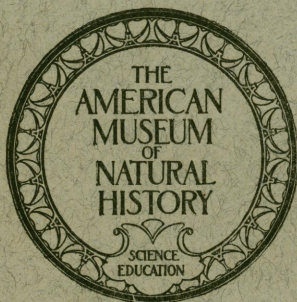


NOTES ON SOME MAMMALS OF THE SOUTHERN CANADIAN ROCKY MOUNTAINS

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PLATES XXXII TO XXXIV; FIGURE 1

INTRODUCTION

Three collections of mammals made by The American Museum of Natural History parties constitute the basis for the present report. The first of these collections was made by Mr. T. Donald Carter in 1935 from August 15 to October 25 in the region immediately outside the northeast corner of the Jasper Canadian National Park. The second expedition was made by Mr. Carter, accompanied by Colles Stowell and Wilbur H. Sawyer, the following year to the southwest corner of Alberta from July 7 to August 26. The third and most recent expedition was undertaken in 1941 from June 22 to August 31 by the author and Mr. Gilbert C. Anthony, who collected at several localities in Alberta and British Columbia within fifty miles of Banff, Alberta. These three expeditions netted a total of 1357 specimens of mammals; the larger mammals are discussed in the addenda by T. Donald Carter. The 1941 expedition had as another purpose cooperation with the Marquis d'Albizzi in making an exploration of the Columbia Ice Fields, a vast tract of ice and snow along the Continental Divide north of Banff. Mr. Anthony participated in these activities for three weeks, but since no mammals were found to inhabit the ice fields, this paper will not treat with their results.

In preparing this report it has been my purpose to present any information of significance observed in the course of examining the specimens for identification and to place on record any biological data to be derived from field observations made by Mr. Anthony and myself during the summer of 1941. A few of Mr. Carter's notes have been similarly incorporated. The taxonomic changes made are few in number, and, although the identifications of some of the specimens are not entirely satisfactory, no new forms have been described. Further specimens from critical localities may, however, lead to the recognition of new forms.

The mammalian fauna of the region under discussion, the Canadian Rocky Mountains from about 54° to 49° north latitude, is affected by several influences. There are some local races, but most of the fauna consists of boreal forms representative of the region to the north. Some forms from the mountains to the south and from the Great Plains add their influences. Several forms characteristic of the dry interior of British Columbia influence mammals of the western slope of the Rocky Mountains, while the humid coastal fauna has a far lesser influence. In consequence, the region is one of intergradation for most species.

LOCALITIES OF 1935 EXPEDITION

ENTRANCE.—At Mr. Harry Davison's ranch near Entrance collections were made during the first part of Mr. Carter's trip in the pine and spruce forests of the plains east of the mountains. Some open fields and bogs were included in the collecting grounds.

THORAL CREEK.—Later the party en-

tered the mountains and camp was made in an upland meadow next to Thorval Creek, fifty miles northeast of Entrance. Collecting was carried on in this meadow and up the mountainside, to a limited extent above timberline, until Mr. Carter's departure October 25.

LOCALITIES OF 1936 ALBERTA-BRITISH COLUMBIA EXPEDITION

MAYCROFT.—Collecting was initiated July 7 at the ranger station near Maycroft, a town situated in a valley just behind the first mountain range of the eastern foothills of the Rocky Mountains. Most of the specimens were taken in this valley and on the mountain slopes to above timberline, but a few were taken on the plains six miles east of Maycroft.

TORNADO PASS.—At Tornado Pass, 7000 feet altitude, situated on the boundary between British Columbia and Alberta on the Continental Divide, collec-

tions were made chiefly in the meadows at the pass and in the forest below. Some specimens were also taken on the mountains flanking the pass.

TWIN BUTTE.—Later, at the close of the trip, collections were made in the open forests and grasslands about Twin Butte, Alberta (not to be confused with a place of the same name in British Columbia).

The descriptions of localities for these two expeditions were kindly provided by Mr. T. Donald Carter.

LOCALITIES OF 1941 BRITISH COLUMBIA-ALBERTA EXPEDITION

During the 1941 expedition collections were made at five localities approximately intermediate in position between the areas covered by the preceding expeditions.

TWELVE MILES WEST NORTHWEST OF BANFF (HILLSDALE).—The first of these localities was at Hillsdale, twelve miles west northwest of Banff, near the Banff-Jasper highway in the valley of the Bow River. At this place trap lines were run in thick stands of lodgepole pine, in the bushy meadows along the Bow River and in open meadows further back from the river. Although this collection is not a sizable one, it is believed that most of the small mammals characteristic of the valley floor were secured.

EGYPT LAKE.—On July 4 we commenced collecting in the vicinity of Egypt Lake at the head of Pharoah Creek near the Continental Divide fifteen miles west southwest of Banff. At this altitude, 6700 feet, Engelmann spruce is the dominant timber tree, giving way to larch at approximately 8000 feet altitude. Traps were set in the heavy spruce growths thereabouts, which were characterized by much fallen timber, in the meadows, both open and overgrown with scrubby, dwarfed willows, and in the rock slides above our camp at the foot of one of the Pharoah Peaks.

THE MONARCH MOUNTAIN.—On two oc-

casions we shot specimens in the rock slides and open alpine meadows north of The Monarch Mountain, across the border in British Columbia, three miles from the Egypt Lake camp.

ASSINIBOINE.—On July 28 we moved to the Mt. Assiniboine Provincial Park in British Columbia at a still higher altitude of 7500 feet, not far from timberline. This park is on the Divide about twenty miles south of Banff. Here the spruce forests are less dense than at Egypt Lake and somewhat stunted in growth. Specimens were taken in these forests, about the brushy margins of Sunburst Lake, where we were camped, in meadows choked with stunted willows along a small stream and in rock slides.

INVERMERE.—August 16 we moved to Invermere at the north end of Lake Windermere, British Columbia, at the headwaters of the Columbia River. The altitude here is low, only 2600 to 3000 feet. The forests are composed chiefly of Douglas fir, interspersed with aspen. The valley floor is badly overgrazed by livestock and not suitable for small mammal collecting, but representative specimens were obtained from hay fields, aspen groves and, at somewhat higher elevations, from fir forests.



ACKNOWLEDGMENTS

Mr. Carter and I particularly wish to acknowledge the financial support of Mr. Harry Davison, sponsor of the 1935 expedition to Alberta, Dr. Wilbur A. Sawyer and Mr. Harley L. Stowell, who together made the 1936 expedition to British Columbia and Alberta possible, and Mr. Childs Frick, who not only financed the 1941 expedition, but, together with Dr. H. E. Anthony, was instrumental in the preparation of this paper. To these persons we owe our thanks.

Several departments of the Canadian government, notably the Department of Mines and Resources, Ottawa, Department of Lands and Mines, Edmonton, and the Game Commission, Vancouver, cooperated wholeheartedly in granting permits for the collection of mammals in the regions which come under their jurisdiction and in actual assistance to the parties while in the field. We are deeply grateful to these agencies.

For the loan of specimens of *Phena-*

comys I owe thanks to Dr. Remington Kellogg of the United States National Museum, Dr. H. H. T. Jackson of the Fish and Wildlife Service and Dr. G. Clifford Carl of the Provincial Museum, British Columbia.

In the preparation of this paper, members of the Department of Mammals at The American Museum of Natural History showed an active interest in the work and offered much valuable criticism from time to time for which I am most grateful. These included Dr. John Eric Hill, Mr. T. Donald Carter and Mr. George G. Goodwin.

Finally, I would like to thank Gilbert C. Anthony for his wholehearted assistance in conducting the field work of the 1941 expedition. He is to be complimented upon his fine photographic work in preparing a pictorial record of this trip in both moving pictures and still photographs, examples of which appear in this paper.

SPECIES ACCOUNTS

***Sorex cinereus cinereus* Kerr**

Cinereus Shrew

SPECIMENS COLLECTED.—Thoral Creek (5500 feet), 4; Entrance (3000 feet), 10; Egypt Lake (6700 feet), 37; Assiniboine (7500 to 7600 feet), 10; Tornado Pass (7000 feet), 3; Twin Butte (4000 feet), 30.

Egypt Lake and, to a somewhat lesser extent, Assiniboine specimens are darker and have larger skulls than typical of the subspecies *cinereus*, indicating intergradation with the coastal form, *streator*, but in external measurements they show no approach to the latter, larger form. It is unusual to find a coastal form exerting an influence this far inland, but Jackson (1928, p. 54) mentions that specimens from as far east as Glacier, B. C., show tendencies toward *S. c. streator* which would lend credence to such a conclusion. Other specimens listed above agree closely with typical specimens of *cinereus*.

Together with *Sorex obscurus* these shrews made up much of the small mammal population at most localities, being

found in nearly all ecological situations side by side, usually in fair abundance, although they were scarce at some localities. In relative abundance *Sorex cinereus* and *Sorex obscurus* were found to be variable, as at Egypt Lake and Assiniboine where the ratios were 1:1 and 1:3, respectively.

The only molting individual is one collected at Egypt Lake July 4 which has old winter pelage covering the rump, while the rest of the animal is in fresh summer pelage.

***Sorex obscurus obscurus* Merriam**

Dusky Shrew

SPECIMENS COLLECTED.—Thoral Creek (5500 feet), 5; Entrance (3000 feet), 1; Egypt Lake (6700 feet), 31; Assiniboine (7500 to 7600 feet), 27; Invermere (3000 feet), 3; Twin Butte (4000 feet), 5.

The specimens from all localities agree closely with typical representatives of this race.

A specimen collected October 3 at Thoral

Creek has fresh winter pelage extending from the shoulders posteriorly and down over the hips. Another taken the following day has progressed further with its molt, for the old pelage remains only across the nose, along the sides of the head to the forelegs and across the chest and underside of the head. None of the other four specimens from that locality, which were taken earlier or at the same time, has fresh winter pelage in place, but one taken October 3 has new hair underlying the summer pelage throughout the posterior dorsal region.

Dusky shrews were taken in many situations: in dense spruce forests, in both open and bushy meadows, along the margins of a lake in low, scrubby spruce, and in grassy ditches of a hay field. They were usually in the company of *Sorex cinereus*, but neither species showed any decided habitat predilections.

Sorex palustris navigator (Baird)

Water Shrew

SPECIMENS COLLECTED.—Entrance (3000 feet), 1; Egypt Lake (6700 feet), 2; Assiniboine (7500 to 7600 feet), 7; Tornado Pass (7000 feet), 1; Twin Butte (4000 feet), 2.

In having proportionately shorter tails than typical of this race (93 per cent of the head and body, compared with 82 per cent for *palustris* and 103 per cent for *navigator*), most of these specimens are intermediate between *navigator* and typical *palustris*. Moreover, four specimens, one each from Egypt Lake, Assiniboine, Twin Butte and Tornado Pass, are as large as *palustris* in total length. The other specimens are smaller, more the size of *navigator*. Cranially and in color all specimens are close to *navigator*.

A specimen from Twin Butte collected August 28 has two patches of new hair on the rump, the one on the right about six times the size of that on the left. New hair underlies the old coat throughout the posterior dorsal region. A patch of new hair covers much of the posterior ventral region, but the sides and anterior half have not yet begun to molt. Another specimen collected at that locality the same day has new hair appearing beneath the old pelage of the rump.

Specimens were collected along running mountain streams and nearby quiet pools, usually more or less overgrown by scrub willows. One was taken beside a stream in a heavy spruce forest at Assiniboine.

Microsorex hoyi intervectus Jackson

Pygmy Shrew

SPECIMENS COLLECTED.—Entrance (3000 feet), 4.

In no respect do these specimens approach *M. h. hoyi*, as characterized by Jackson (1928, pp. 203 and 204), which ranges immediately south of Entrance, according to the same author (*loc. cit.*), but they agree closely with specimens of *intervectus* on hand.

Myotis lucifugus alascensis Miller

Little Brown Bat

SPECIMENS COLLECTED.—Assiniboine (7500 feet), 2; Invermere (2600 to 3000 feet), 25.

Bats of this species were abundant at Invermere and vicinity. Adult females and almost fully grown young (metacarpal epiphyses free) were collected from the "Old Fort," a local meeting hall, where a large breeding colony had become established in the recesses of the roof and walls. They caused considerable litter on the floor despite frequent sweepings. Adults and young of both sexes were shot over a road some distance away where a large flight, all in one direction, occurred every evening. Most of these specimens are darker than *M. l. lucifugus*, but two are as light as the typical race.

Two adults from Assiniboine resemble *pernox* in slightly larger cranial and external size and lighter color but are closer to *alascensis*. In the mountains bats were scarce or absent and late-flying, making shooting very difficult.

Myotis lucifugus pernox Hollister

SPECIMENS COLLECTED.—Entrance (3000 feet), 2.

These two little brown bats, taken thirty-two miles from Henry House, type locality of *Myotis pernox* Hollister, have large skulls, agreeing nearly precisely with the measurements given by Hollister (1911,

p. 4) in his original description of *pernox* and with Miller and Allen's measurements (1928, p. 57) of the same type and paratype, which they considered to be atypical examples of *alascensis* in their revision of the genus. This form is readily distinguished from both *M. l. lucifugus* and *alascensis* by the larger skull, which is from 15.1 mm. to 15.8 mm. (average of four specimens, 15.45 mm.) in greatest length (incisors excluded). Skulls of the subspecies *lucifugus* and *alascensis* rarely measure more than 15 mm. in greatest length and average 14.5 mm. It seems well, then, to recognize this form as a race of *Myotis lucifugus*, for it is closely related to this species both morphologically and geographically. Moreover, the two Assiniboine specimens of *alascensis* show a tendency toward the larger size of *pernox*.

The two new specimens of *pernox* are an adult with worn teeth (A.M.N.H. No. 122442) and an adult with unworn teeth (A.M.N.H. No. 122443) which measured, respectively: total length, 100, 95; tail, 37, 40; hind foot, 12, 10; forearm, 37.9, 37.8. Skull: greatest length, 15.7, 15.1; condylobasal length, 15.0, 14.5; zygomatic breadth, 9.8, 9.7; interorbital breadth, 4.4, 4.3; maxillary breadth at m^3 , 6.1, 5.9; breadth of braincase, 7.9, 7.7; occipital depth, 5.2, 5.3; mandible, 11.4, 11.0; maxillary tooth row, 5.7, 5.6; mandibular tooth row, 6.1, 6.0.

These two bats were shot while flying over a corral in the company of *Eptesicus fuscus pallidus*.

Lasionycteris noctivagans (Le Conte)

Silver-haired Bat

SPECIMEN COLLECTED.—Chief Mountain Pass, international boundary, 1.

At the United States custom house we were given a dead silver-haired bat which had been found and killed in the house by a customs officer the night before. The altitude there is approximately 4100 feet.

Eptesicus fuscus fuscus (Beauvois)

Big Brown Bat

SPECIMEN COLLECTED.—Banff (4500 feet), 1.

This specimen, caught by a resident of Banff in his house, is fully as dark as typical eastern representatives of this race and is so

identified pending the examination of further specimens from this locality. Many others were seen flying over the streets of the town in the company of a smaller bat, probably *Myotis*, but no other specimens were collected. Outside the town bats were not in evidence.

Eptesicus fuscus pallidus Young

SPECIMENS COLLECTED.—Entrance (3000 feet), 8.

These are all paler than the Banff specimens and agree closely with more southern representatives of *pallidus*. I can ascribe little value to Young's character of greater size for *pallidus* when compared with typical *fuscus* (1908, p. 408). It is to be noted that his description of *pallidus* was based almost entirely on females which are appreciably larger than males of this species.

Two of these specimens indicate a rather long period of parturition for this species, for a September 1 specimen was in adult pelage with incompletely fused metacarpal epiphyses, whereas a specimen taken September 13, nearly two weeks later, still had immature pelage and unfused epiphyses.

Mephitis mephitis hudsonica Richardson

Striped Skunk

SPECIMEN COLLECTED.—Entrance (3000 feet), 1.

A single female was taken. It has a distinct medial notch in the posterior border of the palate at the plane of the last molars, a feature of Bowron Lake specimens noted by Hall (1934, p. 368) which is at variance with Howell's description of *hudsonica* (1901, pp. 24 and 25), in which he states that the palate is long, "ending behind plane of posterior molars, without notch or spine." Hall (*loc. cit.*) and Howell (*loc. cit.*) have both noted that the tails of specimens from British Columbia are shorter than typical of this form, and our specimen is in agreement with that trend. Moreover, the hind foot is smaller than typical, while the head and body and skull are larger than the measurements given by Howell for females (*loc. cit.*), perhaps due to the old age of this individual.

***Marmota caligata oxytona* Hollister**

Hoary Marmot

SPECIMEN COLLECTED.—Northwest of Entrance, 1.

This specimen, collected by Mr. R. Neighbor in December (?), 1938, agrees well with specimens of *oxytona* in the collection of The American Museum of Natural History.

Since none of the marmots collected in this region approaches *okanagana* as characterized by Howell (1915, pp. 65 and 66) and as represented in the collection of the American Museum, I feel inclined to doubt Howell's identification of two marmots from fifteen miles south of Henry House, which he refers to the race *okanagana* (*ibid.*, p. 66). Unless these specimens exhibit the characteristic cranial characters of *okanagana*, I believe it will be found that they are intergrades between *oxytona* and *nivaria*.

***Marmota caligata nivaria* Howell**

SPECIMENS COLLECTED.—Tornado Pass (7000 feet), 5; two miles north northeast of The Monarch Mountain (7200 feet), 3; Farrow Pass (also "Ferro Pass") five and one-half miles northwest of Mt. Assiniboine (7500 feet), 1.

These specimens are all very white, much more so than either *okanagana* or *oxytona*, and appreciably whiter than typical *caligata*. In all respects of color they agree well with a single skin without skull of *nivaria* from Idaho, the only available specimen of that subspecies. The skulls closely resemble those of *oxytona* on hand, which Howell points out is typical of *nivaria* (1915, p. 67), and do not fit Howell's description of *okanagana* (*ibid.*, p. 65). These specimens constitute a considerable extension of range for *M. c. nivaria*, as they were formerly known only from Montana and Idaho.

A young marmot collected July 21 near The Monarch Mountain has milk dentition and erupting first molars, the lower of these being more nearly in place. At this time the young were above ground sun bathing, but it was not noticed whether or not they had been weaned. An adult female taken four days later had enlarged mammae but was not lactating. Another young speci-

men taken at Tornado Pass, July 28, has the first molars in position and is erupting the second molars, those of the mandible being in a more advanced state of eruption. A third from Farrow Pass, August 17, has the second molars in position, the third molars unerupted and the milk teeth still in position. A female taken July 25 at The Monarch Mountain had five placental scars in the right horn of the uterus, none in the left horn.

Hoary marmots are locally abundant, but in some places, as in the vicinity of Assiniboine, none was in evidence despite the presence of apparently suitable situations. The most favored habitat for marmots was an open alpine meadow studded with large boulders not far from an extensive rock slide. In the meadow old females with their young were abundant during late July, while in the rock slides other adult marmots were seen. These latter were, I suspect, males, but no specimens were taken there. The meadow was crisscrossed by a maze of runways from one boulder to another and to feeding grounds. Both Columbian ground squirrels and marmots were seen using these trails.

***Citellus columbianus columbianus* (Ord)**

Columbian Ground Squirrel

SPECIMENS COLLECTED.—Twelve miles west northwest of Banff (4300 feet), 7; Egypt Lake (6700 feet), 9; Assiniboine (7400 feet), 3; Tornado Pass (7800 feet), 14; Maycroft (4700 feet), 20.

This species is one of the most abundant and successful mammals of the mountain region, for wherever an appreciable amount of grass is to be found these animals abound. They penetrate the spruce forests for a hundred yards or so in their wanderings, but their burrows were not seen more than a dozen feet from grassy parks or meadows. At our base camp twelve miles west northwest of Banff this species had appeared comparatively recently, within approximately the last six years, we were told. At Maycroft Mr. Carter was informed by Mr. Ed Burton in 1936 that in the last thirteen years *columbianus* had extended its range down to the prairie from the mountains at the expense of *Citellus richardsonii*, which is now only

common on the prairies some six or seven miles from the mountain valley in which Maycroft is situated and where Richardson ground squirrels were formerly abundant.

In comparing the specimens from twelve miles west northwest of Banff with paratypes and topotypes of *Citellus columbianus albertae* Allen and topotypical *C. c. columbianus* I am inclined to concur with Howell's conclusion that the race *albertae* is not sufficiently well characterized to warrant recognition (1938, p. 88). A comparison of fifteen adult topotypes and virtual topotypes of *albertae* with specimens of *columbianus* from several localities, including the type locality, shows Allen's characters (1903, p. 537) to be inconstant, with too great overlap; Hall's character (1934, p. 372) of higher occiput in *albertae* is equally poor, even when age is taken into consideration.

Five of six Banff specimens taken July 22 to 25 are in early stages of molt; three of six Egypt Lake adults taken July 5 to 17 are molting; an adult August 3 specimen from Assiniboine has nearly completed its molt, while one taken August 12 is in fresh pelage. The molting period is apparently long and subject to individual variation.

At Invermere the Columbian ground squirrels begin estivation during the first week and a half of August, all individuals disappearing in a day or two according to Jim Champion, a resident there who has watched this species every year and claims that they disappear several days earlier when the ensuing winter is to be severe. Those in the mountains are active longer, probably until September, for when we left Assiniboine on August 16 they were still in evidence but exceedingly fat, particularly the males.

Citellus richardsonii richardsonii
(Sabine)

Richardson Ground Squirrel

SPECIMENS COLLECTED.—Six miles east of Maycroft (4000 feet), 12.

This species, known locally as the "prairie gopher," was abundant in the prairie region outside of Maycroft. Of

the twelve collected, three are adult females, the others immatures of both sexes (milk premolars undergoing replacement). It appeared at this date, July 10, that adult males and probably some adult females had entered estivation quarters.

Citellus tridecemlineatus
***tridecemlineatus* (Mitchill)**

Thirteen-lined Ground Squirrel

SPECIMENS COLLECTED.—Twin Butte (4000 feet), 9.

In abundance thirteen-lined ground squirrels are complementary to Richardson ground squirrels. Near Maycroft the former species was rare; at Twin Butte the reverse was the case, for there the thirteen-lined ground squirrels were abundant, while Richardson ground squirrels were little in evidence. No habitat predilections were noted for these two species, both occurring on the open prairie.

***Citellus lateralis tescorum* (Hollister)**

Golden Mantled Ground Squirrel

SPECIMENS COLLECTED.—Tornado Pass (6500 to 7000 feet), 8; Maycroft (4000 feet), 1; Egypt Lake (6900 to 7200 feet), 4; Assiniboine (7500 to 7800 feet), 10; Thorol Creek (6500 to 7000 feet), 4; Invermere (2800 feet), 3.

"Big chipmunks," as the natives call them, were usually closely associated with rocks, either outcroppings or talus slopes. At Invermere, however, they were less shy and secretive than in the mountains and had their burrows near or even in a graded dirt road which was well traveled by automobiles. Here they were associated with fir and aspen growths rather than the spruce near which they were found in the mountains. Although generally distributed, they were nowhere abundant.

Young collected during the first week of August at Assiniboine were undergoing the first molt; during this period the third molars appeared and the milk premolars were replaced. At Invermere, two immatures collected August 22 and 26 have adult dentition and are larger than Assiniboine specimens, but were molting at this later date. Adults collected July 8 to 26 at Egypt Lake were all molting.

Eutamias ruficaudus simulans Howell

Coeur d'Alene Chipmunk

SPECIMENS COLLECTED.—Invermere (2800 feet), 6.

This chipmunk was taken in several situations at Invermere in mixed fir and poplar groves; two were shot from the top of a log stockade fence on the sandy shore of Lake Windermere where a few scattered fir trees and tufts of grass were the only plant life. One of these was carrying five early embryos when taken August 19; the mammae had not yet begun to enlarge noticeably. This I believe to be a late case of pregnancy for *Eutamias* and is perhaps exceptional. Another adult female taken twelve days later was not breeding.

These specimens all have much lighter tails than a specimen from Moscow, Idaho, identified by Howell as belonging to this subspecies. The tail averages 15 mm. shorter than Howell's measurements for *simulans* with a difference of 6 mm. between the closest figures. The significance of these departures from the typical specimens of *E. r. simulans* cannot be stated without the evidence of more specimens from southeastern British Columbia, particularly from the lower elevations.

Eutamias amoenus luteiventris (Allen)

Buff-bellied Chipmunk

SPECIMENS COLLECTED.—Twin Butte (4000 feet), 23; Tornado Pass (6500 to 7000 feet), 14; Assiniboine (7200 feet), 1; Maycroft (4700 feet), 4.

Series from several localities agree with specimens of buff-bellied chipmunk on hand, save two adults from Maycroft, which have longer skulls than Howell (1929, p. 67) gives as typical of this race, but they are in agreement in other characters.

At Tornado Pass Carter found the buff-bellied chipmunk to be more common than the timber-line chipmunk (fourteen and six specimens collected, respectively), but at Assiniboine the timber-line chipmunk was by far the commoner species (one and twenty-seven, respectively). The buff-bellied chipmunk was not collected further north than Assiniboine.

Eutamias minimus borealis (Allen)

Northern Chipmunk

SPECIMENS COLLECTED.—Entrance (3000 feet), 19; Thorol Creek (6000 feet), 1.

The Entrance specimens resemble *oreocetes* in that they have shorter tails and narrower cranial breadth than is typical of *borealis* but agree with typical specimens of *borealis* in all other respects. A single adult from Thorol Creek further approaches *oreocetes* in the above mentioned measurements. Nine specimens from Entrance show progressive stages in replacement of the milk premolars from August 17 to September 4.

Eutamias minimus oreocetes Merriam

Timber-line Chipmunk

SPECIMENS COLLECTED.—Egypt Lake (6700 to 7200 feet), 13; twelve miles west northwest of Banff (4900 feet), 2; Assiniboine (7500 to 7800 feet), 27; Tornado Pass (6500 to 7000 feet), 6.

This species was found to be widely distributed throughout the southern Canadian Rockies along the Divide. Specimens from Tornado Pass, Assiniboine and Egypt Lake are further differentiated from *borealis* than topotypes of *oreocetes* from Glacier National Park, Montana, judging from Howell's description of that race (1929, pp. 53 and 54). Two adults from twelve miles west northwest of Banff are intermediate between *borealis* and *oreocetes* in color but are of the small size of the latter race, to which I have accordingly referred them. These observations fulfill Howell's prediction (*loc. cit.*) that *E. m. oreocetes* would be found to range northward from northwestern Montana and intergrade with *borealis*.

This chipmunk occurs throughout the alpine meadows where rocky or bushy cover exists and penetrates the margins of the spruce forests for a short distance. On several occasions I saw chipmunks climb trees of some height. One was observed to climb a sixteen-foot spruce tree to the top and then descend, continually searching each branch from trunk to tip, negotiating the slender twigs with ease. The object of his search was obscure, for he was not observed to feed or pause in his movements.

One Banff specimen collected June 23 had six embryos 8 mm. crown-rump size. On July 17 a lactating female with placental scars was taken at Egypt Lake. Two others taken July 19 and 22 had enlarged mammae and placental scars, but lactation could not be demonstrated. Mammae were arranged in four pairs. Between July 30 and August 11 Assiniboine young erupted the third molars, then replaced the milk premolars. By the time the permanent dentition was in place adult size was nearly attained as regards external measurements.

Tamiasciurus hudsonicus columbiensis

Howell

Chickaree

SPECIMENS COLLECTED.—Entrance (3000 feet), 24; Thoral Creek (5500 to 6000 feet), 6; twelve miles west northwest of Banff (4700 feet), 1; Egypt Lake (6700 to 6800 feet), 7.

Several of the specimens from Thoral Creek and Entrance were examined by A. H. Howell and judged by him to be *T. h. columbiensis*. These and a specimen from near Banff are typical representatives of that race. Egypt Lake specimens show intergradation with *richardsoni* in that they have darker upperparts.

Three adults collected at Thoral Creek, September 21, are all in fresh winter pelage, while an immature specimen has new hair underlying the old pelage throughout the dorsal region. Another immature taken three days later has not yet begun to molt; a third has completed its molt by October 4. It would seem that the adults molt to the winter coat during the third week of September; the young of the year soon thereafter.

Tamiasciurus hudsonicus richardsoni (Bachman)

SPECIMENS COLLECTED.—Tornado Pass (7000 feet), 5; Maycroft (4700 feet), 6; Assiniboine (7200 to 7600 feet), 11; Invermere (2800 feet), 7.

This dark chickaree reaches its maximum differentiation in the Coeur d'Alene and Bitter Root Mountains of Idaho, according to J. A. Allen (1898, p. 265), and intergrades with *columbiensis* over a large area of the southern Canadian Rocky Moun-

tains, where a gradual cline occurs from the dark, black tailed *richardsoni* of Idaho to the light colored *columbiensis* of the north. Of the present collections, the series from Tornado Pass on the Divide is most nearly typical of *richardsoni*, but already the tail is redder (reduction of black), particularly about the median basal region. Maycroft specimens in the foothills to the east of the Rockies have still lighter tails but retain the dark color of the upperparts. The Assiniboine specimens show further lightening of the tail and the body as well. A series from Invermere is composed of particularly variable specimens, some of which are nearly typical *richardsoni*; others approach *columbiensis*, while a few somewhat resemble *streatori* in color and distribution of black on the tail. Egypt Lake specimens, mentioned above, stand nearer the other end of the cline, for they are nearly typical *columbiensis*, differing only in slightly darker upperparts than is typical of that race.

Glaucomys sabrinus bangsi (Rhoads)

Flying Squirrel

SPECIMENS COLLECTED.—Maycroft (4700 feet), 1.

This single specimen is close to *bangsi* in color of underparts, i.e., heavily washed with buffy cinnamon, but the upperparts are slightly more vinaceous and the feet more brownish than typical, an indication of intergradation with *G. s. sabrinus*. The skull is identical with that of *bangsi*, which is virtually indistinguishable from that of typical *sabrinus*, but no indication of intergradation with *alpinus* is apparent.

Glaucomys sabrinus alpinus (Richardson)

SPECIMENS COLLECTED.—Entrance (3000 feet), 8; Thoral Creek (5500 feet), 1.

These are all typical of the subspecies *alpinus*.

Four immatures from Entrance collected August 24 to September 11 are in juvenile pelage and have functional milk premolars. A single subadult taken at Thoral Creek, October 4, is completing replacement of the milk premolars and has adult pelage except for the hind feet and tail. A dead

immature individual was found by Mr. Carter firmly snagged on a barbed wire fence by its flight membrane.

***Glaucomyx sabrinus latipes* Howell**

SPECIMENS COLLECTED.—Tornado Pass (7000 feet), 3.

An adult and two immatures are considered intermediate between *latipes* and *alpinus* but closer to the former, particularly in large size and cranial features. In color the adult approaches *alpinus* in more vinaceous drab upperparts (rather than sayal brown of *latipes*). That part of the hind feet in fresh pelage (they appear to be molting) is fuscous, mixed with a few light, perhaps vinaceous, hairs, agreeing with specimens of *latipes* on hand. The tail is dark fuscous, and the sides of the head are dark smoke gray as in *latipes*.

The skull of this adult is unique in that it is an exaggerated edition of the long narrow skull of *latipes*, for it is markedly elongate with a particularly narrow braincase and occiput. The two young individuals, which are probably members of the same family as the adult, possess the same striking proportions of the skull. It may be that these specimens represent a hitherto unknown alpine race occupying the Rocky Mountains south of the range of *alpinus*, but it seems more logical in view of the few specimens on hand to regard them as intergrades with aberrant crania.

***Thomomys talpoides talpoides* (Richardson)**

Saskatchewan Pocket Gopher

SPECIMENS COLLECTED.—Twin Butte (4000 feet), 22; Maycroft (4700 feet), 2.

The series from Twin Butte are typical of the present form, but the Maycroft specimens appear to be representative of a population intermediate between *Thomomys talpoides talpoides* and *T. t. fuscus* of the mountainous country to the west and south. One of the Maycroft specimens approaches *fuscus* rather closely in external and cranial size and in color, while the other is closer to typical *talpoides*. Although I have not examined any of the three known specimens of *Thomomys fuscus loringi* (which should now stand *Thomomys*

talpoides loringi) it seems likely, judging from Bailey's description (1915, pp. 129 and 130) and figure of the skull (*ibid.*, Pl. VIII) of this race in his review of the genus, that *loringi* was described on the basis of just such an intergrade as the Twin Butte specimens mentioned. It is a notable fact that specimens referred to *loringi* are from localities where such intergradation might be expected, namely, in the eastern foothills of the Rocky Mountains. At the time of Bailey's review only the type specimen and two skins without skulls were referred to *loringi*. I am not aware that any specimens collected since have been referred to this race.

***Peromyscus maniculatus* (Wagner)**

White-footed Mouse

SPECIMENS COLLECTED.—Thoral Creek (6500 feet), 14; Entrance (3000 feet), 32; Egypt Lake (6900 feet), 4; twelve miles west northwest of Banff (4900 feet), 14; Assiniboine (7500 feet), 20; Invermere (3000 feet), 4; Tornado Pass (7000 feet), 2; Maycroft (4700 feet), 13; Twin Butte (4000 feet), 63.

None of these specimens is clearly referable to any race, but on the whole they appear to consist of a number of intergrades affected variously by the surrounding races of *Peromyscus maniculatus*, namely, *P. m. borealis*, *P. m. osgoodi* and *P. m. alpinus*. They show a few distinctive characters of their own, such as larger incisive foramina, but are too variable within themselves to warrant recognition. The strongest influence in this region is that of the northern race, *borealis*. I do not believe the race *artemisiae* enters into the picture here on geographical bases, for while some specimens in this collection resemble that race, their characters are directly attributable to intermediacy between certain of the three races mentioned above. *P. m. artemisiae*, then, may be considered to range from south central British Columbia west of the Selkirk Mountains, which are occupied by *P. m. alpinus*, south into the United States.

Maycroft, Twin Butte and Banff specimens show intergradation with the race to the southeast, *osgoodi*. Of these three series Twin Butte specimens come closest to that race in having the same proportion

of tail to head and body (70 per cent compared to 68 per cent for *osgoodi*), but they are slightly larger than *osgoodi* and intermediate between that race and *borealis* in color and cranial characters. Maycroft specimens are closer to *borealis* in color and in proportionate length of the tail (77 per cent compared to 80 per cent for *borealis*), while in characters of the skull they are identical with *borealis*. Cranially, Banff specimens approach *osgoodi*, but in other respects their agreement with *borealis* is close, except in larger size. The hind feet of these series average from 20 to 20.5 mm. in length, much the same as both *borealis* and *osgoodi*, smaller than *alpinus*.

Egypt Lake specimens, except for larger size than typical, are close to *borealis* in all respects, but the series is a small one.

The remaining specimens, those from Thorl Creek, Entrance and Assiniboine, are judged to be intermediate between *alpinus* and *borealis* by virtue of their proportionately long tails (93 per cent, 91 per cent and 92 per cent, respectively, of the head and body length compared to 108 per cent for *alpinus* and 80 per cent for *borealis*), but they are not similar as a group, except in cranial measurements in which respect they are all close to *borealis*. The hind feet of these series averaged: Thorl Creek, 21.7; Entrance, 22; Assiniboine, 20.8 mm. These measurements are closer to *alpinus* (21 mm.) than to *borealis* (20 mm.). Entrance specimens are close to *borealis* in color; Assiniboine specimens are darker, perhaps resembling *alpinus*; Thorl Creek specimens are buffy with less black than either of the races under consideration, so are unique. In this study no specimens of *alpinus* were available, so comparisons with that race are based on the original description (Cowan, 1937, pp. 215 and 216).

Two females collected near Banff were carrying seven and six embryos when collected June 23 and 29, respectively. In one of these cases an embryo was being resorbed. At Assiniboine (in early August) three of four adult females had enlarged mammae and placental scars evident, numbering six in one case; the fourth female was not breeding.

White-footed mice were found to be more abundant at the lower altitudes than they were at the mountain localities where the red-backed mice appeared to replace them in the forests. At Egypt Lake white-footed mice were found only in the rock slides. At Assiniboine they were common about the margins of the lake in scrubby dwarfed spruce and willows.

***Neotoma cinerea cinerea* (Ord)**

Bushy-tailed Wood Rat or Pack Rat

SPECIMENS COLLECTED.—Maycroft (5000 feet), 2.

These compare favorably with three *N. c. cinerea* from Meagher Co., Montana, eighty miles south southeast of the type locality. However, in having slightly bushier tails and darker upperparts than typical, they show intergradation with *occidentalis* to the west. They entirely lack the pinkish buff cast of *drummondii* to the north.

Neotoma cinerea drummondii

(Richardson)

SPECIMENS COLLECTED.—Egypt Lake (6900 feet), 6; Entrance (3000 feet), 6.

These series include only three adults: two from Egypt Lake in full, lax summer pelage agree with topotypes from Jasper; one from Entrance is in worn summer pelage, September 3. At Egypt Lake pack rats were common in the rock slides. At Entrance Mr. Carter found them living in houses as well.

***Neotoma cinerea occidentalis* Baird**

SPECIMENS COLLECTED.—Invermere and vicinity (2800 to about 4000 feet), 6.

These specimens resemble *occidentalis* in dark color of the upperparts but show intergradation with *drummondii* in having lighter ankles and proportionately shorter tail than typical of the former race.

At Invermere pack rats were all taken in houses or sheds, some occupied, some deserted. The strong odor of the pack rats made them particularly offensive whenever they invaded an occupied home. These were all immatures or subadults, and only one was found to occupy a house at one time.

***Synaptomys borealis chapmani* Allen**

Chapman Lemming Mouse

SPECIMENS COLLECTED.—Egypt Lake (6700 feet), 7; Assiniboine (7500 feet), 6.

This usually rare species was found to occur sparingly under the denser cover in the spruce forests at Egypt Lake and Assiniboine. A female taken July 18, 1941, was carrying seven embryos 15 mm. crown-rump length, five in the right horn of the uterus, two in the left. The mammae were 2-2 = 8 and enlarged but not yet lactating. The first young specimen was collected the same day and measured: total length, 100; tail, 20; hind foot, 18.5 mm.

***Phenacomys intermedius levis* Howell**

Alberta Phenacomys

SPECIMENS COLLECTED.—Banff (4900 feet), 2; Thorval Creek (6000 to 6500 feet), 10; Assiniboine (7500 feet), 8; Egypt Lake (6700 feet), 16; Tornado Pass (7000 feet), 21.

Of these, the only specimens which are strictly typical of *levis* are two from near Banff, an old adult and an immature. The others all show intergradation with typical *intermedius* in having larger, heavier skulls which are more heavily ridged and have proportionately longer rostra on the average than topotypes of *levis* and nearly typical examples from Smoky River, Alberta; five from Egypt Lake and four from Tornado Pass agree with *intermedius* in brownish coloration. In all four of these mountain collections a certain few individuals seem to have a tendency toward the well marked cranial characters of the form *mackenzii*, but the tendency is barely discernible.

Five cases of pregnancy examined between June 23 and August 1 averaged 4.8 per litter with extremes of four to six. An immature taken June 24 measured: total length, 138; tail, 34; hind foot, 18.5 mm., indicating that breeding had been in progress for some time.

Most of the specimens were taken in mossy pine forests, in spruce forests choked with fallen timber, and in more open spruce growths, but a few were collected in both open and bushy meadows. They appeared to be more common throughout the region than is generally the case elsewhere, judg-

ing from published accounts, and rather generally distributed.

Phenacomys intermedius mackenzii

Preble

Mackenzie Phenacomys

SPECIMENS COLLECTED.—Entrance (3000 feet), 7; Maycroft (4700 feet), 1.

The Entrance specimens, while still subadult, display the well marked characters of topotypical *mackenzii* from Fort Smith, N.W.T. A single old adult from Maycroft closely approaches many of the cranial features of *mackenzii*, such as strongly depressed rostrum, high narrow braincase and a slightly developed spine on the posterior border of the palate, but the size of the skull is small and the interorbital breadth great, as in *levis*. In color this specimen is light and gray, matching certain of the topotypical *levis* closely. There is no indication of the yellow nose so characteristic of *mackenzii*. Several other specimens not of the present collections which show intergradation between these two forms are offered as further evidence. Two from Mud Lake, Alberta (near Macleod), A.M.N.H. Nos. 95166 and 95168, are similar in color to some of the mountain specimens listed under *P. i. levis* above, and darker than any of the topotypical *levis* on hand. Cranially, one approaches *mackenzii* in much the same respects as the Maycroft specimen, while the other is closer to *levis*. A skull without skin, No. 81477 in the collection of the Fish and Wildlife Service, from Muskeg Creek (fifty-five miles northwest of Entrance) approaches *levis* in large interorbital breadth, less strongly depressed rostrum and broad flat braincase. A. B. Howell (1924, p. 29) does not mention this skull, but he examined the skin of a young female now on hand, No. 81489 of the Fish and Wildlife Service, from the same locality and remarked that, although definitely like *mackenzii* in color, it is bright, lacking the gray cast of that form. If these two specimens are representative of the same population they may be considered intergrades.

Anderson (1942, pp. 57 and 58) concluded that *mackenzii* is a geographical race of *Phenacomys ungava*, the eastern

form, to which it is linked by the race *soperi*. It is evident from the specimens described above that *mackenzii* also intergrades with *Phenacomys intermedius levis*. Since the name *intermedius* has priority over *ungava*, *crassus*, *mackenzii* and *soperi*, these latter should now stand *Phenacomys intermedius ungava*, *Phenacomys intermedius crassus*, *Phenacomys intermedius mackenzii* and *Phenacomys intermedius soperi*.

Clethrionomys gapperi athabascaae
(Preble)

Red-backed Mouse

SPECIMENS COLLECTED.—Thoral Creek (5500 feet), 10; Entrance (3000 feet), 1; Egypt Lake (6700 feet), 83; Assiniboine (7500 feet), 32; Tornado Pass (7000 feet), 88; Invermere (3000 feet), 2.

Thoral Creek specimens are close to *athabascaae* in color, except that the rump and hindquarters are slightly darker than typical of that race. Egypt Lake, Assiniboine and Tornado Pass series, in having darker gray faces, hindquarters and flanks, and duller red dorsal stripes, all show intergradation with the dark race, *saturatus*, of eastern British Columbia but are closer to *athabascaae*. Their tails are short, as in the latter form. In view of the fact that these last mentioned specimens are uniform over an appreciable area of the Rocky Mountains and have a characteristic combination of characters (derived, I believe, from *saturatus* and *athabascaae*), some investigators might deem it advisable to assign to them a name, but since there are no strictly distinctive characters to support such a treatment, I prefer to regard them as intergrades. The Invermere specimens, two young adults, are close to *saturatus* in color, but the tail averages closer to *athabascaae* in length. On the basis of these and other specimens in the collection of The American Museum of Natural History and from Preble's records (1908, p. 197) it appears that *athabascaae* ranges from the Great Slave Lake region south through central and eastern Alberta and intergrades with typical *gapperi* to the east, at least at the eastern end of Great Slave Lake as indicated by intermediate specimens from

Old Fort Reliance, and with *saturatus* in the Rocky Mountains of southern Alberta.

The average number of young as shown in sixteen cases of pregnancies and uterine scars noted in specimens collected July 4 to August 20 at Egypt Lake, Assiniboine and Invermere is 5.5 (extremes of four to seven were noted). In half of these cases the scars or embryos numbered six, so that is probably the usual number. No cases of embryo resorption were noted in this species. The testes of sixty males were measured, and it was found that they fell into three fairly well defined groups as regards frequency of occurrence. These probably represented sexually immature juveniles (about 5 mm.), young of the year capable of breeding but not yet fully grown (8 to 9 mm.) and breeding adults (11 to 12 mm.). Examination of the skulls of a number of these specimens proved them to be of the relative ages indicated by the size of their testes. The conclusion to be drawn is that young of the year are capable of breeding the first year.

Red-backed mice, while making up the greatest part of the small rodent population in the spruce forests of the mountains, were absent or rare at the lower altitudes of the mountain valleys, as at twelve miles west northwest of Banff, Entrance, Maycroft and Invermere.

Microtus pennsylvanicus modestus
(Baird)

Sawatch Meadow Mouse

SPECIMENS COLLECTED.—Invermere (2800 feet), 26.

These specimens are typical of the race to the south in all respects and constitute a considerable northward extension of range for the subspecies *modestus*. Presumably they intergrade with *drummondii* in the higher mountain valleys.

These meadow mice were abundant in the hayfields about Invermere. All stages of development are represented in this late August collection. Three sets of seven embryos each were noted August 19 and 20. They ranged from 9 to 22 mm. in crown-rump length and included a single resorbing embryo. In addition, two speci-

mens showed placental scars numbering six and seven.

Microtus pennsylvanicus drummondii
(Audubon and Bachman)

Drummond Meadow Mouse

SPECIMENS COLLECTED.—Twelve miles west northwest of Banff (4900 feet), 9; Maycroft (4700 feet), 5; Twin Butte (4000 feet), 10; Thorl Creek (5500 feet), 25; Entrance (3000 feet), 5; Assiniboine (7500 feet), 1; Egypt Lake (6700 feet), 1.

Two of the Banff specimens are adults. One of these is typical of *drummondii*, whereas the other approaches *modestus* which would indicate intergradation in this region. All other specimens agree fairly well with the former race with a little variation, such as several of the Thorl Creek specimens which are of a richer chestnut color, particularly about the face.

This is a widely distributed form more abundant at the lower elevations of the mountain valleys where scrubby dwarfed willows and other shrubs afford protective cover. In the higher meadows they are rare and apparently associated with *Microtus m. mordax*, a more successful species at altitudes of 7000 feet and thereabouts.

Four pregnancies were noted in specimens taken twelve miles west northwest of Banff, June 26 to 29. The embryos numbered eleven, five, seven and six and ranged from 5 mm. crown-rump length to nearly full term. One of the five embryos listed was in process of resorption, judging from its smaller size.

Microtus mordax mordax (Merriam)

Long-tailed Meadow Mouse

SPECIMENS COLLECTED.—Assiniboine (7500 to 7600 feet), 19; Egypt Lake (6700 feet), 10; Thorl Creek (5500 feet), 8; Tornado Pass (7000 feet), 16; Twin Butte (4000 feet), 1.

This was found to be a common species in the mountains where they occurred in the bushy meadows along streams and at the edges of lakes in scrubby spruce. Nowhere were they exceedingly abundant.

Four cases of pregnancy were observed as follows: July 24, four embryos 17 mm. crown-rump at Egypt Lake; at Assiniboine, July 31, four embryos 4 mm. crown-

rump; August 3, four embryos 7 mm. crown-rump; August 5, six embryos 4 mm. crown-rump.

Microtus richardsoni (De Kay)

Richardson Vole

SPECIMENS COLLECTED.—Tornado Pass (7000 feet), 57; Assiniboine (7600 feet), 1; Egypt Lake (6700 feet), 2.

Tornado Pass specimens are intermediate between typical *richardsoni* and *macropus*, the more southern representative of this species. The incisors are strongly procumbent, the rostrum long and size large as in the former race, but in all other respects (ridged supraoccipital, posteriorly narrow nasals, small bullae, posteriorly constricted incisive foramina and m^3 with terminal loop recurved in most) they agree with *macropus*. The largest of these specimens, a male, measured as follows: total length, 249; tail, 70; hind foot, 29 mm. Ten adults, six males and four females, averaged: total length, 227; tail, 67; hind foot, 27; basilar length (of Hensel), 31.9; nasal length, 9.8; zygomatic breadth, 21.4; mastoid breadth, 14; alveolar length of maxillary tooth row, 8.5 mm. In color these are identical with a series of *macropus* from Fremont County, Idaho. Egypt Lake and Assiniboine specimens are immature and are therefore unidentifiable to subspecies.

Mr. Carter and I found this mouse to occur along streams in spruce forests and more or less brushy streams in alpine meadows. Carter found them to be very abundant at Tornado Pass, but they did not appear to be common at Egypt Lake or Assiniboine, perhaps due to less effective trapping technique employed at the latter localities, for these large *Microtus* pull out of ordinary museum special mouse traps without difficulty.

An immature specimen taken July 26 was carrying four embryos 5 mm. crown-rump length. This individual measured: total length, 188; tail, 54; hind foot, 27.5, and was still in juvenile pelage, indicating early sexual maturity in this species. Another, slightly smaller, female taken the same day was nulliparous.

Mus musculus musculus Linnaeus

House Mouse

SPECIMENS COLLECTED.—Entrance (3000 feet), 1; Invermere (3000 feet), 5.

Doubtlessly a common inhabitant of houses, the house mouse was occasionally taken in traps a short distance from human habitations, particularly in grassy meadows and aspen groves at Invermere. One individual taken in a gully grown over by aspen and fir displays a striking color abnormality. The head is widely bridled with white which extends back along the sides of the head to the ears and to the forelegs and throughout the underparts from the chest forward. From this white area posteriorly to the hips and rump the normally pigmented hairs of the back are mixed with white hairs, giving a grizzled effect. The teeth of this specimen are well worn.

Zapus princeps minor Preble

Jumping Mouse

SPECIMENS COLLECTED.—Mayercroft (4700 feet), 1; Twin Butte (4000 feet), 3; Entrance (3000 feet), 7.

An adult from Mayercroft and three specimens, one of them an adult, from Twin Butte exhibit considerable variation in measurements but average appreciably smaller in cranial measurements than specimens from the mountain localities (Egypt Lake, Assiniboine and Tornado Pass) and possess the structural peculiarities of the Saskatchewan jumping mouse, *Z. p. minor*. These characters are anteriorly narrower nasals, shorter, more deflected rostrum and a somewhat higher cranium. In color these specimens agree tolerably well with several specimens of *minor* on hand, except that the sides are more heavily overlaid with black and the Mayercroft specimen lacks the ochraceous lateral line, in which respects they resemble mountain specimens which I have tentatively referred to as *idahoensis*. Seven specimens from Entrance are all immatures or subadults (m³ erupting or recently erupted and unworn). They all have smaller skulls than mountain specimens of a comparable age and have a strong tendency toward the structural characters of

the skull of *minor* listed above. In color they are intermediate between *idahoensis* and Twin Butte specimens in richer ochraceous color of the sides and dorsal stripe. The lateral line is present and the underparts of several are distinctly washed with buff, as in *minor*. These Entrance specimens I judge to be intergrades between *idahoensis* and *minor* but closer to the latter.

Zapus princeps idahoensis Davis

Jumping Mouse

SPECIMENS COLLECTED.—Assiniboine (7200 feet), 14; Egypt Lake (6700 feet), 3; twelve miles west northwest of Banff (4900 feet), 1; Invermere (2800 feet), 1; Tornado Pass (7000 feet), 3.

The series from Assiniboine and Egypt Lake includes twelve adults which I have referred provisionally to *idahoensis*. Anderson (1932, pp. 108 and 109) considers specimens from the Rocky Mountains to be *Z. p. princeps*, but as Davis points out (1934, pp. 224 and 225) in commenting on a communication from Anderson, such specimens cannot be typical *princeps* by virtue of the posterior border of the palate (postpalatal notch of other authors), which in topotypical *Z. p. princeps* is even with the hinder margin of the last molar or posterior to it, while in Anderson's specimens from the Canadian Rockies the hinder margin of the palate is nearly always anterior to the hinder margin of the last molar. In comparing my specimens with topotypical *Z. p. princeps* and with *idahoensis* from Sheridan Mountain, Clark County, Idaho, I have found such to be the case. In Davis' thirteen cranial measurements (*loc. cit.*) and the three conventional external measurements, Assiniboine and Egypt Lake specimens are close to *idahoensis* rather than *princeps*, except in cranial, interorbital and zygomatic breadths, in which measurements the specimens in question are quite intermediate. In color these same specimens, in common with *idahoensis*, have the lateral line reduced or absent, whereas this line is a conspicuous feature of *Z. p. princeps*. They differ from *idahoensis* in having a more ochraceous cast rather than the straw color of that race, and

the sides are more heavily overlaid with black. Unless examination of the ninety specimens of *Zapus* from this region in the collection of the National Museum of Canada proves these differences to be constantly recognizable, it would seem best to refer such specimens to the race *idahoensis*.

An adult from Banff, several immatures from Tornado Pass and a subadult from Invermere seem best referable to *idahoensis* morphologically and geographically, but the material is inadequate for certain identification.

Six Assiniboine adults collected from August 1 to 16 were molting, the new hair appearing throughout the dorsum beneath the much abraded old hair; one had already completed its molt when captured August 4.

Two females collected August 4 and one the following day were lactating. Mammæ were in four pairs. The first young were captured August 7; presumably they had left the nest but a short time before.

A female collected August 22 at Invermere had two *Cuterebra* fly larvae in the inguinal region but showed no ill effects of this myiatic infection.

***Erethizon epixanthum nigrescens* Allen**

Porcupine

SPECIMENS COLLECTED.—Entrance (3000 feet), 3; Tornado Pass (7000 feet), 3; Invermere (3000 feet), 1.

In referring these specimens to the race *nigrescens* I follow Hall's treatment of similar specimens from the Bowron Lake region. They all have the light tips of the guard hairs orange yellow rather than the whitish yellow shade of typical *epixanthum* and more extensive than in the paratype of *nigrescens*, which I have examined. But as Hall points out (1934, pp. 379 and 380) this darkening effect characteristic of the type and paratype of *nigrescens* may be due to winter pelage rather than to a typical feature of systematic worth. If topotypical material of *nigrescens* proves it to be a good race on the basis of dark coloration, then this lighter, orange yellow group will constitute a separable race. Cranially, our specimens agree with both *epixanthum* and *nigrescens*, there being no distinctive char-

acters of the skull differentiating the two subspecies. The Invermere specimen, however, has the nasal region considerably elevated at the middle, giving the rostrum a humped appearance.

Porcupines were seen commonly at most localities. Although *Erethizon dorsatum* occurs to the northwest of this region, as it is represented in the collection of the American Museum by one from Hudson's Hope, British Columbia, collected by Mr. George G. Goodwin, no black individuals, which might have been of that species, were seen. The vertical range of porcupines seems to be considerable, for on August 16 one was seen on Brewster's Pass at an altitude of 9000 feet. In the Banff National Park, where porcupines enjoy more protection than elsewhere, they were quite abundant, frequently raiding our camp for food and gnawing on our saddles and horse blankets for salt. At no time were girdled trees noticed, despite the abundance of porcupines.

***Ochotona princeps* (Richardson)**

Pika

SPECIMENS COLLECTED.—Thoral Creek (6000 to 7000 feet), 3; Egypt Lake (6900 feet), 7; two miles north northeast of The Monarch Mountain (7200 feet), 7; Assiniboine (7500 to 7700 feet), 11; Tornado Pass (6500 to 7000 feet), 19.

At the time of Howell's revision of the genus *Ochotona* no specimens were available from "the region between Jasper Park, Alberta, and northern Montana," but he assumed that typical *princeps* ranged throughout that region "along the higher ridges" (Howell, 1924, p. 14). However, the situation is not so easily disposed of, for the specimens on hand indicate that the race *lutescens* exerts a strong influence on this entire region. The effect is not entirely one of intermediacy but rather one of various combinations of the characters of the two races, such as is sometimes known as "checkerboard intergradation." Specimens from Egypt Lake and nearby Monarch Mountain are small like *lutescens*, buffy and dark colored as in *princeps* and have skulls which are intermediate between the two in size but nearer *princeps*. Assiniboine specimens are precisely like *lutescens* in color and external size, but the

skulls are the large size of *princeps*. Tornado Pass specimens measure the same as *lutescens* in length but have a tendency toward *princeps* in cranial size and in color. Two adults from Thorall Creek are inadequate for critical comparison, but both are large in external length like *princeps* and have skulls of the small size characteristic of *lutescens*. In color these specimens are light, particularly one of the two adults, which almost entirely lacks the ochraceous color of the species.

Conies, or rock rabbits as the natives prefer to call them, were in evidence wherever rock slides afforded them retreat. The only "hay stack" noticed during the summer of the 1941 expedition was seen from the trail August 16 near the Assiniboine camp in the roots of an uprooted tree on a rocky hillside some distance from the nearest rock slide. All adults taken in late July and early August were molting, the new hair appearing first on the nose, then proceeding posteriorly in a well defined molt line. By September most had completed the molt.

Lepus americanus americanus Erxleben

Varying Hare

SPECIMENS COLLECTED.—Entrance (3000 feet), 15.

In cranial measurements these specimens agree more closely with those given for *L. a. americanus* by Cowan (1938, p. 241) than with his figures for the subspecies *columbiensis*, but in most measurements they are intermediate between the two races. In total length the specimens under consideration are close to the figure given by Nelson (1909, p. 86) for *americanus*, but are nearly 30 mm. larger than Cowan gives for that race (*loc. cit.*). It would seem that total length is not a reliable measurement for differentiating these races. The collector's measurements of the hind feet of these specimens average appreciably larger than comparable meas-

urements given by the authors mentioned for *americanus* and *columbiensis*. The upperside of the hind feet of these specimens is the color of the sides of the body, sometimes mixed with white in the summer pelage, as in *columbiensis*, and unlike *americanus* which has the hind feet white in all pelages (Nelson, *ibid.*, pp. 49 and 50). However, it should be pointed out that Preble (1908, p. 205) has found this character to be unreliable. Critical color comparisons with the two races is impossible due to the lack of reliable comparative material. It may be said, however, that some individuals in this collection are yellowish buffy, as in *columbiensis*, while others are decidedly gray, the color of *americanus*. It is apparent from this analysis that these specimens are intergrades, perhaps closer to *americanus*, and this is what one would expect to find at this locality. Average measurements of nine adults are: total length, 467; hind foot, 144; basilar length of Hensel, 59.8.

Although two specimens taken August 26, and one August 28 have not begun to molt, one collected August 16 is molting about the hind feet, inguinal region and in a small area of the rump. Five October 25 specimens are in various stages of molt, the most advanced having a heavy admixture of brown and black hairs along the mid-dorsal line in an otherwise pure white coat, excepting, of course, the black tips of the ears.

Six young varying hares collected August 11 to 28 are from 245 to 380 mm. in size and seem to indicate a wide spread between their dates of birth.

The year 1941 was a bad one for the varying hares of this region, for we saw only one all summer and heard only a very few reports of others from natives. Our guide spoke of seeing a heavy concentration of hares in a lush grassy pocket in the mountains, but we were unable to investigate.

ADDENDA

Mr. Crowe was called into the armed forces before he could finish this paper, so with his kind permission I am adding the following in order to complete the list of mammals collected by the three expeditions.—T. DONALD CARTER.

Mustela cicognanii richardsoni
(Bonaparte)

Richardson's Weasel

SPECIMENS COLLECTED.—Entrance, 3; Thoral Creek, 1.

***Canis latrans latrans* Say**

Northern Coyote

SPECIMENS COLLECTED.—Invermere, 3; Entrance, 1.

At the ranch house at Entrance there was a tame coyote which enjoyed full liberty and could be handled as freely as a dog.

***Marmota monax canadensis* (Erxleben)**

Canada Woodchuck

SPECIMENS COLLECTED.—Entrance, 3.

The woodchuck appeared to be rather uncommon. Only two occupied burrows were noted.

Odocoileus virginianus ochrourus
Bailey

Northwestern Whitetailed Deer

SPECIMENS COLLECTED.—Vicinity of Invermere, 3. Skull and antlers of specimen shot by J. Delsworth during the winter of 1940-1941 and two shed antlers.

***Odocoileus hemionus macrotis* (Say)**

Rocky Mountain Mule Deer

SPECIMENS COLLECTED.—Thoral Creek, 1 ♂; Entrance, 1 ♀.

***Rangifer montanus* Seton-Thompson**

Mountain Caribou

SPECIMENS COLLECTED.—Thoral Creek, 1 ♂, 1 ♀.

Although these caribou were taken within sight of Mt. Robson, the type locality of *fortidens*, they agree more closely with *montanus* in their dental characters.

***Alces americana americana* (Clinton)**

American Moose

SPECIMENS COLLECTED.—Thoral Creek, 1 ♂; Entrance, 1 ♀.

About the Thoral Creek camp moose were common and were encountered almost daily.

***Ovis canadensis canadensis* Shaw**

Rocky Mountain Bighorn

SPECIMENS COLLECTED.—Thoral Creek, 1 ♂, 1 ♀.

Bighorns were quite plentiful north of Thoral Creek, but rams with large horns were scarce and wary and it was only after several days of stalking that a good head was secured.

Oreamnos americanus columbiae

Hollister

Columbian Mountain Goat

SPECIMENS COLLECTED.—Thoral Creek, 1 ♂, 1 ♀.

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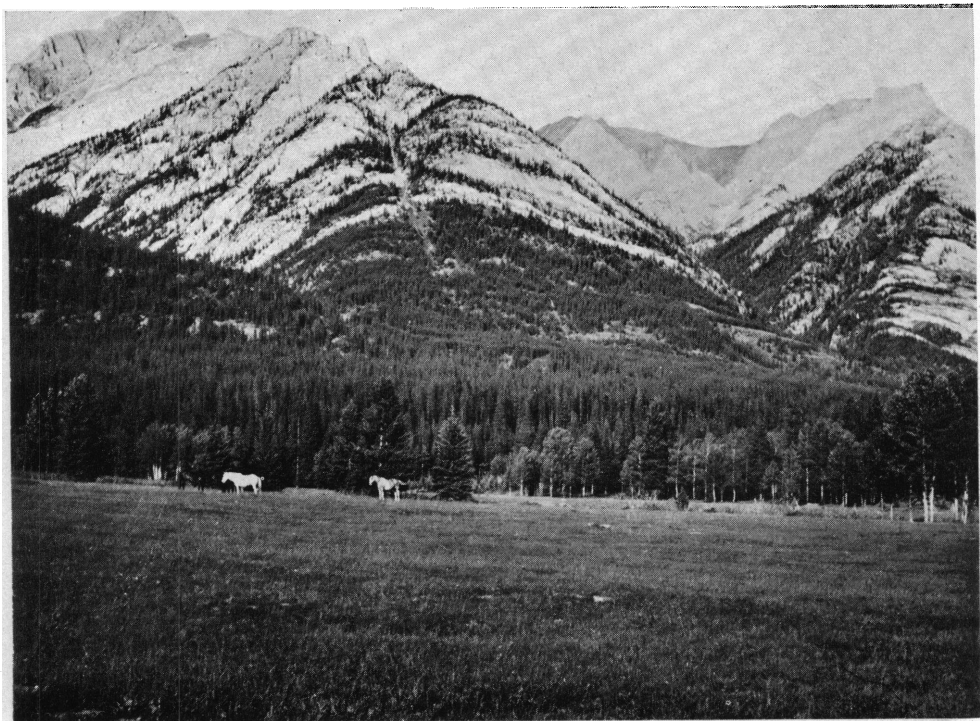
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PLATES XXXII-XXXIV

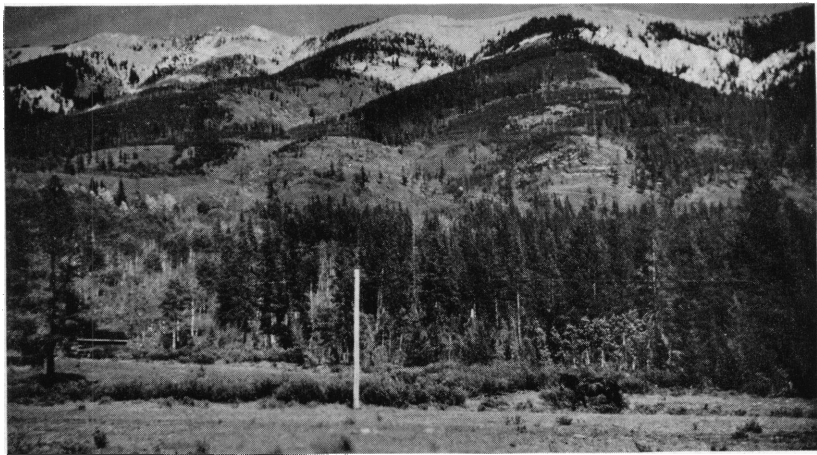
PLATE XXXII

Fig. 1. In the valley of the Bow River twelve miles west northwest of Banff. Open meadow, aspen and lodgepole pine forest mixed with a few spruce. Photograph by Gilbert C. Anthony.

Fig. 2. The Maycroft camp, showing meadow, mixed forest and sparsely timbered mountainside. Photograph by T. Donald Carter.



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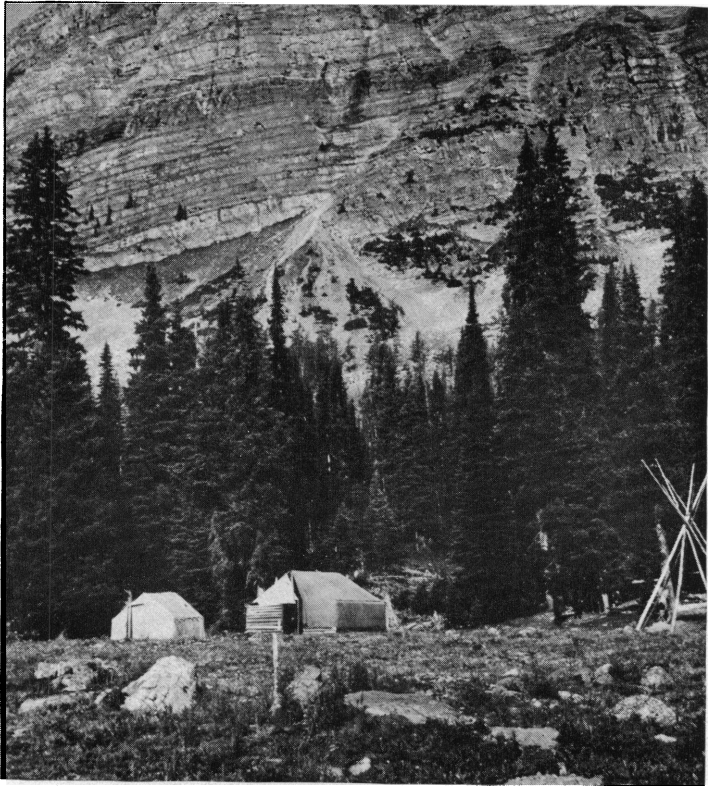


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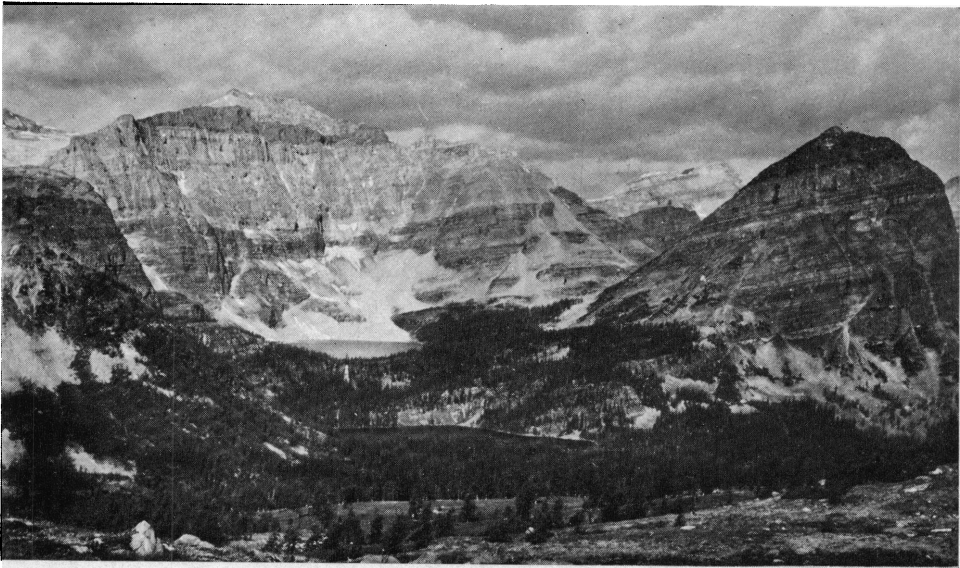
PLATE XXXIII

Fig. 1. The Egypt Lake camp in the mountains, showing rocky meadow, spruce forest and rock slides at the bottom of one of the Pharoah Peaks.

Fig. 2. A broader view of the Egypt Lake country from an alpine meadow above timberline at Simpson Pass. The camp is at the base of the right-hand peak. Photographs by Gilbert C. Anthony.



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PLATE XXXIV

Fig. 1. Alpine meadow and extensive rock slides from the top of Simpson Pass. The Monarch Mountain appears in the middle distance at the right.

Fig. 2. The Assiniboine country, with Mt. Assiniboine in the distance, Sunburst Lake in the foreground. Photographs by Gilbert C. Anthony.



1



2

