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BIOLOGICAL SOCIETY OF WASHINGTON

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REVISION OF THE AMERICAN VOLES OF THE GENUS  
*EVOTOMYS*.

BY VERNON BAILEY.

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The following brief synopsis of the Red-backed Voles is based on a study of specimens in the collection of the U. S. Biological Survey and the private collections of Dr. C. Hart Merriam and Mr. G. S. Miller, Jr., supplemented by a series of the Arctic *Evotomys rutilus* from Alaska in the U. S. National Museum, which I have been permitted to examine through the courtesy of Mr. F. W. True. I am indebted to Mr. Outram Bangs for the privilege of including *Evotomys proteus*, an interesting new species from Labrador, of which he has kindly sent me his manuscript description and a series of specimens. In all, 650 specimens of *Evotomys* from 116 localities have been examined, and while it is still desirable to obtain material from many additional localities, especially specimens in different pelages from the same place, the present collections cover the ground fairly well.

The genus *Evotomys* is circumpolar, inhabiting the northern parts of Europe, Siberia, and North America. The only circumpolar species is the Arctic *E. rutilus*, which does not undergo any considerable change throughout the circumference of the Arctic Zone. None of the other species are common to both continents. The North American forms are boreal in range, covering almost the whole of Alaska, Canada, and the colder parts of the northern United States, and extending southward in the mountains to North Carolina and Colorado, and along the sea coasts to New Jersey and northern California. Excepting the southern Sierra Nevada in California and a few isolated mountains in various



parts of the west, they fill the whole Boreal Zone of North America. In places where they range into a lower zone, local conditions are such as to induce a strong mixture of boreal species into the flora and fauna. This is most noticeable in the coast regions.

The material at hand shows the genus to be wonderfully uniform and the species closely interrelated. No widely divergent forms appear, and several of those now distinguished by names can be traced by every degree of intergradation to the forms from which they have become differentiated. Others in the process of separation have not gone far enough to warrant recognition by name. By mapping the distribution of the several species the more northern are seen to occupy much larger areas than the southern. Thus the Arctic *E. rutilus* is common to the polar parts of both continents, and the northern *E. gapperi* ranges from the Atlantic coast to the Rocky Mountains of British Columbia, while the more southern forms—as *carolinensis*, *galei*, and *californicus*—are restricted to limited areas. In commenting on these facts nearly ten years ago, Dr. Merriam says: "In high latitudes the climatic and general physiographic conditions are comparatively uniform, and boreal localities are not subject to the great and sometimes sudden changes with longitude that are so frequent in temperate and tropical regions. Hence it follows that the splitting up of specific types into subspecific forms from environmental agencies is much less common within the Arctic circle than farther south. Stated differently, boreal species are far more stable and persistent than those inhabiting warmer countries. In view of this fact, it is not surprising that the circumpolar *E. rutilus* presents but one phase throughout its entire range (specimens from Scandinavia, Siberia, and Arctic America being practically indistinguishable), while its more southern representatives have become variously modified."\*

*Generic characters.*—The more important generic characters of *Evotomys* are cranial and dental, but color alone is sufficient for the recognition of the North American species, and also of the three European species—*rufocanus*, *glareolus*, and *rutilus*—that have come into my hands. Except the gray phase in two dichromatic species, all are characterized by a rufescent or reddish brown dorsal stripe which extends the whole length of the back.

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\* MS notes on the genus *Evotomys*, written in 1888, and placed at my disposal by Dr. C. Hart Merriam.



The eyes are small, and the ears, except in a single species, *E. ungava*, are long enough to project above the fur. The feet are small. The tail is rather short, varying from 23 to 33 percent of the total length. The fur in winter is long and soft; in summer in most species it is short and harsh. Lateral glands, similar to those of the subgenus *Arvicola*, are usually present in adult males. They are situated on the flanks, one on each side, and average about 10 mm. in diameter. The hair covering these glands is doubly dense and usually differs in color and texture from that of surrounding parts, forming more or less conspicuous spots. The number of young produced at a birth varies from 4 to 6, but 4 is the more common number. There are 8 mammæ, arranged as follows: inguinal,  $\frac{2}{2}$ ; pectoral,  $\frac{2}{2}$ .

The cranial characters of *Evotomys* are thus summed up by Mr. Gerrit S. Miller, Jr., in his recent paper on the genera of *Microtinæ*:\* "The skull of *Evotomys*, . . . as compared with that of the other voles, is characterized by a general weakness and lack of angularity. All the outlines are full and rounded, and the ridges and furrows are slightly developed, even in extreme old age. The interorbital region is broader and the audital bullæ are larger and more inflated than usual in *Microtus* and *Phenacomys*. On the other hand, the zygomata are very slender and scarcely widened in the region of contact between the jugal and the zygomatic process of the maxillary. The mandible also is slender and weak. The bony palate terminates in a thin edged shelf continuous between the alveoli of the posterior incisors. . . . The structure is very different from that found in *Phenacomys* and in typical *Microtus*."

The teeth, while truly microtine in the arrangement of the prisms, differ from those of *Microtus* and resemble those of *Phenacomys* in having the molars always two-rooted in adults and the root of the lower incisor falling short of the dental foramen; they differ from those of *Phenacomys* in the approximately equal depth of outer and inner reëntrant angles in the lower molars.

*Habits*.—Little is known of the habits of the Arctic *E. rutilus*, but most, and probably all, of the species inhabiting the United States have very similar habits. They live in cool, moist woods and brush lands, and seem to delight in the deepest shade and the cover of fallen leaves, tangled weeds, and half-decayed logs. Their nests are built in underground burrows, under logs, or

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\* North American Fauna, No. 12, p. 43, July, 1896.



under cover of old leaves. A trap set under the edge of a half-rotten log in the woods is pretty sure to get a Red-back if a shrew does not happen along first. Though mainly nocturnal, they are sometimes seen in the daytime. A rustling in the dry leaves and a quick brown flash are the usual evidences of their presence, unless one has the patience to sit for hours in the woods watching for them. I have surprised them by suddenly turning over a log and tipping them rudely out of their nests; have caught them in my hands as they scampered from their feeding grounds to their burrows, and have watched them gliding about among their favorite food plants. Early one morning, when camped in the Big Snowy Mountains in Montana, I was watching the Pine Squirrels climb to the tallest spruce tops to warm themselves in the first rays of sunlight, when the leaves moved and out came an *Evotomys* only a few feet away. After eyeing me intently for a moment he began to move about as freely as if I had been a stump. His ears were erect and constantly changing position, his eyes were bright and prominent, and his nose and whiskers were in constant motion. His color harmonized beautifully with the reddish-brown leaves and the yellow and gray stems of dry grass as he scampered from one plant to another, reaching up to bite off the stems, and then hunching himself up in a fluffy, round ball to eat from his hands, while keeping one eye on me.

In winter these mice do not hibernate, nor have I ever found evidence of their storing provisions. They make long tunnels under the snow, through which they travel about with perfect security from a host of enemies, while they procure the tender grass blades and ripe seeds as easily from the surface of the ground as when the white blanket is not above them. All sorts of seeds and green vegetation are eaten, but grass is the favorite food, especially the half-blanching, tender base of the young grass blades.

Nineteen species and subspecies are here recognized as inhabiting Canada and the United States. Of these, five are described as new—one by Mr. Bangs and four by the writer.

LIST OF AMERICAN SPECIES AND SUBSPECIES OF EVOTOMYS, WITH TYPE LOCALITIES.

<i>rutilus</i> .....	Siberia, east of the Obi.
<i>wrangeli</i> .....	Wrangel Island, Alaska.
<i>dawsoni</i> .....	Finlayson River, Northwest Territory, Canada.



<i>gapperi</i> .....	Near Lake Simcoe, Ontario, Canada.
“ <i>ochraceus</i> .....	Mount Washington, New Hampshire.
“ <i>rhoadsi</i> .....	Mays Landing, New Jersey.
“ <i>loringi</i> .....	Portland, North Dakota.
“ <i>galei</i> .....	Ward, Colorado.
“ <i>saturatus</i> .....	Nelson, British Columbia.
<i>brevicaudus</i> .....	Custer, Black Hills, South Dakota.
<i>carolinensis</i> .....	Roan Mountain, North Carolina.
<i>ungava</i> .....	Fort Chimo, Ungava.
<i>idahoensis</i> .....	Sawtooth Lake, Idaho.
<i>mazama</i> .....	Crater Lake, Oregon.
<i>obscurus</i> .....	Prospect, Oregon.
<i>californicus</i> .....	Eureka, California.
<i>occidentalis</i> .....	Aberdeen, Washington.
<i>nivarius</i> .....	Mount Ellinor, Olympic Mountains, Washington.
<i>proteus</i> .....	Hamilton Inlet, Labrador.

KEY TO SPECIES AND SUBSPECIES OF EVOTOMYS.

Ears distinctly rufous-tipped, not gray or dusky.

Tail more than twice the length of hind foot.

Dorsal stripe not sharply defined.

Ears small, scarcely protruding from fur, dorsal area ill defined, dull chestnut.....*ungava*.

Ears large, prominent above fur, dorsal area dark chestnut, blending with color of sides (winter pelage).....*carolinensis*.

Dorsal stripe sharply defined.

Tail scarcely more than twice the length of hind foot, about 27 per cent. of total length.

Dorsal stripe bright chestnut, with scattered black hairs, color sometimes dichromatic...*gapperi*.

Dorsal stripe dull rusty rufous without black hairs, color not dichromatic.....*ochraceus*.

Tail considerably more than twice the length of hind foot, about 30 per cent. of total length.

Large, hind foot 20 or more; colors dichromatic, a red and a gray pelage.....*proteus*.

Smaller, hind foot less than 20; not dichromatic.

Skull with pronounced superciliary ridges in adults, size medium.....*galei*.

Skull without pronounced superciliary ridges in adults, slightly larger.....*saturatus*.

Tail less than twice the length of hind foot.

Dorsal stripe sharply defined, tail bicolor.

Size large, foot 20 mm., dorsal stripe ferruginous.



- Tail about 30 mm. long, thick, and densely  
bristly . . . . . *rutilus*.
- Tail about 33 mm. long, not very thick or  
densely bristly . . . . . *dawsoni*.
- Size small, hind foot 18–19 mm., dorsal stripe not  
ferruginous.
- Smallest of the genus, foot 18, dorsal stripe  
dark, rich chestnut in summer . . . . . *loringi*.
- Slightly larger, foot 19, tail relatively shorter,  
dorsal stripe pale chestnut in summer . . . *brevicaudus*.
- Dorsal stripe not sharply defined, blending with color  
of sides.
- Tail indistinctly bicolor, dorsal stripe dull  
brownish . . . . . *wranglei*.
- Tail distinctly bicolor, dorsal stripe plain  
chestnut . . . . . *rhoadsi*.
- Ears gray or dusky, not distinctly rufous-tipped.*
- Posterior edge of palate straight, colors bright, tail bicolor.
- Dorsal stripe not sharply defined (dark chestnut in  
summer pelage) . . . . . *carolinensis*.
- Dorsal stripe sharply defined (hazel or chestnut).
- Sides clear, bright gray, skull long and narrow,  
hind foot 20 . . . . . *idahoensis*.
- Sides dark buffy gray, skull wide and angular,  
hind foot 18 . . . . . *nivarius*.
- Posterior edge of palate with a median projection, colors  
dark in all but *mazama*.
- Colors dusky or blackish above.
- Tail unicolor or nearly so, dusky or blackish, hind  
foot 18 . . . . . *occidentalis*.
- Tail bicolor, blackish above, whitish below, hind  
foot about 21.
- Tail long, colors dark, skull thick and wide  
interorbitally . . . . . *californicus*.
- Tail shorter, colors not so blackish, skull  
slender and narrower interorbitally . . . . . *obscurus*.
- Colors not dusky or blackish.
- Dorsal area dull hazel, sides grayish, skull broad,  
angular, and flat-topped . . . . . *mazama*.

***Evotomys rutilus* (Pallas).**

*Mus rutilus* Pallas, Nov. Sp. Quad. Glirium, 246, pl. xiv B, 1778.

*Geographic distribution.*—Arctic regions of America, Europe, and Siberia.

*Type locality.*—Siberia, east of the Obi.

*General characters.*—Rather large and bright colored; always recognizable by the short, thick, bristly tail and stout hind feet; fur long and soft; feet and ears densely haired.



*Color.*—*Winter pelage*: dorsal stripe well defined, extending from in front of ears to rump, rich rufous or ferruginous, slightly darkened with black tipped hairs; face, sides, and rump bright buffy ochraceous; belly heavily washed with buff or rich cream; feet white; ears rufous like back; tail sharply bicolor, buff or ochraceous buff below, above brownish at base, blackish along terminal portion. *Summer pelage*: dorsal stripe darker; sides less strongly buffy; belly soiled whitish; feet gray; tail less sharply bicolor.

*Cranial characters.*—Skull thick and strong, not much ridged or angulated; upper outline slightly arched, not concave interorbitally; brain case squarish; ascending arm of premaxilla terminating on a line with truncate end of nasals; audital bullæ moderately large and inflated, hiding ends of pterygoids in side profile; posterior edge of palate slightly notched; lateral bridges wanting, so that instead of a shelf the bone stands out as a tongue; \* molars not peculiar; incisors stout, with orange colored enamel surface.

*Measurements.*—In the original description Pallas gives the following measurements: "Nose to anus, 3'' 7½''' [= 98 mm.]; tail vertebræ, 1'' 1''' [= 29 mm.]; pencil, 3''' [= 7 mm.]; hind foot, 8½''' [18 mm.]." Two specimens from Finmark and Sweden measure in the dry skin: tail, with vertebræ left in, 24; hind foot, 20. An alcoholic specimen from St. Michaels, Alaska: total length, 130; tail vertebræ, 30; hind foot, 20. *Skull* of adult (No. 6555, Merriam collection) from Finmark: basal length, 23.5; nasals, 7.8; zygomatic breadth, 14.3; mastoid breadth, 12; alveolar length of upper molar series, 5.

*General remarks.*—The above description is based on four specimens in the Merriam collection from Lapland and Finmark, which are assumed to be typical *rutilus*. The American form is similar in most details, but, as all of the available skins are in wretched condition and without reliable measurements, a satisfactory comparison is impossible.

The side glands do not show in any of the four European specimens, though one is marked ♂ and two are unmarked for sex. A faint trace of them may be seen in two of the specimens from St. Michaels, Alaska.

In the original description Pallas states that *Evotomys rutilus* inhabits the woods locally, but is also found in the cold Arctic regions as far north as the Gulf of Obi. In Arctic America it has been taken at various places on the Barren Grounds to as far north as Fort Anderson, as well as at the edge of timber. As yet too little is known of its range to safely attribute it to the Barren Grounds, where it probably belongs.

*Specimens examined.*—Total number, 27; 23 in U. S. Nat. Mus.; 4 from Europe, in Merriam collection.

*Alaska*: St. Michaels, 17; Kagikowik, 2; Fort Yukon, 2.

*Northwest Territory*: Fort Anderson, 1; Fort Simpson, 1.

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\* In Alaska specimens the lateral bridges are usually complete. This and other slight differences may separate the American from the Old World form of *rutilus* when series of good specimens of the two can be brought together.



**Evotomys wrangeli** sp. nov.

*Type* from Wrangel, Wrangel Island, Alaska. No. 74724, ♀ ad., U. S. Nat. Mus., Biological Survey Coll. Collected Sept. 1, 1895, by C. P. Streater. Collector's number, 4835.

*Geographic distribution.*—Known only from Wrangel and Revillagigedo Islands, southern Alaska.

*General characters.*—A large, dull-colored species entirely distinct from any known form. Tail short, rarely twice as long as hind foot; fur thick and long in both young and adults collected early in September; ears well clothed with short hairs, distinctly rufous tipped. Side glands well developed in one specimen of the series.

*Color.*—Dorsal area dull dark chestnut with a liver brown tone, covering whole back from eyes to base of tail, including ears, and shading gradually into the sepia gray of sides and cheeks; sides more or less suffused with buffy yellowish; belly dark plumbeous, washed with whitish or buffy-ochraceous; projecting part of ear and tuft of long hairs in front of ear color of back; no postauricular spot; feet dusky gray in adults, sooty in young; tail bicolor, soiled buffy below, blackish above, darker and less distinctly bicolor in immature specimens. In one adult ♂, No. 74728, the white hairs covering the side glands form oval patches half an inch in length.

*Cranial characters.*—Skull long and narrow, not thick or angular; rostrum long and decurved; zygomata smoothly arched; nasals usually notched, rarely truncate posteriorly, terminating on a line with premaxillæ; frontals slightly concave posteriorly; audital bullæ of medium size; palatine bones short, anterior end rounded, posterior edge straight; lateral bridges complete before maturity; incisors large, molar series long.

*Measurements.*—Average of 4 adults (2 ♂ and 2 ♀) from Wrangel: total length, 147; tail vertebræ, 37; hind foot, 20. *Skull* of type: basal length, 24.3; nasals, 8; zygomatic breadth, 13.5; mastoid breadth, 11; alveolar length of upper molar series, 5.5.

*Remarks.*—The above description is based on 18 specimens from Wrangel, taken from September 1 to 12. The series includes specimens of every size, from quarter-grown young to old adults, and shows very uniform coloration, except the usual brightening with age and variation in color of belly. Four specimens in worn summer pelage have the dorsal area brighter chestnut and the sides decidedly more yellowish than in the rest of the series. All of the specimens from Loring have the bellies strongly washed with buffy-ochraceous, while more than half of those from Wrangel have whitish bellies.

In no way does *E. wrangeli* show a close relationship to any other American species. In size and relative proportions it comes closest to *E. dawsoni*, from which it differs widely in coloration and more widely in cranial characters. With the long-tailed species south and east of its range there is no need of comparison.

*Specimens examined.*—Total number, 35, from two islands on the coast of Alaska: Wrangel, 18; Loring, 17.



***Evotomys dawsoni* Merriam.**

*Evotomys dawsoni* Merriam, American Naturalist, XXII, 649, July, 1888.

*Type locality*.—Finlayson River (a northern source of Liard River, NWT., lat. 61° 30' N., long. 129° 30' W., altitude 3000 feet [915 meters]).

*Geographic distribution*.—From Finlayson River and Fort Liard west to Yakutat and Juneau, and north along the coast to Prince William Sound.

*General characters*.—Robust, with large body and short tail; tail rarely twice as long as hind foot, well haired, but not bristly as in *rutilus*; ears prominent and well haired; colors bright.

*Color*.—Dorsal stripe sharply defined, reaching from just back of eyes to base of tail, bright ferruginous with few dark hairs; sides, face, and rump buffy-ochraceous; belly thinly washed with pale buff; tail distinctly bicolor, clear buffy-ochraceous below, a mixture of rufous and blackish hairs above; feet thinly clothed with buffy and dusky hairs; ears covered on inner surface of projecting tips with short, rufous hairs; an indistinct yellowish postauricular spot; eyes encircled by faint yellowish rings; tufts of rufous hairs fall back from in front and fill openings of ears; a small white throat patch marks 10 out of 29 specimens; spot covering side glands inconspicuous.

*Cranial characters*.—Skull large and thick-walled, relatively short, wide, and angular, with the smallest and flattest audital bullæ of any American species; nasals terminating on a line with ascending arm of premaxillæ, pointed in immature, rounded in adult skulls, never truncate; pterygoids strong and prominent, the ends showing in lateral profile above the small, flattened bullæ; basioccipital unusually wide between bullæ; palatines short, rectangular, with lateral bridges incomplete except in skulls of old individuals; posterior margin of palate with a central notch, deepest in immature specimens; incisors large, with dark orange enamel; molar series long and narrow.

*Measurements*.—Average of 8 adults from Yakutat (4 ♂ and 4 ♀): total length, 144; tail vertebræ, 33; hind foot, 20. *Skull*, No. 73566, adult ♂, basal length, 22.5; nasals, 7.5; zygomatic breadth, 14; mastoid breadth, 12.2; alveolar length of upper molar series, 5.

*Remarks*.—The type was collected June 23, 1887, by Dr. George M. Dawson, Director of the Geological and Natural History Survey of Canada. Through the kindness of Dr. Dawson it is now before me for comparison with a large series of skins and skulls from Yakutat and Juneau, Alaska. It is gratifying to find that the type agrees in every particular with this series of specimens, and that the name *Evotomys dawsoni* stands for this large and handsome species. The type was not fully adult, and unfortunately was mounted from a half relaxed skin, so that the size is greatly reduced. The tail vertebræ were not removed, and the tail has dried short, but the hind foot and ear give reliable measurements for comparison. The skull is badly broken, but the teeth give good characters for comparison. The openly communicating loops and the length of the molar series as a whole may be perfectly matched in slightly immature skulls from Yakutat.



The combination of large size and short tail, notched palate and small audital bullæ, while distinctly separating the species from all others south of its range in America, brings it in closer relationship with *E. rutilus*. From *rutilus*, however, it differs in longer, slenderer, less hairy tail, slenderer feet, duller color, with less rufous on ears, and the following important cranial characters: skull less massive; rostrum longer and slenderer; audital bullæ smaller; pterygoids more prominent; nasals sharp tipped or rounded posteriorly instead of truncate; molar series much narrower and slenderer. In external characters it slightly resembles *E. rufocanus*\* of northern Europe, but differs widely from that species in cranial characters.

*Specimens examined*.—Total number 38, from 5 localities.

*Northwest Territory*: Finlayson River, 1, the type.

*British Columbia*: Fort Liard, 2.

*Alaska*: Yakutat, 29; Juneau, 3; Prince William Sound, 3.

### ***Evotomys gapperi* (Vigors).**

*Arvicola gapperi* Vigors, Zoöl. Jour., vol. V, p. 204, pl. ix, 1830.

*Evotomys fuscodorsalis* Allen, Bull. Am. Mus. Nat. Hist., vol. VI, p. 103, 1894.

*Type locality*.—Vicinity of Lake Simcoe, Ontario, Canada.

*Geographic distribution*.—From Massachusetts, New Jersey, and Pennsylvania northward and from the Atlantic coast westward to the Rocky Mountains in Canada.

*General characters*.—Small, slender, and bright colored, with slender feet and a medium length tail. Of the American species it most nearly resembles *E. glareolus* of Europe.†

*Color*.—*Winter pelage*: dorsal stripe from just back of eyes to base of tail, bright chestnut, with numerous black hairs and a slight frosted tinge from subterminal white portion of part of the rufous-tipped hairs; sides bright buffy-ochraceous; belly washed with pale buff; feet silvery gray; tail bicolor, grayish buff to the tip below, brownish above, with upper part of pencil black. In high pelage a rufous stripe extends through eye

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\**Evotomys rufocanus* (Sundevall) of northern Europe is remarkable for its large molars and almost microtine form of skull. It is the most divergent form of the genus known, with dorsal stripe yellowish rufous; sides, face, and rump clear gray; tail short; hind feet large.

*Measurement* of a dry skin from Lapland (No.  $\frac{3764}{6556}$ , ♂, Merriam collection): total length, 138; tail vertebrae, 33; hind foot, 20. *Skull*: basal length, 25; nasals, 7.6; zygomatic breadth, 15; mastoid breadth, 12.2; alveolar length of upper molar series, 6.7.

†*Evotomys gapperi* differs from *E. glareolus* of Oxfordshire, England, in better defined dorsal stripe and less extensive rufous on ears and face, slightly lighter coloration, and relatively shorter tail. I fail to discover tangible cranial differences.



to black spot at base of mustache. *Summer pelage*: darker all over, with more dusky on feet and tail. *Young*: when half grown, similar to adults, but with thinner surface colors, through which the slaty under fur shows.

*Cranial characters*.—Skull small and slender, not ridged or angular, except in very old individuals; audital bullæ small, full, and rounded, less angular, elongated, and appressed than in *carolinensis*; palate straight edged, or rarely with a slight central projection; molar row slender.

*Measurements*.—Average of 4 adults assumed to be typical from Locust Grove, N. Y., measured by Dr. C. Hart Merriam: total length, 141; tail vertebrae, 37; hind foot, 18.1. Average of 10 adults from Elizabethtown, N. Y., measured by Gerrit S. Miller, Jr.: total length, 141; tail vertebrae, 39; hind foot, 18.3. Average of 10 adults from Peterboro, N. Y.: 145; 40; 18.3. *Skull* from Emsdale, Ontario, Canada, old ♂, No. 75896: basallength, 21.6; nasals, 6.5; zygomatic breadth, 13.3; mastoid breadth, 11.2; length of upper molar series, 5.

*Remarks*.—*Evotomys gapperi*, with the possible exception of *E. rutilus*, occupies the largest area of any species in America, and, as might be expected, presents considerable variation in the extremes of its range. Some of the peripheral forms have become sufficiently marked to be worthy of recognition by name, while others are barely distinguishable from the central form. A decrease in size takes place in the prairie country of Minnesota and the Dakotas; an increase beyond the normal in the northern Rocky Mountains. North and east of the type locality another increase is noticeable, especially in the feet. Specimens from Godbout, Quebec, are larger even than *ochraceous*, though in color they appear to be darker instead of lighter than *gapperi*; but they have been preserved in wood alcohol, which has doubtless changed the color.

Another peculiarity of the northeastern animal as it enters the Hudsonian zone is a tendency to dichromatism. Dr. Allen first made known the abnormal phase from Trousers Lake, New Brunswick, but supposing it characterized a new species gave it the name *fuscodorsalis*.\* Normal, and what were considered typical, *gapperi* were secured at the same place and at the same time as the others. During the past summer Mr. Gerrit S. Miller, Jr., collected series of specimens in both the gray and the red pelages at Nepigon and Peninsula on the extreme north shore of Lake Superior, which he has kindly placed at my disposal. In a critical comparison of measurements, skulls, and external characters of the two forms I find no difference other than color, and am compelled to agree with the previous conclusions of Mr. Miller† that the gray animal represents only a color phase.

The gray form is characterized by the entire absence of a rufous dorsal stripe, in place of which there is usually a sooty or black stripe; by clear gray sides and light gray wash of belly, and in very dark specimens by clear black upper surface of tail.

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\* Bull. Am. Mus. Nat. Hist., vol. VI, 103, 1894.

† Notes on the Mammals of Ontario, by Gerrit S. Miller, Jr. Proc. Bost. Soc. Nat. Hist., vol. 28, p. 16, April, 1897.



*Specimens examined:*

*Massachusetts*: Wilmington, 5.

*Pennsylvania*: Renovo, 5.

*New Hampshire*: Ossipee, 17.

*New York*: Lake George, 13; Locust Grove, 5.

*Minnesota*: Two Harbors, 18; Tower, 5.

*Ontario*: Emsdale, 1; Peninsula, 5; Nepigon, 4.

*Quebec*: Godbout, 10.

*Manitoba*: Rat Portage, 1.

*Assiniboia*: Indian Head, 5.

*Saskatchewan*: Wingard, 7; Carlton, 1.

*Alberta*: South Edmonton, 25; St. Albert, 2; Muskeg Creek (lat. 54°, long. 119°), 11; fifteen miles west of Henry House, 1, im.; fifteen miles south of Henry House, 1; Canmore, 1; Banff, 4.

*British Columbia*: Field, 1, im.

***Evotomys gapperi ochraceus* Miller.**

*Evotomys gapperi ochraceus* Miller, Proc. Bost. Soc. Nat. Hist., vol. XXVI, p. 193, March 24, 1894.

*Type locality*.—Mount Washington, New Hampshire (Alpine Garden, at 5400 feet altitude).

*Geographic distribution*.—The White Mountains of New Hampshire and (probably eastward to) Nova Scotia.

*General characters*.—Similar to *E. gapperi*, but slightly larger and much duller and paler; fur long and lax; skull as in *gapperi*.

*Color*.—Type specimen: dorsal area faintly outlined, pale dull rusty rufous, with no black hairs; sides buffy clay color; belly plumbeous, lightly washed with dirty whitish; feet gray; tail bicolor, buffy below, brownish above; upper part of pencil blackish; ears well haired, upper edges pale fulvous.

*Cranial characters*.—Skull of type not appreciably different from that of typical *gapperi*.

*Measurements*.—Type, measured in flesh by Gerrit S. Miller, Jr.: total length, 148; tail vertebræ, 39.6; hind foot, 19. *Skull* of type: basal length, 22; nasals, 6.7; zygomatic breadth, 13; mastoid breadth, 11.3; upper molar series, 5.

*General remarks*.—This subspecies differs from typical *gapperi* in paler, duller coloration—the opposite extreme from the dark, rich *carolinensis* which inhabits the tops of the mountains of North Carolina. Specimens from Ossipee, N. H., are evidently intermediate between *gapperi* and *ochraceus*. In size they even exceed *ochraceus*, and in color they are slightly paler than true *gapperi*. Specimens from Digby and James River, Nova Scotia, kindly placed at my disposal by Mr. Outram Bangs, are plainly referable to *ochraceus*, though with a slightly darker, brighter dorsal stripe than the type.



***Evotomys gapperi rhoadsi* Stone.**

*Evotomys gapperii rhoadsii* Stone, Am. Nat., vol. XXVII, p. 54, Jan., 1893.

*Type locality*.—Mays Landing, New Jersey.

*General characters*.—Similar to typical *gapperi* but with slightly darker dorsal stripe, less buffy sides, slightly shorter tail, and larger hind foot. The body measurements, as well as the skulls, show the animal to be identical in size with *gapperi*, the difference in dimensions appearing only in length of tail and foot.

*Color*.—Dorsal area, extending from between eyes to base of tail, plain chestnut; sides buffy gray; belly washed with buff or whitish; tail, feet, and ears as in *gapperi*.

*Measurements*.—Average of 3 young adults from type locality, measured in the flesh by J. Alden Loring: total length, 139.3; tail vertebræ, 36; hind foot, 20. *Skull* (adult ♂, No. 76679): basal length, 21.5; nasals, 7; zygomatic breadth, 13.5; mastoid breadth, 11.3; alveolar length of upper molar series, 5.2.

*General remarks*.—Three adult topotypes collected by J. Alden Loring at Mays Landing, New Jersey, February 29 and March 1, agree in part with the original description of the subspecies. The slight shortness of the tail compared with that of typical *gapperi* is entirely within the range of individual variation and discrepancies in methods of taking measurements. If a more extensive series of specimens should prove the color and foot characters inconstant, the subspecies will have to be given up. With the material in hand I prefer to retain it, though other more marked forms remain unnamed. The nearest localities to Mays Landing, N. J., from which I have examined specimens of *Evotomys* are Wilmington, Mass., and near Renovo, Penn. These specimens are fairly typical *gapperi* with no tendency toward *rhoadsi*, and Mr. Rhoads has recorded *gapperi* from northern New Jersey and from Monroe and Pike counties, in northeastern Pennsylvania.

***Evotomys gapperi loringi*,\* subsp. nov.**

*Type* from Portland, North Dakota, No. 75795, ♂ ad., U. S. Nat. Mus., Biological Survey Coll. Collected Nov. 22, 1895, by J. Alden Loring. Collector's number, 3438.

*Geographic distribution*.—Timbered valleys along edge of plains in Minnesota and eastern North and South Dakota.

*General characters*.—Smallest *Evotomys* known in America, with bright coloration and narrow, slender skull.

*Color*.—*Full winter pelage*: dorsal stripe sharply defined, extending from anterior base of ears back between ears to rump, pale reddish hazel, scarcely darkened with black hairs and frosted from the presence of a white subterminal zone. In some specimens with the maximum of white the back is fairly hoary, in others the chestnut predominates and conceals the white zone. Face, sides, and rump, bright grayish ash, more

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\* Named for the collector of the type series, Mr. J. Alden Loring.



or less washed with buffy; belly pure white or rarely creamy white; ears pale chestnut; feet pure white; tail sharply bicolor, whitish below, blackish brown above; pencil black above, a few white hairs below. Adult males with large whitish or light grayish spots over the side glands. *Summer pelage*: dorsal stripe dark, rich chestnut; sides and face pale bister, more or less suffused with yellowish; belly thinly washed with white or whitish; feet dusky; tail darker and less sharply bicolor; ears brownish; side spots in old males sooty gray. Young slightly darker than adults.

*Cranial characters*.—Skull, compared with that of *gapperi*, smaller and relatively narrower and slenderer; even in old age not ridged or angular; audital bullæ less rounded and inflated than in *gapperi*; posterior edge of palate straight or slightly projecting on median line.

*Measurements*.—Average of 18 adults from type locality, measured in the flesh by J. Alden Loring: total length, 123; tail vertebræ, 31.5; hind foot, 17.9; tail, 25.5 per cent. of total length. *Skull* of type: basal length, 21.5; nasals, 6.8; zygomatic breadth, 12.8; mastoid breadth, 10.9; length of upper molar series, 5.

*General remarks*.—There is no climatic or topographic barrier to prevent *Evotomys* from ranging continuously from the type locality of *gapperi* to all of the points from which *loringi* is known. Good series of specimens from a chain of intermediate localities show direct connection, and prove that the form to which the name *loringi* is applied has developed as it reached out on the dryer, more open region along the edge of the prairies. The extremes of the form come from the farthest outlying localities. Specimens from the north shore of Lake Superior and thence westerly as far as Tower, Minnesota, are fairly typical *gapperi*. Those from Hinckley and Bridgman, near the middle of the State, are nearer *loringi*, while Minneapolis and Elk River specimens are almost typical. Specimens from Browns Valley, Minnesota, Fort Sisseton, South Dakota, and Portland, North Dakota, are typical. Two from Pembina, North Dakota, are doubtful, and one from Carberry, Manitoba, is clearly intermediate.

*Specimens examined*.—Total number, 56, from 10 localities (24 in the Merriam collection, 32 in the Biological Survey collection):

*North Dakota*: Portland, 18; Pembina, 2.

*South Dakota*: Fort Sisseton, 2; Travere, 2.

*Minnesota*: Browns Valley, 5; Elk River, 5; Minneapolis, 7; Hinckley, 10; Bridgman, 4.

*Manitoba*: Carberry, 1.

### ***Evotomys gapperi galei* Merriam.**

*Evotomys galei* Merriam, North American Fauna, No. 4, p. 23, pl. ii, figure 3, October 8, 1890.

*Type locality*.—Ward,\* Boulder County, Colorado. Altitude 9500 feet (2900 meters).

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\* The type locality was given in the original description as Gold Hill, It has since been learned that the type specimen came from Ward, about 6 miles above Gold Hill.



*Geographic distribution*.—Boreal zone of mountains of Colorado and northward along eastern ranges of Rocky Mountains to northern Montana.

*General characters*.—Similar to *E. gapperi*, with slightly longer tail and lighter coloration, skull developing prominent superciliary ridges with age.

*Color*.—*Winter pelage*: dorsal stripe sharply defined, reddish chestnut, with a few black hairs; sides and face buffy gray; belly and feet whitish or yellowish gray; tail bicolor, whitish below, blackish or buffy gray above, except the black upper part of pencil; ears faintly tinged with color of back. In spring and early summer pelage the dorsal stripe darkens to warm hazel and the sides to rich buffy gray. *Full summer pelage*: dorsal stripe chestnut, slightly darkened with black hairs; sides and face clearer gray than in winter; feet gray. *Young*, in August: darker than the adults, with ears strongly tipped with chestnut; feet dusky and tail not sharply bicolor; spots covering side glands in old males whitish or gray.

*Cranial characters*.—Skull of adult narrower than that of *gapperi*, sharply concave interorbitally, with prominent superciliary ridges; zygomatic arches not abruptly spreading; audital bullæ small and globose; palate straight-edged or rarely with a slight central projection.

*Measurements*.—Average of 6 adults from Longs Peak, measured in the flesh by Edward A. Preble: total length, 145; tail vertebræ, 43.6; hind foot, 18.2; tail, 30 per cent. of total length. One adult ♂ topotype, No. 74076: 146; 40; 18. *Skull* of adult topotype, No. 74076: basal length, 22.2; nasals, 6.5; zygomatic breadth, 13; mastoid breadth, 11; alveolar length of upper molar series, 5.

*General remarks*.—Apparently *galei* branches off from *gapperi* along the east base of the Canadian Rockies and extends southward in a frequently interrupted line, following the eastern ranges of the Rocky Mountains to Colorado. Specimens from St. Marys Lake, Summit, and Java, in northwestern Montana, except for slightly smaller size, are identical with *galei*. Specimens from Silverton and Crystal Lake, Colorado, are not typical, but the difference is not uniform and may be in part due to age and season. A badly mutilated skin in the National Museum from the Uinta Mountains, Wyoming, ought on geographic grounds to belong to this species. Four not fully adult specimens from the Bighorn Mountains, Wyoming, agree better with *galei* than with any other species. A good series from the Big Snowy Mountains, Montana, does not agree with *gapperi*, *galei*, or *saturatus*, but, as the degree of difference is too slight to warrant a new name, they are referred to *galei*.

*Specimens examined*.—Total number, 81, from 12 localities:

*Colorado*: Ward, 8; Gold Hill, 2; Longs Peak, 6; Silverton, 8; Crystal Lake, 1.

*Wyoming*: Bighorn Mountains, 4.

*Montana*: St. Marys Lake, 15; Java, 2; Summit, 4; Big Snowy Mountains, 25; Red Lodge, 2; Beartooth Mountains, 4.



**Evotomys gapperi saturatus** Rhoads.

*Evotomys gapperi saturatus* \* Rhoads, Proc. Acad. Nat. Sci., Phila., p. 284, October, 1894.

*Type locality.*—Nelson, B. C., on the Kootenay River, 30 miles north of the Washington line.

*Geographic distribution.*—The Blue Mountains of Oregon, mountains of northern Idaho, and northward into British Columbia to Cariboo Lake.

*General characters.*—Larger and longer tailed than *E. gapperi*, with larger ears and stouter hind feet; spot covering side glands conspicuous in all of the 11 adult males.

*Color.*—Dorsal stripe bright and rather light reddish chestnut, closely matching that of *E. gapperi* in specimens from Emsdale, Ontario, and western New York, except that it begins farther behind the eyes; sides, face, and lower rump dark gray, with less ochraceous wash than in *gapperi*; belly washed with almost pure white. Sixteen out of the twenty-four specimens from Nelson have a pure white throat patch extending from lower lip nearly to breast. Ears large, protruding well out of fur, slightly rufous-tipped; feet gray; tail indistinctly bicolor, light gray below, dark gray above.

*Cranial characters.*—Skull, compared with that of *gapperi*, larger, wider, and more angular; pterygoids longer and slenderer; audital bullæ slightly larger; premaxillæ projecting slightly back of truncate posterior end of the nasals; palatine bones U-shaped, with straight posterior margin; front of upper incisors pale lemon yellow.

*Measurements.*—Average of 15 adults measured in the flesh by collector: total length, 149; tail vertebræ, 45; hind foot, 18.2. *Skull* of an average sized adult, No. 66606: basal length, 22.3; nasals, 6.5; zygomatic breadth, 13.5; mastoid breadth, 11.2; aveolar length of upper molar series, 5.

*General remarks.*—Mr. S. N. Rhoads described this subspecies from a single specimen caught August 17, 1892, near the town of Nelson. The animal inhabits a large area of country, and, since the original description gives none of the important characters that distinguish it from neighboring species, the above description has been drawn up from a series of 24 good specimens collected by J. Alden Loring, August 20-28, at Silver King mine, six miles south of Nelson. I have not seen the type of *saturatus*, but assume the present series to be typical.

The species is distinguished from *E. mazama* by a darker dorsal area, shorter tail, more arched skull, straight posterior edge of palate, slenderer, less prominent pterygoids, smaller audital bullæ, and paler incisors. In external characters it resembles *E. idahoensis*, from which it differs in the broad, angular skull, narrower interpterygoid fossa, and in minor details. With the dark-colored *E. occidentalis* it needs no comparison.

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\* The name *saturatus*, in suggesting a dark-colored animal, is misleading. The species is scarcely darker than *gapperi* and much lighter colored than *obscurus*, *californicus*, *occidentalis*, *wrangeli*, *dawsoni*, or *carolinensis*.



*Specimens examined*.—Total number, 71, from 14 localities.

*British Columbia* : Nelson, 24 ; Sicamous, 1 ; Glacier, 1.

*Washington* : Colville, 1.

*Idaho* : Mission, 1 ; Kingston, 1 ; Mullan, 6 ; Craig Mountains, 4.

*Montana* : Thompson Pass, 5 ; Prospect Creek, 3.

*Oregon* : Blue Mountains (10 miles north of Harney), 8 ; Strawberry Butte, 3 ; Elgin, 8 ; Kamela, 5.

***Evotomys brevicaudus* Merriam.**

*Evotomys gapperi brevicaudus* Merriam, North American Fauna, No. 5, p. 119, pl. iii, figs. 7 and 8, July 30, 1891.

*Type locality*.—Custer, Black Hills, South Dakota. Exact locality, 3 miles north of the town ; altitude about 6000 feet [1830 meters].

*Geographic distribution*.—Boreal cap of Black Hills in South Dakota.

*General characters*.—As large as *E. gapperi*, with rather larger hind foot and much shorter tail ; coloration in summer pelage paler. Larger than *E. loringi*, with relatively shorter tail.

*Color*.—*Summer pelage* : Similar to *loringi*, but paler, with black hairs more conspicuous ; sides ash gray, strongly suffused with buffy ; belly creamy white ; side spots dusky gray. In the type and topotype the tail, feet, and ears are discolored by corrosive sublimate.

*Cranial characters*.—Skull similar to that of *gapperi* in large size and broad brain case ; zygomatic arches low and flaring out, so that the inner instead of the outer side shows in a top view ; audital bullæ as large as in *gapperi*, but less rounded ; pterygoids wide, flat, and close together ; molars large ; incisors slender and pale yellow, palate approximately straight-edged.

*Measurements*.—Type specimen measured in flesh by Vernon Bailey : total length, 125 ; tail vertebræ, 31 ; hind foot, 19. A topotype (No. 4506) measures 130 ; 32 ; 19. *Skull* of type : basal length, 21.2 ; nasals, 6.6 ; zygomatic breadth, 12.5 ; mastoid breadth, 11.3 ; alveolar length of upper molar series, 5.4. *Skull* of more fully adult topotype : basal length, 21.8 ; nasals, 7 ; zygomatic breadth, 12.8 ; mastoid width, 11 ; alveolar length of molar series, 5.3.

*General remarks*.—The two original specimens, collected July 18 and 21, 1888, show only the perfect summer pelage. The skulls show that the animals were not fully adult, though probably full grown. Though based on so scanty material, the characters distinguishing the species are fairly pronounced. Its range is isolated, and widely separated from that of any other members of the genus by open prairie country and a wide belt of the Transition zone. There seems to be no valid reason for considering it a subspecies. It is even difficult to decide to which form it is most nearly related.

*Specimens examined*.—Total number, 3, from two localities in the Black Hills.

*South Dakota* : Custer, 2 ; Deadwood, 1.



**Evotomys carolinensis** Merriam.

*Evotomys carolinensis* Merriam, Am. Jour. Sci., vol. XXXVI, p. 460, Dec., 1888.

*Type locality*.—Roan Mountain, North Carolina; altitude 6000 feet [1830 meters].

*Geographic distribution*.—Boreal parts of Alleghany Mountains of North Carolina, Tennessee, and West Virginia.

*General characters*.—Size large; hind foot, 20 mm. or more; tail long; color dark and rich; molars larger than in any other American species.\*

*Color*.—*Full summer pelage*: back dark chestnut, blending gradually with bistre of sides, face, and rump; darkened everywhere above with numerous black hairs; belly varying from white to buffy-ochraceous, the under fur showing through; fur covering side glands of male forming an inconspicuous spot slightly darker than surrounding fur; ears dusky; feet grayish brown; tail indistinctly bicolor, gray below, blackish above, and all round at tip. *Winter pelage* (February, March, and April specimens): paler and brighter; back brighter ferruginous, belly averaging whiter; sides buffy-ochraceous instead of bistre; ears slightly rufous tipped. *Young* darker than adults.

*Cranial characters*.—Skull, compared with that of *E. gapperi*, larger, wider, and more angular, with audital bullæ relatively smaller, flatter, and more elongated; basioccipital wider between bullæ; molars larger and especially wider and heavier; enamel surface of upper incisors darker yellow.

*Measurements*.—Average of 4 adults (2 ♂ and 2 ♀) from type locality, measured in flesh by Dr. C. Hart Merriam: total length, 149; tail vertebrae, 44; hind foot, 20.2. *Skull* (a fully adult ♀, No. 73115): basal length, 23.5; nasals, 7.5; zygomatic breadth, 14.4; mastoid breadth, 12; alveolar length of upper molar series, 6.

*General remarks*.—*Evotomys carolinensis* is readily distinguished from all other eastern forms by its larger size and darker coloration. Specimens in the same pelage should be used for comparison, as the lightest phase of winter pelage in *carolinensis* matches the darkest summer phase of *gapperi*.

*Specimens examined*.—Total number, 87, from 3 localities.

*North Carolina*: Roan Mountain, 47; Highlands, 2.

*West Virginia*: Travellers Repose, Pocahontas County, 38.

**Evotomys ungava** sp. nov.

*Type* from Fort Chimo, Ungava. No.  $\frac{5471}{8158}$ , ♂ ad., Merriam Coll. Collected by L. M. Turner, May 12, 1883. Original number, 317.

*General characters*.—Size about as in *gapperi*; tail and feet slender; ears very small, not projecting beyond fur; colors dull; tail bicolor; skull slender; rostrum not decurved.

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\* Only exceeded in size by the molars of *E. rufocanus* of Europe.



*Color* [type specimen skinned out of alcohol].—Dorsal area not sharply defined, dull brownish chestnut; sides and face buffy gray, finely lined with blackish hairs; belly dark plumbeous, heavily washed with buffy; ears tipped with color of back; feet dusky gray; tail indistinctly bicolor, soiled buffy below, brownish above; sides of nose whitish; a small white spot under lower lip.

*Cranial characters*.—Skull, compared with that of *gapperi*, long and slender; brain case narrower; zygomata less spreading; rostrum longer and straighter; audital bullæ longer, flatter, and less rounded; both upper and lower incisors slenderer; lateral bridges of palate incomplete; molars as in *gapperi*, except the first upper, in which the edges of the first and second inner salient loops meet and coalesce, inclosing a dentine core.

*Measurements*.—Type specimen, measured from alcohol by Dr. C. Hart Merriam: total length, 134; tail vertebræ, 39; hind foot, 19. *Skull*: basal length, 22.8; nasals, 7; zygomatic breadth, 13.5; mastoid breadth, 11; alveolar length of upper molar series, 5.

*General remarks*.—The type and only specimen was skinned and made up from alcohol, and doubtless the colors have changed somewhat; but the small ears, slender feet and tail, and distinctive cranial characters mark the species as entirely distinct from any other known form. In geographic position it comes nearest to *E. proteus* Bangs, of Hamilton Inlet, Labrador, but in characters differs more widely from that species than from the more distant *gapperi*.

In a letter to Dr. Merriam, Mr. Turner reported the species as abundant at Fort Chimo.

### ***Evotomys idahoensis* Merriam.**

*Evotomys idahoensis* Merriam, North American Fauna No. 5, p. 66, July 30, 1891.

*Type locality*.—Sawtooth or Alturus Lake, east foot of Sawtooth Mountains, Idaho.

*Geographic range*.—Mountains of south central Idaho, between Snake River and the Salmon.

*General characters*.—Size medium, larger than *gapperi*; conspicuously different in color from any known species, the sides being clear gray; tail longer than in *gapperi* or *galei*; ears not tipped with rufous; skull narrow and smoothly rounded.

*Color*.—Dorsal stripe well defined, extending from in front of ears to rump, pale hazel, somewhat darkened with black-tipped hairs; face, sides, and rump clear ash gray; belly washed with white or whitish; ears sooty gray without rufous tips; feet gray; tail bicolor, gray below, blackish above. Side glands scarcely visible in the specimens at hand.

*Cranial characters*.—Skull long, narrow, and smooth, convex inter-orbitally; zygomatic arches very oblique; rostrum long; posterior margin of palate straight; pterygoids long and slender, longer, straighter, and



farther apart than in *E. saturatus*; audital bullæ long and laterally appressed; basioccipital wide between bullæ; incisors pale yellow.

*Measurements.*—Type, measured in flesh by Dr. C. Hart Merriam: total length, 153; tail vertebræ, 48; hind foot, 20. Average of 4 adults from type locality measured by A. H. Howell: 148; 44; 20.2. *Skull* of type: basal length, 23.5; nasals, 8; zygomatic breadth, 13.3; mastoid breadth, 11.6; alveolar length of upper molar series, 5.4.

*Remarks.*—Three specimens from the Salmon River Mts. differ slightly from the type, but the difference may be individual. Specimens of *E. saturatus* from the Craig Mts., Idaho, and of *E. galei* from the Bear-tooth Mts., Montana, though geographically near, show no close affinity with *E. idahoensis*.

*Specimens examined.*—Total number, 15, from the two following localities: Idaho: Sawtooth or Alturas Lake, 12; Salmon River Mts., 3.

### ***Evotomys mazama* Merriam.**

*Evotomys mazama* Merriam, Proc. Biol. Soc. Wash., vol. XI, p. 71, April 21, 1897.

*Type locality.*—Crater Lake, Mt. Mazama, Oregon; altitude, 7000 feet [2130 meters].

*Geographic distribution.*—Crest of the Cascade Mountains in Oregon.

*General characters.*—Large, long tailed, and bright colored; ears not rufous; skull broad and angular; side glands conspicuous in all of the adult males.

*Color.*—Dorsal stripe extending from in front of ears to base of tail, cinnamon rufous or hazel, shading gradually into buffy gray of sides and face; belly washed with buffy white; oval spot covering side glands slaty gray, more or less frosted with white-tipped hairs; feet grayish white; tail sharply bicolor, whitish below, blackish above.

*Cranial characters.*—Skull angular, with unusually flat top, long, straight rostrum, and abruptly spreading zygomata; audital bullæ large; pterygoids prominent, wide, and inflated at the tips; palatines rounded anteriorly, with a median posterior projection; enamel surface of incisors orange.

*Measurements.*—Average of 4 adult males from type locality measured by Dr. C. Hart Merriam: total length, 157; tail vertebræ, 52; hind foot, 18.7. *Skull* of type: basal length, 23.3; nasals, 7.2; zygomatic breadth, 14.2; mastoid breadth, 12.4; alveolar length of upper molar series, 5.

*Remarks.*—*Evotomys mazama* differs from *E. saturatus* in slightly larger size and longer tail; in yellower, less sharply outlined dorsal stripe; no tendency to white throat patch; in more angular skull with larger audital bullæ and pterygoids; in orange instead of pale yellowish enamel of upper incisors, and most conspicuously in form of palatine bones. From the dark colored coast species it differs conspicuously in color, but with *E. obscurus* it needs careful comparison.

*Specimens examined.*—Total number, 19, from 2 localities:

Oregon: Crater Lake, 16; Mount Hood, 3.



***Evotomys obscurus* Merriam.**

*Evotomys obscurus* Merriam, Proc. Biol. Soc. Wash., vol. XI, p. 72, April 21, 1897.

*Type locality*.—Prospect, Upper Rogue River Valley, Oregon.

*Geographic distribution*.—West slope of the southern Cascade Range and northern Sierra Nevada in southern Oregon and northern California.

*General characters*.—A rather large, grayish species, with small gray ears and indistinct markings; side glands inconspicuous, but easily discovered on blowing apart the fur. The characters given are mainly those distinguishing the species from *E. mazama*.

*Color*.—Upper parts olive gray, with an ill defined dorsal area of cinnamon rufous, obscured by black hairs; lower part of sides and face clear gray; belly washed with dull buff; ears dusky, not rufous tipped; feet dusky gray; tail distinctly bicolor in specimens from the type locality, more sharply bicolor in specimens from Carberry Ranch, California.

*Cranial characters*.—Skull less angular and abruptly spreading than that of *E. mazama* and with a more arched dorsal line; rostrum short, decurved, with lower outline well arched; incisive foramina short and wide; palatines and audital bullæ as in *E. mazama*.

*Measurements*.—Type specimen, measured in the flesh by E. A. Preble: total length, 155; tail vertebræ, 47; hind foot, 17. *Skull* of type: basal length (basion to gnathion), 21.8; zygomatic breadth, 13.3; mastoid breadth, 11.5; alveolar length of molar series, 4.5.

*Remarks*.—The series of specimens includes both young and adult individuals collected in May, August, September, and December, but apparently none in full winter pelage. In both geographic position and specific characters this species lies between *E. mazama* of the summit of the Cascades and *E. californicus* of the coast region. On the side of Mount Mazama it almost or quite meets the range of *E. mazama*, with which none of the specimens show evidence of intergradation. Specimens from Carberry Ranch show a slight approach toward *californicus*, and future collections may prove *obscurus* to be a lighter-colored, interior form of that species.

*Specimens examined*.—Total number, 10, from 5 localities:

*Oregon*: Prospect, 4; west side of Crater Lake, 1; Grand Pass, 1; Siskiyou, 1.

*California*: Carberry Ranch (near Montgomery Creek), Shasta County, 3.

***Evotomys californicus* Merriam.**

*Evotomys californicus* Merriam, North American Fauna No. 4, p. 26, pl. ii, fig. 2, Oct. 8, 1890.

*Type locality*.—Eureka, Humboldt Co., California.

*Geographic distribution*.—Coast strip of Oregon and northern California.

*General characters*.—One of the largest, darkest, and longest-tailed species in North America. Dorsal area ill defined; ears small, and in May and



June specimens almost naked, not rufous; lateral glands well defined in half of the specimens examined, conspicuous in the type and two other old males.

*Color.*—Upper parts dark bistre or sepia, becoming dusky on rump and dull, dark chestnut on back; dorsal area indistinct and shading gradually into color of sides; oval patches of dense fur covering side glands plumbeous in slight contrast to surrounding fur; belly pale buffy or soiled whitish, darkened by the plumbeous under fur; tail sharply bicolor, blackish above and at tip all round, whitish beneath; feet whitish or but slightly dusky; ears dusky, with no rufous or light-colored hairs.

*Cranial and dental characters.*—Skull thick and heavy, with short, stout decurved rostrum; audital bullæ and pterygoids both relatively and actually larger than in any other species; palatines usually triangular in outline instead of U-shaped, as in other species, and with a triple or single pointed posterior projection; zygomatic arches bent well down and not abruptly spreading; molars wide and heavy; enamel folds crowded longitudinally and irregular; posterior upper molar short, with terminal loop very small or, in 4 specimens out of 6, absent.

*Measurements.*—Type, measured in flesh by T. S. Palmer: total length, 161; tail vertebrae, 50; hind foot, 21. An adult ♂ from Yaquina Bay, Oregon, measured by B. J. Bretherton: total length, 163; tail vertebrae, 55; hind foot, 20. *Skull*: basal length, 22.8; nasals, 7.5; zygomatic breadth, 14; mastoid width, 12.3; alveolar length of upper molar series, 5.3.

*General remarks.*—In geographic position this species lies nearest to *E. obscurus* on the east and to *E. occidentalis* on the north, and with these species only does it need comparison. The darker color, larger size, and longer tail distinguish it at a glance from *E. obscurus* without reference to the numerous cranial differences. Specimens from localities away from the coast (Willetts and Sherwoods, near the center of Mendocino County, California) are somewhat smaller and lighter colored than the type, which suggests that the species may grade into *E. obscurus*, though at present no intermediate specimens are available. *E. californicus* is readily distinguished from its northern neighbor, *E. occidentalis*, by light feet and belly, bicolor tail, larger size, and blacker coloration, in contradistinction to the sooty feet and belly, concolor tail, smaller size, and more rufous back of *occidentalis*.

*Specimens examined.*—Total number, 9, from the 5 following localities:

*California*: Eureka, 1; Willetts, Mendocino County, 3; Sherwoods, 3.

*Oregon*: Yaquina Bay, 1; Oregon City, 1.

#### ***Evotomys occidentalis* Merriam.**

*Evotomys occidentalis* Merriam, North American Fauna, No. 4, p. 25, pl. ii, fig. 1, Oct. 8, 1890.

*Evotomys pygmaeus* Rhoads, Proc. Phila. Acad. Nat. Sci., p. 284, October, 1894.

*Type locality.*—Aberdeen, Washington.

*Geographic distribution.*—Coast and Puget Sound region of Washington and southern British Columbia.



*General characters*.—Size considerably less than *californicus*; dorsal area indistinct; tail long and slender; concolor ears nearly naked, not large, but conspicuous above the short summer fur; tail and feet scantily haired in summer specimens; lateral glands conspicuous in 2 out of 3 adults from Aberdeen.

*Color*.—August specimens from Aberdeen: dorsal area ill defined, sometimes indistinct, varying from dull burnt umber to dark chestnut, darkened by numerous black-tipped hairs; sides dusky gray with a buffy suffusion; an oval patch of darker sooty gray covering side glands in the type and two other specimens; tail almost concolor, blackish; feet dusky or blackish; belly salmon-buff, the dusky under fur showing through; nose blackish.

*Cranial characters*.—Skull thin and light, without prominent angles and processes, relatively narrow and slender, with gently arching zygomata; anterior part of palate from molars to incisors well arched; audital bullæ much inflated, crowding close together over basioccipital; pterygoids flat, thin, and much perforated at base; palatines with a rounded or notched posterior projection; molars normal; anterior surface of upper incisors orange, in strong contrast to the pale yellowish of those of *E. saturatus*.

*Measurements*.—Type, measured in the flesh by T. S. Palmer, ♂ ad.: total length, 145; tail vertebræ, 45; hind foot, 18. Average of 3 adults from type locality: 146; 47; 18.3. *Skull* of type: basal length, 22; nasals, 7; zygomatic breadth, 12.5; mastoid breadth, 11; alveolar length of molar series, 4.7.

*Remarks*.—This species is peculiar to the low, moist coast and sound region—the 'Webfoot country'—where its dark color blends with the shadows of dense vegetation. In general the color is nearly as dark as that of *E. californicus*, but the rich brown on the back, the concolor, dusky tail, and dusky feet are the characters most sharply distinguishing it from neighboring species. There is a possibility of intergradation with *E. californicus* on the south, as well as with *E. saturatus* of the mountains farther east. Specimens from Port Moody, B. C., while agreeing closely with the type in all external characters, show a slight departure in cranial characters in the more angular skull, paler incisors, and smaller audital bullæ. A half-grown specimen from the head of Cascade River is slightly lighter and brighter colored than specimens of the same age from the type locality.

*Evotomys pygmæus* Rhoads, from the mouth of the Nisqually River, Washington, is based on small size, and was described as the smallest species of the genus, measuring 120; 34; 16. In a series of 9 specimens from Tenino (16 miles SW. of the mouth of Nisqually River), adult specimens, measured in the flesh by C. P. Streater, range from 136; 40; 18 to 155; 49; 18. Two not fully adult specimens from Steilacoom (8 miles NE. of the mouth of Nisqually River) measure 125; 36; 16.5 and 128; 39; 17. In brief, specimens from Tenino and Steilacoom localities close by and on both sides of the type locality of '*pygmæus*' agree within the limits of individual and slight seasonal variation in size, color, and cranial characters with specimens from Aberdeen, the type locality of *E. occiden-*



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*tal*is. It is evident, therefore, that *E. pygmaeus* Rhoads is the young of *E. occidentalis*.

*Specimens examined*.—Total number, 19, from 5 localities.

*Washington*: Aberdeen, 6; Tenino, 10; Steilacoom, 2; head of Cascade River, 1 im.

*British Columbia*: Port Moody, 1.

***Evotomys nivarius* \* sp. nov.**

*Type* from Olympic Mountains, Washington, at altitude of 4000 feet [1220 meters], on NW. slope of Mt. Ellinor. No. 66203, ♀ ad., U. S. Nat. Mus., Biological Survey Coll. Collected July 9, 1894, by C. P. Streater. Collector's number, 4025.

*Geographic distribution*.—Mt. Ellinor and probably other high peaks in the Olympic Mountains.

*General characters*.—Size and proportions about as in *E. occidentalis*, but color lighter and brighter, with skull more angular. Fur long and lax; ears small and scantily haired; tail and feet slender, well covered with short hair.

*Color*.—Dorsal stripe well defined, extending from anterior base of ears to base of tail, dull light chestnut; sides dark gray with little buffy suffusion; belly thinly washed with soiled whitish, darkened by plumbeous under fur; postauricular spots whitish; ears dusky; tail distinctly bicolor, soiled whitish below, dusky above; feet dirty white.

*Cranial characters*.—Skull short, wide, angular, and flat; zygomatic process of maxilla projecting at right angles to axis of skull; zygomatic process of squamosal spreading; frontals deeply concave postorbitally; lateral ridges of frontals and parietals prominent; audital bullæ as large as in *E. occidentalis*; pterygoids slender; palatines short, anterior edge truncate or rounded, posterior edge straight; tooth pattern different in each of the three specimens; incisors yellow like those of *E. occidentalis*.

*Measurements*.—Average of 3 adult females from type locality, measured in the flesh by C. P. Streater: total length, 150; tail vertebræ, 50; hind foot, 18. *Skull* of type: basal length, 21; zygomatic breadth, 13; nasals, 6.5; mastoid breadth, 11.5; alveolar length of upper molar series, 5.

*Remarks*.—The specimens from the type locality were caught on July 9, at the edge of an alpine lake, at about 4000 feet altitude. At that date Mr. Streater reports about one-third of the lake covered with ice and snow from the previous winter, while deep snow drifts lay on most of the neighboring slope. Ice formed over the water almost every night during his stay, from July 8 to 11. The snow banks do not entirely leave Mt. Ellinor during the summer. At this altitude the timber is smaller and more scattered and the undergrowth less dense than lower down.

The species shows no close relationship with any other, except *occidentalis*. The types of these two are widely different, but specimens from

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\*The name *nivarius* seems appropriate to this alpine species, found in close proximity to snow banks that never melt.



the vicinity of Lake Cushman, at the east base of the Olympic Mountains, show either that the two species meet there or that intergrades occur. A more complete series of specimens is needed to prove intergradation, and until such a series is obtained *E. nivarius* may stand as a full species.

*Specimens examined*.—Total number, 6, from three localities.

Washington : Mt. Ellinor, 3; Lake Cushman, 2; Skokomish River (10 miles above Lake Cushman), 1.

[The account of the following species is contributed by Outram Bangs.]

“***Evotomys proteus* sp. nov.**

“*Type* from Hamilton Inlet, Labrador. No. 4081, ♀ old adult, coll. of E. A. and O. Bangs. Collected Aug. 27, 1895, by C. H. Goldthwaite.

“*General characters*.—Size largest of the northeastern forms; ear and hind foot large; colors very variable; usual coloring of adults yellowish or grayish, with a darker (often sooty) dorsal stripe. Red-backed individuals are in a small minority, and even these have the face gray; feet and tail more hairy than in *gapperi* or *ochraceus*; skull large and angular, with deep interorbital constriction, behind which the brain case expands more squarely than in either *gapperi* or *ochraceus*, with more strongly marked spur-like process of squamosal.

“*Color*.—The color of this mouse varies enormously. The type (representing the color phase that seems to be most usual): sides, flanks, cheeks, and face smoke gray, somewhat shaded with yellowish and drab, darkening on back into a broad dorsal stripe of sepia, and paling off on under parts to light smoke gray; feet and hands dull gray; tail indistinctly bicolor, dusky above, dull gray below, hairy. No. 4088 has the whole upper parts, back, and sides dull yellowish, the dorsal stripe slightly darker. No. 4054 has the sides darker yellowish brown and the dorsal stripe bright chestnut, while No. 4139 is slaty all over, slightly paler below, and darker dorsally. Every degree of intermediate coloration can be found between these extremes.

“*Cranial characters*.—The skull is larger than that of either *gapperi* or *ochraceus*, the brain case more angular, the interorbital constriction deeper, and the forward spur-like process of squamosal much more strongly marked. The dentition does not appear to differ materially from that of either *gapperi* or *ochraceus*.

“*Measurements* (taken in the flesh by collector).—The type, ♀ old adult: total length, 171; tail vertebræ, 53; hind foot, 21; ear from notch, 17. Average of the 20 largest adult specimens: total length, 161.8; tail vertebræ, 48.83; hind foot, 20.47; ear from notch, 17.75.”



### EXPLANATION OF PLATE III.

FIG. 1. *Evotomys rutilus* (Pallas).

ad., Syd Varanger, Finmark, Norway, No. 6555, Merriam Coll.  
1, top of skull; 1a, palate region.

2. *Evotomys dawsoni* Merriam.

♂ ad., Yakutat, Alaska, No. 73566, U. S. Nat. Mus., Biological  
Survey Coll.  
2, top of skull; 2a, palate region.

3. *Evotomys loringi* subsp. nov.

♂ ad. (type), Portland, Traill Co., N. Dakota, No. 75795, U. S.  
Nat. Mus., Biological Survey Coll.  
3, top of skull.

4. *Evotomys nivarius* sp. nov.

♀ ad. (type), Mt. Ellinor, Olympic Mts., Washington, No.  
66203, U. S. Nat. Mus., Biological Survey Coll.  
4, top of skull.

5. *Evotomys wrangeli* sp. nov.

5. ♀ ad. (type), Wrangel Island, Alaska, No. 74724, U. S.  
Nat. Mus., Biological Survey Coll. (5a, same locality; No.  
74730.)  
5, top of skull; 5a, palate region.

6. *Evotomys mazama* Merriam.

6. ♂ ad. (type), Crater Lake, Oregon, No. 79913, U. S. Nat. Mus.,  
Biological Survey Coll. (6a ♂, same locality; No. 79915.)  
6, top of skull; 6a, palate region.





Bailey, Vernon. 1897. "Revision of the American voles of the genus *Evotomys*." *Proceedings of the Biological Society of Washington* 11, 113–138.

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