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LAKE-SHORE BIRD MIGRATION AT BEAMSVILLE, ONTARIO.

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The following field notes were gathered during the summer and autumn of 1918. While in the service of the Royal Air Force the writer was stationed upon the south shore of Lake Ontario almost due north of the town of Beamsville. Here in checking the aerial gunnery practice six or seven hours were spent daily up in a fifty-foot tower at the water's edge. Periods on duty ranged from daylight until dark. As every day was spent largely out-of-doors and duty commenced on alternate mornings at dawn, excellent opportunity for observation was afforded. A rough bird census was taken daily and new migrants and disappearances thus noted.

The country surrounding the tower and within range of the field glasses consisted of the open lake northward, and to the south stretched a flat typically peninsular farming land of fields and orchards interspersed with remnant wood lots. Most of the notes were gathered from the tower; unless otherwise stated, each record following may be so taken. A few birds were noted in the woods to southward that did not show themselves close to the water.

The course of migration here was from east to west. A great many birds followed the shore and it was plain very early in the season that this was a pathway. Many expected species, however, notably the hawks, were disappointments, and the following gleanings may be as noteworthy for their omissions as their records. Nearly all migrants chose the fine days for moving and almost invariably passed during the early morning hours, or before 9 a.m. There was little movement in the afternoon. The bobolinks, bluebirds, blackbirds, snowflakes, horned larks, waxwings, pipits and swallows made a procession of it here; other species were more retiring and veiled their movements. Birds not mentioned in the following list were not seen in the autumn. No specimens were taken. Where any doubt existed in the mind of the writer, the record is marked so (?). The number in italics after the date gives the number of birds seen. The last notes were made November 26.

Colymbus auritus, Horned Grebe. Oct. 5, first noted; small company. Oct. 13, hundreds occupying waters near shore for several miles. They became quite callous to machine-gun fire and were very numerous till the end of the month. Only on rare occasions was one of these divers noted in flight. Numbers declined as follows: Nov. 6 (50); Nov. 8 (50); Nov. 16 (1); Nov. 18 (few); Nov. 26 (1).

Gavia imber, Loon. Aug. 10 (1); Aug. 20 (1); Sept. 30 (1). During October seen almost daily and often in flight. Nov. 1 (2 in flight); Nov. 6 (young); Nov. 11 (1); Nov. 19 (one flying high south-east across the peninsula).

Larus argentatus, Herring Gull. Aug. 17 (6)? Owing to the difficulty in distinguishing this from the next species, no exact record could be kept.

Argentatus was noted in September and October but very sparingly, and in November the numbers rose and fell apparently with the weather. Nov. 4 (numerous); Nov. 7 (beautiful adult picked up on shore); Nov. 20 (numerous); Nov. 26 (adult and young).

Larus delewarensis, Ring-billed Gull. Much more common than the preceding species up till November. July 21, July 28, Sept. 26, Oct. 13, Oct. 17, Oct. 19 (young); Oct. 23, 26 and 29 (numerous); Nov. 10.

Larus philadelphia, Bonaparte's Gull. Oct. 13 (flock); Oct. 17, Oct. 31, Nov. 1 (flock). Observed also Nov. 2, 3, 4, 6, 7, 10 and 18. Unlike the larger gulls, this bird almost invariably was posting west close to shore.

Sterna caspia, Caspian Tern. Sept. 4 (3); Sept. 25 (2). One of these birds in the first instance and both in the second were travelling east fairly close to shore.

Sterna hirundo, Common Tern. Aug. 19 (12); Aug. 22 (3); Aug. 25 (2); Sept. 6 (flock); Sept. 17 (11); Oct. 1 (20); Oct. 2 (three flocks). In nearly all cases moving westward, low.

Phalacrocorax dilophus, Double-crested Cormorant. On Nov. 21, 23 and 24, a lone bird, doubt-

less this species, took perch on one of the floating targets. Machine-gun fire from the air did not seem to interfere with his fishing.

Merganser americanus, American Merganser. Suspected in the distance more than once, but none of the mergansers were positively identified in the autumn.

Anas obscura, Black Duck. The commonest duck noted on this shore. Noted plentifully from first appearance July 26, until November. Large flocks on the lake Sept. 15. Last noted Nov. 4.

Mareca americana, Baldpate. Sept. 26?.

Spatula clypeata, Shoveller. Sept. 19 (2).

Dafila acuta, Pintail. Sept. 20 (3); Oct. 18 (flock); Nov. 1 (1).

Aythya marila, Scaup. Sept. 27 (flock)?.

Clangula clangula americana, American Golden-eye. Oct. 26 (flock); Nov. 4, Nov. 5, Nov. 10 (flock); Nov. 26 (3).

Charitonetta albeola, Buffalo-head. Nov. 7 (3); Nov. 10 (several).

Harelda hyemalis, Old Squaw. Nov. 4 (flock of 35); Nov. 10 (several).

Oidemia deglandi, White-winged Scoter. One of the common ducks. Oct. 8 (flock); Oct. 17, Oct. 18, Oct. 23 (small flock); Nov. 4, Nov. 10 (2); Nov. 21 (6); Nov. 26 (1).

Branta canadensis, Canada Goose. Oct. 7 (20); Oct. 18 (43); Nov. 2 (small flock); Nov. 5 (14); Nov. 8 (6). Three of these flocks when observed were in migration and followed a south-easterly course toward Niagara.

Ardea herodias, Great Blue Heron. July 22 (2); July 23 (2). During August seen singly almost daily, usually going west, low over the water. Not noted between Aug. 22 and Oct. 15. Oct. 15 (1); Oct. 27 (1). None were seen to stop here.

Butorides virescens, Green Heron. July 27 (2); Aug. 13 (2); Aug. 16 (1);. These two birds were noted at their fishing along the little creek that flowed by the foot of the lower tower.

Nycticorax nycticorax naevius, Black-crowned Night Heron. Aug. 10 (1); Aug. 31 (1). These followed the shore in the evening.

Arenaria morinella, Ruddy Turnstone. Aug. 13 (1). Noted resting on the gravelly beach.

Numenius hudsonicus, Hudsonian Curlew. July 31 (15); Aug. 5 (1); Aug. 6 (small flock); Aug. 7 (4); Aug. 10 (15); Sept. 8 (3); Oct. 1 (2)?. Those noted Sept. 8 were travelling east; the others were going west; none were seen to stop on this shore.

Bartramia longicauda, Bartramian Sandpiper. July 25, Aug. 9 (2); Aug. 10 (2). This species bred locally not far from the tower. The bird observed July 25 either came across the lake or made a wide circuit over the water, as he was noted coming inland several hundred yards. The others were high in air and travelling westward.

Actitis macularia, Spotted Sandpiper. The commonest shore bird in this section. Bred plentifully; very numerous through July and August, the numbers dwindling early in September and by the 11th of the month was gone. A doubtful record Sept. 19. This bird gave no hint of his manner of leave-taking; it simply disappeared.

Calidris arenaria, Sanderling. Aug 1 (3)?. In flight low over water, west-going.

Squatarola squatarola, Black-bellied Plover. Aug. 10 (2); Aug. 23 (flock); Aug. 29 (1). On Aug. 2, the two plover were noted in company with eleven curlews. These plover did not rest here; all were observed west-going.

Oxyechus vociferus, Kildeer. July 23 (7); July 30 (several); Aug. 5 (1); Aug. 7 (2); Oct. 6 (1). The seven observed on July 23 were most probably a family. They were out over the water a considerable distance (300 yards) and were winging off westerly, evidently on a mission.

Aegialitis semipalmata, Semipalmated Plover. Aug. 7 (7); Aug. 12 (5). The first group noted were old and young. They did not use this shore as a stopping-place, but went by low as the other shore birds did.

Totanus melanoleucus, Greater Yellowlegs. Aug. 1 (1)?. Only a fleeting glimpse of this bird was secured though his notes were heard. No other Yellowlegs were observed throughout the season.

Bonasa umbellus togata, Ruffed Grouse. Observed in woods back on rocky ridge. During the "mad" season in October a bird of this species was reported in the orchard near the tower. It was not seen by the writer.

Zenaidura macroura, Mourning Dove. Common through July, August and September. Noted also Oct. 4 and Oct. 13. The latter observation was peculiar for at this date a fledgling barely able to fly was discovered.

Pandion haliaetus carolinensis, American Osprey. Sept. 20, a beautiful adult hunted near the shore during the afternoon and disappeared to eastward.

Circus hudsonicus, Marsh Hawk. An old male in grey plumage came occasionally to hunt in a nearby field. Noted July 25, July 30, Aug. 29, Sept. 10. Doubtless always the same bird. One young bird was seen here also, but the date was not recorded.

Accipiter velox, Sharp-shinned Hawk. Nov. 23 (1)?.

Accipiter cooperi, Cooper's Hawk. Sept. 17 (1)?; Oct. 12 (1); Nov. 30 (1).

Buteo borealis, Red-tailed Hawk. Sept. 18 (1)?.

Falco sparverius, American Sparrow Hawk. Bred locally, but no birds were observed in migration along the shore.

Buteo smainsoni, Swainson's Hawk. Sept. 2 (1)? Possibly a Red-shouldered Hawk, *Buteo lineatus lineatus*. Field description reads: "Yellowish below; darker towards breast; little brown marking on under parts.

Megascops asio, Screech Owl. Oct. 9, heard hooting in the orchard close to the tower at night.

Coccyzus erythrophthalmus, Black-billed Cuckoo. One of these birds evidently nested near the tower as it was observed carrying food over a regular beat. Disappeared July 22 and none seen later.

Ceryle alcyon, Belted Kingfisher. Aug. 17, Aug. 30, Oct. 3, Oct. 13. Always noted singly; never in migration.

Dryobates pubescens medianus, Downy Woodpecker. Sept. 14, Sept. 20.

Dryobates villosus, Hairy Woodpecker. Nov. 2, heard his loud call in the woods a mile south of the lake. Not noted on the shore.

Colaptes auratus luteus, Northern Flicker. Sept. 20 (1).

Melanerpes erythrocephalus, Red-headed Woodpecker. Aug. 26. This bird like the flicker, though breeding locally close at hand, did not appear on the shore more than once in migration.

Sphyrapicus varius, Yellow-bellied Sapsucker. Sept. 29. On this date a young bird was noted in the woods back of the ridge. Not noted on the shore.

Chordeiles virginianus, Night Hawk. Aug 21 (3); Aug. 24 (8); Aug. 27 (2); Aug. 31 (2); Sept. 3 (1); Sept. 6 (1); Sept. 9 (1); Sept. 23 (1). These followed the usual westerly course.

Chaetura pelagica, Chimney Swift. July 28 (4); July 31 (4); Aug. 17 (15); Aug. 29 (numerous); Sept. 1 (2); Sept. 2 (2); Sept. 3 (1); Sept. 4 (1); Sept. 5 (3); Sept. 7 (5); Sept. 9 (2); Sept. 17 (3); Sept. 25 (2); Sept. 27 (several). Their destination was westward.

Trochilus colubris, Ruby-throated Hummingbird. Sept. 14 (1). Female or young.

Tyrannus tyrannus, Kingbird. In greatest numbers about Aug. 22. Numbers thinned by Aug. 28. Sept. 2 disclosed a family, and Sept. 4 a single bird.

Myiarchus crinitus, Crested Flycatcher. Sept. 14. A young bird noted in the timber. Not seen on the shore.

Sayornis phoebe, Phoebe. Sept. 1 (family); Sept. 2 (heard calling); Sept. 12 (2, old and young); Sept. 17 (1); Sept. 26 (1); Sept. 29 (heard).

Contopus virens, Wood Pewee. July 30, Aug. 22, Aug. 28, Sept. 1 (heard); Sept. 6 (heard); Sept. 11 (heard); Sept. 14, 17 and 18.

Empidonax minimus, Least Flycatcher. Aug. 28 (1).

Empidonax flaviventris, Yellow-bellied Flycatcher. Sept. 2 (2). These were noted in the timber back from the shore.

Otocoris alpestris praticola, Prairie Horned Lark. Horned larks bred in the adjoining fields, but migrants supposedly this species followed the shore regularly in small parties throughout October and November. Oct. 2 (10); Oct. 10 (numerous); Oct. 26 (flock); Oct. 30 (flock); Nov. 3 (flock); Nov. 6 (flock).

Corvus americanus, American Crow. Bred locally, but no flocks passed this way in migration. Sept. 23 (family); Sept. 29 (small party); Oct. 1 (4); Oct. 7, Oct. 17, Nov. 9 (2).

Cyanocitta cristata, Blue Jay. Observed back in the timber, but not on the shore.

Quiscalus quiscula aeneus, Bronzed Grackle. Bred locally. The flock of locals after gathering up to about fifty strong on July 20, left and was seen no more.

Scolecophagus carolinus, Rusty Blackbird. Sept. 30 (flock, males and females); Oct. 1 (flock); Oct. 4 (flock).

Agelaius phoeniceus, Red-winged Blackbird. July 22 (15); Sept 1 (small party, males and females); Sept. 18 (12); Sept. 25 (small flock); Oct. 4 (flock). With the exception of the July flock, all the rest were migrants, like the other birds, headed westward.

Molothrus ater, Cowbird. This bird furnished surprises. Bred locally and during July the young were under observation almost daily. On July 31 a female and two young were noted after which the species disappeared entirely until Oct. 4, when a whole flock of males, females and young in company with Rusty Blackbirds, one morning surrounded the tower and spent an hour before moving off westward. A few more followed over the same course Oct 6 and on Oct. 15 a male was noted.

Icterus galbula, Baltimore Oriole. Aug. 3 (2, young); Aug. 11 (male in song); Aug. 24, Aug. 30 (2); Sept. 1 (1); Sept. 2 (2). These birds probably were locals. On Aug. 24 two were seen to fly out over the lake a distance as though restless and ready to move; and their disappearance a week later followed.

Dolichonyx oryzivorus, Bobolink. Bred locally, but it was also one of the most interesting migrants. July 20 ("chinking" restlessly); July 22 (flock of fifty, only one faded male in evidence); Aug 6 (two small flocks); Aug 11 (30); Aug. 15 (flock);

Aug. 17 (flock); Aug. 22 (several flocks); Aug. 24 (several flocks); Aug. 26 (several flocks); Aug. 28 (flock); Aug. 31 (flock heard in the night, 10 o'clock); Sept. 2 (several flocks); Sept. 3 (flock); Sept. 7 (heard passing over). All these later flocks with the exception of one or two on Aug. 22, moved westward. They picked fair mornings and flew low. Usually they followed a course out over the water, aiming at the points on the shore and cutting the bays, and though they were often disconcerted by the aeroplanes, could not be shaken from their course. The height of their migration passed on Aug. 24. All these flocks were small, suggesting families, from five to eight being the rule. None were observed en route in the afternoon.

Sturnella magna, Meadowlark. Bred locally. Observed a small flock of about a dozen almost daily from Aug. 12 till Oct. 17. Only once (Oct. 6) did they show any evidence of migration, when a number of them flew off westward over the orchards as though in farewell.

Astragalinus tristis, American Goldfinch. Sept. 2 (several); Sept. 18 (common); Oct. 29 (five or six flocks heard); Nov. 16 (flock heard). It will be seen that this bird here was somewhat erratic. Only on Oct. 29 when several flocks passed overhead toward the west did it give a clue to its course.

Carpodacus purpureus, Purple Finch. This bird was never definitely identified though the clucking notes thought to belong to this species were heard Aug. 12, Sept. 2 and Oct. 6. A male, probably nesting, sang all summer in the ravine behind the main camp to southward.

Pooecetes gramineus, Vesper Sparrow, Sept. 14, Sept. 26, Sept. 29 (4); Oct. 2 (1); Oct. 4 (1); Oct. 12. This was a common summer resident about the tower, but like the song sparrow gave no hint of its manner of leave-taking. It merely disappeared.

Passerculus sandwichensis savanna, Savanna Sparrow. Bred locally. Sept. 2 (1); Sept. 2 (in song); Sept. 8 (in song). This was the last definite record; there was mystery about this bird. What was probably his migration began Sept. 9. On the morning of this date fully fifty sparrows answering to the Savanna's markings, size and notes, came close by the tower. They took perch in the top of the walnut and locust trees and gave excellent view in the field-glasses. In threes and fours they broke away at short intervals and went dodging off westward, plainly on a mission. On Sept. 14 and Sept. 25 they repeated these field manœuvres. A single bird of the same was noted Sept. 28. To all appearances these were Savannas, but the trait did not seem to ring true.

Zonotrichia albicollis, White-throated Sparrow. Sept. 25 (heard); Oct. 4 (heard in song); Oct. 7 (several seen).

Spizella monticola, Tree Sparrow. Oct. 18 (1); Nov. 6 (5); Nov. 8 (several); Nov. 16 (flock of 12). Never observed en route; always in the shrubbery.

Passer domesticus, House Sparrow. During the late autumn several densely crowded small flocks of these adjustible gamins passed the tower. They were mostly west-bound and suggested a local migration.

Melospiza melodia, Song Sparrow. Perhaps the commonest bird of the locality. Very numerous during September, thinning out in mid-October. Observed also Oct. 31 and Nov. 6 (2).

Passerella iliaca, Fox Sparrow. Oct. 12 (1). Observed in the woods half a mile from the shore.

Junco hyemalis, Slate-colored Junco. Oct. 6 (several); Oct. 12 (numerous); Oct. 13, Oct. 14. As usual, these birds were not noted on the march; they merely came, increased and diminished.

Passerina nivalis, Snowflake. Oct. 15 (2); Oct. 29 (2 flocks); Nov. 3 (4 flocks); Nov. 5 (flock); Nov. 6 (6 flocks); Nov. 9 (flock); Nov. 10 (4); Nov. 16 (flock); Nov. 21 (large flock); Nov. 26 (flock). For the Snowflakes this shore seemed a direct pathway; they never on any occasion showed inclination to come down to the nearby fields.

Acanthis linaria, Redpoll. Oct. 18 (1); Oct. 19 (3); Oct. 20 (several); Oct. 29 (5 flocks); Oct. 30 (numerous); Nov. 3 (flock); Nov. 5 (flock); Nov. 6 (flock). These tiny sprites behaved like the Snowflakes, except that they invariably flew higher. Their chattering notes were the only means to identification.

Pipilo erythrophthalmus, Towhee. Bred locally. Observed in timber Sept. 14 (1); Sept. 29 (1); Oct. 7 (1). Not observed at all on the shore.

Calcarius lapponicus, Lapland Longspur. Noted only once (Nov. 9) when three went clicking overhead.

Petrochelidon lunifrons, Cliff Swallow. Aug. 5 (a few small parties); Sept. 8 (1); Sept. 19 (1)?. It was rather hard to definitely identify the swallows as they posted by the tower on rapid wings. Several "doubtfuls" were recorded. The bird on Sept. 9 was with barn swallows and chimney swifts; the one noted Sept. 19 was alone. All were moving westward post-haste.

Hirundo erythrogaster, Barn Swallow. The commonest swallow here in migration. July 19 (family); July 22 (80 counted, passing a given point in 5 minutes, west-going); Aug. 10 (flock); Aug. 24 (2 families); Sept. 5 (1); Sept. 9 (12);

Sept. 12 (1); Oct. 4 (1).

Iridoprocne bicolor, Tree Swallow. Aug. 10 (1 young in a flock of barn swallows); Sept. 12 (3)?.

Riparia riparia, Bank Swallow. During the summer the commonest swallow species here; several colonies nested in the perpendicular clay banks. Latest appearances, Aug 26 (2); Sept. 1 (2)?; Sept. 12 (5).

Progne subis, Purple Martin. Only one martin was seen on this shore. This was late in August; the date of appearance was neglected.

Ampelis cedrorum, Cedar Waxwing. In very large numbers along the shore by Aug. 10. The height of migration passed about Aug 28, in small parties they moved off along the shore almost exactly as the bobolinks had done. They travelled low, seldom over two hundred feet. Later dates gave Sept. 4 (1); Sept. 5 (1); Sept. 7 (3); Sept. 10 (2); Sept. 11 (1).

Lanius ludovicianus migrans, Migrant Shrike. Bred locally. Old and young, the former with a fledgling house sparrow in its clutches, observed on the range by the tower Aug. 4. Not seen later.

Lanius borealis, Northern Shrike. Nov. 11. Shrike noted on a high perch in the field; doubtless this species.

Vireo olivaceus, Red-eyed Vireo. Aug. 15 (1); Sept. 2 (several); Sept. 8 (1); Sept. 14 (2); Sept. 24 (1); Sept. 29 (2).

Vireo flavifrons, Yellow-throated Vireo. Sept. 8 (1)?.

Mniotilta varia, Black and White Warbler. Sept. 8 (1). Observed in timber half a mile from shore.

Helminthophila peregrina, Tennessee Warbler. Sept. 2 (in song)?.

Dendroica tigrina, Cape May Warbler. Sept. 24 (1 male).

Dendroica aestiva, Yellow Warbler. Bred plentifully. Last young noted July 28. Aug. 6 (2); Aug. 11 (6); Aug. 22 (2). Neither this warbler nor any of the others were observed to make any bold flights. They merely darted from one cover to another.

Dendroica caerulescens, Black-throated Blue Warbler. Sept. 5 (adult male); Oct. 12 (adult male). The second bird was noted back from the shore in the timber.

Dendroica coronata, Myrtle Warbler. Sept. 23 (1); Sept. 25 (heard); Sept. 29 (7); Oct. 1 (1); Oct. 12 (numerous). Observed also Oct. 13, 15, 16 and 17. On Oct. 16 several of these fine warblers were in company with the bluebirds and as they worked below the tower there was a stiff contest between the two over the capture of a species of large insect prey coming from over the water. Often a bluebird and a warbler went after the same victim. Seen from above it was a beautiful picture indeed.

Dendroica maculosa, Magnolia Warbler. Sept. 6, Sept. 14 (family); Sept. 24 (adult male).

Dendroica striata, Black-poll Warbler. The warbler most commonly observed on the shore. Sept. 5, 6, 15, 17. Sept. 19 (2); Sept. 23 (1); Sept. 24 (2); Sept. 25 (2)

Dendroica virens, Black-throated Green Warbler. Oct. 13 (1); Oct. 14 (1). Neither of these birds were on the shore; both were back in the timber.

Geothlypis trichas brachidactyla, Northern Yellow-throat. Aug. 29 (1); Sept. 17 (1). The first was an adult; the second young.

Wilsonia canadensis, Canadian Warbler. Sept. 8 (family). These were observed back in the woods.

Setophaga ruticilla, American Redstart. Sept. 2 (young).

Anthus pensylvanicus, American Pipit. Sept. 13 (3); Sept. 23 (1); Oct. 31 (several). All these birds went by westward above the tower and showed no inclination to stop here.

Troglodytes aedon, House Wren. Sept. 25 (1).

Olbiorchilus hiemalis, Winter Wren. Oct. 7 (heard)?; Oct. 13 (1); Oct. 14 (1). All these birds were in the woods back from the shore.

Toxostoma rufum, Brown Thrasher. Bred locally, but not observed near the shore.

Galeoscoptes carolinensis, Catbird. Aug. 9 (2); Aug. 11 (1).

Sitta canadensis, Red-breasted Nuthatch. Sept. 2 (2); Sept. 8 (2); Oct. 4 (1). The September birds were noted in the timber to southward.

Sitta carolinensis, White-breasted Nuthatch. Oct. 6 (1); Oct. 17, Oct. 31, Nov. 11 (1); Nov. 6 (1). This species followed the shore more closely than the preceding.

Parus atricapillus, Black-capped Chickadee. Sept. 14 (2); Sept. 24 (family); Nov. 1 (numerous); Nov. 6, 7, 11, 26. These little sprites were most numerous during the first week in November. They plainly were working westward. On Nov. 1, during a strong south-westerly wind, four were observed to spring up from a nearby walnut and fight it out with the wind for several minutes. They made two or three trials and then gave it up. They were more numerous at this time than circumstances other than migration could warrant.

Regulus satrapa, Golden-crowned Kinglet, Oct. 12, 13, 14, 30 and Nov. 7. On the last two dates only, the birds were in the apple trees along shore. The earlier records were back in the timber. These birds were always in small companies.

Regulus calendula, Ruby-crowned Kinglet. Oct.

1 (1); Oct. 4 (1); Oct. 6 (3); Oct. 7 (4); Oct. 14 (2). With the exception of the last record when both species were found in company back in the woods, all the ruby-crowns were noted in the orchard below the tower.

Hylocichla aliciae, Grey-cheeked Thrush. Oct. 7 (1)?.

Hylocichla ustulata swainsoni, Olive-backed Thrush. Sept. 2 (several); Sept. 8, Oct. 7 (20); Oct. 12 (50); Oct. 13 (3). Not one bird of these numbers was observed at the tower; all clung to the woods to southward. Owing to the extreme difficulty in distinguishing the grey-cheek from the olive-back in the field, it is possible that numbers of the former may have been overlooked.

Hylocichla guttata pallasii, Hermit Thrush. Oct. 11 (1). On this date a thrush with a reddish tail was observed for a few moments almost directly below the tower. It was doubtless a hermit. Not seen elsewhere.

Merula migratoria, Robin. Sept. 2 (several); Sept. 7 and 8 and Oct. 4, heard in song; Oct. 13 (12); Oct. 18 (3); Oct. 31 (1); Nov. 1 (small flock).

Sialia sialis, Bluebird. Sept. (family); Sept. 14 (family); Sept. 29 (family); Oct. 4 (flock of 30); Oct. 6 (several; Oct. 8 (flock); Oct. 9 (several); Oct. 16 (several); Oct. 17 (several); Oct. 18 (several). The September records probably were all local birds; they were seen remote from the tower. But on Oct. 4 the birds were en route westward. They stormed into the locusts nearby—a beautiful blue blizzard—and after a short council they swirled away again over the orchards. On Oct. 8 a large flock went over without stopping to pay their respects. The later birds were in small numbers and taking their time.

THE FLORA OF WARRENS LANDING, LAKE WINNIPEG, MAN.

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Warrens Landing is at the extreme north of Lake Winnipeg and at the source of the Nelson river which carries all the waters of the lake to the Hudson Bay. It is north of the fifty-second parallel and is, therefore, in that territory which has been recently added to the Province of Manitoba.

The source of the Nelson river is about 2½ miles wide and is almost blocked by an island which is nearly 2 miles across with approximately 8 miles of coast line. The eastern channel is narrow and comparatively little water flows through it. The western channel is the important one. Here, the only signs or marks of civilization are four lighthouses, two on the mainland and two on the island, and two fishing stations, one on the mainland and one on the island. It was during a visit on the first eleven days in August, 1918, to the fishing station on the island that I made the observations recorded here.

Travelling northwards up Lake Winnipeg one cannot help noticing a number of natural features and I think the most conspicuous is the difference between the eastern and western shores. The eastern shore is strewn with large red rocks of Laurentian granite, whilst the western shore is littered with grey Cambro-Silurian limestone boulders. This feature is alone sufficient to make a study of the flora surrounding the lake of great interest. On the eastern side many species typical of Ontario reach their western limits and on the western shore are found the first of many prairie forms not found in the east.

Another conspicuous feature travelling northwards is the gradual ascendancy of coniferous trees over the deciduous ones. The coniferous trees are not frequent at the southern end of the lake and the deciduous trees are comparatively few around the the northern shores. The prevailing conifer is the white spruce, *Picea alba*, in the more southern parts, and the bog spruce, *Picea mariana*, in the swampy regions of the north. The deciduous trees in the northern parts around the lake are comparatively small and restricted to poplars, willows, and a few birches.

The island at Warrens Landing is practically all muskeg. It appears to be, for the greater part a deposit of mud on the top of granite and covered with from one to two feet of *Sphagnum*. Only in a few places is the rocky substratum exposed. It is thickly treed with the bog spruce. The shore on the south and west is littered with uprooted trees and shrubs. This is the result of rapid coast erosion and is due to the violence of lake storms, the strong and fast current carrying great masses of ice through the very shallow and comparatively narrow channel, and to heavy rain storms. During the eleven days I was there it rained every day and nearly every night and caused frequent landslides along the shore. Water slowly soaking through the *Sphagnum* washes out the loose muddy soil underneath and when a

heavy fall of rain saturates this peaty moss the weight is too great for it to remain in position and it breaks away and slides down to the water's edge.

The dominant feature of the island is the bog spruce, *Picea mariana*. It is by far the commonest and largest tree on the island. Near the shore in a few places the poplars are plentiful, but elsewhere they are scarce, the two species *Populus tremuloides* and *P. balsamifera* are evenly distributed. *Larix laricina* is not infrequent among the spruce.

The interest of the small sandy portion of the island centres on the variety of willows of which there are seven species, some of them being typically northern ones, as *Salix candida* and *S. argyrocarpa*. *Mertensia paniculata* is frequent here. The following beach plants are also restricted to this area, *Lathyrus maritimus*, *L. palustris*, *Artemisia caudata*, and *Juncus balticus* var. *littoralis*.

Two plants usually found in limestone regions, *Rhinanthus Kyrollae* and *Primula mistassinica*, are found on a small mud flat which has been thrown

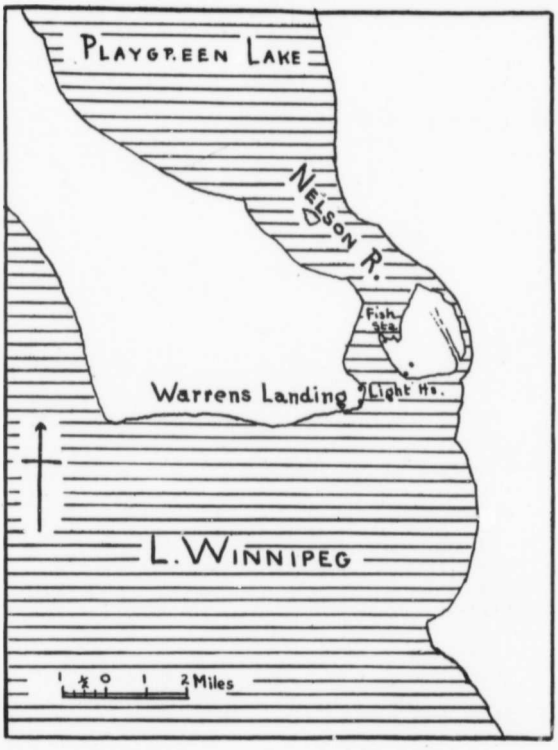

Fig. 1. Map showing the source of the Nelson river and the island in the source of Warrens Landing.

A dense shrubbery undergrowth prevails throughout the greater part of the island and the Labrador tea, *Ledum groenlandicum*, is the most prevalent. Other shrubs less numerous although fairly plentiful are *Kalmia polifolia*, *Chamaedaphne calyculata*; and *Viburnum pauciflorum*.

Under the shrubs many species, typical of northern regions, are found in large numbers. These include *Rubus arcticus*, *Rubus chamaemorus*, *Ranunculus lapponicus*, *Petasites trigonophyllus*, and *Stellaria longipes* var. *laeta*.

up by lake storms and is rich in fragments of broken calcareous shells.

Owing to the heavy and frequent rains many plants were found submerged. One patch of *Drosera rotundifolia*, was in from six to eight inches of water, nearly every plant was in flower and every flower was two inches or more above the water.

In the following list of species the arrangement and nomenclature is as far as possible that used in the seventh edition of Gray's Manual of Botany.

LIST OF PLANTS FOUND AT WARRENS LANDING ISLAND, LAKE WINNIPEG, MANITOBA.

EQUISETACEAE

Equisetum arvense L.
fluviatile L.
sylvaticum L.

PINACEAE

Juniperus communis L. var. *depressa* Pursh.
horizontalis Moench.
Larix laricina (Du Roi) Koch.
Picea mariana (Mill.) B.S.P.

TYPHACEAE

Typha latifolia L.

NAJADACEAE

Potamogeton interior Rydb.
Richardsonii (Benn.) Rydb.

*Carex Bebbii** Olney.
*brunnescens** Poir.
*retrorsa** Schewin.
*utriculata** Boott.
*viridula** Michx.
Eleocharis acicularis (L.) R. & S.
palustris (L.) R. & S.
Eriophorum callitrix Cham.
Scirpus microcarpus Presl.*
validus Vahl.*

LEMMACEAE

Lemna minor L.

JUNCACEAE

Juncus balticus Willd. var. *littoralis* Engelm.
*bufonius** L.
*Richardsonianus** Schutt.

Fig. 2. Part of the shore of the island at Warrens Landing, showing the effect of coast erosion. The trees are Picea mariana, Populus balsamifera and P. tremuloides. In the foreground on the left is Eleocharis palustris.

ALISMACEAE

Alisma Plantago-aquatica L.
Sagittaria latifolia Willd.

GRAMINEAE

Agropyron tenerum Vasey.
Alopecuris pratensis L.
Beckmannia erucaeformis (L.) Host.
*Deschampsia caespitosa** (L.) Beauv.
*Elymus macounii** Vasey.
Hordeum jubatum L.
*Panicularia grandis** (S. Wats.) Mash.
*Phalaris arundinacea** L.

CYPERACEAE

*Carex atherodes** Spreng.
*aquatilis** Wahlenb.
aurea Nutt.

LILIACEAE

Smilacina trifolia (L.) Desf.

IRIDACEAE

Sisyrinchium angustifolium Miller.

ORCHIDACEAE

Habenaria hyperborea (L.) R. Br.

SALICACEAE

Populus balsamifera L.
tremuloides Michx.
Salix argyrocarpa Anders.
candida Flügge.
discolor Muhl.
longifolia Muhl.
lucida Muhl.

* Plants marked with * were sent to Dr. M. O. Malte, Ottawa, for identification and confirmation.

Salix pellita Anders.
rostrata Richards.

URTICACEAE
Urtica gracilis Ait.

POLYGONACEAE
Polygonum aviculare L.
Convolvulus L.
Persicaria L.
Rumex mexicanus Meism.

CHENOPODIACEAE
Chenopodium album L.

CARYOPHYLLACEAE
Arenaria lateriflora L.
Stellaria longifolia Muhl.
longipes Goldie var. *laeta* (Richards) Wats.

RANUNCULACEAE
Actaea alba (L) Mill.
rubra (Ait.) Willd.
Anemone canadensis L.
Ranunculus abortivus L.
Cymbalaria Pursh. var *alpinus* Hook.
aquatilis L. var. *capillaceous* D.C.
flammula L. var. *reptans* (L.) Mey.
lapponicus L.
pennsylvanicus L. f.
sceleratus L.

CRUCIFERAE
Arabis Drummondi Gray.
Brassica arvensis (L.) Kütz.
Capsella Bursa-pastoris (L.) Medic.
Erysimum cheiranthoides L.
Lepidium apetalum Willd.
Radicula palustris (L.) Moench.
Sisymbrium incisum Engelm.

DROSERACEAE
Drosera rotundifolia L.

SAXIFRAGACEAE
Mitella nuda L.
Parnassia palustris L.
Ribes oxyacanthoides L.
prostratum L'Her.

ROSACEAE
Fragaria virginiana Duchesne.
Geum strictum Ait.
Potentilla Anserina L.
monspeliensis L.
palustris L.
Rosa acicularis Lindl.
Rubus arcticus L.
Chamaemorus L.
idaeus L. var. *aculeatissimus* (Mey) R. & T.
triflorus Richards.

LEGUMINOSAE
Astragalus canadensis L.
Lathyrus maritimus (L.) Bigel.
palustris L.
Vicia americana Muhl.

GERANIACEAE
Geranium Bicknellii Britton.

VIOLACEAE
Viola nephrophylla Greene.

ELAEAGNACEAE
Elaeagenus argentea Pursh.

ONAGRACEAE
Epilobium adenocaulon Haussk.
angustifolium L.

HALORAGIDACEAE
Hippuris vulgaris L.

ARALIACEAE
Aralia hispida Vent.

UMBELLIFERAE
Carum Carvi L.
Heracleum lanatum Michx.
Sanicula marilandica L.
Sium cicutaefolium Schrank.

CORNACEAE
Cornus canadensis L.
stolonifera Michx.

ERICACEAE
Arctostaphylos uva-ursi (L.) Spreng.
Chamaedaphne calyculata (L.) Moench.
Chiogenes hispidula (L.) T. & G.
Kalmia polifolia Wang.
Ledum groenlandicum Oeder.
Pyrola asarifolia Michx.
secunda L.
Vaccinium Oxycoccus L.

PRIMULACEAE
Dodecatheon Meadia L.
Primula mistassinica Michx.
Trientalis americana (Pers.) Pursh.

GENTIANACEAE
Gentiana Amarella L. var. *acuta* (Michx.) Horder.

BORAGINACEAE
Mertensia paniculata (Ait.) G. Don.

LABIATAE
Mentha arvensis L. var. *canadensis* (L.) Briquet.
Stachys palustris L.
tenuifolia Willd. var. *aspera* (Michx.) Fernald.

SCROPHULARIACAEA
Rhinanthus Kyrollae Chabert.
Veronica serpyllifolia L.

PLANTAGINACEAE
Plantago major L.

RUBIACEAE
Galium triflorum Michx.

CAPRIFOLIACEAE

Linnaea borealis L. var. *americana* (Forbes) Rehder.

Viburnum pauciflorum Raf.

CAMPANULACEAE

Campanula rotundifolia L.

LOBELIACEAE

Lobelia spicata Lam. var. *hirtella* Gray.

COMPOSITAE

Artemisia caudata Michx.

Bidens cernua L.

Erigeron philadelphicus L.

Petasites sagittatus (Pursh) Gray.

trigonophyllus Greene.

Solidago multiradiata Ait.

Taraxacum officinale Weber.

CANADIAN SPHAERIIDAE.

BY THE HON. MR. JUSTICE LATCHFORD.

(Continued from Vol. XXXIII, page 86)

2. SPHAERIUM CRASSUM Sterki. This species was described in 1901 from shells procured in Northern Michigan. In Ontario it has so far been found in but one locality—an artificial water-course, made about twenty-five years ago to intersect the flow of Cave creek across Holland Avenue, and divert it directly northward to a new outlet above the Little Chaudiere rapids. The members of the Club are now regrettably few who can recall the time when this stream disappeared into a rocky cave or fissure in Hintonburg, south of the Richmond road, and saw light again only when near the foot of Lazy Snye—*le Chenal Paresseux* of the rivermen—a locality prolific in molluscs in those remote days, though now foul and virtually barren.

A few immature shells, collected long ago in Cave creek, on the Stewart and Hinton farms, when it contained a large volume of water, which were thought to be *S. sulcatum*, were probably *S. crassum*. But the very metropolis of the species was not discovered until many years later. It was—not is, I regret to say—in the deepest part of the cutting through the Black river limestone, north of the Canadian Pacific Railway, in the line of Holland Avenue produced. There was at the time about a foot of clear water at the bottom of the trench, flowing freely over a few inches of small pieces of rock—in many cases fragments of cephalopods, corals and brachipods that had flourished and perished on the shores of a torrid sea in the inconceivably remote era when this limestone was in process of formation. Among these relics of primaeval faunas the new species was unexpectedly found in great numbers and beautiful form. Dr. Walker has courteously afforded me an opportunity of examining specimens of the type lot from Michigan. Our shells are larger and more robust, but appear to be identical in many of their aspects.

It is fortunate that an extensive series was secured during the season when *S. crassum* was first observed, as more recent visits to the locality proved absolutely fruitless. The new intercepting system of drainage along Wellington Street had cut off the flow of water from the south, and large blocks of stone fallen from the banks had clogged the cutting so that little water flowed through it. Of this rare and remarkable species not even a "bone"—as a mere value or empty shell is called—could be found, though many of *Lymnaea palustris* (a pond snail that ranges deeply over three continents) and of a large form of *Planorbis trivolvis* were noticed. However, on passing out of the cutting, and reaching a muddy pool in the stretch extending directly southward to the railway, a few good specimens of *S. crassum* were procured. This locality was still producing sparingly in August, 1919. For a few more years it will doubtless afford opportunities for collecting this fine shell, and then, like the ponds which once existed near Gladstone Avenue and St. Louis' Dam, be swallowed by the insatiable city.

S. crassum, when mature, is easily distinguished from *S. sulcatum*, especially when large number of the two species are placed side by side. To state the precise differences briefly and without the use of many technical words is difficult. Perhaps it will suffice to say that *crassum* as found near Ottawa, is less elongated than *sulcatum*, more inflated and heavier; the umbones are larger and rounder, and the beaks more closely approximate. The striae are deeper, and the rest bands are less distinct; the general colour, a deep ashy grey, is much more uniform.

This fine *Sphaerium* probably occurs in other places in Ontario. I have a few shells in poor condition from Masham which may be *crassum*. It is said by Dr. Sterki to have been found in Quebec, and New York, but the localities are not given.[6]

3. SPHAERIUM AUREUM Prime was described in 1851 from speciments probably found by Prof.

[6]Ann. Carng. Mus. Vol. X (1916) p. 432.

Agassiz on the expedition to Lake Superior. It is supposed to be identical with a *Sphaerium* now found in the Upper Mississippi Valley, in Illinois, Iowa, South Dakota, and as far east as Northwestern Ohio. Such shells are generally light to dark corneous or greyish. As it occurs near Ottawa it conforms more closely to Prime's description, and is "bright golden" or "greenish-yellow." Like *S. crassum* it has been found here in but one station—Moore's Creek in Hull. It is not a common shell, but is least rare in a pool about a hundred yards north of the Aylmer Road, near the abrupt turn of the stream southward, after a short westerly course. It is smaller than *S. sulcatum*, and larger than the recently described *S. torsum*, which are found associated with it in Moore's Creek.

A single representative of each of the three genera of *Unionidae* found in Canada occurs in the same stream—*Unio compressus* Lea, *Margaritana undulata* Say, and *Anodonta ferussaciana*, var. *subcylindracea* Lea—the latter being the only anodon occuring also in the creeks at Stittville and Britannia Highlands.

Mr. C. W. Johnson of the Boston Society of Natural History, has compared specimens of *S. aureum* from Hull with shells believed to be Prime's types, and is satisfied of the corectness of the identification, which Dr. Sterki confirms.

A single shell, shorter and much more inflated—almost sphaerical in fact—from Moore's creek, is doubtfully referable to this species. It might be regarded as merely abnormal if another shell, identical in size and shape, had not been found in the outlet of Meach Lake. If additional specimens should be found, the shell may be entitled to specific rank.

4. SPHAERIUM FLAVUM Prime is another of the shells described from specimens found on the Agassiz Expedition, and was described as from Sault Ste. Marie. Dr. Sterki states its habitat to be "the region of the Great Lakes." Whiteaves[7] records it as collected by Mr. McInnis in the Root and English rivers, near Lac Seul, in north-western Ontario.

My first specimens were imperfect separate valves obtained in the early eighties in the mill pond of Pattee & Perley, at the Chaudiere, which happened at the time to be empty. They were sent for indentification to Tryon of the Philadelphia Academy, who marked them "*S. striatinum*?" It was not until long afterward, one day in late summer, when the river was very low, that the shell was found living about a mile higher up the Ottawa. I was picking my steps along the remains of the dam that once led a portion of the waters of the Little Chaudiere to the pioneer mills of Nicholas Sparks.[8] As the crib work of the dam decayed the filling of stones and gravel was in places pressed outwards into the rapids. In the centre of a runnel in one of the breaches so formed I observed what seemed like a number of golden beads. Closer inspection proved the attractive little objects to be bright yellow sphaeriums unlike any form of *striatinum* known to me. Large numbers were collected in this and other similar places along the dam, and good sets distributed among my correspondents. The shell was so uniformly regarded as *S. flavum* of Prime that I have little doubt of the correctness of the identification.

Although the dam has since been swept completely away, the shell is, I am sure, still to be found in the depressions in the rapids where eddies form and fragments of rock accumulate. However the current is usually so strong that wading would be seldom unattended with danger. One locality for this species is accessible without risk when the river is low. It is in the old mill race itself. Along the shore line, and from fifty to a hundred feet above the dead water in the "Snye," lies a narrow talus, covered in late summer with not more than a few inches of water. On moving the larger stones and raking among the smaller ones, many specimens of this shell may be easily found.

S. flavum is smaller than any of the shells previously mentioned. At Ottawa it rarely exceeds 10 mm. in length. Its color is brighter than that of any of our sphaeriums except the much larger *S. aureum* and certain of the less inflated *S. occidentale*. As no other shell of the family has been observed in

[7]Report Bureau of Mines, 1912, p. 138.

[8]It may be of interest to note that Captain Le Breton's mills at Britannia were of a still earlier date. They were begun in 1818 to serve the military settlements established in that year at Richmond and March, and were the first built on the Upper Canada shore of the Grand river (as the old name of the Ottawa was then commonly abbreviated) above the Long Sault, where Hawkesbury now is. Robert Randall's ambitious projects to develop water power and establish mills and iron works to smelt the Hull ores on his four hundred acre property, purchased in 1809, and extending (in present-day nomenclature) from Bronson avenue to Booth avenue and from Carling avenue to the Ottawa (but not including the islands), were frustrated by the persecution to which he was subjected by members of the Family Compact, his seven years' imprisonment at Montreal, and the scheme devised and successfully carried out by Le Breton and Levius Peters Sherwood, assisted by Sherwood's brothers-in-law, John Stuart and Henry John Boulton, by which Stuart, as sheriff of Brockville, at the instance of Boulton, and without notice to Randall, for whom Boulton had acted as counsel, sold to Le Breton on December 11, 1820, all Randall's lands in what is now the heart of Ottawa. On the next day the captain, as no doubt in duty bound, conveyed an undivided half-interest in the property to Sherwood. The story of this nefarious transaction, which was held nevertheless by a judicial member of the Compact to be within the law, is told at length in Appendix (S.S.S.S.) to the Journals of the Legislative Assembly of Upper Canada for 1853.

The destruction of Sparks' mills is among the faintest of early memories. Of these mills—as of Troy—it may be truly said that even the ruins have perished.

the Little Chaudiere rapids, at least along the Ontario shore, any bright little bivalve found there may safely be designated *S. flavum*.

5. SPHAERIUM RHOMBOIDEUM Say is a shell of great beauty and very wide distribution, its range extending from the New England States to Alaska. The most northerly locality recorded for this province is Albany river, where it was collected by Mr. McInnes.

The specific name, like many of the names applied by the famous naturalist who described it, expresses the most striking characteristic of the species. Certain other sphaeria are rhomboidal in lateral outline; but none appears so obviously to have that form. Other features renders this species readily distinguishable. The epidermis is highly polished, usually dark olive in color, with lighter bands and an outer yellow zone. In a few localities, however, it is of a uniform deep brown. This is especially a marked feature of the shells from the pond on Duck Island, and, to a less extent, of those from the pond on the Metropolitan Electric Company's property at Britannia. Iron in the water may have brought about this effect. No other cause can in my opinion be suggested for the brown color—not only external but incorporated in the substance of the shell of the lymnaeidae which swarm in the bay, opposite the Rideau falls, into which Leamy lake discharges—"the Rafting Ground" of other times, where the huge sticks of white pine, made in the *chantiers* of the Wrights, McGoeys, and Hamiltons, were after their perilous drive down the chutes and cataracts of the Gatineau, formed into cribs and rafts in the spacious days of the square timber trade. Either from rusted chains, iron implements long lost in the bay, or from leachings from the mines and furnaces once operated a few miles to the north, every shell there acquires a coat of brown mail, and many become dwarfed in growth. *Planorbis antrorsus* has not a tenth of the volume of shells of the same species found among the nearby hills; and *Pl. campanulatus* is even smaller than the depauperate form from the marl beds at Hemlock Lake. *S. rhomboideum*, as it occurs not in the bay, but in the canal leading into it from Leamy lake, is not seriously affected, though browner than any found elsewhere except at Britannia and on Duck island.

This species was once very common in the ponds north of St. Louis' Dam, and is doubtless still to be found in Dow's lake, south of it. Farther to the south it ocurs in the outlet of Dow's swamp. To the east it is found in Hemlock lake, but not in large numbers. The most easily accessible and productive locality for it is the creek in Britannia Highlands, at the Bridge on Tavistook Road. It may, however, be met with in almost any stream or pond on the Ontario side of the Ottawa. In the clearer waters of the Laurentian hills it seems to occur but rarely. One specimen has been found in Meach lake, and none elsewhere on the Quebec side. An adult shell of average size measures 13x10x9 mm. Young shells are proportionably less inflated.

6. SPHAERIUM OCCIDENTALE Prime. This is one of our commonest species. It may be found in almost any marsh, or any depression in our deciduous woods where water lies at intervals. Many of the sphaeriidae are capable of enduring long periods of dessication—more apparent at times than real, as some moisture will on careful investigation be often seen to be present; but this species can seal up its activities and lie dormant for weeks or months in the driest situations. Of course all molluscs living in our marshes, and shallow creeks, and ponds, are frozen stiff as icicles every winter; but except in winter comparatively few can remain long alive without water or at least moisture. *S. occidentale* can better endure a long period of absolute drought, such as sometimes prevails in Ontario, especially in recent years, than any of the genus. None of our large bivalves seems capable of enduring dessication for more than a few days or at most a week; though certain Florida kinds have been found alive by Charles T. Simpson in stations which had long been as dry as dust.

In the woods in the Eastern part of the City, near Beechwood cemetery, every hollow contains this *Sphaerium* and no other. In midsummer it may be found in such places by raking the surface of the mould. It is usually bright yellow, oval in outline, but slightly inflated, and seldom exceeds 8 mm. in length. A much paler form ocurs on Lemieux island, south of the new pumping station. It is a clear Naples yellow in color, but does not vary from the normal in any other respect. At Britannia where *S. occidentale* exists in great numbers in the marsh in Loma Park, near the Magee farm, and, on that farm, north of the railway lines, in a hollow under large willows directly north of Britannia Highlands station—a locality singularly prolific in many desirable shells—it is smoky grey in color. West of the village it may be found inside the railway culvert. In these and other stations it is accompanied by several members of the family, and the beginner would do well to procure first the shells of McKay's bush or Lemieux island before resorting to places where several sphaeriums and musculiums are also found.

Under an inch objective this shell will be noticed to be covered with numerous small papillae. This feature has not been observed in any of our other species, and may serve as a means of identifying *occidentale*. Once however the characteristics of the species are carefully observed, confusion with any other known to occur near Ottawa is unlikely.

S. occidentale does not extend as far to the north as *S. rhomboideum*. It ranges however in a belt of irregular width from Quebec and the Eastern States to California and British Columbia.

7. SPHAERIUM TORSUM Sterki was described from shells collected in Moore's Creek in the same station that affords *S. aureum*. I have not found it elsewhere. Dr. Sterki may, however, have specimens among shells sent to him from the Rideau. If so the fact escaped my notice. By his permission—one of many sets of kindness—I append his description:—

Sphaerium torsum sp. nov.

Mussel inequipartite, oblique, well-inflated, posterior part higher, and much more voluminous than the anterior; dorso-ventral axis curved and oblique; beaks strongly inclined forward, large, prominent, rounded, not or slightly, mamillar, superior margin curved, not, or barely, bounded by angles; scutum and scutellum well marked; anterior and posterior ends rounded, inferior margin moderately curved; surface with fine, slight, irregular or subregular concentric striae and a few lines of growth, shining; yellow, straw colored in younger specimens; shell moderately strong, hinge long for the shape and size of the mussel, almost regularly curved, rather slight; cardinal teeth small, the left posterior tooth vestigial in some specimens; laminae rather slight, at almost right angles to each other; ligament covered, resilium moderately strong. Soft parts not examined. Long. 11 mm.; alt. 9 mm.; diam. 7 mm. (100: 83:64).

S. torsum appears to range near *emarginatum* of the same region, but is more oblique, of more rounded outlines, more evenly inflated. The beaks are less elevated, less mamillar, and more inclined forward, and the hinge is much slighter.

Habitat.—Quebec, Ontario, along the Ottawa River near Hull and Ottawa, collected by Justice Latchford. No. 6956 for full-grown, and 7286 for young and adolescent specimens. It occurs also in Wisconsin.

Fossil.—Goat Island, Niagara, collected by Miss J. E. Lotson, 1900, (No. 2224a).

8. SPHAERIUM EMARGINATUM Prime ranges from Maine to Lake Superior and Winnipeg, and northwest to the District of Patricia, where it was found by Mr. McInnes in the Attawapiscat river. Mr. James H. Ferris found it in great numbers in the Montreal river, north of Sault St. Marie, and has kindly sent me specimens from that locality.

In the vicinity of Ottawa this species has been found only in the canal, above Hartwell's locks, and in the outlet of Phillip's lake, in the County of Pontiac. Its resemblance to *torsum* is indicated in the description of that species. The Ottawa shells are slightly more inflated, the average size from the canal being 10.2 x 8 x 7 mm.

9. SPHAERIUM STAMINEUM Conrad does not seem to be a common shell in or near Ottawa, where I have not found it elsewhere than in the Rideau opposite Strathcona Park. In Toronto it abounds in the Don and Humber. The beautiful little Lynn between Simcoe and Port Ryerse, in the County of Norfolk, also affords it in great numbers.

A shell doubtfully considered *stamineum*, but which may be an undescribed species, occurs in the outlet of Swan lake in Pontiac. Unfortunately only a few could be procured.

S. stamineum is approximately triangular in outline and of a uniform yellow color. The name applied to it by Conrad (meaning *thready* or *fibrous*) does not refer to any of its characteristics. Probably *stramineum* (=*strawy*) was the term intended, as that is the prevailing color of the species; but as the specific name applied has some meaning it must stand for all time. Toronto shells average 13.5 x 10 x 9.7 m.m.

10. SPHAERIUM ACUMINATUM Prime. A mussel believed to be this species is very common in Lake Des Chenes, especially above the pier at Britannia and in Graham Bay. Prime at one time at least regarded *acuminatum* as a synonym of *striatinum;* but no form of the latter species that I have ever seen approaches in appearances the Des Chenês shell when mature, though young shells are not unlike young *striatinum*.

In midsummer dead shells may be occassionally noticed washed up along the railway embankment at the southerly end of the bay. Later, when the river is in its lowest state, thousands of this species rise from their drying beds all over the exposed flats, and plough along the surface their slow way—devious at times but in the main direct—towards the receding water. This manifestation of the instinct of self preservation is common to all mussels, large and small, in similar condition; but I know of no place in which it is more plainly exhibited than in Graham bay. The furrows end in a deeper depression when the animal is exhausted or has reached a location sufficiently moist. The number of specimens that one can collect is limited only by the time at one's disposal. Children learn quickly where the shells are to be found, and delight in picking them up and rendering aid to the naturalist who desires a large series of specimens. Identification is rendered easy owing to the fact that no other *Sphaerium* has been found in the bay. Many *pisidia* however ocur there—of which more hereafter; and south of the railway, in the marsh, connected at high water with the bay through a culvert, several species of our three genera of sphaeridae are to be found in early summer.

Eighty or ninety shells found on June 21, 1916, between little islets, near the shore, about five hun-

dred yards west of the pier at North Bay in Lake Nipissing, while similar to *acuminatum* not fully matured, appear to be a different species. If so, they have not been described. Additional material in quantity, collected later in the season, would probably remove all doubt; but an effort to obtain it on the occasion of a subsequent visit failed owing to the height of the water and the absence of proper facilities for dredging. The ten largest shells found average 8.78 x 7, 15 x 5.13 mm. or 100: 81.5: 58.5.

The average size of ten full grown shells found at Britannia is 12.1 x 10 x 7.5 mm. or 100:82.5: 61.5. Four miles up the lake, in Shirley's Bay, the shell is slightly smaller. The species occurs sparsely along New Orchard Beach.

11. SPHAERIUM STRIATINUM LAMARCK was described in 1818 from specimens believed to have been collected in Lake George, New York. The types are, I presume, preserved in the Jardin des Plantes. The type locality lies in a region where there are few collectors, even among those who, like the writer, occasionally visit its lovely shores. My few opportunities have been restricted to the south or upper end of the lake, and were absolutely fruitless. The shell doubtless occurs in one or more of the bays along the east shore, or at the outlet, near historic Ticonderoga.

The desirability of obtaining shells from the locality which furnished the type chiefly arises from the brevity of the original description and the difficulty of determining what shell it was applied to. Lincoln had in his law office a drawer labelled "If you can't find it anywhere else, look here." Similarly *striatium* is a species to which any medium sized shell of the genus may be assigned. Dr. Sterki states (Am. Carng. Mus. Vol. X, p. 437) that almost every *Sphaerium* has been named "*striatinum*."

Mussels believed to be of that species abound on the sandy shoals along the northerly shore of Duck Ilsand. They are so numerous that sometimes in August and September they form a distinct line where washed up by the waves from passing boats, and are preyed upon by plover and other wading birds. Ten adult shells average 11.2 x 8.3 x 5.6 mm., or 100: 74:50. No *Sphaerium* but this has been observed along the upper beaches of the island, unless a shorter and less inflated shell which is but occasionally met with shall prove distinct.

Striatinum has been found in the canal at Cornwall. Shells from that locality more nearly resemble specimens attributed to this species received from various points in the United States than do the Duck Island shells. It occurred among shells collected at Toronto, in the bay east of the mouth of the Humber, a locality now destroyed by harbor improvements, which afforded me the only specimens of the European *Valvata piscinalis L.* discovered on this continent. In passing it may be mentioned that another importation, *Bithynia tentaculata* L., abounds in Toronto Bay, and in the canal at Cornwall.

(To be continued.)

BELATED GUESTS.

BY FRANK MORRIS, PETERBOROUGH, ONT.

In the last week of December, while working on examination papers, I took an occasional tramp with a colleague through the countryside about the city of Peterborough, Ont. We were both armed with field-glasses and got more than the usual run of luck in observations.

On one occasion, west of the city, we sighted a flock of small birds at work among the coarse stalks of pigweed and other plants in a wayside field. The quickness of the birds' movements and the curious unanimity of the whole flock, as it forged hurriedly ahead to a fresh clump of seed spikes, or rose in swirling flight through the air, now warping half across the field, to settle suddenly down, as by a single impulse, at some unexpected point—all this made endless entertainment to watch, even though the bleak wind drew the rheum from one's eyes. On closer view the flock proved to be made up of goldfinches in their sober garb of winter with a sprinkling of snowbirds.

East of the city, again, on Dec. 28th, from the middle of a field beside us, there suddenly rose just such another flock of small birds, for all the world like a flutter of leaves caught up by a random gust and swept through the air; along they came, warping this way and that, now rising, now falling; and suddenly wheeling downwards in mid-air, dropped into a row of elm saplings right beside us. The numerous faint twitterings heard in flight were replaced by one or two, single, clear, deliciously sweet canary notes of *twee-ee, twee-ee*, from some leader of the band. "Goldfinches," I exclaimed; but my companion, more alert with his glasses, soon detected the rich brown-crimson cap of the Redpoll, and before I had time to confound my ears with the more telling evidence of the

eye, another puff of impulse had caught them into the welkin and away beyond our ken.

Hoping next day to get another glimpse of living nature in the form of these winged spirits, we sallied forth after an early lunch past the field of their operations;—nothing to be seen, but the wide-spread carpet of snow with scattered stalks of weeds and dry brown clover heads protruding here and there.

A mile or more east, we turned down a side-road, and had just risen from swamp level with poplar and cedar thickets on either side, when a large cinnamon-brown bird flew across the road in front of us, apparently from the outskirts of an old deserted orchard on our right.

It settled forthwith, in some staghorn sumacs at the margin of the road within 4 or 5 yards of where we stood. Like many birds seen feeding in winter, it appeared remarkably tame; there it perched, while we scanned it leisurely through our glasses; a large bright-brown bird with broken lines of dark throstle flecks on its white breast, a long light brown tail apparently more than doubling the length of the bird; on the forward half of the wing two distinct, if not conspicuous bars of whitish, the upper somewhat shorter than the lower; unmistakably, the Brown Thrasher.

It presented a remarkable picture as it stood swaying slightly in the breeze among the stiff, naked and fantastically angled branches of the sumac; presently, craning forward and up, it drove its long slender bill into one of the quaint, velvety-crimson, candelabra seed-spikes of the "Staghorn," and ate voraciously. A slight breeze was blowing and the delicate plumes of the bird's neck and back ruffled and stirred with the play of the air as soft as thistledown; perhaps this fluffing of its feathers was a protest at the chill of our northern winter. Occasionally the breeze freshened and the bird almost lost its balance, reft of its beloved prop and windbreak of summer foliage; once I saw it partly unfurl the wings, but for the most part it used the long tail for a balancer, depressing and spreading the feathers fanwise in perfect adjustment to the streams of air.

From first to last the bird remained perfectly silent and careless, though aware of its observers. It little skilled to note that here and there in the sumac where the bird had perched, the stout velvety spikes had already been picked to the bone and nothing left but bare skeletons of stem and pedicel; or that on the snow-white floorcloth beneath lay a sprinkling of seed and husk—crumbs from the feast of previous days; none but the most perverse of skeptics needed any such demonstration; in the directness with which the bird flew to the sumac, mounted its perch and fell to, the inference was already plain—here was its daily lunch counter where it had a standing order for one set dish and no other. Many of our winter residents show this constant preference in their food; the Pine Grosbeak flocks to the rowan, the Evening Grosbeak to the Manitoba maple, with the same unerring flight as this Thrasher to the sumac.

We took our fill of this delightful sight and then passed quietly on, leaving the bird still "throng" at its simple one-course meal. The Brown Thrasher has given me many an hour of exquisite pleasure, listening to its rhapsodies of leafy June, but I would not for a wilderness of summer songbirds have missed this sight of him in our December barrens, and the image of it all will not quickly fade from the heart.

Twenty minutes later, as we retraced our steps on the next line south, we were stopped at the crest of a hill by a flock of Redpolls playing in the cedar shrubberies. The birds seemed to court the inner recesses of their thicket, and rather than be spied on presently rose in a twittering cloud and were wafted away to the south. We were just turning away with a sigh of pleased content at their joy of life, when we both on the instant became aware of some larger form moving about under the cedars, skulking in the shadows. Following its direction a few paces, we soon came abreast of it, and quite unconcernedly it stopped and faced about in an open place by the fence; by all the Powers! a Ground Robin or Towhee, and a male at that! black coat, jet hood and cape, white vest flanked at the wings with reddish brown, and when it turned away, a long black tail with conspicuous white margins and cross marks at the outer end.

What were these birds thinking about? Had Dan Whetung of Chemong deceived them to their undoing with his forecast of an open winter, or had birds and Indian chief alike misread the signs of the weather? December the 29th was a fine winter's day, bright and almost calm, with only 10 or 12 degrees of frost; but it is worth noting that three weeks earlier we had passed through a zero dip at least. Three times since, I have gone the same round, approaching the hallowed spots with bated breath, but no further vision has been vouchsafed; and I cannot even be sure whether these summer residents of ours ever managed to see the old year out, or sped south for their new year, as having outstayed their welcome in old Ontario.

NOTES AND OBSERVATIONS.

Migratory Birds Convention Act Prosecutions.

The following is a condensed list of some of the cases brought into court by officers of the Dominion Parks Branch, of the Department of the Interior. The Dominion Parks Branch will be pleased to receive notice of cases brought by private individuals or societies.

Marr Millinery Company, Limited, St. John, New Brunswick, pleaded guilty to having possession of gull plumage, and a fine of $10.00 was imposed.

Nettie McKinnon, Digby, Nova Scotia, fined $10.00 for having gull plumage in her possession.

Miss G. P. Mawley, Summerside, Prince Edward Island, fined $10.00 for having Brant out of season.

George Arsenault, St. Elinor's, Prince Edward Island, sold Brant in June and was fined $10.00.

Mr. McAdam, manager, Island Cold Storage Company, Charlottetown, Prince Edward Island, fined $10.00 for having Brant in his possession and birds confiscated.

Francis Ruggles, Caledonia, Nova Scotia, fined $10.00 for shooting White-rumped Sandpipers.

Edgar Fromm, Frank Dixon and John Tingley, Westmorland County, New Brunswick, were convicted for having black duck out of season, and penalties of $20.00 each imposed.

T. G. Butler, Ottawa, fined $10.00 for having a mounted loon.

James Baker, of Clam Harbour, Nova Scotia, found guilty of illegal possession of eider duck and fined $10.00.

Victor Crain, of Boston, Massachusetts, found guilty and gun confiscated for shooting shore birds in Yarmouth County, Nova Scotia.

Wallace Hatfield, of Central Argyle, Nova Scotia, was convicted of shooting Willets.

Charles Muse, of Central Argyle, Nova Scotia, also convicted for same offence.

Freeman Deviller, of Lower Melbourne, Nova Scotia, ordered to release young flock of ducks held in captivity.

The following mounted birds were confiscated at Ottawa: A Great Blue Heron, a Flicker, a Wood Duck, 3 Loons, a Herring Gull, and a Pileated Woodpecker.

Eugene Van Anberg, of Lockport, Nova Scotia, found guilty and fined $10.00 for shooting an eider duck.

Ernest Thoburn, Lower Jordan Bay, Nova Scotia, fined $10.00 for shooting eider duck.

Winslow Buchanan, Lower Sandy Bay, Nova Scotia, shot an eider duck, and was fined $10.00.

The Absence of Song Birds in the Wilderness of Nova Scotia.—Any "bird man" who for the first time makes a trip to the wilderness country in the interior of the Province of Nova Scotia will be struck by the absence of bird songs. There are birds, it is true, but no real singers that at times compel us to pause in the act of dipping our paddle in the glassy lake or arrest our hasty step as some of our best feathered performers of the orchards and the clearings do. Occasionally the croak of a raven is heard or the *dee-dee* of chickadees, both the common variety and the Hudsonian, and at night the hoot of the Great-Horned Owl. The Canadian Jay is quite common and well known with his extremely slow and noiseless flight, and his discordant *ca-ca*. Occasionally a flock of Crossbills will pass overhead with undulating flight, spreading out and closing together again in fan-like fashion, leaving one wondering why they do not collide and injure their frail wings. The flute-like whistle of these little acrobats is quite pleasant when nearby, and yet it would be impossible to describe it as a song. During the fall months, one meets more birds in the wilderness than in the spring or summer. These, also, however, are not real singers, with the exception of the robins which at this time are indifferent to song, being too busy fattening upon the luscious berries that cover the barrens in great profusion. When seen far from habitation and especially in the autumn they will nearly always be accompanied by Flickers, migrating together in perfect harmony, the latter "sticking" against the dead pine trunks while the robins seek the bare branches. I have watched them many times while moose calling in the early frosty mornings of September and October, and never have seen any discord among them. It is quite the reverse with the Canadian Jays, which seem to agree when not feeding, but quarrel fiercely, though ludicrously, when engaged in stealing from a moose carcase. These latter are very bold and it is a common sight to see them tearing at a moose carcase while the operation of gralloching is in process. Perhaps one will tear off a piece of fat and fly through the swamp with two or three others pursuing him, the tit-bit changing ownership many times before the fortunate one

is left to enjoy his prize in peace. Occasionally one sees a solitary Swamp Sparrow as he patters over the mud and trash caused by the overflow of lake or river. His discordant metallic *chink* does not impress one as a feathered friend at all. The first time I visited the Nova Scotia wilderness in quest of big game, when a boy of sixteen, I remarked upon the absence of crows to an old guide. "No sir," said he, "you will never see or hear one back here, but I should like to bring a live one out here and let him go; he wouldn't live long." "Why?" I queried. "Oh," the guide replied, "he would fly up to one of these big granite rocks and caw himself to death trying to locate a friend." This fall I was surprised to hear a Song Sparrow burst forth into song. He was at least twenty-five miles from civilization. I waved my hat in his direction and wished him a safe journey south and an early return next spring. He was the exception to the rule.

We may sum up the perching birds that may be seen in the wilderness here as follows: Great-Horned Owl; Raven; Jay; Chickadee; Crossbill; Flicker; Robin; Hawk; Swamp Sparrow. The first five mentioned are residents.

H. A. P. SMITH, DIGBY, N.S.

BOOK NOTICES AND REVIEWS.

LEAD POISONING IN WATERFOWL, by Alexander Wetmore, Bulletin No. 793, U.S. Dept. Agr., Professional Paper, Washington, D.C., July 31, 1919. This is a twelve-page pamphlet of considerable interest to sportsmen, conservationists and ornithologists. Many of our ducking marshes have been shot over for a good many years. Each shot so fired scatters in the neighborhood of an ounce of shot over the bottom. Mr. Wetmore estimates that on one large marsh examined by him an average of 75,000 shells are fired annually. This amounts to over two tons a year. As lead shot resists corrosion and is practically everlasting, the effect is cumulative and amounts to over eighty tons in the past twenty years. The shot gradually sinks in the mud, of course, but as tipping ducks, such as Mallard, Pintail and others, dig down into it from 12 to 16 inches, it is evident that their opportunity for picking up shot is considerable. On examination the author found in the mud from the bottom in the neighborhood of favorite shooting stands from 20 to 22 No. 6 shot in each sample dredged up and examined. The ducks in sifting through the mud for food retain any small hard particle like gravel and the presence of real gravel does not seem to prevent them from taking the shot as well. Experiments on captive specimens of wild species proved that six pellets, often less, are fatal to ducks.

In this manner large numbers of ducks have been poisoned in certain marshes every year though it is only lately (see Bowles, *Auk*, XXV, 1908, pp. 312-313) that the cause of the deaths was recognized. By a process of experiment and elimination it was proved that it is the lead content and not the additions to the metal such as arsenic that causes the trouble, though chilled shot is less rapid in its effects than soft.

The paper deals at length with the symptoms and pathology of the poisoned conditions. The first effect is a weakening of the wing muscles until the power of flight is lost, difficulty is experienced in walking and partial or complete paralysis of the legs ensues. The wings drag and the tail droops. The bird's appetite remains good and even increases, but the food does not seem to pass the stomach and the proventriculus and lower esophagus become distended with food. The fecal matter is green and watery. The heart is finally affected and death comes in from a few days to five weeks.

Though magnesic sulphate in water, 60 grams to 10 quarts, seems to give relief and sometimes cure in individual treatments no suggestions as to treatment or prevention on a large scale is proposed. It is suggested that by its nature the trouble is more likely to increase than decrease but the author seems more anxious over the effect the lead poisoning will have, even in the cases of birds showing considerable resistance to or even recovery from it, on reproductive fertility, than over the number it actually kills.

So far only Mallards, Pintails, Canvas-backs, Whistling Swans and Marbled Godwits have been known to be affected, and as shot is common in stomachs of wild ducks examined by the Biological Survey, it seems that some individuals or species have more or less tolerance for, or resistance to, lead poisoning, or its effects would be more widespread and serious. It would be well for the sportsmen to look out for sickly ducks and examine them for lead poisoning, in order that fuller details may be known.

P. A. TAVERNER.

ANNOTATED CHECK LIST OF THE MACROLEPIDOPTERA OF ALBERTA. By Kenneth Bowman. Published by the Alberta Natural History Society, Red Deer, Alta., 16 pp., February, 1919.

For a number of years the late F. H. Wolley-

Dod, who was one of our leading lepidopterists, published in the *Canadian Entomologist*, a series of papers dealing with the lepidoptera of the province of Alberta. Since the appearance of Mr. Dod's last paper, however, other indefatigable collectors, particularly Messrs. Bowman and Mackie, of Edmonton, have added many records new to the province. The new list prepared by Mr. Bowman is certainly a useful publication and I have had many occasions to refer to it. In the preparation of this list the author has "endeavored to provide an epitomy of what has been accomplished by students of this order within the province to date, as an aid, not only to present workers, but those who will follow after."

ARTHUR GIBSON.

OTTAWA FIELD-NATURALISTS' CLUB SATURDAY AFTERNOON EXCURSIONS FOR THE SEASON OF 1920.

May 1. Geology.—Rockcliffe Park.—Meet at the first stop in the Park.

May 15. General natural history.—Catfish Bay, along the Ottawa River just west of Hull.—Meet in front of the Eddy Co's office.

May 29. Botany and Ornithology.—Fairy Lake. Take the Chelsea road electric car line to the end of the loop.

June 12. Entomology (Mr. C. B. Hutchings, Leader).—Queen's Park, Aylmer.

June 26. Horticulture (Mr. W. T. Macoun, Leader)—Central Experimental Farm, Ottawa.

Sept. 18. General natural history.—Britannia.

The time of meeting at the points indicated will be 2.45 p.m. Leaders conversant with the subjects mentioned will be present to render assistance. All interested are cordially invited to attend.

An unusually well-attended meeting of the Excursions Committee of The Ottawa Field Naturalists' Club was held on the afternoon of April 8, for the purpose of formulating the above programme for the coming season.

Reference was made incidentally to two very enjoyable reunions of the Club held during the past winter, and the intention was expressed of holding similar meetings and outings during the next winter season.

OBITUARY.

JAMES MELVILLE MACOUN, C.M.G.

Succumbing to a fatal illness, James Melville Macoun, C.M.G., passed peacefully away, in Ottawa, on January 8th, 1920.

The late James Macoun was born in Belleville, Ont., in 1862, and was the son of Professor John Macoun, the illustrious Father of Canadian Botany, who, living at Sidney, on Vancouver Island, B.C., is still active in natural history research. James Macoun attended the Belleville High School and Albert College, where, at that time, his father was Professor of Botany. When, in 1882, Professor Macoun was called to Ottawa to take charge of the botanical and other natural history work in the Geological Survey, James Macoun became his Assistant, beginning regular work with the Dominion Government in 1883. As early as 1881, however, he assisted his father in field work, exploring the territory between Portage la Prairie, Man., and the headwaters of the Assiniboine.

James Macoun was a born naturalist and natural history explorer. Although, by natural inclination, he gradually specialized in botany, he made most valuable contributions in other branches of natural history. The wideness of the extensive scope of work in which Mr. Macoun was engaged during his long career as a Canadian naturalist may be more fully realized from the brief data which are presented herewith.

In 1884, at the age of twenty-two, Mr. Macoun made extensive collections of Cambro-Silurian fossils in the Red River valley, Man., on the west shore of Lake Winnipeg, and on the adjacent islands. In 1885, he collected natural history specimens in general in the Lake Mistassini district in the Province of Quebec and, the following year, worked along the line from Lake Winnipeg, Man., to Hudson bay. In 1887, Mr. Macoun explored islands of James Bay and contributed much interesting information, floristic and zoological, to the knowledge of the natural history of the southern part of the Hudson Bay region.

In 1888, he collected plants and birds along the Athabaska and the Churchill rivers, and in the following year collected, with his father, birds, mammals, reptiles and insects in British Columbia. He also greatly assisted his father in making a very

complete collection of the flora from the Pacific Coast to the Eagle Pass in the Gold Range, a distance of nearly 400 miles on the Canadian Pacific Railway. In 1890, he again worked in British Columbia, assisting his father collecting on the Columbia river along the Kootenay lake, and in the Selkirk and Rocky mountains.

Up to this time, Mr. Macoun had devoted his time and energy to natural history study in general. His intimate knowledge of methods and his ability to draw reliable conclusions from his findings were then fully recognized by the Geological Survey and, as a result, his wide knowledge and his skill as an investigator soon prompted the Government to engage him in special and important work.

JAMES M. MACOUN, C.M.G.

When, in 1891, the fur seal conditions in the Northern Pacific became of international importance, Mr. Macoun was made Secretary to the late Dr. G. M. Dawson, Director of the Geological Survey and Behring Sea Commissioner of Canada, and in this capacity he went to the North Pacific to investigate the fur seal conditions. His services in the study of the habits and life history of the fur seal proved so valuable that he was retained on this special work in 1892 and 1893, and sent to Europe as an expert in connection with the Fur Seal Arbitration. In 1896 he again went to Behring Sea, and also in 1914. In 1911, he was one of Canada's representatives at the Fur Seal Conference at Washington, D.C. Because of his most valuable work on the international fur seal investigations he was made a C.M.G., at the recommendation of Lord Bryce, then British Ambassador to Washington.

Mr. Macoun's intimate knowledge of Canada's forestry resources was taken particular advantage of by the Government in 1899. That year Mr. Macoun was placed in charge of the Canadian Forestry Exhibit, which was to be displayed at the Paris Exposition in 1900. Mr. Macoun brought together a magnificient collection of Canadian forestry products which, when exhibited in Paris, most strikingly demonstrated to all Europe the immense timber resources of the Dominion.

When in Paris, in 1900, Mr. Macoun also attended the International Congress of Botanists, which was called together for the purpose of drafting rules and regulations to govern the use of botanical nomenclature. On behalf of Canada, Mr. Macoun signed the recommendations which later were adopted at the International Congress at Vienna, thus committing Canadian botanists in official positions to adhere to the so-called "Vienna rules of nomenclature" in botany.

In 1903, Mr. Macoun undertook an investigation of the Peace river country in general, and of the upper portion in particular, to ascertain the true character of the soil and climate of that part of

Canada. His resultant report displays, in the amplest degree, a faculty of observation given to but a very limited number of investigators, and a fearlessness in presenting the results of findings which is, and always will be, the highest and most valued characteristic of a genuine scientific investigator and a true public servant.

When not engaged in the special work briefly referred to, Mr. Macoun was, during his last 20 years, largely occupied with botanical work, except in 1909, when he spent considerable time assisting his father in the preparation of the "Catalogue of Canadian Birds." Remaining in Ottawa during the summer of 1897, for the first time since being connected with the Geological Survey, Mr. Macoun made a special study of the violets of the Ottawa region, discovering species new to science, and in 1913 he again collected in the Ottawa region, supplementing the botanical material which had been brought together by his father and himself with a view of publishing a "Flora of the Ottawa District." In 1910, Mr. Macoun studied the fauna and flora on the west coast of Hudson bay, and, in 1912, he was engaged in botanical work on Vancouver island, particularly in Strathcona Park where several species new to Canada as well as to science were discovered. From 1914, he worked in British Columbia and in Jasper Park, Alberta . The islands of the Gulf of Georgia, as well as the Comox district of Vancouver island, were thoroughly investigated from a botanical standpoint. During the last two years, Mr. Macoun made a most complete botanical survey of Jasper Park, Alta., extending his working field the last year westward along the Grand Trunk Pacific railway.

Mr. Macoun was appointed Assistant Naturalist in the Geological Survey in 1898 and Botanist in 1917. In 1918, he was appointed Chief of the Biological Division.

This brief outline of Mr. Macoun's field work and career as a naturalist may give some idea, although a rather incomplete and vague one, of the magnitude of the scope of work undertaken by him.

His unique record will, by force of its excellence, guarantee him an ever-honoured place as a Canadian naturalist of the highest rank. As a botanist, particularly, he contributed enormously to the knowledge and understanding of the Canadian flora. His extensive travels made him familiar with the flora from eastern Canada to the extreme islands off the Pacific coast, and from the hot and arid parts of southern British Columbia to the tundra of the Arctic. No one in Canada, with the exception of his illustrious father, ever possessed such a thorough knowledge of the Canadian flora as did James Macoun, and, as a result, he was justly recognized and esteemed as the greatest authority in matters botanical, next to his venerable father, that Canada ever produced. His name is indelibly written on the pages of the History of Canadian Botany.

Mr. Macoun's fame as a botanist and as a naturalist in general may be contributed to three main characteristics, namely, a brilliancy of mind enabling him to grasp quickly and accurately the central idea of arguments and the relative value of evidence presented, an in-born love of investigations for the sake of the investigation itself, and a fund of energy which permitted no physical obstacles to be raised in the way of his investigational efforts.

Extremely modest and unassuming, Mr. Macoun was the type of scientist who derives complete satisfaction from the conscientious persecution of his work without seeking public reward for the service done.

Mr. Macoun was a true scientist whose untimely death is sincerely deplored by his many scientific and other friends. The Ottawa Field-Naturalists' Club is feeling his departure deeply and recently expressed its sentiments in the following resolution:

"The members of the Ottawa Field-Naturalists' Club desire to place on record their deep sorrow in the death of their fellow member and friend, Mr. James M. Macoun, C.M.G. Mr. Macoun's reputation as a careful, conscientious naturalist was by no means confined to Canada. In his death the Geological Survey has lost a valuable officer and members of the Ottawa Field-Naturalists' Club a true friend, ever ready to assist, not only in the furtherance of the botany of Canada, but in other branches of natural history as well The council desires to express its sincerest sympathy to his widow and daughter."

M. O. MALTE.