

Very abundant. Residents do not complain much of its destructiveness to crops but it is certainly a great nest robber and its effects upon the ducks must be marked and serious. Amongst Young's specimens are two that he concluded from their actions to be mated, but, while the male is large even for *C. b. brachyrhynchos*, the female falls well within the measurements for *C. b. hespris*. Considering other Canadian prairie specimens with these, I do

not consider the two races satisfactorily differentiated.

127. *BOBOLINK, *Dolichonyx oryzivorus*.

In 1917 a few were seen on wet meadows in the spring, none in the autumn. In 1918 Young noted them from June 8 to Aug. 22. The residents say that occasionally they do some damage to grain.

128. *COWBIRD, *Molothrus ater*.

Very abundant. Noted by Young in 1918 to Sept. 7.

129. *YELLOW-HEADED BLACKBIRD, *Xanthocephalus xanthocephalus*.

The least common of the resident blackbirds. Occasional small flocks were found foraging here and there on the uplands, cultivated fields and dry marshes. In 1918 still scarcer than during the preceding season. It seems that this bird requires more extensive marshes than the Red-wing. In 1917 we found resident colonies in a few places while the Red-wings occupied every reedy slough. Young reports no breeding birds in 1918. His latest record for the species is Aug. 26. The juveniles in first winter plumage are quite similar to the adults but the white primary coverts are reduced to traces and the crown and hind neck concolorous with the back. In one specimen, a stripped plumage, similar to that of the juvenile Red-wing is just disappearing on the breast where it is being replaced with yellow of rather a deeper orange than that of the adult.

130. *RED-WINGED BLACKBIRD, *Agelaius phoeniceus*.

Very abundant, breeding in every suitable locality.

The A. O. U. Check List recognizes the Red-winged Blackbird of central North America as the Thick-billed Red-wing, *A. p. fortis*. This race Mr. H. C. Oberholser (*Auk* XXIV, 1907, pp. 332-336) further divides into northern and southern forms, calling the Canadian race *A. p. arctolegus*, extending its range east to Isle Royal, Lake Superior, and restricting *fortis* to the United States, south from Nebraska. As the A. O. U. Committee has not as yet recognized *arctolegus*, from the standpoint of the Check List, it can be regarded as a synonym of *fortis*. The diagnosis for *fortis* calls for a larger bird than *phoeniceus*, the eastern race, with a comparatively shorter, thicker bill. *Arctolegus* is characterized by its describer as a large *phoeniceus* with slight color differences in the female.

To obtain easily compared factors of shape and size, I have divided the length of the bill by the depth for an index of shape and multiplied them together for an index of size. The former gives the length in units of depth, and the latter a product that whilst more or less arbitrary in itself, when derived from specimens of the same species, should be strictly comparable with each other and representative of relative size, irrespective of the disturbing element of shape.

Comparing Shoal Lake birds with other material, I have made use of the following adult male material: 9 from Mass., southern Ont. and southern Mich.; 7 from Shoal Lake and two from Douglas, Man.; and 7 from Sask., Alta., and Mack. The measurements of these birds together with those similarly derived from Mr. Oberholser's paper above cited, tabulate as follows:

	Index shape.	Index size.	Wing average.	Wing Min. & Max.
9. Eastern Canada	1.9	245.1	121.7	(116.0-128.0)
7. Manitoba	1.96	264.4	124.4	(120.5-128.0)
7. Sask., Alta., Mack	1.8	229.2	127.2	(111.5-132.5)
10. phoeniceus (H.C.O.)	1.8	269.2	118.8	(114.0-122.0)
12. arctolegus (H.C.O.)	1.88	304.8	125.4	(121.5-130.0)
11. fortis (H.C.O.)	1.88	254.04	129.7	(125.0-134.0)

In color, I find Shoal Lake females showing a slightly greater amount of white below, most distinctly on the throat and upper breast, but the distinction is too slight and inconsistent for certain or individual recognition.

It will be seen that the difference in shape of the bills of these various strains is very slight, and in no case marked enough to warrant the title "Thick-billed", in fact Oberholser's *arctolegus* and *fortis* have more slender bills than *phoeniceus*, and the Shoal Lake specimens considerably exceed all others in this direction having minimum and maximum indices of 1.72 and 2.22.

It is also evident that whilst there is a slight increase in size of both bill and wing of this species westward over the prairie provinces, the difference is not so marked in the new material as in Oberholser's measurements: also that individual variation is almost as great as the racial distinction and is one of averages, leaving the bulk of individual specimens subspecifically unrecognizable by character. Such distinctions do not in the view of the writer form criteria sufficient for systematic separation and nomenclature. Irrespective of such judgment on the races concerned it is evident that these Shoal Lake birds are just about intermediate between eastern and west plains birds though personally I do not care to separate them from *phoeniceus*.

131. *WESTERN MEADOW LARK, *Sternella neglecta*.

Very common during all visits. The song of the Western Meadow Lark is justly noted. It is one of the most wonderful prairie sounds and its constant repetition and infinite variety is characteristic of the west. However, eastern ears may be pardoned for a little disappointment on first hearing it. If they expect to hear a glorified eastern Meadow Lark song they certainly will be disappointed. While it is a beautiful production it is not the song they have been accustomed to associate with the coming of spring. It has many charms of its own, but they are not familiar; in fact hardly a note suggests the

well remembered voice of the old eastern friend and until its source is traced, even an experienced ornithologist is apt to wonder as to the identity of the singer. It will, I think, take several seasons' experience with this species to build up a new set of associations and take it to the heart in place of the well beloved eastern harbinger of spring.

132. *BALTIMORE ORIOLE, *Icterus galbula*.

In 1917, arrived on May 23, common on June 2; not seen in the autumn. In 1918, arrived on May 16, the bulk disappeared on July 23, and the last one was seen on Aug. 6.

133. *RUSTY BLACKBIRD, *Euphagus carolinus*.

Not recognized in spring, but one was noted on Sept. 21, 1917; not recorded by Young in 1918.

134. *BREWER'S BLACKBIRD, *Euphagus cyanocephalus*.

Very abundant and nesting in nearly every open bluff. They follow the ploughman about his work gleaning from the newly turned furrow, and associate commonly with the sheep perching upon their backs and scrutinizing the fleece, probably for ticks. On Sept. 25, 1917, three were taken from a flock. Of these one female, seemingly an adult by its completely granulated skull, had the iris reddish-brown just flecked with straw. All other specimens taken had the usual straw-colored iris.

135. *BRONZE GRACKLE, *Quiscalus quiscula*.

In 1917 there was a thriving colony of Bronzed Grackles nesting in the willows just behind the Ward house until persevering work with a shot gun removed them, after which many more attractive birds of less questionable character were able to appropriate the premises. The Wards accuse them of doing considerable damage by killing young chicks. While I cannot substantiate this charge I have little doubt as to its truth. None were seen in the autumn of 1917, but Young noted the species as late as Sept. 27, in 1918.

136. *EVENING GROSBEAK, *Hesperiphona vespertina*.

In 1917 we saw two to four individuals, May 20, 24 and 25, and secured several specimens. I noted that the bills of these were as green as those of summer birds from British Columbia and quite different from the yellow mandibles of eastern mid-winter specimens. The difference is probably seasonal rather than subspecific. Unfortunately these are amongst the birds that were lost. In 1918, Young noted three and two Sept. 25 and 30.

137. *PURPLE FINCH, *Carpodacus purpureus*.

None noted during either spring. Two or three were seen on several days in a small growth of hawthorn in September. In 1918, Young noted small numbers from July 11 to Aug. 26, and a single individual on Sept. 25.

138. *GOLDFINCH, *Astragalinus tristis*.

None seen in spring until May 27, 1917, after which they became common and were still numerous in September. Young noted them in 1917 from April 29 to his departure on Oct. 2.

139. *PINE SISKIN, *Spinus pinus*.

In 1918 Young noted 5 on June 5, 2 on the 21st, and one Sept. 24, taking specimens on the first two occasions.

140. *SNOW BUNTING, *Plectrophenax nivalis*.

In 1918, Young found large flocks on his arrival on April 24, and saw them almost daily until May 24. After this, 5 were noted on the 22nd and one on the 28th. Specimens taken on April 21 and May 2 are in high breeding plumage.

141. *LAPLAND LONGSPUR, *Calcarius lapponicus*.

A few seen between May 22 and 25. Very abundant in the autumn, occurring in large flocks in the long grass of the old marshes and on the lake shore. In 1918, Young found large flocks on April 24, but the bulk of the species left after the 30th. One straggler was taken on June 4. In the autumn the flocks of the previous year were absent and he noted but one individual on Sept. 23.

142. *CHESTNUT-COLLARED LONGSPUR, *Calcarius ornatus*.

A single bird secured on June 6, 1917, and a flock of seven noted on the 9th. It was not seen by Young in 1918. Seton has a specimen taken by Miller Christy in May, 1887, but the Ward brothers are not familiar with it, and it is doubtless rather rare in the locality or very local in distribution.

143. *VESPER SPARROW, *Pooecetes gramineus*.

Strangely absent both springs in the vicinity of the lake though from the train one was seen a few miles south of Erinview. In the autumn of both years they were seen about the Ward house in limited numbers between Aug. 23 and Sept. 28. These birds are rather large for the eastern race, and though in rather indeterminate juvenile plumage can probably be referred to the western race *P. g. confinis*.

144. *SAVANNA SPARROW, *Passerculus sandwichensis*.

Very common indeed during all visits. The local breeding birds show the bright yellow eye-brow common to the birds of the prairie provinces, and certainly do not agree with the described characters of *P. s. alaudinus* and at present seem without a name. The autumn birds are slightly darker than *savanna* and are both with and without the yellow loreal spot. I suspect that both a resident and a migrant form are represented, but I do not care to refer them to any sub-species generally accepted at present.

145. BAIRD'S SPARROW, *Ammodramus bairdii*.

Though reported by Chapman as very common at Shoal Lake and by Seton as common and breeding, the species was carefully searched for both seasons without success. Undoubtedly it has departed from the country with the lowering of the lake level and the disappearance of the broad marshes.

146. *LECONTE'S SPARROW, *Passerberbulus lecontei*.

Scattered individuals were met with both seasons in widely separated localities both in spring and in autumn.

147. *NELSON'S SPARROW, *Passerberbulus nelsoni*.

The western form, the Prairie Sharp-tailed Sparrow, *P. n. nelsoni* was met with in scattered individuals in various parts of the surrounding country as late as September 25. The juvenile plumage is quite different from that of the adult and might well be taken for a different species. All strong ochre, slightly paler below and only broken by restricted fuscous centres of secondaries and wing coverts which become fainter and almost concealed across the back, a double crown stripe and a faint bar back from the eye. The outer web of the first primary is edged with clear cream and the tail is ochraceous-fuscous with dark shaft. One specimen shows adult plumage appearing in the juvenile dress indicating that full plumage is assumed the first winter.

148. *HARRIS'S SPARROW, *Zonotrichia querula*.

Very common on our first arrival in 1917. Most of them left about May 28, though a couple of individuals remained to the end of our stay. Frank Ward reported seeing one carrying nesting material from his chip-yard towards the nearby bluff and suspected that they were nesting in the locality. The same authority tells us that some years ago he found a nest of this species on the ground in the shelter of an old log. On the return visit the same autumn they were common again in their old spring haunts and I was informed that individuals had been noted regularly through the summer. With this possibility of finding breeding birds, Young watched carefully for them during the summer of 1918, but between May 28 and Sept. 14 none were noted. They returned on Sept. 14 and were still present when he left on Oct. 2. The most peculiar thing about these autumn birds was the unusual abundance of adults in comparison to juveniles. Of perhaps fifty birds seen but three or four were juvenile either by plumage or cranial characters. This is unusual enough amongst autumn birds to justify special mention, as usually juveniles greatly outnumber adults.

149. *WHITE-CROWNED SPARROW, *Zonotrichia leucophrys*.

In 1917, single individuals seen on May 15 but

common throughout the autumn stay. In 1918, present in limited numbers from May 6 to May 23 and rather more numerous Sept. 17 to 30. Of those in adult plumage, two males (May 13, 1918 and Sept. 20, 1917) have the white loreal line continuous to bill and can therefore be ascribed to *Z. l. gambeli*. The other has it faintly interrupted across the lores and must therefore be regarded as intermediate between *Z. l. leucophrys* and *gambeli*.

150. WHITE-THROATED SPARROW, *Zonotrichia albicollis*.

Common both spring and autumn. In 1918, absent from May 27 to Sept. 8, except four individuals seen on July 24. Great numbers seen Sept. 19-27, but still present when Young departed on Oct. 2.

151. *TREE SPARROW, *Spizella monticola*.

Not noted in 1917. In 1918 observed from: April 26 to May 4, and again on Oct. 1 and 2. One specimen, female, April 30, I refer to *S. m. monticola*.

152. *CHIPPING SPARROW, *Spizella passerina*.

Very common in the spring of 1917. To the end of May flocks of a hundred or more were met. In the autumn the species was not certainly identified though the first day of arrival I thought I recognized them amongst the hordes of clay-colored sparrows. In 1918, Young noted a few on May 4 and 8. From the 16th to 27th it was present in flocks of from 50 to 100. The species departed on June 8 and no more were seen except 3 on July 23.

153. *CLAY-COLORED SPARROW, *Spizella pallida*.

Very common in spring and autumn. In 1917, they seemed to leave on Sept. 21, but in 1918, Young noted them to the date of leaving on Oct. 2.

154. *SLATE-COLORED JUNCO, *Junco hyemalis*.

In 1917, but one specimen seen in the spring but fairly common in the autumn. In 1918, Young noted it from April 24 to May 15 and from Sept. 6 to Oct. 2.

155. *SONG SPARROW, *Melospiza melodia*.

Common in spring and autumn of both years. In 1918, present on arrival, April 24, and when leaving, Oct. 2. Specimens taken between May 13 and July 31, probably breeding birds are the slightly lighter form, with more distinct markings, than eastern *M. m. melodia* and I refer them to *M. m. juddi*.

156. *LINCOLN'S SPARROW, *Melospiza lincolni*.

In 1917, single individuals seen and taken on May 19 and June 1. In the autumn seen nearly daily in limited numbers. Noted in limited numbers by Young in 1918 from May 11 to 25 and more commonly from Aug 3 to Oct. 1.

157. *SWAMP SPARROW, *Melospiza georgiana*.

Seen in small numbers in the spring of 1917 and more commonly in the autumn. In 1918, Young noted it from May 4 to 30 and again Aug. 21 to Oct. 2. Strangely enough but one bird was seen in the summer, June 10, which seems to indicate that the species does not breed in the locality.

158. *FOX SPARROW, *Passerella iliaca*.

One specimen taken Sept. 22 is all that was seen in 1917. In 1918, Young noted single individuals on Sept. 16, 24 and 30, and a flock of 30 on the 25th.

159. *TOWHEE, *Pipilo erythrophthalmus*.

In 1917, fairly common in the spring and still present Sept. 19 and 21. In 1918, Young saw a few individuals with general regularity from May 24 to July 29. A single bird, Aug. 13, and another Sept. 19.

160. *ROSE-BREADED GROSBEAK, *Zamelodia ludoviciana*.

Fairly common during the spring visit in 1917. In 1918 observed irregularly from May 16 to Aug. 5.

161. *PURPLE MARTIN, *Progne subis*.

A few seen daily in 1917, probably the same ones. A few occupied a box near an adjoining summer cottage and another colony was found nesting according to aboriginal habit in a hollow tree a few miles from camp. In 1918, noted by Young from May 17 to Sept. 20.

162. *CLIFF SWALLOW, *Petrochelidon lunifrons*.

In 1917 a few seen daily with the flocks of Barn Swallows about camp and occasional birds elsewhere. Seton noted twenty-five nests on a barn in 1891. In 1918, noted from May 24 to Sept. 17.

163. *BARN SWALLOW, *Hirundo erythrogaster*.

Small colonies occupy most of the farm building groups in the neighborhood. In the autumn of 1917 this was the only swallow seen. In the chilly mornings a small flock of them would be found warming themselves on the sunny roof of the house where the frost was melting. As soon as the day warmed they disappeared over the meadows and rarely returned until the next morning. The last seen were on Sept. 21. In 1918, they remained common until Sept. 20.

164. *TREE SWALLOW, *Iridoprocne bicolor*.

In 1917, only a few seen each day in spring and none in the autumn. In 1918, they remained common until Aug. 21, but a few were seen thereafter until Sept. 17.

165. *BANK SWALLOW, *Riparia riparia*.

A few observed daily in the spring of 1917. The Ward brothers say that one stage of the lake left numerous steep banks five to six feet high and that swallows nested in these in great numbers. Now

these banks are far removed from the water, cut down by cattle and sheep, and are deserted by the birds. We saw no nesting places in the vicinity. Young noted it in 1918 only in autumn, arriving on Aug. 17, and seen in small numbers irregularly until Sept. 12.

166. *CEDAR WAXWING, *Bombycilla cedrorum*.

In 1917, a flock of a hundred or so seen on May 11 and smaller lots daily thereafter through the spring visit but not noted in the autumn. In 1918, the species was first seen on June 4th and irregularly observed until Sept. 26.

167. *LOGGERHEAD SHRIKE, *Lanius ludovicianus*.

In the spring of 1917 we found two breeding pairs and a single individual. I can find little foundation for Ridgeway's color distinction, "decidedly paler" of the White-rumped Shrike, *L. l. excubitorides*. Prairie birds are very slightly paler than *L. m. migrans* from eastern Ontario. The difference can only be observed by the closest comparison. In the four specimens taken at Shoal Lake the rumps are intermediate between that of eastern birds and *excubitorides* from Alberta. I, therefore, regard them as intermediates between these rather poorly defined races.

168. *RED-EYED VIREO, *Vireosylva olivacea*.

In 1917, not seen until May 30 after which occasional birds were noted. Not seen that autumn. In 1918, Young noted the species continuously, in fair numbers from May 17 to Sept. 16.

169. *PHILADELPHIA VIREO, *Vireosylva philadelphia*.

Not noted by us in 1917, but Seton has a specimen in his collection taken at Shoal Lake by Miller Christy on May 20, 1887; Young collected specimens on the following dates in 1918, May 21 and 24, June 1 and Sept. 24.

170. *WARBLING VIREO, *Vireosylva gilva*.

In 1917, quite common after May 28. In 1918, Young found it constantly present in fair numbers from May 20 to Sept. 26. All specimens are *V. g. gilva*.

171. *SOLITARY VIREO, *Lanivireo solitarius*.

Not noted by us in 1917, but seen by Young in 1918 from May 10 to 20 and Sept. 2 to 16.

172. *BLACK AND WHITE WARBLER, *Minotilta varia*.

In 1917, occasional individuals seen after May 30 in spring and one on Sept. 19. In 1918, Young noted it with fair regularity, but scarcer in July, from May 8 to Sept. 26. It probably breeds.

173. *NASHVILLE WARBLER, *Vermivora rubricapilla*.

Not noted in 1917 but reported by Young in 1918 to be very common in May and September. Noted May 18 to June 20 and Sept. 2 to 26 with occasional individuals through July.

174. *ORANGE-CROWNED WARBLER, *Vermivora celata*.

In 1917, seen the first two days of our spring visit and on Sept. 19. In 1918, Young noted it only from May 17 to 24. In specimens obtained the yellow is slightly lighter than in comparable eastern species, but as this is probably due to the cleaner and better condition and make up of the skins, I regard them as *V. c. celata*, the geographical probability.

175. *TENNESSEE WARBLER, *Vermivora peregrina*.

Not noted in 1917, but reported by Young in 1918 to be very common in May and September. Noted May 18 to June 24 and Sept. 2 to 26 with occasional individuals through July.

176. *CAPE MAY WARBLER, *Dendroica tigrina*.

Two taken at Maple Island on May 30, 1917, and noted by Young on May 21 to 24, 1918.

177. *YELLOW WARBLER, *Dendroica aestiva*.

In 1917, a few present on our arrival on May 17 but common after June 1. In 1918, common from May 8 to Sept. 16. Compared with the writer's experience with this species in southern Ontario this is a very late stay for the species as in the Lake Erie neighborhood Yellow Warblers are rarely seen after Sept. 1.

178. *MYRTLE WARBLER, *Dendroica coronata*.

In 1917, the commonest Warbler on both visits. In spring it disappeared about June 1, after which but occasional individuals were seen.

179. *MAGNOLIA WARBLER, *Dendroica magnolia*.

In 1917, rather scarce in spring. In 1918, on the contrary, Young found it quite common from May 16 to the 27th and in the late autumn from Sept. 2 to 28.

180. *CHESTNUT-SIDED WARBLER, *Dendroica pensylvanica*.

Individuals seen June 4 and 5 and on Sept. 17. Not seen by Young in 1918.

181. *BAY-BREASTED WARBLER, *Dendroica castanea*.

In 1917, only seen on June 2 and 6. In 1918, only noted on Sept. 6 to 12.

182. *BLACK-POLLED WARBLER, *Dendroica striata*.

In 1917, first seen on May 30. Quite common on June 2, and but occasional individuals thereafter. One seen on Sept. 17.

183. *BLACKBURNIAN WARBLER, *Dendroica fusca*.

One taken by Young on May 16, 1918, is our only record.

184. *BLACK-THROATED GREEN WARBLER, *Dendroica virens*.

Individuals seen by Young on May 24 and Sept. 4, a specimen being taken on the latter date. He also reports the remains of another impaled by shrikes without giving date.

185. *PALM WARBLER, *Dendroica palmarum*.

In 1917, present in limited numbers on our arrival but none seen after May 25. Several seen between Sept. 19 and 22. In 1918, noted by Young from May 8 to 30 and Sept. 6 to Oct. 2, the date of departure.

186. *OVENBIRD, *Sciurus aurocapillus*.

In 1917, a few single individuals were heard and seen in the deeper woods from May 29 on. Before leaving they become slightly more common. In 1918, noted by Young from May 21 to June 3, one individual in July, and then again from Sept. 2 to 14. This is a retiring species and oftener recognized by ear than sight. Its absence through June, July and August is probably more apparent than real.

187. *NORTHERN WATER THRUSH, *Sciurus noveboracensis*.

In 1917, two water thrushes were seen, perhaps an original pair, May 18 and June 2, in the dry willow grown creek bed by the Ward house. On Sept. 19 another was noted in the same locality. In 1918, the species was noted with daily regularity from May 10 to 25 and Sept. 4 to 26, with a single individual on Aug. 22. The specimens are in a very mixed lot of plumages, and one a male, Sept. 12, is nearly as white below as a Louisiana Water Thrush, *S. motacilla*; two other specimens are nearer the eastern one *S. n. noveboracensis* than *S. n. notabilis*. Three others while yellower below and blacker above and characteristic *notabilis* are quite comparable with some New Brunswick birds. I find that Grinnell's Water Thrush rests upon very inconstant characters.

188. *CONNECTICUT WARBLER, *Oporornis agilis*.

On June 4, 1917, one bird was seen under excellent conditions for determination, when shot it fell far away in heavy brush and could not be found. One juvenile was taken by Young on Sept. 16.

189. *MOURNING WARBLER, *Oporornis philadelphia*.

Several times in the spring of 1917 I thought I heard this bird in a slashing in the oak patch in the big bluff behind the camp. It kept so close to a limited locality that I have no doubt that it was nesting nearby. It was absolutely identified June 14 when secured. In 1918 the species was noted by Young from May 30 to June 8 and one was taken Sept. 7. Specimens of this species in fall plumage are rather scarce in collections as it usually drifts through very inconspicuously early in the autumn.

190. *MARYLAND YELLOWTHROAT, *Geothlypis trichas*.

Quite common after June 2. In the autumn individuals were seen Sept. 21 and 22. The species obtained are referable to *G. t. occidentalis*, the

Western Yellow Throat. The backs are faintly lighter than eastern and intermediate between them and individuals from Indian Head and Edmonton, but the white foreheads are decidedly more extensive than in eastern species.

191. *WILSON'S WARBLER, *Wilsonia pusilla*.

Only seen in 1918 on May 18. In 1918, Young observed the species on May 16, 18 and 24.

192. *CANADIAN WARBLER, *Wilsonia canadensis*.

One taken on June 6, 1917, and noted by Young on May 24 and June 4.

193. *REDSTART, *Setophaga ruticilla*.

Not seen in 1917 until May 29, but common thereafter. In 1918, Young observed it from May 18 to June 8 and from Aug. 26 to Sept. 27. He did not note it through the summer.

194. *AMERICAN PIPIT, *Anthus rubescens*.

In 1918 fairly common during the early days of our spring visit along the lake shore, but none seen after May 30. Abundant in the fall occurring in large flocks, scattered bunches and individuals on all bare ground. In 1918, noted by Young on May 13 and 27 and Sept. 14 to date of departure Oct. 2.

195. *SPRAGUE'S PIPIT, *Anthus spraguei*.

Between June 5 and 9, 1917, I was much puzzled by an oft repeated and haunting bird song that could be barely heard and which I was unable to locate or recognize. It was a fine silvery gradually descending Ree-ree-ree-a-ree-a-ree-a-ree-aree of about eight notes, and an octave in range. It had a peculiar ringing jingle like the Veery but more sustained and regular. After innumerable futile attempts at discovering the singer at last I found it high over head flying about in circles for minutes at a time. It beat its wings vigorously against the slight breeze, making altitude rather than headway, and then the song came down. After the first two or three syllables reached the ground the wings fixed and the bird would sail in a downward spiral through the remainder of the song. This was repeated time and time again. It took considerable patience to watch the little vocalist until it came down to earth by an almost straight dive. Though nearly out of sight in the air the speed with which it dropped and the distance away at which it alighted indicated that it was originally up no more than a hundred yards or so while singing. Thereafter we could hear this song nearly the whole of every fine day, but this was the only bird of the species that we met. In 1918, Young reports the species occasionally throughout the summer from June 21 to Sept. 7.

196. *CATBIRD, *Dumetella carolinensis*.

Common, found in nearly every bluff. In 1918, Young noted it almost daily from May 20 to Sept. 11.

197. *BROWN THRASHER, *Toxostoma rufum*.

Fairly common. At least two pairs lived within hearing of our camp in 1917 and we met with half a dozen more on our spring rambles. In 1918, Young noted it constantly from May 16 to Aug. 24 with a couple of late individuals on Sept. 12 and 17.

198. *HOUSE WREN, *Troglodytes aedon*.

Very abundant and heard singing everywhere. They do not seem as inclined to build about the farm buildings as the species does in the east. There were innumerable possible nesting places about the farmstead that few eastern wrens could resist yet none of them were occupied. A few individuals were still present during the autumn visit. In 1918, Young noted it continuously and regularly from May 10 to Sept. 30. Specimens are distinctly *T. a. parkmani*.

199. *WINTER WREN, *Nannus hiemalis hiemalis*.

Not seen in 1917, but in 1918 Young observed single individuals from May 20 to 23, and on Sept. 16.

200. *SHORT-BILLED MARSH WREN, *Cistothorus stellaris*.

Not uncommon in certain localities. While usually inhabiting damp marshes some were found in dry grass or even in brushy edges in typical House Wren ground. None were certainly recognized in the fall of 1917 though Young lists it occasionally from June 1 to Sept. 25.

201. *LONG-BILLED MARSH WREN, *Telmatodytes palustris*.

Hardly commoner than the Short-bill and not so widely distributed. This species requires wetter and more extensive swamps than that species and the drying up of the marshes would more severely limit its habitat. A Marsh Wren glimpsed on the shore of a small pond on Sept. 19, 1917, was supposed to be of this species. Owing to their more restricted habitat the Long-billed Marsh Wren was, in 1918, even scarcer than the previous year. Young only records occasional individuals May 7 and June 10. Specimens show the light back, and brown rather than black head of *T. p. iliacus*.

202. *BROWN CREEPER, *Certhia familiaris*.

Young took two specimens of the Brown Creeper on Sept. 23 and 26, 1918.

203. *RED-BREADED NUTHATCH, *Sitta canadensis*.

One individual seen by Young on Sept. 24, 1918.

204. *BLACK-CAPPED CHICKADEE, *Penthestes atricapillus*.

Only seen in 1917 on May 20 and Sept. 26. Of the former one female was taken with an egg in oviduct ready for deposition. Scattered individuals noted by Young throughout the summer of 1918. Specimens taken have constantly longer tails than

any but extreme eastern specimens and hence are referred to *P. a. septentrionalis*.

205. *RUBY-CROWNED KINGLET, *Regulus calendula*.

In 1917, single individuals seen May 20 and June 1. In September a few were seen nearly every day. In 1918, noted by Young daily from May 7 to 24 and Sept. 9 to 30.

206. *WILSON'S THRUSH, *Hylocichla fuscescens*.

Common. Its golden chain song could be heard every evening from our camp. In 1918, Young recorded it nearly every day from May 9 to Sept. 28. All specimens show the slightly olive back of the Willow Thrush, *H. f. salicicola*.

207. *ALICE'S THRUSH, *Hylocichla aliciae*.

Thrushes of this genus were fairly common during migrations, but the bush was generally so dense and the birds so shy that collection gave the only certain separation between Alice's and Olive-backed Thrushes. I was fairly certain that we had specimens of both in the spring collection of 1917, but they all were lost in transit. One specimen taken by Young on Sept. 19 belongs to this species.

208. *OLIVE-BACKED THRUSH, *Hylocichla ustulata*.

In 1918, Young noted thrushes under this heading from May 15 to June 1 and Sept. 6 to 20. All his specimens except one mentioned under previous heading are of this species which is probably the more common. We have specimens of the following dates: juvenile and adult males Sept. 18, 1917, Sept. 6 and 9, 1918; and juvenile females Sept. 9, 1918. These four are slightly but consistently more olivaceous (or grayer) above and rather more heavily spotted on breast than comparable eastern *H. u. swainsoni* differing from them almost as much as the Willow Thrush, *H. f. salicicola* differs from the Veery, *H. f. fuscescens*. I find these same distinctive characters in an autumn specimen from as far west as Jasper Park but not in spring and summer birds from intermediate points. These specimens agree closely with the description and range of *H. u. almae* Oberholser, and if every perceptible difference is regarded worthy of a separate name this form probably has claim to reinstatement in the Check List.

209. *HERMIT THRUSH, *Hylocichla guttata*.

Quite common during the spring of 1917. The last specifically recognized was on June 2. In the autumn one was taken on Sept. 19. In 1918, Young noted the Hermit Thrush from May 13 to 24 and Sept. 3 to 30. These are of course eastern Hermit Thrush, *H. g. pallasii*.

210. *AMERICAN ROBIN, *Planesticus migratorius*.

Common on all visits, in 1918, at date of departure, Oct. 2.

211. *BLUEBIRD, *Siala sialis*.

Though not known by the Ward brothers as a

bird of the locality, we took a pair in 1917 on May 28, and later some six individuals were seen at various times in the neighborhood. In 1918, Young saw 2 and 7 birds on June 24 and 25. On Oct. 2 as he was leaving there was a migrational wave of the species and he lists 50 for that day. This suggests that far from Shoal Lake being the most northern extremity of the species range here there is a habitat beyond that is occupied by them in considerable numbers. The species is apparently spreading into this country.

ADDENDA.

Since the publication of the earlier parts of this paper the following published data on the birds of the locality have been called to my attention in

Recent Bird Records for Manitoba by E. T. Seton, *Auk*, XXV, 1908, pp. 450-454.

20. (*antea*) BLACK DUCK, *Anas rubripes*.

Mr. Seton here reports another Shoal Lake specimen of this species in his collection taken by Geo. H. Meacham in 1901 who reports "two or more were shot at Shoal Lake in 1899".

28. (*antea*) WOOD DUCK, *Aix sponsa*.

Seton says: "G. H. Meacham reports it rare at Shoal Lake, but one or two are seen there each year".

212 LEAST BITTERN, *Ixobrychus exilis*.

Seton says: "Frank M. Chapman saw one at Shoal Lake, June, 1901".

BRIEF REPORT OF THE OTTAWA FIELD-NATURALISTS' CLUB FOR THE YEAR ENDING MARCH 18, 1919.

The fortieth year of the existence of The Ottawa Field-Naturalists' Club has been the most successful in the recent history of the society. The club activities are directed toward popularizing and diffusing knowledge of the natural sciences, and have been carried on in three chief ways: a course of lectures, two series of field excursions, and the publication of THE OTTAWA NATURALIST.

The club membership now numbers 540. Twenty-one members serving overseas have been carried gratis.

The lecture programme consisted of seven scheduled lectures and a special lecture on wild geese by Mr. "Jack" Miner, of Kingsville, Ontario. The lectures are planned to create a more intelligent interest in Canadian natural history, and to give a better understanding of the value of scientific work.

The field excursions were well patronized, especially the spring series at which the attendance averaged 38. Weather conditions reduced the attendance at the fall series. The spring series consisted of five outings and the autumn series of three outings. Scientific men attended the excursions to direct interest and answer questions.

THE OTTAWA NATURALIST, the official organ of the Club has been enlarged in dimensions and improved in material qualities and by the introduction of a cover design, more illustrations and more articles of Dominion-wide interest.

At the request of several natural history societies of the Dominion, a plan of affiliation has been arranged, the magazine of The Ottawa Field-Naturalists' Club to be the medium of publication.

The officers and committees for the year 1919 are as follows:

President, M. Y. Williams; Vice-Presidents, L. D. Burling, P. A. Taverner; Secretary, Clyde L. Patch; Treasurer, F. W. Waugh; Editor, Arthur Gibson.

Additional members of Council: Hoyes Lloyd; W. T. Macoun, G. A. Millar, R. M. Anderson, J. M. Macoun, Miss M. E. Cowan, Miss Crampe, C. B. Hutchings, C. M. Sternberg, H. I. Smith, H. McGillivray, H. B. Sifton.

STANDING COMMITTEES OF COUNCIL.

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Lectures—J. M. Macoun, P. A. Taverner, L. D. Burling, W. T. Macoun, G. A. Millar, R. M. Anderson.

Trust Funds—W. T. Macoun, C. Gordon Hewitt, H. M. Ami.

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LEADERS AT EXCURSIONS.

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Geology—Dr. E. M. Kindle, Dr. W. Y. Williams, H. McGillivray, L. D. Burling, E. Poitevin, Dr. M. E. Wilson.

Ornithology—P. A. Taverner, C. L. Patch, Dr. M. Y. Williams, A. G. Kingston, Hoyes Lloyd.

Zoology—Dr. R. M. Anderson, A. Halkett, E. E. Lemieux, E. A. LeSueur, C. H. Young, C. E. Johnson.

Photography—W. S. Hutton.

NOTES AND OBSERVATIONS.

AMERICAN SOCIETY OF MAMMALOGISTS.—The organization meeting of the American Society of Mammalogists was held in the New National Museum, Washington, D.C., April 3 and 4, 1919, with a charter membership of over two hundred and fifty, of whom sixty were in attendance at the meeting. The following officers were elected:

President, C. Hart Merriam (Washington); First Vice-President, E. W. Nelson (Washington); Second Vice-President, Wilfrid H. Osgood (Chicago); Recording Secretary, H. H. Lane (Oklahoma); Corresponding Secretary, Hartley T. H. Jackson (Washington); Treasurer, Walter P. Taylor (Washington). The Councilors are: Glover M. Allen (Cambridge); R. M. Anderson (Ottawa, Canada); J. Grinnell (Berkeley); M. W. Lyon (Washington); W. D. Matthew (New York); John C. Merriam (Berkeley); Gerrit S. Miller, Jr., (Washington); T. S. Palmer (Washington); Edward A. Preble (Washington); Witmer Stone (Philadelphia); and N. Hollister (Washington), Editor.

Committees were appointed on: Life Histories of Mammals, Charles C. Adams, Chairman; Study of Game Mammals, Charles Sheldon, Chairman; Anatomy and Phylogeny, W. K. Gregory, Chairman; and Bibliography, T. S. Palmer, Chairman.

The policy of the Society will be to devote its attention to the study of mammals in a broad way, including life histories, habits, evolution, palaeontology, relations to plants and animals, anatomy and other phases. The Society arranged to start the publication this year of a "Journal of Mammalogy," in which popular as well as technical matter will be presented. This journal will fill a long felt want in the natural history world, for with all the publications dealing with bird life on this hemisphere, there has been none making a specialty of the no less interesting and important mammalian life.

In choosing the name of the Society, the word American is used in the broad sense of including all the Americas, North as well as South. Canada was represented at the organization meeting by two men, and several Canadians appear among the charter members. The Society starts out democratically, with but one class of members, the general consensus of opinion being that the establishment of fellows and different classes of members would not be conducive to the good feeling and harmony desirable in a society of scientific aims. The Society invites the co-operation and support of all persons in the study and conservation of the mammalian life of America.

REMARKS CONCERNING SAND LAUNCES.—There has recently been received for identification by the Fisheries Branch of the Department of the Naval Service a number of small specimens of Sand Launce (*Ammodytes personatus*) obtained from Barclay and Clayoquot Sounds, British Columbia.

The genus *Ammodytes* is represented on our coasts by three reported species in all, and all of which inhabit sandy shores.

The geographical ranges of the three are as follows:

A. personatus: Shores of the Pacific from California to Alaska, embracing British Columbia and the Aleutian Islands and westward to Japan. (This is the species of which the Department received specimens.)

A. americanus: Maritime Provinces, Gaspe Basin, Labrador and Newfoundland, southward to Cape Hatteras, North Carolina.

A. dubius: Labrador and Greenland, southward to Cape Cod. (As its name implies this is a doubtful species, and was first recorded by Reinhardt in 1838.)

Altogether there are about eight different species of sand launces, of which, besides our own, may be mentioned *A. lanceolatus* and *A. tobianus*, both of which occur on the British coasts.

ANDREW HALKETT.

THE MOUNTAIN BLUE BIRD, AND ITS IRREGULAR APPEARANCE.—Every observer of birds has noticed the abundance or scarcity of certain varieties in different years, and the reason of this periodical variation in appearance is often hard to account for. There are several birds that come under this class in Alberta, and perhaps the most prominent of these is the Blue Bird, (ours is the Mountain variety *Sialia currucoides*.)

The winter of 1917-18 was quite severe up till about the middle of March, when it turned very mild and spring like. On the 21st of the month I was very much surprised to see three Blue Birds flying along the telephone wires on one of the principal streets of Camrose. This was fully two weeks earlier than I had ever recorded them before in my twenty-eight years residence in Alberta.

A few days later the weather turned suddenly cold, and the month ended with below zero temperatures. The cold extended into Montana, between 200 and 300 miles south of this latitude. There is reason to believe that these three birds were not the only ones to come north around the 21st of the month, and it is likely that a large migration took place at that time. The cold weather

came on so unexpectedly that there can be little doubt but what all the Blue Birds that ventured so far north at that time must have perished.

The consequence was that there was practically an entire absence of these birds in this district the following summer.

F. L. FARLEY,
Camrose, Alberta.

ON THE EARLY LIFE-HISTORY OF THE AMERICAN LOBSTER (*Homarus americanus*).—Were this tiny creature, just after it has emerged from the egg, to be enlarged to say ten inches in length and a regular ten-inch long lobster put along side of it, two forms, quite unlike in general appearance would be seen. The reason for this difference in general form is because whilst the mature lobster crawls about upon the bed of the sea, the little juvenal does nothing of the kind, but swims, or rather floats upon its back, through the water or near the surface of the water. It would be interesting to follow out in detail how this most valuable of all crustaceans becomes more and more modified as it passes from moult to moult, but it must suffice for the present to point out that by the time the lobster has acquired the crawling mode of locomotion it has not then reached an inch in length. Obviously the free swimming mode of movement is primitive, and there are crustaceans, for

instance the phyllopods, which swim upon their backs throughout their life-histories, but in the case of the decapods, which stand higher in the scale of crustacean life, and to which shrimps, crabs, and the lobster belong, this phenomenon is usually only temporary, and in the case of the lobster is purely so. Now when the mother lobster, guided by her instincts, approaches the more shallow parts of the sea in order that her eggs may hatch off her swimmerets, and once the eggs are all hatched off, her maternal duties are over, for that is all the maternity she has. The young nauplii are now left to their own resources. It was a wise provision of nature that led the mother lobster to the shallows, for the little helpless creatures are there defended against many dangers which would have been encountered further out at sea. Furthermore, they undoubtedly meet there with a plenteous supply of surface food. Nor is this all. In the sheltered harbors and bays the little lobsters have an opportunity to undergo their metamorphosis until as little crawling creatures they seek refuge among the sea-weeds and under the rocks; from which time on they become better and better equipped, through increase in size, a shell hardened with carbonate of lime, and a pair of powerful claws, to protect themselves at considerable depths in more exposed parts of the bed of the sea.

ANDREW HALKETT.

BOOK NOTICES AND REVIEWS.

INJURIOUS INSECTS AND USEFUL BIRDS. By Prof. F. L. Washburn. J. B. Lippincott Company, Philadelphia and London; 414 illustrations in text and four coloured plates. Price \$2.00.

This volume prepared particularly for high schools and agricultural colleges is largely the result of 21 years of work in economic entomology on the part of the author. It will of course also be a useful work of reference for gardeners and farmers generally. Chapters one to six deal with the losses to agriculture due to insects and rodents; farm practices to lessen these; external structure of insects; collecting and preserving insects; insecticides, spraying and fumigation. Chapters seven to eighteen discuss insect affecting various crops, such as apple, pear, small fruits, grain, roots, etc. Chapter XIX on "Our Insect Friends"; XX, "The Relation of Birds to Agriculture" and XXI, "Some

Four-Footed Pests of the Farm," complete the volume.—A. G.

OUTLINES OF ECONOMIC ZOOLOGY. By Albert M. Reese, Ph.D., Professor of Zoology in West Virginia University. Philadelphia, P. Blakeston's Son & Co. 316 pages. 194 illustrations.

This volume which has been based upon a brief course in economic zoology given by the author for several years in the above university, will be found of special value to students, not only those who are taking courses in general zoology, but also those who are interested in agriculture. The book is divided into fourteen chapters, as follows: I, Protozoa; II, Porifera; III, Coelenterata; IV, Echinodermata; V, Platyhelminthes; VI, Nematelminthes; VII, Annelata; VIII, Mollusca; IX, Arthropoda; X to XIV, Chordata. The importance of the study of economic zoology is becoming more apparent every day.—A. G.