

# Royal Ontario Museum of Zoology

Handbook No. 1

## THE MAMMALS OF ONTARIO

*by*

E. C. CROSS and J. R. DYMOND

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Price Twenty-five Cents

1929

# ROYAL ONTARIO MUSEUM OF ZOOLOGY

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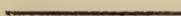
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## THE MAMMALS OF ONTARIO

ONE of the difficulties encountered in beginning the study of natural history in Ontario is the lack in many groups of animals of literature descriptive of the forms found in our province. The lack of such literature is in part due to the incompleteness of our knowledge: for instance, our knowledge of the distribution in Ontario of even our largest mammals is very indefinite and it is quite probable that future study will add a number of species to those now known to occur within our boundaries. This booklet has been prepared in the hope that it will help to stimulate a more active interest in the study of the mammals of Ontario.

Our mammals are not only important economically on account of their value as fur-bearers and as game, and some unfortunately on account of their destructiveness, but a consideration of their life-histories and relationships to one another and to other creatures afford many interesting illustrations of biological principles of fundamental importance. Until one can identify the different forms and has some acquaintance with their general habits and life-histories, a study of the facts upon which such principles are based is impossible.

It is to be regretted that we have no common name for the animals which the zoologist calls mammals. In older books on natural history we find them referred to as quadrupeds, but this term has almost dropped out of use, and now they are very generally called animals. The word animal, however, is not distinctive of the group under discussion, for birds, fishes, frogs and worms are as much animals as mammals are. The term mammal was given these animals because they possess mammary glands which secrete milk for the nourishment of the young. Mammals also possess hair, which is as distinctive of them as a class as feathers are of birds.

*Distribution of Ontario Mammals.* One of the first facts to be noticed in the study of our mammals is that each kind

occurs over a fairly definite extent of country, which is known as its range. The moose, for instance, is confined to the north woods, while the cottontail rabbit occurs only in the cleared and settled areas of southern Ontario.

There is the further fact to be noticed that an animal occurs only in a certain kind of locality within its range where conditions are to its liking or suitable to its manner of life. Such a locality is known as the animal's habitat. The woodchuck, for example, is found in fields or clearings where the soil is sandy or of such a nature as not to offer too much difficulty in the construction of its burrow; the muskrat on the other hand is restricted to the neighbourhood of streams, ponds or lakes.

Because of the fact that animals differ in their habitat preferences and in their areas of distribution, different species are met with as we move from one part of the province to another. There is, of course, no hard and fast line separating the ranges of the various species. The occurrence of the varying hare and of the cottontail rabbit in Ontario offers an interesting example of the gradation which exists in the distribution of animals. In Northern Ontario we have varying hares but no cottontail rabbits; in southern Ontario the cottontail is the common rabbit, but there is an intermediate region in which both species are met with. Even in such intermediate areas, the two species do not occupy the same situations, the hare being found in the cooler and the cottontail in the warmer situations. As we move north in the area in which the two species overlap, the cottontail becomes scarcer and scarcer until finally only hares are found; in the opposite direction the opposite tendency is seen.

The distribution of an animal, or the area over which it is found, depends on climatic and other conditions (soil, vegetation, etc.). In the study of animal distribution it has been found useful to divide the country into a number of zones or areas in each of which the climate and other factors affecting animal life are essentially similar. Each zone is characterized by a different set of animals although here again there is no hard and fast line demarking the distribution of the various animals making up the fauna of the different zones. On the

borders of the zones intermingling of animals characteristic of the two zones occurs and some animals range indiscriminately in two or more zones or faunal areas.

The accompanying map indicates the location of the life zones usually recognized in Ontario.



Map of Ontario showing life zones.

It has been found difficult in the following pages to designate with any degree of exactness the distribution of the various species described. This is partly owing to the small amount of study that our mammal fauna has received, but there is the additional difficulty that a mammal often occurs in isolated localities far outside what may be regarded as its normal range. It has been found necessary, therefore, to indicate the ranges of most species in very general terms.

*Identification.* It is hoped that the brief descriptions given in the following pages will prove adequate for the identification of most of our common forms. In the case of some, such as the shrews, mice and a few of the bats, recourse must be had to more detailed descriptions than are thought advisable in a publication of this kind. In some cases, too, access must be had to large series of specimens such as are found in museums.

References to more comprehensive accounts of the different groups are given towards the end of the booklet as a guide to those who may wish to pursue their studies beyond the stage made possible by the present publication.

The Museum will also be glad to assist anyone in connection with any difficulty which he may have in natural history studies.

*Measurements.* Closely related species of mammals differ not only in habits and appearance but also in size. Certain body measurements have been found useful in distinguishing species, those most commonly used being total length (indicated as T.L. in this booklet), tail vertebrae (T.V.), and hind foot (H.F.). The total length is measured by placing the animal on its back on a table or board, straightening it out (but not stretching it), placing a pin in the table or board at the tip of the mammal's nose and another at the tip of the fleshy part of the tail, *not including the hair*, and measuring the distance between the two pins. The length of the tail vertebrae is taken from the base of the tail to the end of the fleshy part, as in the case of total length. The length of the hind foot is measured in a straight line from the heel along the sole to the end of the claw on the longest toe. It must be remembered that there is considerable variation in size not only between animals of the same species from different parts of its range but also between individuals in the same locality. The measurements given in the following pages indicate approximately the average size for the species in question. All measurements are given in inches.

## SOME GENERAL PRINCIPLES

*Periodic Fluctuation in the Number of Animals.* One of the most interesting facts which has come to light as a result of the study of mammals is the extent to which their numbers fluctuate from time to time†. Almost everyone is familiar with the fact that hares at times reach great abundance in the north woods and that following these periods of maximum abundance they die off in such numbers as to leave very few survivors. Their numbers then gradually increase over a period of years until they are again very abundant. It is popularly believed that these periods of maximum abundance recur every seven years but it does not always or everywhere happen so regularly. Sometimes one plague may follow another after an interval of five years or may not occur for ten or twelve years, but it is true that waves of abundance and scarcity of hares follow one another at fairly regular intervals. But the hare is not the only creature affected by these fluctuations in its numbers. The Canada lynx subsists almost entirely on hares and as they increase in numbers, the lynx increases, and following the disappearance of the hare, the lynx becomes very scarce.

Mice of various kinds are known to have periods of abundance and scarcity, and the same tendency has been noted in other mammals, birds, snakes, insects, etc. Taverner has drawn attention to the way in which the scarcity of a certain animal in one place may affect others in a widely separated locality. He says: "In times of rabbit abundance all the flesh-eating animals of the north, including the goshawk, revel in plenty and increase in number. When this food supply is cut off, hunger and starvation is their lot and their attention,

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†Hewitt in 1921 called attention to the periodic fluctuations in the abundance of a number of animals, especially of varying hares, as shown by the fur returns of the Hudson Bay Company. Previously Cabot ("In Northern Labrador"), MacFarlane ("Mammals of Northwest Territories"), Seton and others had noticed the same tendency. More recently Elton (Brit. Journ. Exper. Biol. 2:119-163, 1924) has discussed this phenomenon in more detail.

rendered keen by need, is turned to sources of supply neglected when easier prey is procurable. At such times grouse of all kinds suffer most severely. The grouse of the northern localities are soon exhausted and the goshawk and large owls are forced out into new fields. They then come down in the southern prairie provinces in unusual numbers and continue there the work that they began in the north."

The cause of these periodic fluctuations in the abundance of certain mammals is not understood, but on account of its far-reaching effect on the numbers of certain game and fur-bearing animals it is important that every possible observation bearing on the subject should be brought together. By keeping accurate records of the abundance of all sorts of animals—mammals, birds, reptiles, insects, etc., naturalists can contribute towards the solution of this interesting and important subject.

*Closely Related Animals Fitted for Different Conditions.*

Another interesting fact which comes to light when we consider a group of closely related animals is the manner in which they are fitted to different conditions of life. This is well illustrated in the weasel family, in which the different members have become fitted to obtain their livings by such diverse means and in such diverse situations. The weasels themselves hunt over the surface of the ground and into crevices and holes; the mink while hunting actively on land is quite at home in the water, swimming and diving in search of aquatic prey; the otter is so thoroughly adapted for life in the water that it lives almost entirely on fish which it catches in their own element; the marten and fisher live in trees in which they are so much at home that they can catch squirrels; the badger has taken to a subterranean life and burrows in search of the small mammals on which he lives; the wolverine is not adapted to any particular niche but has had his strength and cunning developed to a remarkable degree; the skunk of course is remarkable for the perfection of his particular means of defence; the other members of the family possess scent glands like those of the skunk but in none of them are they so highly developed.

*Differences between Animals of the Same Species from Different Localities.* In the case of a species of mammal which occurs over a very wide area, specimens from widely different parts of its range are usually found to differ rather widely in their characteristics. Thus the animals from one region may average larger than those of the same kind from another region, or they may be of a different colour, have longer tails or longer ears or differ in other body proportions. Some of these differences appear to be correlated in some way not yet understood with certain factors of the environment, thus specimens from forested areas are usually darker than specimens of the same species from prairie or desert regions, and northern forms are generally larger than representatives of the same species from the south. In other characters no such correlation can be discovered. Thus specimens from one geographical area usually have certain average differences of size, colour, body proportions, etc., as compared with those of the same species from a different geographical area.

Animals of a species occupying different geographical areas and differing in their characters are regarded as belonging to different geographical races or subspecies. Thus *Marmota monax canadensis*, the woodchuck of Northern Ontario, is smaller and redder than the more southern form, *Marmota monax rufescens*. There is, however, usually no sharp line of demarkation between the geographical races or subspecies of a mammal either in their characters or their ranges; in the area intervening between the ranges of neighbouring subspecies occur specimens intermediate in some or all of their characters between those of the two subspecies in question.

As the differences between subspecies are not so wide as those which characterize distinct species, it is thought by many students of animal life that by careful study it may be possible to discover the way in which these smaller differences have arisen and so provide a clue as to the origin of specific differences.

*The Carnivore's Place in Nature.* At first sight it may appear as if the carnivorous mammals,—those that live by

killing and devouring others—are a disadvantage in the economy of nature, but as one investigates the matter more carefully he begins to wonder if Elton is not right when he says that for a species to have the right enemies is a biological advantage.

Were all of the young of any species to survive and multiply, that species would sooner or later occupy the whole earth and commit suicide by eating out its food-supply. On the average but two of all the offspring produced by each pair of animals will reach maturity. If more matured that species would increase until it crowded others off the earth. In the case of the lower animals, such as fish, millions of young are produced by a pair of adults; in the case of higher animals, fewer young are produced but greater care is given them. In any case, however, there must be a terrible mortality among the offspring of all animals. This is the cause of the struggle for existence,—more animals are produced than can possibly survive.

What decides which two of the offspring of a pair of animals shall survive of the dozens, hundreds or millions that are produced? Is it blind chance that decides? Accidents no doubt play an important part in the matter but zoologists believe that on the average those best fitted to survive do survive,—those least liable to disease or more robust to throw it off, the swiftest or the most skilful in escape, the cleverest in securing food. In nature the misfits and the unfit are soon weeded out and only the fit, on the average, left to reproduce their kind. Man does the same with his domestic animals. He ruthlessly weeds out those that do not measure up to his standard and breeds only from the best.

The carnivore is one of nature's selectors. To escape his enemies an animal must be keen witted, and with all his physical powers of a high degree of perfection. By weeding out the unfit and the misfits, the carnivore contributes to the well-being of the species on which it preys.

## DESCRIPTIVE LIST OF ONTARIO MAMMALS

The mammals described in the following pages are taken up in the order in which it was felt that they could be best described. In most cases common or well-known forms are discussed before less common forms.

On pages 45 to 48 will be found a complete list of the species and subspecies dealt with, arranged in the order in which they appear in Miller's List of North American Recent Mammals. (U.S. Nat. Mus. Bull. 128, 1924.)

### The Carnivores

### Order Carnivora

The "flesh-eaters" include many of our most valuable fur-bearing mammals. They differ widely in size, appearance and habits, but all make flesh the major portion of their food. They are especially characterized by their large, strong, pointed canine teeth. The incisors are small and relatively weak while the premolars and molars have sharp, cutting edges which bite on one another like a pair of shears. The backmost teeth are usually broad and fitted for crushing.

The families represented in Ontario are as follows:

Ursidae. . . . . Bears

Procyonidae. . . Raccoon

Mustelidae. . . . Weasels, mink, otter, fisher, martin,  
wolverene, skunk

Canidae. . . . . Foxes and wolves

Felidae. . . . . Lynx

### THE BEARS

### URSIDAE

The general appearance of bears is familiar to everyone. The coat colour of North American bears varies from jet black through varying shades of brown and in one case grey-blue to white. Only two species occur in Ontario—the Black Bear, and at the extreme north, around James bay, the Polar Bear.

**The Black Bear** once ranged all over the province but is now confined to the more unsettled and forested parts.

The bear is very much afraid of man and is usually not

dangerous except when cornered or wounded. A mother bear, however, will fight for her cubs if harm threatens them.

It will eat almost anything it can get, but prefers a vegetable diet, being especially fond of fruit. It also eats roots, nuts, grasshoppers, ants, grubs, birds, mammals, frogs, fish, and even carrion.

This bear hibernates during the winter and it is during this time that the young, usually two in number, are born. At birth they are about the size of squirrels, and at an early stage of development.

The pelt of the black bear is usually a glossy black except for the face, which is brownish. There is often a white spot on the chest. Occasionally a brown colour phase known as the Cinnamon Bear occurs.

A medium-sized black bear weighs two hundred pounds, a very large one three hundred pounds.

T.L. 60 in.                      T.V. 5 in.                      H.F. 7 in.

The Ontario form is *Ursus americanus americanus* Pallas.

**The Polar Bear** ranges along the coast of Ontario bordering on Hudson and James bays, never penetrating very far inland.

This huge bear also eats almost anything it can find or catch, ashore or afloat. It does not hibernate and spends most of its life on drifting icefloes and swimming about in the sea. The young, usually two in number, are born in December or January. The polar bear measures from seven to nine feet in length and weighs from seven to sixteen hundred pounds.

The Hudson bay form is *Thalarctos maritimus maritimus* (Phipps).

## THE RACCOONS

## PROCYONIDAE

**The Raccoon** is distributed over that part of Ontario south of Parry Sound and Ottawa but occurs sparingly as far north as the north shore of Lake Huron. It also enters the province in the west along the Ontario-Minnesota boundary.

Raccoons are usually found along the edges of woodlands, especially of hardwoods, where they find the hollow trees in which they prefer to place their dens. Dense coniferous

woods are not to their liking. They prefer areas near streams, lakes or marshes where frogs, fish and other aquatic animals are to be had, but they will eat almost any fresh food such as mammals, birds, eggs, reptiles, insects, fruit, green corn and nuts. Their hunting is done in the darkest hours of the night.

The young, three to six in number, are born in April or May. Raccoons "den-up" during the coldest weather, becoming active early in the spring.

The "coon's" grizzly, grey-brown fur and black-ringed tail are familiar to almost everyone. The usual weight is between fifteen and twenty pounds.

T.L. 30 in.            T.V. 10 in.            H.F. 4.5 in.

The Ontario form is *Procyon lotor lotor* (Linnaeus).

#### THE WEASEL FAMILY

#### MUSTELIDAE

**Weasels** are long, slender-bodied little animals with short legs. In summer they are brown above and whitish beneath, but in winter they become white except for the black tip of the tail.

They are fierce, active hunters with an especial fondness for the warm blood of their prey. While they can and at times do climb trees, they spend most of their time hunting on the ground and investigating burrows. From four to eight young are brought forth to the litter.

**The New York Weasel** is the common weasel of southern Ontario. The northern limit of its range is not definitely known but it occurs at least as far north as Muskoka.

It preys on mice, squirrels, chipmunks, rabbits, birds and eggs.

Its size, length of tail and proportion of the black tip of the tail (about half the total tail length) are its distinguishing features. Males are larger than females.

Male. . . . . T.L. 16 in.    T.V. 5½ in.    H.F. 1½-2 in  
 Female. . . . . T.L. 13 "    T.V. 4-4½ "    H.F. 1¼-1½ "

The Ontario form is *Mustela noveboracensis noveboracensis* (Emmons).

**The Bonaparte Weasel** is the common weasel of northern Ontario. As mentioned above, these two species of weasels

occur together over quite an area in central Ontario, the New York weasel gradually disappearing northward and the present species becoming rarer towards the south. Its habits are similar to those of its larger southern relative from which it may be distinguished by its size, length of tail and proportion of the black tip, which comprises about one-third the length of the tail.

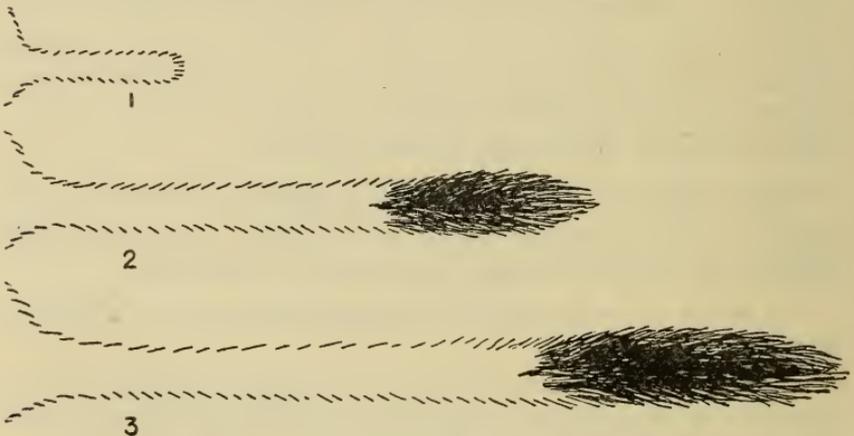
Male.....	T.L. 11-12 in.	T.V. 3-3½ in.	H.F. 1½ in.
Female.....	T.L. 9	T.V. 2-2¾ "	H.F. 1 "

The form occurring over the greater part of the range of this species in Ontario is *Mustela cicognanii cicognanii* Bonaparte. A larger form with longer tail occurs in the extreme north along Hudson and James bays, *M.c. richardsonii* (Bonaparte).

**The Least Weasel** has been recorded in Ontario only from the shores of James bay. It is the smallest of the weasels and is further distinguished by the fact that the tail has no black tip.

Female.....	T.L. 6 in.	T.V. 1.2 in.	H.F. .9 in.
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The form referred to above is *Mustela rixosa rixosa* (Bangs). A southern form *M.r. allegheniensis* (Rhoads) occurs along the south shore of Lake Erie and may possibly extend into southwestern Ontario.



Sketches indicating relative lengths of tails and proportion of black tip of three species of weasels, 1. Least weasel, 2. Bonaparte weasel, 3. New York weasel.

**The Mink** is generally distributed throughout the province. In structure and appearance it resembles the weasel but is larger, lacks the whitish belly and black-tipped tail and does not turn white in winter.

While not so well adapted to an aquatic mode of life as the otter, the partly webbed feet and short thick fur fit the mink very well for its aquatic habits and it is seldom found far from a stream, pond or lake. Its food consists of fish, frogs, crayfish, mice, rabbits, muskrats and birds.

The den is usually a burrow in a stream bank or a retreat under rocks or logs. The young are born in April or May. Only one brood of from three to ten is brought forth in a year.

There is considerable difference between the minks of different regions but those of Ontario have received so little study that it is not certain how many forms occur here. Those in the northwestern part of the province (*Mustela vison lacustris* (Preble)) are quite large as compared with those farther east and south (*Mustela vison vison* Schreber). *M. v. mink* (Peale and Beauvois) occurs in the eastern United States from the coast of New England south to North Carolina, and in the interior to central Georgia and Alabama, westward through southern Pennsylvania and Ohio to Missouri and northeastern Texas, and is said to be the form found in southern Michigan. It may possibly be represented in southwestern Ontario. *M. v. letifera* Hollister ranges from northern Wisconsin and northern South Dakota to northern Illinois, northern Missouri and southern Kansas. Dice thinks it probable that this form occurs in northern Michigan. If so, it is possible that it extends also into Ontario in the vicinity of Sault Ste. Marie.

**The Otter** is still found in Ontario north of Lake Nipissing. South of that it has been exterminated except where the water courses are sufficiently wooded and unsettled.

It is the most aquatic in its habits of any of the weasel family and is seldom found far from a lake or a stream. Its dense, oily fur and webbed feet fit it admirably for life in the water where most of its living is secured. Its food consists chiefly of fish and crayfish, but it will take mammals, birds, or even frogs when opportunity occurs.

The young, which are one to three in number and born in April or May, must be taught by the adults to swim and catch fish.

The otter is dusky brown in colour and is characterized especially by its short thick fur, short legs and long tail.

T.L. 40-45 in.

T.V. 12-15 in.

H.F. 4-4 $\frac{3}{4}$  in.

The Ontario form is *Lutra canadensis canadensis* (Schreber).

**The Fisher** once ranged over most of Ontario and is still found not uncommonly in the wilder parts of northern Ontario. It is essentially a forest animal and disappears when the pine and spruce forests in which it lives are cut down.

For its size the fisher is said to be the swiftest and most deadly of our forest carnivores. So agile is it that it catches and kills squirrels and martens in the tree tops. On the ground it hunts and captures a variety of mammals, including foxes. One of its favourite victims is the porcupine.

The one to five young are usually born in May.

The pelt of the fisher is one of the most valuable of Ontario furs. It is usually a brownish black in colour with an almost black area along the back and with black nose, tail and feet.

T.L. 36 in.            T.V. 15 in.            H.F. 4 in.

The Ontario form is *Martes pennanti pennanti* (Erxleben).

**The Marten** is still to be found in northern Ontario as far south as Algonquin Park.

It lives in the heavy evergreen forests, spending most of its life in the trees. It is a skillful climber, able to overtake and kill squirrels among the branches. Birds, small mammals, fish, frogs, insects, reptiles and even fruit are also included in its bill of fare. The fisher, the lynx and the great horned owl are probably its most dangerous enemies.

The den is occasionally in a burrow but usually in a hollow tree. The young martens, from one to five in number, are born in the latter part of April.

The marten's fur is quite valuable. It is lighter in colour than that of the fisher. The legs and bushy tail are dark brown, not black as in the case of that species, while the general colour is a rich brown.

T.L. 24 in.            T.V. 7-8 in.            H.F. 3.5 in.

The Ontario form is *Martes americana americana* (Turton). The marten found west of Hudson bay is larger and has been described as a separate geographical race under the name *M. a. abieticola* (Preble).

**The Skunk** is generally distributed over the province. It may be found in all sorts of habitats within its range but is not usually encountered in thick forests or swamps.

The skunk lacks the swiftness and agility of the other members of its family and except by luck or strategy is not able to kill other mammals. Its food consists largely of insects but it also eats snakes, frogs, birds and mammals when it can catch them.

While the skunk, properly speaking, does not hibernate, it does "den-up" during the severest weather. The dens are usually old woodchuck holes but it will make a burrow for itself if necessary. The young are born in April or May and may be anywhere up to ten in number.

The appearance of the skunk is familiar to all, its black fur, white stripes and bushy tail being quite distinctive.

The fluid which it uses in self-defence is secreted by two glands under the tail. All the members of this family produce a similar secretion but it reaches its highest development in the skunk.

T.L. 24 in.      T.V. 6.5-7.5 in.      H.F. 3 in.

As in the case of so many of our mammals, definite information as to the forms occurring in Ontario is very meagre. The species found in northern Ontario is *Mephitis mephitis mephitis* (Schreber), and in southern Ontario *Mephitis mephitis nigra* (Peale and Beauvois). The form occurring in Northern Michigan and Minnesota *M. m. hudsonica* (Richardson) may occur in the adjoining parts of Ontario.

**The Wolverine** occurs only in the extreme northern part of the province and there only sparingly. It is the largest of the weasel family and is especially characterized by its great strength and cunning. It has been described as the animal world's greatest thief, and does considerable damage by following up lines of traps and destroying the animals caught in them, and breaking and carrying away the traps.

The wolverine cannot climb or run well and so most of its hunting is done on the ground. Its food consists principally of birds, mice, lemmings, young animals, reptiles and insects, but it has been known to attack and kill even deer.

The young, varying from two to five, are born in some sheltered nest in midsummer.

The wolverine's squat, powerful frame and long, dark coat with a yellowish band along the side make it unmistakable.

T.L. 37-41 in.      T.V. 7-8.5 in.      H.F. 7-8 in.

Our species is *Gulo luscus* (Linnaeus).

The members of this family are medium-sized, carnivorous animals, dog-like in form. Their hunting is confined to the land although they can swim well enough if occasion demands. In contrast to most animals, the father takes an active part in the care of the young. They do not hibernate but are active all winter. Four representatives of the family occur in Ontario.

**The Red Fox** is distributed all over the province and is found in all sorts of habitats within its range.

It preys on mice, rabbits, squirrels, birds and other small animals. Birds' eggs, fruit, berries and even carrion are also eaten. The fox in turn is preyed upon by eagles, wolves, the lynx, and fisher.

The young, numbering from four to nine, are born in March or April, usually in a burrow but sometimes a hollow log or an old stump is used as a den.

Black, Silver and Cross foxes are colour phases of the common red fox.

T.L. 40 in.

T.V. 16 in.

H.F. 6.5 in.

The Ontario red fox is *Vulpes fulva* (Desmarest).

**The Arctic Fox** frequents that part of Ontario bordering on Hudson bay.

Its food consists of small mammals, birds and eggs, fruit, berries and carrion. During the winter it ranges the ice floes for sea food as well as hunting on land.

The summer coat of the Arctic fox is dark brown above, with lighter underparts; in the winter the animal is entirely white. A "blue" colour phase that does not turn white in winter sometimes occurs.

The chief enemies of this fox are wolves and polar bears.

The den is either a burrow or a retreat among the rocks and there in the early summer the young, numbering as high as eleven, are born.

T.L. 30 in.

T.V. 10 in.

H.F. 4.5 in.

The Ontario form is *Alopex lagopus innuitus* (Merriam).

**The Brush Wolf** ranges over the greater part of the

province, from the Manitoba boundary as far east as Ottawa, south as far as the Kawartha lakes and north at least as far as the main line of the Canadian National Railway.

This wolf preys chiefly on small mammals and birds but will eat reptiles, fruit or carrion.

The young, three to ten in number, are born in spring. The den is in a burrow, a hollow log or among rocks.

The brush wolf is smaller than the timber wolf and usually has finer fur of a more reddish hue.

Female. . . . T.L. 49 in.      T.V. 16 in.      H.F. 7.2 in.

The Ontario form is provisionally identified as *Canis latrans* Say.

**The Timber Wolf** ranges as far south and east as the brush wolf and is distributed all over northern Ontario up to Hudson bay.

It preys on the animals within its range from deer to mice, as well as eating birds, fish and carrion.

The young vary in number, six to nine being the average. They are born in spring or early summer. The den is usually among rocks or in a hollow log, or less often in a hole in the ground.

In colour the timber wolf shows great variations, from white, grizzled gray or reddish gray to an almost blue shade and sometimes to a deep black. Its large size, coarse fur, which on the neck and shoulders form a sort of mane, and proportionately shorter tail, will usually distinguish it from the brush wolf.

Male. . . . . T.L. 64 in.      T.V. 16 in.      H.F. 10 in.  
Female. . . . T.L. 56 "      T.V. 12 "      H.F. 10 "

The timber wolf of eastern Canada is *Canis lycaon* Schreber.

## THE CAT FAMILY

## FELIDAE

Two species of lynx are the only representatives of this family now found in Ontario. The cougar (*Felis couguar* Kerr) was occasionally found in the southern part of the province up till the middle of the last century but has now been extinct in Ontario for nearly fifty years.

**The Canada Lynx** is generally distributed over northern Ontario, especially in the wilder sections.

Its staple diet consists of hares but it also eats squirrels, mice, birds, snakes and frogs and has been known to attack and kill even deer and caribou. Its numbers fluctuate markedly with the rise and fall in number of hares, as described in the introduction.

The lynx is a large cat-like animal with prominent tufts of long hairs on its ears, with long legs and big feet, and short tail, tipped with black. In summer the colour is brownish, in winter a grizzled gray. In winter, too, the large feet become larger still by the growth of long, stiff hairs and serve as snowshoes to enable the animal to walk on snow into which other animals of its size and weight sink.

T.L. 36-39 in.      T.V. 4 in.      H.F. 9½ in.

The Ontario form is *Lynx canadensis canadensis* Kerr.

**The Bay Lynx or Bobcat**, as it is sometimes called, once ranged over southern Ontario, as far north as Georgian bay. It is still found occasionally in various parts of its former range where wooded and unsettled areas give it a refuge.

The bay lynx preys on the same animals as its northern relative, the Canada lynx, and has similar habits.

It also resembles that species in appearance but is more reddish in colour, more definitely spotted, the black spots on the tail having a tendency to form rings. It is not always possible to identify lynx with certainty from external appearances. As the extent to which this species still occurs in Ontario is doubtful, persons killing an animal which they believe to be of this species are urged to communicate with the Museum. For certain identification the skull should be saved and measurements made of the animal before skinning, as described on page 6.

T.L. 36 in.      T.V. 7 in.      H.F. 7 in.

The Ontario form is *Lynx rufus rufus* (Schreber).

## Order Marsupialia

**The Opossum** formerly occurred sparingly along the north shore of Lake Erie, but none has now been recorded from Ontario for many years.

The Ontario form was *Didelphis virginiana virginiana* Kerr.

## Moles and Shrews

## Order Insectivora

Moles and shrews are small, mouse-like animals with long, pointed snouts, and minute eyes and ears. The soft, erect, velvety fur differs from that of most mammals in that it may be stroked forwards as easily as backwards. They subsist largely on insects which the moles secure by burrowing, and the shrews by searching among the leaves and fallen debris of the forest floor. Two families are represented in Ontario, the Moles (Talpidae), and the Shrews (Soricidae).

### THE MOLES

### TALPIDAE

The moles differ from shrews in the possession of broad, shovel-like forefeet adapted for digging. They prefer a loose, sandy or loamy soil and in it will drive burrows in all directions in search of earth worms and grubs. Long ridges of earth and piles of loose soil are the usual visible evidence of these active little miners. Very little is known regarding their habits. The young, about four in number, are born in April or May and remain in the nest deep underground till well grown.

**The Prairie Mole** is found in Ontario only in the southwestern part of the province. It is most abundant in open ground, such as meadows, but is also found in open woodlands and other similar locations.

It may be readily distinguished from other Ontario moles by its naked tail and absence of fleshy projections about the nose.

T.L.  $6\frac{1}{2}$  to 7 in.

T.V. 1 to  $1\frac{1}{2}$  in.

The Ontario form is *Scalopus aquaticus machrinus* (Rafinesque).

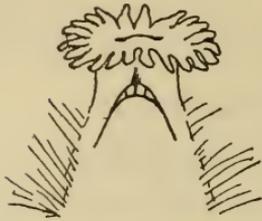
**The Hairy-Tailed Mole** is nowhere common but occurs throughout most of southern Ontario. It resembles the prairie mole in general appearance except that its tail is thickly haired.

T.L. 6 in.

T.V.  $1\frac{1}{4}$  in.

The Ontario form is *Parascalops breweri* (Bachman).

**The Star-Nosed Mole** is generally distributed over Ontario. It is most abundant in wet, swampy ground but is sometimes found in dry locations. In winter the star-nosed mole will burrow under the snow or even run about on the surface. It is easily recognized by the peculiar fringe of fingerlike processes about its nose.



Nose of star-nosed mole showing fringe of tentacles.

T.L.  $7\frac{1}{2}$ -8 in.

T.V.  $3\frac{1}{8}$  in.

The Ontario form is *Condylura cristata* (Linnaeus).

## THE SHREWS

## SORICIDAE

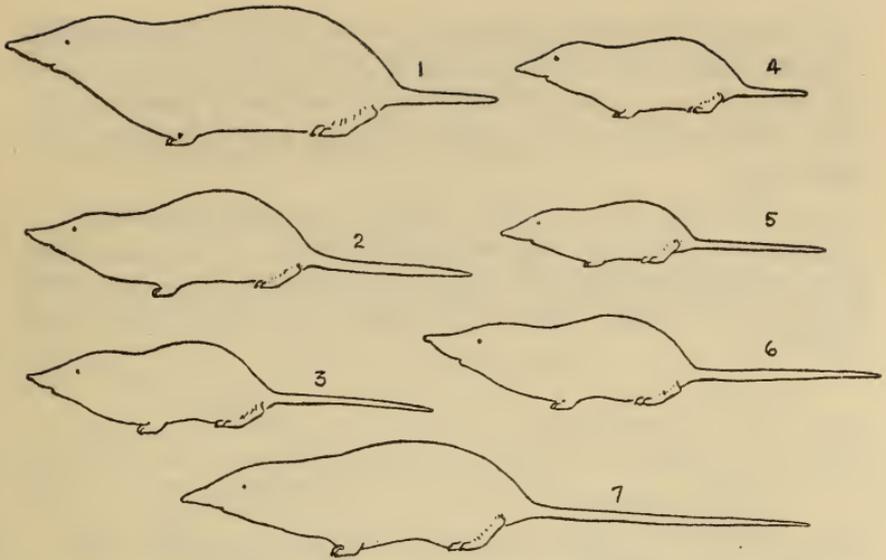
The shrews are the smallest of our mammals. In appearance they are not unlike moles but their forefeet are not enlarged for digging. They are usually found in damp situations, such as along the banks of streams, in low meadows, sphagnum bogs, swamps or cool, damp woods. These tiny hunters spend their lives searching under rocks, logs and vegetation for insects and worms, but will kill and eat mice if opportunity offers. They do not hibernate but are active under the snow all winter.

The shrews offer many difficulties to the beginner, but will be found an intensely interesting group by anyone who will devote a little time to their study. Comparatively little is known about the occurrence and distribution of shrews in Ontario. The opportunity of making original discoveries is perhaps greater in this group than in that of any other group of Ontario mammals.

### SHORT-TAILED SHREWS

Two species of Ontario shrews may be readily known from all others by their short tails which are less than half the length of the head and body.

**The Mole Shrew or Short-Tailed Shrew** is one of the commonest and most widely distributed of our shrews. Its range covers the entire province except perhaps the extreme north. In habits it is more like a mole than a shrew, in that it hunts about beneath the layer of decaying leaves and other debris that covers the forest floor. Its size will serve to dis-



Sketches indicating relative sizes and lengths of tails of Ontario shrews, 1. Mole shrew, 2. Saddle-back shrew, 3. Cinereous shrew, 4. Little short-tailed shrew, 5. Pigmy shrew, 6. Smoky shrew, 7. Water shrew.

tinguish it from the next, the only other species of short-tailed shrew in Ontario.

T.L. 5 in.

T.V. 1 in.

The Ontario form *Blarina brevicauda talpoides* (Gapper) is perhaps identical with *B. b. brevicauda* (Say).

**The Little Short-Tailed Shrew** is known at present from only one locality in Ontario, viz., Long Point on Lake Erie.

T.L. 3.1 in.

T.V. .64 in.

The Ontario form is *Cryptotis parva* (Say).

#### LONG-TAILED SHREWS

The following shrews have the tail more than half the length of the head and body.

**The Pigmy Shrew** is our smallest mammal. It is thought to occur throughout the province but little definite information as to its occurrence and habits is available. It is said to prefer dry clearings rather than dark woods or damp places. Its diminutive size is one of its distinctive features.

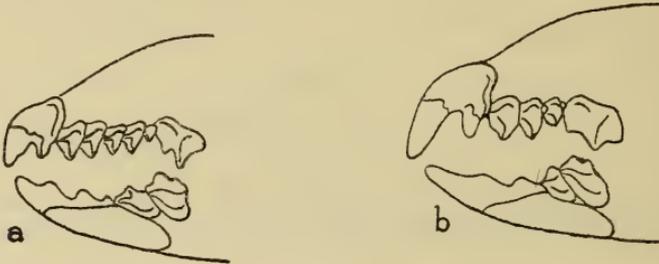
From our other long-tailed shrews it may be distinguished with certainty by an examination of its teeth. Looking at the side of the upper jaw only three unicuspid teeth can be seen while in the others there are four and sometimes five such teeth.

T.L. 3.3 in.

T.V. 1.3 in.

H.F. .42 in.

The form throughout most of northern Ontario, and at least as far south as Georgian bay is *Microsorex hoyi intervectus* Jackson; southward in Ontario, *M. k. hoyi* (Baird). The range limits of all these forms are uncertain.



Sketch showing difference between dentition of genus *Sorex* (Cinereous shrew) (a) and *Microsorex* (Pigmy shrew) (b). In the former note the two-lobed incisor followed by five unicuspid teeth and first molariform tooth; in the latter the third unicuspid is small, disc-like antero-posteriorly flattened and the fifth unicuspid is minute.

**The Smoky Shrew** is likely to be found anywhere in Ontario south of Lake Nipissing. The northern limit of its range is not known. It may usually be distinguished from the next species by its larger size.

The incompletely pigmented ridges on the inner side of the upper unicuspid teeth afford a more certain means of distinguishing this species from the preceding.

T.L. 4.6 in.

T.V. 1.8 in.

H.F. .52 in.

The form found in Ontario is *Sorex fumeus fumeus* Miller.

**The Cinereous Shrew** is the commonest and next to the pigmy shrew the smallest of our long-tailed shrews. It is generally distributed throughout Ontario.

It is likely to be confused with the smoky shrew. From this species it is distinguished by its much smaller and lighter skull, while each of the upper unicuspid teeth has a completely

pigmented vertical ridge on the inner side. The unicuspid teeth are arranged in pairs, while in the smoky shrew they are graduated in size from the front backwards.

T.L. 4 in.                      T.V. 1.6 in.                      H.F. .5 in.

The Ontario form is *Sorex cinereus cinereus* Kerr.

**The Saddle-back Shrew** is known to occur north of Lake Superior\*. It is of medium size with rather short tail. It is characterized by a pronounced tricolour pattern, "the back distinctly darker than the sides, which in turn are distinctly darker than the ventral parts."

T.L. 4½ in.                      T.V. 1¾ in.                      H.F. 9/16 in.

The form found north of Lake Superior is *Sorex arcticus arcticus* Kerr. *S. a. laricorum* Jackson, a form found in northern Michigan, may extend into Ontario in the vicinity of Sault Ste. Marie.

**The Water Shrew**, as its name suggests, is never found far from water. It is a splendid swimmer and diver, obtaining much of its food in ponds and streams. It is known to occur in Ontario north of Parry Sound. It may be identified by its habitat preferences, its size and is thickly fringed hind feet.

T.L. 6.4 in.                      T.V. 2.7 in.                      H.F. .8 in.

*Sorex palustris palustris* Richardson is the form found north and east of Lake Superior; *S. p. albibarbis* (Cope) occurs east and north of Parry Sound; the Wisconsin form (*S. p. hydrobadistes* Jackson) may extend into Ontario north of Lake Huron.

## The Bats

## Order Chiroptera

Bats are regarded with aversion if not with dread by the great majority of people. There seems to be something uncanny and mysterious about a creature that avoids the day, coming out in the dusk to flit about so noiselessly. There is, however, no cause to fear the bats found in this country. Their presence is, if anything, to be desired since their food consists of insects and they thus rid the air of many annoying pests.

The bats are the only mammals capable of flight. Their

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\*Its general range is "Plains of Saskatchewan and boreal parts of Minnesota and Wisconsin; north to lower Mackenzie valley."

“wings” are really modified hands, the fingers being greatly extended and connected by a thin membrane which also extends to the hind limb and to the tail.

Bats are to be found almost anywhere within their range at the proper season and where flying insects abound. Their favourite hunting grounds are along streams, lakes, forest glades, meadows and even near street lights.

On the approach of winter most of our bats migrate, but the question of migration has not been fully investigated as yet.

The breeding season is in the early fall and the young, from one to four in number depending on the species, are born the following spring or summer. The mother carries the young about with her till they are able to fly.

Owls are probably their worst enemies.

Only one family (Vespertilionidae) is represented in Ontario.

**The Red Bat** is known to range over Ontario, south of Lake Nipissing, but its northern range limits are not known.

This bat is never found far from forests except during migration. It starts hunting early in the evening, occasionally flying about in the day time. In flight its long narrow wings may be noted and it shows a tendency to fly high.

The young, one to four in number, are born about June, the mother carrying them about with her for some time.

Its reddish colouration will serve to identify this bat. It has 32 teeth.

T.L. 4.25 in.

T.V. 2 in.

H.F. 3 in.

Forearm 1.5 in.

The Ontario form is *Nycteris borealis borealis* (Müller).

**The Hoary Bat.** The whole of the province is included in the range of the hoary bat but it is everywhere rare.

Its habits are similar to those of the red bat but it starts hunting later in the evenings and flies very high.

This is the largest of our bats and may be readily identified in flight by its size and on closer examination by the silvery-white tips of the long hairs which overlie the yellowish-

gray underfur on the back. It also has 32 teeth.

T.L. 5.5 in.      T.V. 2.25 in.      H.F. .4 in.

Forearm 2 in.

The Ontario form is *Nycteris cinerea* (Beauvois).

**The Silver-haired Bat** is widely but irregularly distributed over the province. It is most often found along streams and borders of woods. It spends the day in a hollow tree or some similar shelter, appearing in the early twilight. The young are generally two in number.

The dark brown almost black fur of this bat, tipped with silvery-white, will serve to distinguish it. The teeth are 36 in number.

T.L. 4 in.      T.V. 1.6 in.      H.F. .3 in.

Forearm 1.5 in.

The Ontario form is *Lasionycteris noctivagans* (LeConte).

**The Big Brown Bat** ranges over most of Ontario at least as far north as the northern shore of Lake Superior, but its northern range limits are uncertain.

This is the commonest of our larger bats, being often found in towns and cities, though it seems to prefer meadows, clearings and watercourses. Some big brown bats hibernate during the cold weather and others migrate. The young are one or two in number.

The uniform dull brown colour combined with its size will usually serve to distinguish it. It possesses 32 teeth.

T.L. 4-5 in.      T.V. 1.75-2 in.      H.F. .3-.5 in.

Forearm 1.8 in.

The Ontario form is *Eptesicus fuscus fuscus* (Beauvois).

**The Little Brown Bats** resemble one another so closely that without the aid of a series of specimens for comparison it is, in most cases, almost impossible to distinguish the different forms. Their ranges include the whole of the province and they penetrate farther north than any others of our bats.

All the members of this genus have 38 teeth and the measurements of the commonest form, *Myotis lucifugus lucifugus*, are as follows:

T.L. 3.6 in.      T.V. 1.6 in.      H.F. .35 in.

Forearm, 1.5 in.

But two forms are certainly known to occur in Ontario, *Myotis lucifugus*

*lucifugus* (LeConte), which ranges all over Ontario as far north as the limit of trees, and *Myotis keenii septentrionalis* (Trouessart), which ranges over southern Ontario and north at least to the north shore of Lake Superior. The long ears of this bat, reaching well past the tip of the nose when laid forward, will serve to distinguish it from the former in which the ear will usually reach only to the nostril.

Two other forms, *M. subulatus leibii* (Audubon and Bachman) and *M. sodalis* Miller and Allen occur in the United States along the St. Lawrence and lakes Erie and Ontario and may extend into adjoining parts of Ontario.

**The Pipistrelle** has been recorded only once from Ontario, but as it appears to be generally distributed south of lakes Ontario and Erie in the United States, it may be expected to occur at least occasionally in the neighbouring parts of Ontario. This species is rather social in its habits and is often found sleeping during the day in large clusters. The young are usually two in number.

In size and yellowish brown colouration this small bat resembles the little brown bats mentioned above but it has only 34 teeth whereas the bats of the genus *Myotis* have 38.

T.L. 3.4 in.      T.V. 1.5 in.      H.F. .32 in.

Forearm 1.3 in.

The Ontario form is *Pipistrellus subflavus obscurus* Miller.

**The Evening Bat** has been taken in extreme southwestern Ontario. It is of medium size and dull brown colouration. The tip of the tail extends beyond the inter-femoral membrane which is bare.

The teeth are 30 in number.

T.L.  $3\frac{3}{4}$  in.      T.V.  $1\frac{1}{2}$  in.      H.F.  $\frac{1}{4}$  in.

Forearm  $1\frac{1}{2}$  in.

The form found in Ontario is *Nycticeius humeralis* (Rafinesque).

## **The Rodents**

## **Order Rodentia**

The members of this order in Ontario range in size from mouse to beaver. They differ widely in appearance and habits but all have the front or incisor teeth reduced to a single pair, in each jaw. These teeth are chisel-like and are especially adapted for gnawing. With use they gradually wear away but do not become worn down because they continue to grow from the root throughout the entire life of the animal.

All rodents depend on a vegetable diet. Ultimately, of course, all animals depend for their existence on plants and the rodents are very important in the rôle of converting vegetation into food for the carnivores.

The rodent families found in Ontario are as follows:

- Sciuridae. . . . . Squirrels, chipmunks and woodchuck.
- Castoridae. . . . . Beaver.
- Cricetidae. . . . . Native mice and rats.
- Muridae. . . . . Introduced mouse and rat.
- Zapodidae. . . . . Jumping mice.
- Erethizontidae. . Porcupine.

#### THE SQUIRREL FAMILY

#### SCIURIDAE

This family affords an interesting case of closely related animals that have become adapted to widely different manners of life. The chipmunks spend much of the time on or near the ground; the squirrels are at home in the trees, the flying squirrel being the nearest approach this family has attained to life in the air; the burrowing habit is represented by the woodchuck.

**The Red Squirrel** is a common mammal all over Ontario. It prefers coniferous woods but is at home almost anywhere.

It does not hibernate but stores up quantities of nuts, cones and seeds of various kinds for the lean winter season. Hollow trees are favourite nesting places but outside nests of leaves perched high in the forking branches of a tree are also used.

Usually from four to six young are brought forth each year.

T.L. 12 in.

T.V. 5 in.

H.F.  $1\frac{7}{8}$  in.

*Sciurus hudsonicus loguax* Bangs is the form found in Ontario south and east of Georgian bay; *Sciurus hudsonicus hudsonicus* (Erxleben) is the northern Ontario form; a third form *S. h. gymnicus* Bangs, which occurs in Quebec south of the St. Lawrence and in the New England States, may extend into Ontario in the extreme east.

**The Black or Gray Squirrel** is still to be found in fair numbers all over southwestern Ontario and even as far north as Lake Simcoe and Ottawa. It prefers to live in hardwood forests.

It does not hibernate but stores up food for the winter. Its nests are either placed in hollow trees or consist of large bundles of leaves placed high in the branches.

The young number four to six to a litter and it is thought that sometimes two litters are produced in a season.

The black squirrel is a colour phase of the gray. In some places the gray phase is the more numerous, in others the black phase, while in others the two colours occur in almost equal numbers.

T.L. 18 in.            T.V. 8.5 in.            H.F. 2.5 in.

*Sciurus carolinensis leucotis* (Gapper) is the only Ontario form.

**The Eastern Chipmunk** occurs all over Ontario except perhaps in the extreme north. It is the only chipmunk found in southern Ontario.

Its favourite haunts are high, dry ridges or sunny places with plenty of underbrush or rocks for cover. In forests it is found in openings and clearings rather than in the deep woods. When startled it scampers precipitately, with tail erect, to its burrow, located in a rockpile or under a stump, log or brush heap.

The chipmunk stores up a great quantity of food for winter and whether it really hibernates or simply lives underground in its burrows during this time is not definitely known.

But one litter is thought to be produced each year, the young usually numbering four or five.

The only animal it is likely to be confused with is the little Western Chipmunk. The eastern chipmunk's greater size, two broad stripes and reddish colouration, particularly on the rump, will usually identify it.

T.L. 9-10 in.            T.V. 4 in.            H.F.  $1\frac{3}{8}$  in.

*Tamias striatus lysteri* (Richardson) is the form found in southern Ontario; in northern Ontario *Tamias striatus griseus* Mearns.

**The Western Chipmunk** occurs throughout Ontario north of North Bay. It is smaller and greyer than the foregoing and has five dark and four narrow light-coloured stripes on its back.

In habits it does not differ essentially from that of its larger eastern cousin.

T.L. 8-8½ in.      T.V. 3¾ in.      H.F. 1¼ in.

The ranges of the two forms known to occur in Ontario are uncertain. *Eutamias minimus jacksoni* Howell ranges through northern Wisconsin, Minnesota and Michigan and eastward along the north shore of Lake Superior as far as Nipigon, where it is said to intergrade with *Eutamias minimus borealis* (Allen).

**The Flying Squirrels** are tree dwellers, and so are limited to wooded sections. They are to be found sparingly all over Ontario, but owing to their nocturnal habits are seldom seen.

Flying squirrels do not fly in the true sense of the term. They climb to a considerable height in a tree and then, by spreading out the folds of skin which connect their front and hind limbs, glide downward, alighting below as well as ahead of the starting point.

They do not hibernate. Their nests are often placed in hollow trees, usually in old woodpecker nests, but sometimes outside nests made of leaves are used. The three to six young are born late in April.

**The Eastern Flying Squirrel**, which in Ontario is found only in the south, is considerably smaller than the northern species. In addition, the fur on the under side of the former is white at the roots whereas in the **northern flying squirrel** it is grey at the roots.

Eastern flying squirrel:—

T.L. 9 in.      T.V. 4 in.      H.F. 1¼ in.

Northern flying squirrel:—

T.L. 12 in.      T.V. 5½ in.      H.F. 1¾ in.

The Ontario form of the Eastern Flying Squirrel is *Glaucomys volans volans* (Linnaeus). The central Ontario form of the Northern Flying Squirrel is *Glaucomys sabrinus macrotis* (Mearns); in the north it is *G. s. sabrinus* (Shaw).

**The Woodchuck** lives contentedly in suitable habitats all over Ontario.

It prefers high and dry situations, frequenting fields and the openings in the forest rather than the deep woods. It becomes very fat in the fall and goes into hibernation at an early date.

The young, numbering three to five, are born in late April.

The woodchuck is commonly a grizzled, reddish brown but occasionally a very dark or black specimen is found.

T.L. 24 in.

T.V. 5 in.

H.F. 3.5 in.

*Marmota monax monax* (Linnaeus) perhaps occurs in the extreme outh-western part of the province. *Marmota m. rufescens* (Howell) occurs over the rest of southern Ontario. *Marmota m. canadensis* (Erxleben) ranges over northern Ontario.

## THE BEAVER FAMILY

## CASTORIDAE

**The Beaver** in early times was abundant along the water-courses throughout the province, and for many years was the most sought after North American fur-bearer. Finally, from excessive trapping, it became almost extinct, but as a result of the protection afforded it recently it is gradually increasing in some localities.

The beaver subsists on aquatic and other plants and on the bark, twigs, foliage and even the wood of trees, particularly aspen, cottonwoods and willows.

A dome-like lodge of branches and mud built in a pond created by damming a slow-flowing stream forms the usual home but occasional individuals live in bank burrows along suitable streams.

The form found in Ontario is *Castor canadensis canadensis* Kuhl.

## RATS AND MICE

In considering the rats and mice it is necessary to distinguish between the semi-domestic house mouse and house rat, which have reached America since the white man came, and the rats and mice native to the country. The introduced mouse and rat usually live in buildings, and cause enormous economic loss by consuming grain and other stores and by their injury to the buildings. The rat is moreover a carrier of disease. The native mice as a rule frequent the fields and wooded areas, but some of them, notably the meadow mice, are destructive to crops and particularly to young orchards which they injure by girdling the small trees. Most of our native species of mice, however, live in uncultivated areas and are of little economic importance except as food for some of the

carnivorous fur-bearing animals. In this connection Ernest Thompson Seton says: "What moss is to the reindeer, what grass is to the cattle, the mouse millions of the north are to all the northern carnivores from bear to *Blarina*. When we shall have fully worked out the life history of each of these species, I believe we shall learn that the whole of that vast, beautiful, important, and specialized production that we call the Carnivora rests on a broad, simple basis of Muridae, that in turn rests on the grass, that rests on the earth. We shall for each of these flesh-eaters write, 'it sometimes eats this and sometimes eats that, but by far the greatest bulk of its food is mice.' "

The muskrat, a member of this group, is, of course, one of our most important furbearers.

#### NATIVE RATS AND MICE

#### CRICETIDAE

##### LONG-TAILED NATIVE MICE

(Tail about as long as body)

**The White-footed Mice (Deer Mice)** are found in every part of Ontario. They are sleek, graceful little animals with large ears, big eyes and a long, slender tail. They derive one of their common names from the colour of their coats which are fawn-coloured above and white below. 'The name, white-footed mice, is also accurately descriptive of another of their characteristic markings. The tail, which is about as long as the body, is dark above and whitish beneath. Young and immature specimens are quite dark as compared with adults.

These mice do not hibernate but are active throughout the winter. They are commonly found in or near wooded areas, but sometimes enter houses.

A number of forms of *Peromyscus* occur in Ontario. *Peromyscus maniculatus maniculatus* (Wagner) is the form in the Hudsonian zone. *Peromyscus maniculatus gracilis* (LeConte) occurs in the rest of the province. The latter area is occupied also by *Peromyscus leucopus noveboracensis* (Fischer). The two forms, however, are said to occupy different habitats within their common range, "*gracilis* showing preference for the colder, more moist places, or deep, mostly coniferous woods; *noveboracensis* for the dryer, more open county, or deciduous woods."

With the clearing away of the forest of southwestern Ontario and of Michigan and Illinois there has spread into this area from the prairies of

the middle west, *Peromyscus maniculatus bairdii* (Hoy and Kennicott). This form has now spread as far east as Toronto. The immigration of this prairie mouse makes three forms of deer mice in some sections of Ontario. *P. m. bairdii* is the smallest of the three, has the shortest tail and is darkest in colour; *P. m. gracilis* has a longer, more hairy and more distinctly bi-coloured tail and softer and duller coloured fur than *P. l. noveboracensis*. The latter is the most brightly coloured of the three.

There is so much variation in size among these mice that the following measurements indicate only the average size of the different forms. In the study of these mammals access to a properly named series of specimens such as is found in museums is almost a necessity.

	Total length	Tail vertebrae	Hind foot
<i>P. m. maniculatus</i> .....	7 inches	3 $\frac{5}{8}$ inches	$\frac{3}{4}$ inch
<i>P. m. gracilis</i> .....	7 $\frac{1}{2}$ "	3 $\frac{3}{4}$ "	$\frac{3}{4}$ "
<i>P. m. bairdii</i> .....	5 "	2 $\frac{1}{2}$ "	$\frac{5}{8}$ "
<i>P. l. noveboracensis</i> .....	6 $\frac{3}{4}$ "	3 "	$\frac{7}{8}$ "

#### SHORT-TAILED NATIVE MICE

**The Meadow Mouse** is found throughout the province. It is a stout, little animal with small eyes, inconspicuous ears, short legs and tail, and long, thick fur. It is dark brownish grey above with grayish underparts. The short tail is covered with short, dark hairs.

They prefer to live in grassy places. They are active by day as well as by night and make a network of runways among the vegetation, connecting their burrows with their feeding grounds. They are active all winter under the snow, but have the habit of gathering stores for winter use. Their large nests of dry grass are sometimes placed in underground chambers; at other times in depressions on the surface. Under favourable conditions, particularly when their natural enemies are absent, they sometimes increase in numbers sufficiently to cause "mouse plagues."

Their food consists almost entirely of grass, roots, seeds, bark, etc. Their enemies are legion, including hawks, owls, weasels, skunks, foxes, wolves and all other carnivorous mammals. Milk snakes, fox snakes and rattlesnakes prey on them also.

T.L. 5 $\frac{1}{2}$ -7 in.      T.V. 1 $\frac{1}{2}$ -2 in.      H.F.  $\frac{3}{4}$  in.

The form in southern Ontario is *Microtus pennsylvanicus pennsylvanicus* (Ord); in the north *M. p. fontigenus* (Bangs).

**The Yellow-cheeked Vole** has been taken in Ontario north of Lake Superior and at Lake Abitibi. It resembles the preceding species in size but has larger ears. It is especially characterized by a yellowish patch on the side of the face between the nose and the eye. Its habits are little known.

T.L.  $6\frac{1}{2}$  in.      T.V.  $1\frac{3}{4}$  in.      H.F.  $\frac{3}{4}$  in.

The Ontario form is *Microtus chrotorrhinus chrotorrhinus* (Miller).

**The Red-backed Vole** is quite similar to the meadow mouse, to which it is closely related, but its ears are longer and it usually has a broad reddish band running down the centre of its back.\* It prefers cool forests and so is now found chiefly in northern Ontario, occurring farther south only in low, cool swamps and bogs.

Their habits are somewhat similar to those of the meadow mouse, except as affected by differences in their habitats. The entrances to their burrows are often placed in the shelter of a stump or log. They are vegetable feeders and have about the same enemies as their near relatives.

T.L.  $5\frac{1}{2}$  in.      T.V.  $1\frac{1}{2}$  in.      H.F.  $\frac{3}{4}$  in.

The Ontario form is *Clethrionomys gapperi gapperi* (Vigors).

**The Pine Mouse** is another close relative of the meadow mouse to which it bears considerable resemblance. Its tail, however, is shorter and its fur finer, shorter and more glossy, giving it a somewhat mole-like appearance.

In habits, as well as in appearance, the pine mouse resembles the mole for it tunnels just under the surface of the ground. It prefers open woods with some brush and "scrub," rather than thick forests.

This mouse has been taken in Ontario only in the neighbourhood of London.

T.L.  $4\frac{1}{2}$  in.      T.V.  $\frac{5}{8}$  in.      H.F.  $\frac{1}{2}$  in.

The Ontario form is *Pitymys pinetorum scalopsoides* (Audubon and Bachman).

**The Lemming Mouse** occurs throughout Ontario at least as far north as Lake Nipigon. It looks something like a short-tailed meadow mouse but is really more closely related

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\*In some localities individuals occur which lack the red on the back.

to the lemmings.\* Its fur, which is coarser than that of the meadow mouse, has a grizzled appearance above; below, the colour is whitish over darker under-fur. The tail is bicolour. The lemming mouse may be recognized by its orange-coloured incisors, the upper of which are grooved longitudinally. In comparison with other mice which resembles in appearance it has a very short tail. Its habits are almost unknown; specimens have been taken in dry situations as well as in bogs, which are said to be its favourite habitat.

T.L.  $4\frac{5}{8}$  in.      T.V.  $\frac{5}{8}$  in.      H.F. 11/16 in.

The form occurring in Ontario, formerly recorded under the name *Synaptomys fatuus* Bangs, should now be known as *S. cooperi cooperi* Baird.

**Phenacomys** is a rare mouse which has been recorded only a few times from northern Ontario.

In general appearance it resembles a medium-sized meadow mouse, except that it has a shorter tail and a distinctly yellowish area on the nose. The feet are pale buff and the tail faintly bicolour. †

Very little is known regarding its habits. It has been found in dry situations as well as in bogs.

T.L.  $5\frac{1}{2}$  in.      T.V.  $1\frac{1}{4}$  in.      H.F.  $\frac{3}{4}$  in.

The Ontario form is *Phenacomys ungava ungava* Merriam.

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\*The lemmings are stout, long-haired relatives of the meadow mice found chiefly in Arctic regions. The group is perhaps best known because of the migrations occasionally undertaken by the lemming of Scandinavia. During these migrations vast hordes of the creatures are said to move steadily in one direction, regardless of all obstacles, even crossing rivers and lakes and when they come to the sea, swimming until they drown. They form an important item in the food of many carnivorous birds and mammals of the Arctic.

In northern Canada occur the collared lemmings (*Dicrostonyx hudsonius* and its relatives) which are the only mice to turn white in winter, and the brown lemming (*Lemmus trimucronatus* (Richardson)). These true lemmings are confined to Arctic America and perhaps do not occur as far south as Ontario.

†The hind foot is 6-tuberculate, the outer tubercle large and prominent, while in *Microtus* it is nearly obsolete.

*Phenacomys*, in common with *Clethrionomys* and *Ondatra*, differ from all other Cricetidae in having rooted molars in the adult. From *Clethrionomys*, *Phenacomys* may be distinguished by having the posterior border of the palate not shelf-like.

**The Muskrat** is found all over the province, being especially common in marshes, slow-flowing streams, and shallow, muddy lakes.

Its principal food consists of the roots and branches of aquatic plants, but it is fond of molluscs, and will also eat fish or flesh on occasion.

In suitable situations muskrats build dome-shaped houses of reeds and other coarse vegetation, but in a stream with high banks they usually live in burrows.

They are very prolific, three to twelve young being born to a litter, and in Ontario two or three litters are produced each year.

T.L. 21 in.            T.V. 10 in.            H.F.  $3\frac{1}{2}$  in.

*Ondatra z. zibethica* (Linnaeus) is the form found over most of the province. Along Hudson Bay a smaller form *Ondatra z. alba* (Sabine) occurs.

#### INTRODUCED RATS AND MICE            MURIDAE

**The House Mouse** is unfortunately only too familiar to most people. It has followed man into most parts of Ontario except in some of the more sparsely settled districts of the north.

It is distinguished from our native mice by its long, hairless tail and by the nearly uniform brownish gray colour of its upper and under parts.

T.L.  $6\frac{1}{2}$  in.            T.V.  $3\frac{1}{4}$  in.            H.F.  $\frac{5}{8}$  in.

The scientific name of this mouse is *Mus musculus musculus* Linnaeus.

**The House Rat** is native to central Asia. It reached Europe early in the eighteenth century and is believed to have first arrived in Great Britain about 1730. Since then it has been disseminated by ships and other transportation means to nearly all parts of the globe. Because of their immense numbers, world-wide distribution, destructiveness and the fact that they are carriers of disease, rats are the worst mammal pests known to man.

T.L. 12-16 in.            T.V. 6-7 in.            H.F.  $1\frac{1}{2}$ - $1\frac{3}{4}$  in.

The scientific name of the common house rat is *Rattus norvegicus* (Erxleben).

Two European relatives of the house rat preceded it to North America,

the black rat *Rattus rattus rattus* (Linn.), and the roof rat *Rattus rattus alexandrinus* (Geoffroy). The house rat being larger and fiercer has driven the other two invaders from the haunts which it prefers and so reduced them to insignificance. The black rat and the roof rat have occasionally reached Ontario in shipments from abroad but so far as known have never survived and spread.

## JUMPING MOUSE FAMILY

## ZAPODIDAE

**Jumping Mice** are slender-bodied, mouse-like animals with long hind legs and very long, slender tails (5-6 in.). They progress by leaping, the long tail serving as a balancing organ. The hind feet are very long, like those of a little kangaroo, while the front legs are relatively short.

Their nests are placed in underground chambers opening off burrows—shallow in summer and deeper for winter use. Chambers for food storage are also provided although they pass the winter in hibernation.

**The Meadow Jumping Mouse** is found throughout Ontario. It is of a buff brown colour, grizzled with blackish, lighter on the lower sides, darker above with a broad dark band along the back; creamy white beneath; tail bicolour, without white tip.

It is found in meadows or open spaces grown up with weeds or brushwood, in the neighbourhood of wet woods.

T.L. 8 in.

T.V. 5 in.

H.F.  $1\frac{1}{8}$  in.

The Ontario form is *Zapus hudsonius hudsonius* (Zimmermann).

**The Woodland Jumping Mouse** prefers the neighbourhood of cool streams in dense forests and so is largely confined to northern Ontario, but may occur farther south in suitable localities. It is a more brightly-coloured animal than the preceding species, the lower sides being a light yellowish buff; tail tipped with white.

T.L. 9 in.

T.V.  $5\frac{1}{2}$  in.

H.F.  $1\frac{1}{2}$  in.

Two forms occur in Ontario. The most northerly one is *Napeozapus insignis abietorum* (Preble), farther south *N. i. insignis* (Miller). The range limits of these two forms are not definitely known.

**The Porcupine** occurs throughout the forested regions of Ontario,—abundant in some areas, rare in others.

It will eat almost any green food from aquatic plants up, quite literally, to the tree tops.

Being so well protected by its quills, it has few dangerous enemies. By virtue of minute barbs, these sharp-pointed quills, once they enter the flesh, can go ahead but not back and thus often drive through a vital organ. In this way his enemies, though successful in killing "Porky," sometimes die from the effects of the quills received. Contrary to what is generally believed, the porcupine cannot "shoot" its quills.

The porcupine is active all winter. It has no real nest, merely a shelter, and there in spring the young, usually but one, is born.

T.L. 36-40 in.

T.V. 6 in.

H.F.  $3\frac{1}{2}$ -4 in.

The Ontario form is *Erethizon dorsatum dorsatum* (Linnaeus).

## Hares and Rabbits

## Order Lagomorpha

The members of this order differ from the Rodentia in a number of characters, one readily noticeable point of difference being in the presence of a second pair of small incisors behind the large pair in the upper jaw. Only one family, the Leporidae, occurs in Ontario.

### LEPORIDAE

The general appearance of the members of this family is too well known to need description.

These defenceless animals are the prey of all the carnivores from the weasel up; even hawks and owls attack them. They continue to hold their own in the face of such odds, partly in virtue of the rapidity at which they multiply.

The food of the various members of the family comprises almost all sorts of vegetation. They will also eat flesh.

The terms "hare" and "rabbit" are used rather loosely in this country. A typical hare is long-eared, long-legged and a swift runner. It does not burrow but rears its young in a nest

or "form." A typical rabbit is smaller, shorter-eared, shorter-legged and is a weak runner. Its nest is placed in a burrow. There are no typical rabbits native to America, most of the members of this family here being hares.

**The Varying Hare** is the common hare of our north woods. It formerly occurred throughout Ontario but is now absent from southern Ontario except in bogs and similar cool "boreal islands."

It is a much larger animal than the cottontail and has longer hind legs and hind feet. In winter it assumes a white coat, hence the name varying hare. Its brown summer coat is of a duller colour than that of the cottontail and it lacks the white underside of the tail to which that species owes its name.

These animals are sometimes called snowshoe rabbits (although they are not true rabbits) because of the breadth of their hind feet, especially in winter, when the development of hair at the sides adds to their width. These broad, snowshoe-like hind feet enable the hare to travel over snow into which they would otherwise sink.

Another interesting feature of the species is the marked fluctuations in their numbers, to which reference is made in the introduction.

The nest is usually placed in a depression in the ground. There may be as many as ten young to a litter and more than one litter during the season.

T.L. 18-19 in.      T.V. 1½ in.      H.F. 5.3 in.

The forms found in Ontario are *Lepus americanus virginianus* (Harlan) in southern Ontario; *Lepus americanus americanus* Erxleben throughout the rest of the province, except in "extreme western Ontario," where *Lepus americanus phaeonotus* Allen occurs. The range of the latter subspecies includes northern Minnesota and north into extreme western Ontario and southern Manitoba.

**The Cottontail Rabbit** has gradually extended its range from southwestern Ontario till at the present time it extends at least as far as Prince Edward county and north to Georgian

bay. It is not fond of deep forests, preferring open woods with some tangled scrubby growth or the brushy borders of cultivated lands.

Cottontails often make "forms" in which they lie concealed after the manner of a hare. They will also resort to burrows although it is doubtful if they ever dig the burrows themselves; they sometimes enlarge the burrows of other animals which they appropriate. The nest in which the young are born is placed either in a burrow or in a shallow depression on the surface. Several litters of from four to eight young are born in a year.

It never reaches the abundance attained by the varying hare in the north but is sometimes sufficiently numerous to be a nuisance and to cause considerable injury by girdling young trees.

The cottontail is much smaller than the varying hare and unlike it does not turn white in winter. Its most distinctive marking and the one from which it gets its name is the fluffy, snow-white under surface of the tail, which shows conspicuously when the animal is in flight.

T.L. 15-18 in.      T.V.  $2\frac{1}{2}$  in.      H.F. 4 in.

The Ontario form is *Sylvilagus floridanus mearnsii* (Allen).

**The European Hare** (erroneously called Jack Rabbit) was introduced from Europe into Ontario near Brantford in 1912. Since then it has spread in all directions and now (1929) occupies most of southwestern Ontario and extends north as far as Georgian bay and east to Ontario county.

It is seldom found in woods, preferring open fields with scrubby borders.

It may be readily identified by its large size and long ears. The tail has a conspicuous clear black median area.

Like the cottontail and unlike the varying hare this animal does not turn white in winter.

T.L. 2-3 ft.      T.V. 3-5 in.      H.F. 5-7 in.

The form in Ontario is *Lepus e. europaeus* Pallas.

## Order Artiodactyla

### THE DEER FAMILY

### CERVIDAE

Deer are distinguished by the solid horns or antlers which they possess. These antlers are borne by the males only in the case of the moose, elk and deer, but in the caribou the female as well as the male has antlers.

The antlers are shed and renewed each year. There is a more or less regular increase in the size of antlers as the animal increases in age and vigour and a corresponding diminution in old and feeble animals so that it is not possible to tell exactly the age of a deer from examination of his antlers.

The antlers are shed in winter. Within a few weeks new ones appear, first as little knobs and then as flat or branching horns, depending on the species of the animal. The developing antler is covered with a skin clothed with fine, short hairs and well supplied with nerves and blood vessels. This covering is known as "velvet." By early fall the antlers are full grown, the velvet dries up and is scraped off by rubbing them against trees and shrubs.

The food of these various animals consists of plants of various kinds, grasses, the twigs and foliage of trees and shrubs, aquatic plants and lichens.

The wolves are our only beasts of prey hunting the adult animals to any extent, but any of the carnivorous animals from the size of a fox up, will attack the young while helpless.

The deer move about to some extent during the day but the period of greatest activity is in the evening and early morning.

**The White-tailed Deer** is now, probably always has been, and possibly always will be the commonest big game animal of eastern North America. It has been gradually extending its range northward and now occurs throughout the province south of latitude 50° except in thickly settled areas.

Bush, with plenty of open fields such as occur in second-growth and burned-over areas suit it better than thick, heavy forests.

During the winter, if the snow is very deep, the deer congregate in "yards," which are beaten paths meandering through good feeding grounds.

The young, one or two in number, are born in late spring and are kept hidden for about a month before they start to follow the mother.

The colour of the coat of deer during the hunting season and in winter is perhaps familiar enough to most people but many are not aware that in summer the animals are of a beautiful golden sienna colour. Locally they receive the rather descriptive name of red deer. Newborn fawns are of a similar colour but with a heavy spotting of white. This coat is changed to that of maturity as the fall season approaches.

This species of deer gets its common name from the white under surface of the tail which is conspicuously displayed as the animal bounds away through the woods when alarmed. The main beams of the antlers bend outward, forward, and then inward, the tips pointing towards each other. The tines or branches point upward and backward.

The bucks are larger than the does and have been known to exceed three hundred pounds in weight.

The form in Ontario is *Odocoileus virginianus borealis* (Miller).

**The Moose** is the largest member of the deer family, bulls not infrequently exceeding one thousand pounds in weight. It is now rather uncommon south of Algonquin Park, and the French river, but beyond that is generally distributed except in the extreme north. In fact it has for some time been gradually extending its range northward. Its favourite haunts are dense forests interspersed with streams and lakes.

During the summer it subsists largely on aquatic plants, while in winter it feeds on shrubbery and the tender twigs of trees, which its great height enables it to reach with ease.

The moose has massive, broad, flat, palmated antlers with points or tines on the outer edge.

The moose is not a handsome deer, his long legs and high shoulders giving him a rather ungainly appearance. He seems more like a relic of the past than a part of our present fauna, but we hope his picturesque presence is not soon to disappear from our northern forests.

The form in Ontario is *Alces americana americana* (Clinton).

**The Caribou** is a close relative of the reindeer of Europe and like it is confined to northern regions. Its antlers are partly flattened and partly round, and are usually long with many branches. A characteristic feature is that one (rarely both) of the brow tines is flattened and projects downward nearly to the end of the nose. In size the caribou is intermediate between the white-tailed deer and the moose.

The vast herds of this deer which once ranged over Arctic America have dwindled to only a fraction of their former abundance and are now absent from much of the territory which they formerly occupied. Formerly great herds moved into our northern woods in winter in search of food and shelter, at one time ranging as far south as Lake Nipissing, but they are now rarely found south of a line from the north shore of Lake Superior to Lake Abitibi.

Caribou subsist on sedges, moss and lichens which they obtain in winter by pawing away the snow.

Two forms of the woodland caribou occur in northern Ontario, *Rangifer caribou caribou* (Gmelin) being the eastern form, while *Rangifer caribou sylvestris* (Richardson) is the form southwest of Hudson bay, and extending from thence to the northwestward. The barren-ground caribou *Rangifer arcticus arcticus* (Richardson) does not occur in Ontario.

**The Wapiti or American Elk** once ranged over southern Ontario but soon disappeared when the country began to be settled. It is perhaps more than one hundred and fifty years since any wild elk occurred in the province.

It is smaller than the moose but is a much finer looking animal,—the finest looking of all deer.

The elk is a round-antlered species. The tines, typically five on each side, point forward from the main beam.

The scientific name of this deer is *Cervus c. canadensis* (Erxleben).

## CHECK LIST OF ONTARIO MAMMALS

Arranged according to Miller's "List of North American recent mammals." U.S. Nat. Mus. Bull. 128, 1924.

This list is not believed to be complete as future work will probably add to the species found in Ontario.

So far as known it includes all species and subspecies of land mammals authoritatively stated to occur in the province. The fauna of the extreme western (Manitoba border) and northern part of the province is very inadequately known, so that any list of Ontario mammals published at the present time is far from final. Species now extinct in the province in a wild state but which formerly occurred here are included in parentheses.

The nomenclature is that of Miller except in the following cases, in which we have followed the authors indicated.

- Sorex arcticus* }  
*Sorex cinereus* } Jackson. N.A. Fauna 51. 1928.  
*Sorex palustris* }  
*Myotis keenii*. Miller and Allen. U.S. Nat. Mus. Bull. 144. 1928.  
*Ursus americanus*. Hall. Univ. Calif. Pub. Zool., Vol. 30, No. 10. 1928.  
*Mephitis mephitis*. A. H. Howell. Letter.  
*Eutamias minimus*. Jour. Mammalogy, 6:53. 1925.  
*Synaptomys cooperi*. Howell. N.A. Fauna 50. 1927.  
*Clethrionomys*. Palmer. Proc. Biol. Soc. Wash. 41:87. 1928.

### Marsupialia

#### DIDELPHIIDAE

(*Didelphis virginiana virginiana* Kerr. Opossum.)

### Insectivora

#### TALPIDAE

- Parascalops breweri* (Bachman). Hairy-tailed Mole.  
*Scalopus aquaticus machrinus* (Rafinesque.) Prairie Mole.  
*Condylura cristata* (Linnaeus). Star-nosed Mole.

#### SORICIDAE

- Sorex cinereus cinereus* Kerr. Cinereous Shrew.  
(= *s.p. personatus*).  
*Sorex arcticus arcticus* Kerr. Saddle-back Shrew.  
(= *S. richardsonii*).  
*Sorex fumeus fumeus* Miller. Smoky Shrew.  
*Sorex palustris palustris* Richardson. Water Shrew.

- Sorex palustris albibarbis* (Cope). Water Shrew.  
*Microsorex hoyi hoyi* (Baird). } Pigmy Shrew.  
*Microsorex hoyi intervectus* Jackson }  
*Cryptotis parva* (Say). Little Short-tailed Shrew.  
*Blarina brevicauda talpoides* (Gapper). (= *Blarina brevicauda brevicauda* (Say)). Mole Shrew; Short-tailed Shrew.

## Chiroptera

### VESPERTILIONIDAE

- Myotis lucifugus lucifugus* (LeConte). } Little Brown Bats.  
*Myotis keenii septentrionalis* (Trouessart). }  
 (= *Myotis subulatus subulatus* (Say) of Miller and other lists).  
*Lasionycteris noctivagans* (LeConte). Silver-haired Bat.  
*Pipistrellus subflavus obscurus* Miller. Pipistrelle.  
*Eptesicus fuscus fuscus* (Beauvois). Big Brown Bat.  
*Nycteris borealis borealis* (Müller). Red Bat.  
*Nycteris cinerea* (Beauvois). Hoary Bat.  
*Nycticeius humeralis* (Rafinesque). Evening Bat.

## Carnivora

### URSIDAE

- Ursus americanus americanus* Pallas. Black Bear.  
*Thalarchos maritimus maritimus* (Phipps). Polar Bear.

### PROCYONIDAE

- Procyon lotor lotor* (Linnaeus). Raccoon.

### MUSTELIDAE

- Martes americana americana* (Turton). Marten.  
*Martes pennanti pennanti* (Erxleben). Fisher.  
*Mustela cicognanii cicognanii* Bonaparte. Bonaparte Weasel.  
*Mustela cicognanii richardsonii* (Bonaparte). Richardson Weasel.  
*Mustela rixosa rixosa* (Bangs). Least Weasel.  
*Mustela noveboracensis noveboracensis* (Emmons). New York Weasel.  
*Mustela vison vison* Schreber. } Mink.  
*Mustela vison lacustris* (Preble). }  
*Gulo luscus* (Linnaeus). Wolverine.  
*Lutra canadensis canadensis* (Schreber). Otter.  
*Mephitis mephitis mephitis* (Schreber). } Skunk.  
*Mephitis mephitis nigra* (Peale and Beauvois). }  
*(Taxidea taxus taxus* (Schreber). Badger.)

### CANIDAE

- Vulpes fulva* (Desmarest). Red Fox.  
*Alopex lagopus innuitus* (Merriam). Arctic Fox.  
*Canis latrans* Say. Brush Wolf.  
*Canis lycaon* Schreber. Timber Wolf.

### FELIDAE

- (*Felis cougar* Kerr. Cougar.)  
*Lynx canadensis canadensis* Kerr. Canada Lynx.  
*Lynx rufus rufus* (Schreber). Bay Lynx; Bobcat; Red Lynx.

## Rodentia

### SCIURIDAE

- |  |   |                                  |
|--|---|----------------------------------|
| <i>Marmota monax rufescens</i> Howell.           | } | Woodchuck.                       |
| <i>Marmota monax canadensis</i> (Erxleben).      |   |                                  |
| <i>Eutamias minimus jacksoni</i> Howell.         | } | Western Chipmunk.                |
| <i>Eutamias minimus borealis</i> (Allen).        |   |                                  |
| <i>Tamias striatus griseus</i> Mearns.           | } | Eastern Chipmunk.                |
| <i>Tamias striatus lysteri</i> (Richardson).     |   |                                  |
| <i>Sciurus hudsonicus hudsonicus</i> (Erxleben). | } | Red Squirrel.                    |
| <i>Sciurus hudsonicus loquax</i> Bangs.          |   |                                  |
| <i>Sciurus carolinensis leucotis</i> (Gapper).   |   | Gray Squirrel or Black Squirrel. |
| <i>Glaucomys volans volans</i> (Linnaeus).       |   | Eastern Flying Squirrel.         |
| <i>Glaucomys sabrinus sabrinus</i> (Shaw).       | } | Northern Flying Squirrel.        |
| <i>Glaucomys sabrinus macrotis</i> (Mearns).     |   |                                  |

### CASTORIDAE

- Castor canadensis canadensis* Kuhl. Beaver.

### CRICETIDAE

- |  |   |                                    |
|--|---|------------------------------------|
| <i>Peromyscus maniculatus maniculatus</i> (Wagner).                                    | } | White-footed Mouse;<br>Deer Mouse. |
| <i>Peromyscus maniculatus gracilis</i> (LeConte).                                      |   |                                    |
| <i>Peromyscus maniculatus bairdii</i> (Hoy and Kennicott).                             |   |                                    |
| <i>Peromyscus leucopus noveboracensis</i> (Fischer).                                   |   |                                    |
| <i>Synaptomys cooperi cooperi</i> Baird. Lemming Mouse.<br>(= <i>S. fatuus</i> Bangs). |   |                                    |
| <i>Phenacomys ungava ungava</i> Merriam. Phenacomys.                                   |   |                                    |
| <i>Clethrionomys gapperi gapperi</i> (Vigors). Red-backed Vole.                        |   |                                    |
| <i>Microtus pennsylvanicus pennsylvanicus</i> (Ord).                                   | } | Meadow Mouse.                      |
| <i>Microtus pennsylvanicus fontigenus</i> (Bangs).                                     |   |                                    |
| <i>Microtus chrotorrhinus chrotorrhinus</i> (Miller). Yellow-cheeked Vole.             |   |                                    |
| <i>Pitymys pinetorum scalopsoides</i> (Audubon and Bachman). Pine Mouse.               |   |                                    |
| <i>Ondatra zibethica zibethica</i> (Linnaeus). Muskrat.                                |   |                                    |

### MURIDAE

- Rattus norvegicus* (Erxleben). House Rat.  
*Mus musculus musculus* Linnaeus. House Mouse.

### ZAPODIDAE

- |  |   |                           |
|--|---|---------------------------|
| <i>Zapus hudsonius hudsonius</i> (Zimmermann). Meadow Jumping Mouse. | } | Woodland<br>Jumping Mouse |
| <i>Napaeozapus insignis insignis</i> (Miller).                       |   |                           |
| <i>Napaeozapus insignis abietorum</i> (Preble).                      |   |                           |

### ERETHIZONTIDAE

- Erethizon dorsatum dorsatum* (Linnaeus). Porcupine.

## Lagomorpha

### LEPORIDAE

- Lepus americanus americanus* Erxleben. }  
*Lepus americanus virginianus* (Harlan). } Varying Hare.  
*Lepus americanus phaeonotus* Allen. }  
*Lepus europaeus europaeus* Pallas. European Hare.  
*Sylvilagus floridanus mearnsii* (Allen). Cottontail Rabbit.

## Artiodactyla

### CERVIDAE

- (*Cervus canadensis canadensis* (Erxleben)). Wapiti; American Elk.  
*Odocoileus virginianus borealis* (Miller). White-tailed Deer.  
*Alces americana americana* (Clinton). Moose.  
*Rangifer caribou caribou* (Gmelin). }  
*Rangifer caribou sylvestris* (Richardson). } Woodland Caribou.

## PUBLICATIONS ON MAMMALS

The same principle has been followed in the preparation of the following lists of publications as in the preparation of the preceding pages, viz., to make it a guide to the literature on mammals. The list is believed to contain the most important works which one interested in our mammals should consult in pursuing further his studies on this group.

### GENERAL WORKS ON NORTH AMERICAN MAMMALS

- Field book of North American mammals. H. E. Anthony. G. P. Putnam's Sons. 1928.  
Life histories of northern animals. Two volumes. E. T. Seton. Chas. Scribner's Sons. 1909.  
Lives of game animals. Four volumes. E. T. Seton. Doubleday, Page & Co. 1925-1928.  
The larger North American mammals. E. W. Nelson. National Geographic Magazine. Nov., 1916.  
Smaller mammals of North America. E. W. Nelson. National Geographic Magazine. May, 1918.  
(The above two republished as Wild animals of North America. E. W. Nelson, Nat. Geog. Soc., Washington, D.C., 1918.)  
American animals. Stone and Cram. Doubleday, Page & Co. 1902.  
Mammals of America. Nature Lovers Library, University Soc., Inc., 1917.  
List of North American recent mammals. 1923. G. S. Miller. U.S. Nat. Mus. Bull. 128. 1924.  
A manual of the land and freshwater vertebrate animals of the United States (exclusive of birds). H. S. Pratt. P. Blakiston's Son & Co. 1923.

## ONTARIO MAMMALS

- Following is a partial list of references to Ontario mammals. In addition to these, numerous shorter articles dealing with one or a few species have been published, chiefly in the *Canadian Field-Naturalist* and the *Journal of Mammalogy*.
- Notes on the mammals of Ontario. G. S. Miller, *Proc. Boston Soc. Nat. Hist.* **28**:1-44. 1897.
- Mammals of Ontario. In: *Vertebrates of Ontario*. C. W. Nash, Dept. Education, Toronto. 1908.
- Mammals. J. H. Fleming. In: *The Natural History of the Toronto region, Ontario, Canada*. Roy. Can. Inst., Toronto. 1913.
- Mammals. In: *The vertebrates of the Otter Lake region, Dorset, Ontario*. A. H. Wright and S. E. R. Simpson. *Can. Field-Nat.* **34**:166-168. 1920.
- Notes on the mammals of Ridout, District of Sudbury, Ontario. J. Dewey Soper. *Can. Field-Nat.* **34**:61-69. 1920.
- A biological reconnaissance of portions of Nipissing and Timiskaming districts, Northern Ontario. J. Dewey Soper. *Can. Field-Nat.* **36**: 176; **37**:11-13. 1922.
- The mammals of Wellington and Waterloo counties, Ontario. J. Dewey Soper. *Jour. Mammal.*, **4**:244-252. 1923.
- Notes on the birds and mammals of Brent and vicinity, Algonquin Park, Ontario, July and August, 1922. L. L. Snyder and J. L. Baillie. *Can. Field-Nat.* **37**:89-94. 1923.
- The mammals of the Lake Nipigon region. J. R. Dymond. In: *A faunal investigation of the Lake Nipigon region, Ontario*. *Trans. Roy. Can. Inst.* **16**:233-291. 1928. Reprinted as *Contributions of the Royal Ontario Museum of Zoology*, No. 1.
- The mammals of the Lake Abitibi region. L. L. Snyder. In: *A faunal investigation of the Lake Abitibi region, Ontario*. *University of Toronto Studies; Biol. Series No. 32*, 1928. Reprinted as *Contributions of the Royal Ontario Museum of Zoology*, No. 2.
- The Mammalia of Canada. J. B. Tyrrell. Copp, Clark Co., Ltd., Toronto. 1888.

### POPULAR WORKS ON INDIVIDUAL SPECIES OR GROUPS

- The beaver: its work and its ways. E. R. Warren. *Monographs of the Amer. Soc. of Mammalogists*. 1927.
- The romance of the beaver. A. R. Dugmore. J. B. Lippincott Co.
- Beaver habits, beaver control and possibilities in beaver farming. V. Bailey, U.S. Dept. Agric. Bull. 1078. 1922.
- Beaver habits and experiments in beaver culture. V. Bailey. U.S. Dept. Agric. Technical Bull. No. 21. 1927.
- In a beaver world. Enos. A. Mills. Houghton Mifflin Co. 1913.
- Castorologia or the history and traditions of the Canadian beaver. H. T. Martin. Wm. Drysdale & Co., Montreal. 1892.

- The muskrat in New York: its natural history and economics. C. E. Johnson. Roosevelt Wild Life Bull., Vol. 3, No. 2. 1925.
- The moose book. Samuel Merrill. E. P. Dutton & Co., N.Y., 2nd Ed. 1920.
- White-tailed deer. Wm. H. Newson. Chas. Scribner's Sons. 1926.
- The deer family. Roosevelt, Van Dyke, Elliott and Stone. Macmillan Co. 1903.
- The antelope and deer of America. J. D. Caton. 2nd Ed. 1877.
- The black bear. W. H. Wright. Chas. Scribner's Sons. 1910.
- The habits and economic importance of wolves in Canada. Norman Criddle. Dept. Agric. Bull. No. 13, New Series. Ottawa. 1925.
- Economic value of North American skunks. D. E. Lantz. U.S. Dept. Agric., Farmers' Bull. 587. 1914.
- Squirrels and other fur-bearers. John Burroughs.
- Rats and mice as enemies of mankind. M. A. C. Hinton. Economic Series No. 8, 2nd Ed. British Museum (Natural History). 1920.
- Mouse control in field and orchard. James Silver. U.S. Dept. Agric., Farmers' Bull. 1397. 1924.

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##### Bats.

- American bats of the genera *Myotis* and *Pisonyx*. G. S. Miller and G. M. Allen. U.S. Nat. Mus. Bull. 144. 1928.
- Revision of the North American bats of the *Vespertilionidae*. G. S. Miller. North Amer. Fauna. No. 13, U.S. Dept. Agric. 1897.
- The families and genera of bats. G. S. Miller. U.S. Nat. Mus. Bull. No. 57. 1907.

##### Moles and Shrews.

- Review of the American long-tailed shrews. H. H. T. Jackson. North Amer. Fauna No. 51, U.S. Dept. Agric. 1928.
- Review of the shrews of the American genera *Blarina* and *Notiosorex*. C. H. Merriam. North Amer. Fauna No. 10, U.S. Dept. Agric. 1895.
- A review of the American moles. H. H. T. Jackson. North Amer. Fauna No. 38, U.S. Dept. Agric. 1915.

##### Carnivores.

- Notes on *Mustela campestris* Jackson and on the American forms of least weasels. M. H. Swenk. Jour. Mammalogy 7:313-330. 1926.
- Synopsis of the American marten. S. N. Rhoads. Proc. Acad. Nat. Sci. Phila. 54:443-460. 1902.
- Synopsis of the weasels of North America. C. H. Merriam. North Amer. Fauna No. 11, U.S. Dept. Agric. 1896.

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\*Information on animals not mentioned in this section may be found in volumes listed under general accounts.

Notes on Canadian weasels. J. D. Soper. *Can. Field Nat.* **33**:43-47. 1919.

Revision of the skunks of the genus *Chincha* (= *Mephitis*). A. H. Howell. *North Amer. Fauna* No. 20. U.S. Dept. Agric. 1901.

Synopsis of American minks. N. Hollister. *Proc. U.S. Nat. Mus.*, **44**:471-480. 1913.

## Rodents.

### *Squirrels*

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Revision of the red squirrels. J. A. Allen. *Bull. Am. Mus. Nat. Hist.*, **10**:249-298. 1898.

Review of the squirrels of eastern N. America. O. Bangs. *Proc. Biol. Soc. Wash.*, **10**:155. 1896.

Revision of the American flying squirrels. A. H. Howell. *North Amer. Fauna* No. 44, U.S. Dept. Agric. 1918.

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Revision of the genus *Microtus*. V. Bailey. *North Amer. Fauna* No. 17, U.S. Dept. Agric. 1900.

A systematic synopsis of the muskrats. N. Hollister. *North Amer. Fauna* No. 32. U.S. Dept. Agric. 1911.

Revision of the genus *Zapus*. E. A. Preble. *North Amer. Fauna* No. 15. U.S. Dept. Agric. 1899.

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The rabbits of North America. E. W. Nelson. *North Amer. Fauna* No. 29. U.S. Dept. Agric. 1909.

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The white-tailed deer of the eastern United States. T. Barbour and G. M. Allen. *Journ. Mammalogy* **3**:69. 1922.

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The present status and future prospects of the larger mammals of Canada. R. M. Anderson. *Scot. Geogr. Mag.* **40**: 259-303. 1924.

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## ECOLOGY

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## DISTRIBUTION AND LIFE ZONES

Distribution and origin of life in America. R. F. Scharff. Constable & Co., Ltd. 1911.

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Wanderings of animals. H. Gadow. Cambridge University Press. 1913.

## MAMMALS OF THE PAST

The age of mammals. H. F. Osborn. Macmillan Co. 1910.

History of land mammals in the western hemisphere. W. B. Scott. Macmillan Co. 1913.

The pleistocene of North America and its vertebrated animals east of the Mississippi river. O. P. Hay. Carnegie Inst. of Wash., Pub. No. 322. 1923.

## LIFE HISTORY STUDIES

Field study of life-histories of Canadian mammals. R. M. Anderson. Can. Field-Nat. 33: 86-90. 1920.

Suggestions for field studies of mammalian life-histories. W. P. Taylor. Dept. Circ. 59, U.S. Dept. Agric. 1919.

## PRESERVATION OF SPECIMENS

The capture and preservation of small mammals for study. H. E. Anthony. Amer. Mus. Nat. Hist., New York, Guide Leaflet No. 61. 1925.

## FUR FARMING

Fur Farming in Canada. J. Walter Jones. Commission of Conservation, Canada. 1914.

Theory and practice of fox ranching. J. A. Allen and W. C. S. McLure. Irwin Printing Co., Charlottetown, P.E.I. 1926.

Fur-farming for profit. F. G. Ashbrook. Macmillan Co. 1928.

## PERIODICALS

Those interested in mammal study would do well to subscribe to one or both of the following journals:

Canadian Field-Naturalist. Published by the Ottawa Field-Naturalists' Club, Ottawa, Ontario.

The Journal of Mammalogy. Published by American Society of Mammalogists, Washington, D.C.

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