

ploration by field and stream. He could go on and on and, being a natural story teller with a photographic memory that forgot no detail, interest was always sustained. His energy was inexhaustible and no mountain was too steep or way too rough for him to face if a desirable specimen were the objective. His memory, not only for events but for scientific names and specific details, was remarkable. Though he never had an opportunity of studying his specimens after they were shipped from the field to the Museum, once a specimen had passed through his hands and its characters were noted, it remained with him and was his thereafter. A number of times we have found it advisable to consult with him over some specimen he had collected long before, and he always had the answer ready, the details of its taking and all about it. James Macoun tells of asking him to stop over a train to or from the field at some little station where he had once collected, obtain a specimen from a certain tree that stood on a particular hillside. Though it had been ten years since the original specimen was collected, the material was produced in the most matter-of-fact way. He was always on the alert to obtain valuable specimens. At one camp in the mountains, James had gone to the post office for mail and supplies, returning through the bush late at night. Next morning William remarked to him, "You had a companion on your way back last night." James asked, "What do you mean?" "Nothing, but a cougar followed you most of the way." "How do you know?" "Oh, I was following the cougar."

Through years of association in the closest and most trying manner that men can associate,—in camp, through good weather and bad, William and the Macouns, especially James in the later days, grew very close together. Whatever he was doing at the time, when the proposal of field

work came, he was always ready to drop higher wages or other inducements to accompany his old friends to new fields and fresh discoveries. But age began to tell and though he was always ready to accompany James, he felt that the days of strenuous endeavour were waning. When "Jim" died, his heart for field work failed him and he refused to continue his life-long work under new auspices with new associates. His last field work and that of his friend James Macoun, was in the summer of 1919. After that he retired to his home at Esquimalt near Victoria and worked permanently for the municipality in various outside capacities, for William was never a man to be confined between walls. He had a little garden that he cultivated assiduously and was never idle. Not to be busy from daylight to dark made him unhappy. A Victoria neighbour confirms our experience of him in the field, that he lived to eat, sleep and work, but the greatest of these was work.

Though he withdrew from all association with other naturalists, he was never a recluse and was always ready to lend a neighbour or friend a hand either by advice or making or mending a tool or device. One of the last acts of his life was to pass a repaired pruning hook through the fence where a neighbour would find it. But when he had reached the age of retirement and was permanently laid off the municipal staff, his heart was taken out of him and undoubtedly the feeling that he was no longer useful to the day's work preyed heavily upon his mind and materially hastened his end. He passed away March 30th, 1931, in the little workshop at his home and was buried in Royal Oak Burial Park, Saanich, nearby. He leaves a widow in Victoria, and a memory that will long remain green in the annals of Canadian ornithology.

NOTES ON THE MAMMALS OF THE INTERIOR OF WESTERN NOVA SCOTIA

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THE FOLLOWING notes were made during July and August, 1928, and from August 28 to September 10, 1931, about the headwaters of the Liverpool chain of lakes whose waters flow down through the big game and trout regions of Lakes Kejimikujik and Rossignol. Most of the collecting was done about Fisher's Lake, some sixteen miles south of Ann-

apolis Royal. In 1928, while I was with the Annapolis Royal Camp for Boys, Mr. G. A. Boggs, the director, greatly facilitated my work and also generously allowed me the use of the camp in 1931. Mr. Walter Hubley, a local resident and guide at the camp, also gave me assistance.

The country is in a granite area, probably of paleozoic age, and has been heavily glaciated. It

is a boldly undulating to hilly country, where boulders are scattered about in careless profusion, and bed rock, never far down, is exposed in places for hundreds of feet. As one may expect in such a glaciated country, many of the hollows are without possible drainage, and small island-studded lakes and narrow stillwaters form a network of waterways. Sphagnum bogs abound.

It is a country of dry ridges and alternating swamps; the ridges clothed with stands of timber, birch, beech, hemlock, or spruce, or in various stages of reforestation; the swamps form a succession from open water encroached upon by sphagnum, to wooded swamps.

Clearing for agriculture and settling has played but little part, the very nature of the country forbidding it. Lumbering used to be an important industry, but most of the valuable timber has gone. A few roads cross the province at widely separated intervals with their narrow fringes of clearings, but, once away from the roads, the rest is wilderness. Every ridge looks alike, the one ahead and the one that has just been passed. The only trails are the canoe carries between the lakes; the well-trodden game trails that begin out of nothingness, become distinct around a lake or bog, then disappear into nothingness again; and the old "tote" roads, or logging trails of lumbermen, which usually lead directly to the nearest water, whence the logs were rafted to the saw mills.

At one time continuous forest probably extended over the country. Much of the original forest was pine, but pine is now unimportant. Fire, even before the time of the white man, had sadly reduced the forests, and now, both fire and axe have continued their work of destruction until the greater part of the country has been burned over, and stands of "old growth" are restricted to comparatively small areas. Where once a heavily forested region with a forest floor of rich leaf mould and moss-covered rocks was to be seen, now a devastated area is to be found, either in actual slashing or in the aftermath of burned country. The forest is gone and the leaf mould burned. Tangled masses of burnt fallen trees lie everywhere. The bare trunks of former forest monarchs, still upright, make a grim desolate sky line, their bleached or charred skeletons a mute testimony to the richness of the former forest, and to man's heedlessness in destroying it. These "stubs" are crashing down every year, and in time, their unburied skeletons will rot and give new life to the forest that is growing there.

The effect of small local burns which quickly

grow up to brush, and, as such, provide more varied conditions and an increase in certain foods, may be considered beneficial and may tend to increase the numbers of certain species. This is particularly noticeable with birds and is applicable to mammals to some extent. Moose find better browse on the saplings, porcupines find food there during the summer, rabbits frequent the areas, and the jumping mouse has extended its range to include them. This does not apply, however, to widespread areas swept by forest fires where nothing is left for miles but blackened wastes. Here vegetation is slow in gaining a foothold again.

The vegetation in much of the country is in various stages of reforestation, from burned lands to stands of fair sized trees, the so-called green country. It is currently held, and seems to be true, that when hardwood is burned, softwood springs up, and the reverse. The vegetation that follows the fire has an abundance of shrubs, which, with the granite boulders and the grey weathered "stubs," form the typical "barrens." The shrubs predominate; laurel (*Kalmia*), rhododendron (*Rhododendron*), blueberries (*Vaccinium*), and other shrubs form extensive areas of brush. Bunch berries (*Cornus canadensis*) and wintergreen (*Gaultheria*) are common. Bracken is everywhere and lichens clothe the rocks. Sometimes extensive beds of reindeer moss (*Cladonia rangifer*) occur, which probably furnished food for the caribou that used to range here. Here and there areas of alders (*Alnus incana*) grow up on bits of low damp ground. Soon scattered forest trees come in, clumps of birch (*Betula pendula* and *Betula lutea*) and beech (*Fagus grandifolia*) giving hardwood "barrens," or scattered spruce (*Picea*) and hemlock (*Tsuga canadensis*), giving spruce "barrens."

Sometimes enough grey birch (*Betula populi-folia*) and poplar (*Populus*) is present to dominate the area. These trees grow to a certain height, become static, then die out to give way to a sapling stand. The sapling stand, often a direct continuation of the hardwood "barrens," is a rather dense stand of young forest trees, birch, beech and maple (*Acer saccharum*). Many of the shrubs have disappeared and in the new shade one finds sassafras (*Sassafras variifolium*), clintonia (*Clintonia borealis*), and *Trillium*. Many ferns are common and mosses have come in. This continues up to the hardwood forest or, as is more often the case, as an admixture of softwoods, spruce, hemlock, and fir (*Abies balsamea*), in almost any proportion. The hardwood forest is of

beech and birch. Sometimes oak (*Quercus*) and maple come in. The forest floor is leaf-covered and Indian pipes (*Monotropa uniflora*) and beech drops (*Epifagus virginianus*) grow there. The outcropping rocks alone are covered with mosses, and ferns are not common.

The spruce and fir "barrens" may give a second growth of spruce, fir and hemlock, with a mixture of hardwood in almost any proportion. The shrubs disappear, the ground becomes heavily carpeted with mosses. In the glades still linger bracken and shrubs; lady's slipper (*Cypripedium hirsutum*), bunchberries (*Cornus*) are found, and twin flowers (*Linnaea borealis*) form mats almost hiding the moss beneath. The timber that rises from this second growth may be either hemlock or spruce and hemlock, the fir dying out, but is more often a mixture of the two. The hemlock-spruce stands are the most beautiful. No undergrowth occurs and clear vistas open in all directions. A few plants, wild sarsaparilla (*Aralia nudicaulis*), Indian cucumber (*Medeola virginiana*), twister stalk (*Streptopus*), trillium, and Jack-in-the-pulpit (*Arisaema triphyllum*) occur. In some places moss carpets the ground and in others the needles form brown mats. Where much hardwood occurs, the fallen leaves cover the ground.

The swamp succession is rather clearly defined. The humidity here has saved many of them from the fires and their succession comes from the encroachment of the sphagnum on the open water, giving a foothold for other plants.

Lakes form the greater part of the waterways. Small streams run into them from the low rocky ridges, but the runs between the lakes are usually short broken stretches of water. The stillwaters, long narrow reaches of water without apparent current are very characteristic. They often represent the last stages of a lake or bay being encroached upon by the sphagnum. It is in them that some of the finest trout are to be found. The lakes are small, rocky, and island-studded. In the shallow bays the vegetation is continually encroaching. Yellow and white waterlilies occur (*Nymphaea advena* and *Castalia*) as well as chara (*Chara*), bladderwort (*Utricularia*) and pickerel weed (*Pontederia cordata*). Sphagnum encroaches on the water giving it first nearly a pure culture, sometimes with much pickerel weed, but it soon changes to a sphagnum-sedge "meadow," a level area, solid enough to walk over, with a thick growth of sedge. From these areas the sedge is sometimes cut for hay, though it is poor fodder for cattle. Shrubs, rhododendron,

laurel, sweet gale (*Myrica Gale*), meadow-sweet (*Spiraea*), and others often come to occupy completely such an area, locally called a "bog." From a distance it looks like a smooth level area but at close hand it is a tangled mass of shrubbery. The sphagnum grows up between the shrubs and the whole is saturated with water. One sinks ankle deep, or waist deep, and progress is practically impossible. A modification of this area occurs along the lake shore where the land rises abruptly. Here is a narrow line of brush often with much royal fern (*Osmunda regalis*) between the water and the timbered land. Sometimes scattered spruce or tamarack (*Larix laricina*) occur in these "bogs," and give them a characteristic appearance. Sometimes "meadows" occur where blue-joint grass grows, and clumps of alders, meadow-sweet, sweet gale and other shrubs occur, and soft maple (*Acer rubrum*) comes in. The final stage of the habitat is spruce-fir or maple-alder swamps, or swamps where all of these occur. The shade has discouraged the shrubs, the sphagnum is deep and spongy, sedge may be quite common and *Osmunda* (*Osmunda cinnamomea*) may occupy extensive areas.

The clearings, roadsides and waste lands are of little extent and are unimportant. Soil is mostly poor and rocky, and potatoes, carrots, turnips, beans, corn and oats are raised. Areas are cleared of brush so that cattle may find browse amongst the stones, or the hay may be harvested, but these areas are restricted to the vicinity of the few dwellings.

DISCUSSION.

Mammals play an important role in the lives of the settlers in the region. Fur is an important source of income, and moose and deer are used for food. Their depredations are few. Bears sometimes kill sheep, and mink and fox raid chicken yards. Woodchucks, porcupines, rabbits and deer appear in the gardens, but when all this is balanced against the value of the fur catch, the mammalian fauna well repays its debt from an economic standpoint.

Certain mammals of the region are gone; the wolf before the memory of most of the younger men; the caribou, recently. Fisher and martin are extirpated or nearly so, and lynx are sadly reduced in numbers.

Some mammals are moving in. Skunks and raccoons are probably recent additions to the fauna (Gilpin, 1868). Deer have been introduced and are thriving. Grey squirrels (probably escaped cage animals) have been recorded. The introduced house mouse (*Mus musculus*) and the

Norway rat (*Rattus norvegicus*) have not yet reached this area though they are common in the settlements nearer the more settled region of the Annapolis Valley.

There were marked differences in the abundance of certain types of mammals in the seasons of 1928 and 1931. In 1928, long-tailed shrews (*Sorex fumeus*) and (*Sorex cinereus*) were common and numbers were taken in many habitats. *Microtus* was very scarce, though old runs were to be seen everywhere in suitable habitats. In 1931, long-tailed shrews were very scarce in the same areas. Only one, a specimen of *Sorex cinereus*, was secured. *Microtus* was fairly common and many old nests were seen in the meadows and signs of recent work were common. *Synaptomys* was found and from signs had been common but a short time before. Again, in 1928, red-backed mice (*Clethrionomys gapperi*) were only fairly common and were restricted to the damp coniferous habitats. In 1931, they were very common and found in almost all habitats.

Condylura cristata (Linnaeus). STAR-NOSED MOLE.—This creature is rather common in low wet land and pastures and in some alder swamps, where there is soft earth to burrow in. Though common in the fertile Annapolis Valley to the north, its distribution in this region will always be limited by the scarcity of suitable soil. I did not find it, however, in many of the alder swamps where the black muck seemed very suitable.

These moles moved about indiscriminately day or night, specimens being taken at various times during the day.

Average measurements of six adults: total length, 196.3 mm.; tail, 80.4 mm.; hind foot, 28.9 mm.

Sorex cinereus cinereus Kerr. CINEROUS SHREW.—In 1928, this shrew was one of the commoner small mammals. It was fairly common in the hemlock-spruce forest as was the smoky shrew. In the second growth of spruce-fir it was much more common than the smoky shrew and I found its minute tunnels in the moss as well as the runs under rotten logs and stumps. It occurred in the maple-spruce-sphagnum, sphagnum-heath, and sphagnum-sedge habitats, while in the sphagnum swamps on the edge of the lakes and stillwaters, where I found its tiny burrows and trapped it, it appeared to be the only small mammal. Often a set would take two on consecutive nights, but no more, although the trap was left set for some time. It was rare in the dryer habitats of deciduous trees and scanty moss.

In 1931 I was able to secure but a single individual though I trapped in the same areas where it had been common in 1928.

Measurements of three adults, averaged: total length, 108.6 mm.; tail, 45.0 mm.; hind foot, 12.8 mm.

Sorex fumeus umbrosus Jackson. SMOKY SHREW.—This shrew was fairly common in 1928 especially in the stands of large spruce and hemlock with mossy floor where it was perhaps the most common small mammal. It was found commonly in damp pasture land and was often taken in the runs of the mole (*Condylura cristata*). It was also found less commonly in dryer sapling stands and in hardwood.

In 1931 not a single specimen of this species was secured though I trapped intensively in areas where it had been common in 1928.

Measurements of seven adults averaged: total length, 125.5 mm.; tail, 51.4 mm.; hind foot 13.7 mm.

Sorex arcticus arcticus Kerr. SADDLE-BACKED SHREW.—This shrew has been taken in Nova Scotia near Truro (one and three-quarters miles east-south-east) (Jackson, 1928) and may perhaps be found in other parts of the province.

Sorex palustris gloveralleni Jackson. WATER SHREW.—Although I have trapped for this species in all likely habitats, but four specimens have been secured, three of them by pools of open water in mossy spruce-fir habitat, and one in the narrow fringe of shrubs between a second growth spruce area and the lake.

Gilpin (1868) speaks of a hunter cutting a hole in the ice and stooping to drink and having a shrew appear in the opening. It may have been this species.

Average measurements of three adults: total length, 152.3 mm.; tail, 74 mm.; hind foot, 19.1 mm.

Microsorex hoyi thompsoni (Baird). PIGMY SHREW.—This little shrew has been taken in the western part of Nova Scotia at Digby and Little River, Digby Neck (Jackson, 1928). It may occur in this area though none were taken.

Blarina brevicauda talpoides (Gapper). SHORT-TAILED SHREW.—This is one of the commonest small mammals in the dryer habitats of deciduous trees. Its tunnels criss-cross under the dead leaves on the sapling stands and the hardwood hills and spruce, but they are not nearly so common in the clear stands of spruce and hemlock. It is not uncommon in the deciduous "barrens" where there are enough fallen leaves to make ground cover, but seems absent from the spruce "barrens." It occurs only occasionally in the spruce-fir though I captured one amid moss-covered boulders where a small stream trickled along almost underground in a place that would seem ideal for the water shrew (*Sorex palustris*). I took one short-tailed

shrew in the sphagnum habitat. They were common in the alder swamp habitats, following the runs of meadow mice and moles or making their own runways. It was abundant in some habitats and was taken in a single trap night after night. At one such station where a star-nosed mole (*Condylura cristata*) run crossed the trail at the surface, I took more than fifteen short-tailed shrews beside *Sorex*, meadow mice, and the star-nosed mole, in a month and a half. Sawdust piles seem to have a particular attraction for them and they can always be found and taken there. They move indiscriminately day or night, and specimens were taken between eleven and one o'clock on bright days. Many of the specimens had white hairs in the tips of their tails and one had the terminal portion half white.

Average measurements of eight adults: total length, 116.9 mm.; tail, 25.5 mm.; hind foot, 14.4 mm.

Myotis lucifugus lucifugus (LeConte). LITTLE BROWN BAT.—Small bats which may have been of this form, or the next, were often seen over the lake or about the clearing around the camp. The two specimens secured were ones that flew into a lighted cabin.

Myotis keeni septentrionalis (Trouessart). TROUSSERT'S LITTLE BROWN BAT.—The only example of this species secured flew into the lighted cabin.

Euarctos americanus americanus (Pallas). BLACK BEAR.—The black bear is quite common here but is very shy and none were seen. When travelling over the "barrens" during the summer it was a common sight to see dead logs that they had ripped apart for ants, and logs and rocks that they had over-turned in their search for food.

Walter Hubley told me that during the hottest weather in summer they spend the day in the cool sphagnum-maple-spruce habitat. He showed me several wallows in such places, open spring holes with black silty bottoms into which the cool water seeps. At one of these he had trapped a bear in August, 1926. In August, 1928, we kept a trap set at this place but the weather was hardly warm enough for the bears to come to the spring holes.

When the blue-berries are ripe, they form the staple food of the bears. One can see where the animals have been feeding and their droppings are coloured with this food.

On June 28, 1928, on my way to camp I saw a bear cub tethered in a farmer's yard at Aylsford. I was told that the mother had been found in hibernation in January and killed and the cub, which weighed but eleven ounces, had been taken

home and brought up on a bottle. It was quite playful and would romp with the children but it was getting too strong and was becoming a dangerous playmate for it sometimes resented being disturbed.

Procyon lotor lotor (Linnaeus). RACCOON.—The raccoon is said to be rather common here. It is taken only occasionally. In the Annapolis Valley to the north where transition conditions are present, it is fairly common. Gilpin (1868) says that the raccoon is a recent addition to the fauna, entering the province and spreading along the north side of the Annapolis Valley within the last twenty years. It was, he says, previously unknown to the Indians. Lescarbot (1606) says that raccoons occur but this seems doubtful.

Martes americana americana (Turton). MARTEN.—There is a permanent closed season on marten and any data were difficult to secure but I heard of one that had been trapped and smuggled out of the country some years before, bringing some forty dollars when finally sold.

Gilpin (1868) says that marten occurs and, also that one may look for its extinction.

Tyrrell (1888) gives it as occurring in Canada from the Pacific to the Atlantic.

Martes pennanti pennanti (Erxleben). FISHER.—I have no records for the fisher but Gilpin (1868) mentions its occurrence in Nova Scotia, although he says that we may look for its extinction.

Tyrrell (1888) also says that it occurs in Nova Scotia.

Mustela cigognanii cigognanii Bonaparte. WEASEL.—The weasel is said to be tolerably common and to follow the waterways and the low bushy areas. I saw one skull from a carcass left by a trapper and on August 18, 1928, saw a live one. It was in a small thicket of spruce that had grown up in a clearing cut for a camping spot in a magnificent stand of hemlock. We were sitting on our blankets before turning in and two jumping mice leaped through the glow of the campfire. Turning to see the reason for their precipitate haste, I heard the leaves rustle and flashing the light from a torch, could see a weasel running about not at all disconcerted by the light. It had apparently been feeding on the scraps of trout that had been thrown out there and it retired in a few minutes. By a gentle squeaking it was enticed back and came within a few feet of us.

Mustela vison vison. Schreber. MINK.—The mink is fairly common in the low wet habitats. I saw one on a small rocky island some distance from shore in mid-afternoon. Several others were seen about the lake shores during the summer of 1928.

Walter Hubley told me of one he saw on an open spruce-heath bog. As he approached it, it started toward him as though attacking rather than retreating, chattering shrilly. It had a freshly killed rabbit and was apparently defending its prey.

Lutra canadensis canadensis (Schreber). OTTER.—The otter is one of the inhabitants of the waterways and some are taken here each winter. Almost every lake or waterway may be visited by these creatures. They range over wide areas or beats and cannot be called common. In a country such as this where mud slides down banks are not possible, the animals come ashore and roll in the moss along the streams. In the spruce-sphagnum swamps I have seen areas several yards in extent that have been scratched up by these animals. Many of the trappers say that the otters travel in pairs and are sometimes seen swimming and playing along the lakes in the early morning or in the evening. In winter they fish in the runs where there is open water and are sometimes secured at such places by hunters lying in wait to shoot them.

Mephitis mephitis (Schreber). SKUNK.—Skunks have been taken occasionally by trappers near here and during the first of the camp season in 1928 their characteristic odour gave unmistakable evidence that one had been in the cellar of the main lodge. This creature, like the raccoon, is rather rare here, preferring the edge of the more settled districts of the Annapolis Valley. Gilpin (1868) speaks of its comparative recent intrusion into the province.

Vulpes fulva rubricosa (Bangs). RED FOX.—The fox is fairly common and I occasionally saw its signs on the "barrens." It has a propensity for travelling along wood roads and following trails and this habit has been taken advantage of in the practice of snaring it, though it is often hunted with dogs as well.

Cross foxes are sometimes taken. One fur dealer estimated that one cross fox to twelve red ones occurs in the province.

Canis lycaon Schreber. WOLF.—The wolf has been gone so long that there are not even traditions current regarding its presence. At the time Gilpin writes (1868) the wolf was making its last stand. He says that they are trying in vain to reinhabit the province and that for the last sixty to seventy years, they have constantly appeared singly or in pairs, then have disappeared to be unheard of for years. Tyrrell (1888) mentions the wolf as rare in Nova Scotia so that it may still have existed at that time.

Lynx gigas Bangs. LYNX.—The lynx is rather rare but seems to be quite universally known un-

der the name of "Lucifee" which is probably a corruption of the word "Loup-cervier," and designates a larger, stronger and more shadowy creature than the wild cat.

Gilpin (1864) writes that it was common at that time, one man taking twenty in a winter and that two hundred and fifty skins a year were being exported from Nova Scotia while five hundred and fifty wild cat skins were exported, but even then it was becoming rare. This decrease has continued and in 1927 there were thirty-five lynx skins exported from the province against 1142 wildcat skins. (Report of the Department of Lands and Forests, 1927, Province of Nova Scotia, 1928.)

Lynx rufus rufus (Schreber). WILDCAT.—The wildcat is fairly common and numbers are taken every winter but I saw neither tracks nor signs. The granite boulders are often heaped together on the ridges and form caves and crevices in which they are said to den, and some such places are called "cat ledges."

Gilpin (1864) speaking of the wildcat in Nova Scotia, said that these cats love the sterile granite hills and that where it abounds no Loupcerviers (*Lynx*) are found.

Marmota monax canadensis (Erxleben). WOODCHUCK.—The woodchuck is rather common in parts of the Annapolis Valley but in this area I have seen but a single individual, August, 1928, which unadvisedly took up its abode in Walter Hubley's garden and attempted to live off the produce. Walter Hubley says that one or two appear each year and are promptly shot. Though usually found in the clearings, Hubley saw one a number of years ago in the "barrens" near Frog Lake some distance from any settlement.

Tamias striatus lysteri (Richardson). CHIPMUNK.—The chipmunk is fairly common on hardwood hills, on the "barrens" and about clearings. The rock piles left by the glacier furnish ideal shelter for them and the stone fences about the clearings are a favourite resort. They are rather shy and the first intimation of their presence is usually their shrill cry as they dart to shelter at the first approach of the intruder. They did not become tame even when food was put out at the camp, although they occasionally came within the cabin.

The fruit of the raspberry, when ripe, and the seeds of the sweet fern are their favourite foods at this season, at least about the clearings, and at this time there is a slight concentration of the species in the areas where these foods are abundant. Blueberries on the "barrens" are undoubtedly their most important food in the fall. Young ones taken July 22 and July 25, 1928, were prac-

tically full grown.

Sciurus hudsonicus gymnicus Bangs. RED SQUIRREL.—The red squirrel is one of the most common mammals in this region. Its distribution is largely confined to the habitats where conifers occur though in the fall they undoubtedly forage out on the hardwood ridges for beechnuts.

Their trill is one of the most characteristic sounds of the region and continues all summer. It is most common in the morning but may be heard at any time during the day and it greets the sun after a storm as does the song of the robin in more settled districts.

They are not molested by man and pay little attention to him except to keep him at a distance. They rarely scold at him and usually continue on their way unmindful of his presence.

Several times I saw them come to the water's edge apparently to drink. While canoeing we overtook one that was swimming from the mainland to an island. It readily accepted the offer of a paddle as I drifted across its course and came up and perched on my shoulder not at all exhausted. After a minute it leaped to the man in the next canoe and thence to the gunwale and, running to the end of the canoe, sprang into the water. It then swam to the nearest island about one hundred yards away. It swam with its head held quite high and so rapidly that I was unable to turn the canoe about and overtake it before it reached the shore. It pulled itself up amid the "Hardhack" and scampered away. On many of the islands there are squirrels or squirrel signs and the ground is littered with cone scales. Many may reach these islands by the ice in the winter but I think that many of them swim to them. At Trout Lake, some forty miles to the northeast, I camped on an island for two weeks in June, 1927. About the middle of our stay there an old male squirrel in ragged pelage appeared. It had most certainly swam to the island that morning for we should have heard it or the cries of the birds nesting on the island if it had been there before.

The seeds of the conifers furnish one of the most important foods and the floor of the forest is usually littered with cone scales in such an area. About the middle of July before the cones are ripe they start to eat them and their faces and chest may be quite sticky with the balsam from them. In August a red-capped fungus, common in the woods, forms an important article of diet. The squirrels often take these up into the trees and wedge them into a safe place. Whether they use them later I am not sure as I have seen many that have been in the tree for a long time.

On August 13, 1928, I picked up a young squirrel which was crawling across the path. It was perhaps two-thirds grown and had its hind quarters paralyzed. It squealed and bit savagely when I picked it up. I took it to camp and it died during the night. Skinning it I found that the backbone was broken but there was no scar on the skin nor was the flesh torn. Possibly the young one not yet able to judge its strength, had tried too long a jump and had failed to make it. A few days afterward another was picked up in the same condition, but as I was away at the time I did not see it.

Sciurus carolinensis Gmelin. GREY SQUIRREL.—Grey squirrels are occasionally reported from various parts of the province. Walter Hubley told me of one that had been seen near this locality during the summer of 1930. It seems probable that these are escaped cage animals, brought to the province by tourists.

Glaucomys sabrinus macrotis. (Mearns). FLYING SQUIRREL.—I have not found the flying squirrel common anywhere in the province. When it was found it was in hemlock-spruce or in mixed forest. In this area the only record I have is of one that a cat belonging to Walter Hubley brought in to her kittens.

Castor canadensis canadensis Kuhl. BEAVER.—The beaver was fairly common in Fisher's Lake in 1928. There were two occupied houses near camp where it was possible to see them any evening. In 1931 but a single beaver was heard during the time spent there and no inhabited beaver house was seen on the lake. The taking of beaver at any time is illegal but the value of the skin makes the risk worth while and skins are taken to supply the demand.

Peromyscus maniculatus abietorum (Bangs). WHITE-FOOTED MOUSE.—This mouse was fairly common, usually on hardwood habitats, on "barrens" and in brush where the berries were ripening. From signs in the cabins it had been abundant there during the winter and there was a desiccated specimen in an old milk-can from which it had been unable to escape. Some time ago, at another camp, I found one stuck in the bottom of a molasses jug from which the cork had been removed. Hubley trapped nine of them in one of the cabins early in the spring but except for one that the cook killed during the summer I was unable to secure any in the cabins and though food was readily accessible to them it was not disturbed. They evidently congregate in the buildings during the winter and spread out into the country in the spring, irrespective of the food supply.

A few were taken along a stone fence on the edge of the pasture where the cook threw out potato peelings and such debris. Several were taken at the junction of the narrow sand beach along the lake, and on the "barrens," and a few in the fringe of shrubs between the lake and the spruce-fir habitat. On the hardwood hills they were feeding on the catkins of the birch and little mounds of the scales were found beneath convenient shelters.

Average measurements of five adults: total length, 187.8 mm.; tail, 95.8 mm.; hind foot, 21.7 mm.

Synaptomys cooperi Baird. LEMMING MOUSE.—This mouse apparently becomes very common at times and then suddenly disappears from its haunts. In 1928 no specimens were taken though old runs which may have been made by this species were found in certain spruce-maple-sphagnum swamps.

In 1931 indistinct runs, probably of this species, were very common in little sedge-grown clearings in the Osmunda of the spruce-maple-sphagnum swamps. Many of them appeared fresh or not more than a few weeks old but persistent trapping for ten days yielded but three specimens of the species and a nest containing four young was found.

An adult male and female were taken during the night of August 23, 1931, in their indistinct runs in the sedge on the sphagnum within a few feet of one another. The female was nursing and a search revealed the nest containing four recently born, naked young, several yards away from where the female was trapped. The nest was on a thickly sedge-grown hummock at the base of a low bush and was a ball of dry sedge and a little moss, placed in a depression in the sphagnum amongst the sedge roots so that the short sedge completely concealed it from above. The entrance was by way of a short tunnel but the runs over the sphagnum were for the most part faintly marked in the scanty sedge and the droppings were much more conspicuous signs of their recent abundance.

On August 25, 1931, a two-thirds grown young was taken in a runway to the entrance to the nest. The three stomachs contained finely ground up material consisting of both sedge and moss.

Clethrionomys gapperi (Vigors). RED-BACKED MOUSE.—In 1928 this mouse was only fairly common and was found only in the damper coniferous habitats often along the little moss grown streams and pools. In 1931 it was common and spread through the hardwood habitats and the

"barrens" as well as the coniferous habitats.

Their burrows often open directly to the surface of moss and they evidently spend much time wandering about above ground. Their burrows are shared with the short-tailed shrew and the two species were often taken on consecutive nights on the same trap set at the mouth of a burrow.

Average measurements of five adults: total length, 145.4 mm.; tail, 44.4 mm.; hind foot, 18.5 mm.

Microtus pennsylvanicus acadicus Bangs. MEADOW MOUSE.—The meadow mouse must be very common in certain years. In damp pastures, in sphagnum-sedge bogs, and bluejoint-maple-alder associations, old runs and droppings and grass stalks cut into short lengths were very common but a line of several dozen traps would bring in perhaps one or two individuals. In examining the runs for places to set the traps, fresh signs were rarely found. This decrease in the number of meadow mice must have an important effect on the carnivores that prey upon them and must undoubtedly influence their abundance. In one grassy swamp in a pasture they were fairly common if not abundant. This seemed to be an isolated group that had not been affected by the general conditions affecting the species.

In 1931 these mice were fairly common along the edges of the bogs but few were found in the grassy swamps where they had been common in 1928.

In examining their stomachs I found the food usually too finely ground for identification but in several instances their stomachs contained strawberries and the contents were dyed red from the juice.

Measurements of five adults averaged: total length, 161.4 mm.; tail, 48.4 mm.; hind foot, 21.2 mm.

Ondatra zibethica zibethica (Linnaeus).—MUSKRAT.—This animal was fairly common along all the waterways which have aquatic vegetation along their edge. Their signs were noted on nearly every log and rock that projected along the stillwaters. Here they do not build houses but live in burrows in the bank. There is a belief held here that one muskrat lives in every beaver house.

They were sometimes seen during the day feeding some distance out in the lake.

Zapus hudsonius hudsonius (Zimmermann).—JUMPING MOUSE.—This mouse was not found common but Walter Hubley assured me that they were common in some years on the wild mea-

dows and were conspicuous during haying time through their habit of taking long jumps. I secured two and saw others in that sort of habitat and also found them on the open "barrens," a habitat in which I have taken them elsewhere in the province. Two were also secured in an area which had grown up to spruce and fir. Evidently the mice had inhabited it when it had been a "barren" and had stayed there when it grew up. The species was tolerably common in the sedge-sphagnum bogs both in 1928 and in 1931.

One specimen measured: total length, 225.0 mm.; tail, 135.0 mm.; hind foot, 31.5 mm.

Napeozapus insignis insignis (Miller). WOODLAND JUMPING MOUSE.—I was able to secure but two specimens of this species although traps were kept set for it in places that seemed suitable. One of the specimens was secured in a set under an overhanging bank of a little pool in a spruce-fir habitat; the other, by a stream in a moss-grown hemlock forest.

Average measurements of two adults: total length, 228.5 mm.; tail, 150.5 mm.; hind foot, 31.0 mm.

Erethizon dorsatum dorsatum (Linnaeus). PORCUPINE.—This was a common animal. During the summer it was found not only in the forest but out on the "barrens" and in the cultivated fields. It was often encountered on the ground when it would go into a den if one were near by, or it might climb a tree, leisurely ascending to the very top if it were a small one, or, under apparently the same conditions, would start off at a gallop, a pace faster than a man walks, seeking shelter under windfalls and in thickets, or failing that, it might go down some crevice in the rocks.

The rock piles left by the glacier make ideal dens for it. In the caverns thus formed the floor is often deeply covered with their droppings which have a characteristic odour noticeable at some distance, and contain so much cellulose that they prove very resistant to weathering.

Their food seems to be largely herbaceous at this season, clover and garden truck when available, and leaves. Birch seemed to be a favourite. A large percentage of the young birches examined showed claw marks on the delicate white bark and I observed several animals in such trees. The bark of these birches was not removed although in the winter the food must be largely bark.

The porcupine destroys much valuable timber by gnawing large areas of bark from the trees, often killing them in this way. Its mutilation of

spruce makes the sawing of lumber more difficult since it necessitates the making of adjustments on the carriage.

In this area porcupines are little addicted to coming about camp and disturbing things. A few years ago a porcupine gnawed the thwart of one of the canoes, but these canoes had been out of doors all summer for four years and that was the only bit of damage done to them. The animals never came about our camping places or cabins making themselves obnoxious.

I have never seen one swim but Dr. Breck, who was staying at South Milford, some two miles away, had a young one for a while that he attempted to maroon on a little island off shore, and it promptly swam back to shore.

Their flesh is dark, strong and tough. Even at that it often makes a welcome addition to stew. The liver is not at all bad when fried.

Lepus americanus struthopus Bangs. (VARYING HARE) "RABBIT."—The year 1928 was a poor year for rabbits in this area. Old signs were to be seen in swamps, pastures and brush areas, but the animals were uncommon. I saw very few and the general report bore out my observations. I do not think that this condition necessarily extended over the whole province as I found them abundant elsewhere especially in certain restricted alder swamps although they were apparently absent from the surrounding region.

In 1931, rabbits were quite common and were seen almost daily in every type of second growth country.

Odocoileus virginianus borealis (Miller). DEER.—The deer, now a fairly common animal, is not native but was introduced from New Brunswick although some perhaps found their own way across the isthmus. In any event, it has become firmly established.

During the summer they are often found in the cool spruce-Osmunda-sphagnum swamps and out on the sedge-sphagnum, especially at evening, but they are also seen in almost every type of habitat.

Alces americana americana (Clinton). MOOSE.—Throughout the region the moose is fairly common and it is said to be more common now than it was forty years ago.

During the summer a favourite resting place in the day time is in the spruce-maple-sphagnum swamps where it "beds down" on the cool, wet moss, though sometimes it will lie out on the sphagnum-sedge. The guides say that it feeds on the sedge, and the sphagnum-sedge is usually tracked by it. The food at this time is certainly

herbaceous for their droppings are only semi-solid instead of solid and woody as they are at other seasons when they are feeding on sprouts. Where moose feed on lily pads there is much debris left which may drift ashore and mark their feeding place. One cow moose that I watched feeding in the water waded in until only the top of her head was visible but during the hour that she fed there she did not put her head under the water, feeding only on the surface lily pads.

Remains of winter "yards," mutilated saplings and droppings were found on the "barrens" and also in the "spot-lumbered" hemlock-beech habitat.

Rangifer caribou caribou (Gmelin). CARIBOU.—The caribou was formerly not uncommon in this region and all of the older inhabitants remember having seen it. Most of the inhabitants are of the opinion that it has been extirpated through possibly it may have occurred near this region no longer than twelve years ago.

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CHRISTMAS BIRD CENSUS, 1932

MONTREAL, P.Q., DECEMBER 25, 1932, 8.30 A.M. to 4 P.M.—Weather clear and exceptionally mild. Temp. 40° at 8 a.m., 50° at 4 p.m. Strong S.W. wind, very little snow in woods, open country bare, streams mostly open and almost at flood level. Observers in two parties. American Golden-eye, 3; American Merganser, 20; Sharp-shinned Hawk, 1; Brünnich's Murre, 15; Northern Blue Jay, 1; Eastern Crow, 3; Black-capped Chickadee, 45; White-breasted Nuthatch, 1; Brown Creeper, 3; Eastern Robin, 2; Eastern Golden-crowned Kinglet, 5; Cedar Waxwing, 3; Starling, 450+; Eastern Red-wing, 2; English Sparrow, not estimated; Common Redpoll, 10; Eastern Goldfinch, 1. Total, 17 species, 565 individuals (not counting English Sparrows.)

Also seen during the past week: Canada Ruffed Grouse, Glaucous Gull (Wynne-Edwards), Herring Gull, Northern Downy Woodpecker.

With the exception of Starlings and Chickadees, birds are scarce at present. This applies especially to Woodpeckers. Very few finches appear to have come in from the north, notwithstanding an abundance of wild fruits and seeds locally. The presence of Brünnich's Murres is most noteworthy. These were first reported here on the 10th of December (1 bird—Low). Another was knocked down by a motor-car on the highway west of Montreal on December 18th. The stomach of this bird was quite empty, but others still to be seen in the open water between Montreal and

Longueuil appear to be obtaining a sufficient supply of small fish.—V. C. WYNNE-EDWARDS, HY. MOUSLEY, NAPIER SMITH, ALEX JOHNSON, H. A. C. JACKSON, L. McI. TERRILL (*Members of the Province of Quebec Society for the Protection of Birds.*)

OTTAWA, ONTARIO, DECEMBER 26, 1932.—This Christmas Bird Census was taken by sixteen observers, organized in nine separate parties. The day began with poor weather, the sky being heavily overcast, while light showers of rain fell at times. About 9.00 a.m. the showers gave place to light snow flurries, which ceased about 10.00 a.m., when the clouds broke and the weather began to clear, with falling temperature. The percentage of cloudiness decreased from that time on throughout the day, until at sunset the sky was absolutely cloudless. There was a strong west wind almost all day, falling to a calm at sunset. The temperature was 38° at 8.15 a.m. and 30° at 3.15 p.m. It was estimated that 75% of the ground in open fields and 5% of it in the woods was bare of snow and ice. The maximum depth of snow in the woods was about six inches.

One of the most striking facts about this census is that it contains no Crossbills, Redpolls, Canadian Pine Grosbeaks, Eastern Evening Grosbeaks, Bohemian Waxwings, or Northern Shrikes. These are all northern forms, commonly found in the vicinity of Ottawa at Christmas time. It is also



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<https://doi.org/10.5962/p.339450>.

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