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PRELIMINARY REVISION OF THE EUROPEAN  
REDBACKED MICE.

BY GERRIT S. MILLER, JR.

It has been generally supposed that only three redbacked mice, *Evotomys rutilus*, *E. rufocanus*, and *E. 'glareolus'*, occur in Europe, some writers assuming that even this small number should be reduced. That this view is highly incorrect is shown by the material recently collected for the United States National Museum by Mr. J. Alden Loring, Miss Thora Steiner, and Mr. Robert T. Young, supplemented by series presented and loaned by Mr. Oldfield Thomas and the specimens in my private collection, a total of about 300 specimens. While it is clear that the number of recognizable forms must be increased from three to ten or thereabouts, it is almost equally certain that still others remain to be discovered in the many unexplored portions of Europe. At present, therefore, I am able to give nothing more than a preliminary revision of the group, limited to the mice occurring west of Austria. Even in this small area much more collecting must be done before it will be possible to solve all of the systematic problems relating to this one genus.

During the preparation of this paper, published here by permission of the Secretary of the Smithsonian Institution, I have received aid from Mr. Oldfield Thomas, Mr. G. E. H. Barrett-Hamilton, Dr. Robert Collett, and Mr. Vernon Bailey.

NOMENCLATURE.

While it is not necessary to enter into any further discussion of the generic names that have been applied to the redbacked

mice<sup>1</sup> the specific names based on European members of the genus *Evotomys* must be examined in detail. There are eleven of these.

**Bicolor.** *Myodes bicolor* Fatio, Revue et Magasin de zoologie, 2<sup>o</sup> sér., XIV, p. 257, July, 1862. Although I have seen no topotypes of this animal I have little doubt that it is the boreal redbacked mouse of northern Switzerland, *Evotomys nageri* Schinz. The type was taken in the Genthal, Berne, Switzerland, at an altitude of 1800 m.

**Fulvus.** *Arvicola fulvus* Millet, Faune de Maine-et-Loire, II, p. 40, 1828. This name, as pointed out long ago by De Selys-Longchamps,<sup>2</sup> applies to the redbacked mouse of France.<sup>3</sup> It is, however, a mere misidentification of the *Lemmus fulvus* of Étienne Geoffroy St. Hilaire<sup>4</sup> and the *Arvicola fulvus* of Desmarest, a species of *Microtus* (see De Selys-Longchamps, Faune Belge, I, pp. 34-35. 1842).

**Glareolus.** *Mus glareolus* Schreber, Säugthiere, IV, p. 680. The specific name *glareolus* was applied by Schreber to a short-eared mouse found by O. F. Müller among the beach vegetation of the Island of Laaland, Denmark.<sup>5</sup> The animal is described in the text at the end of the account of *Mus aconomus*, and is figured on plate 190 B. The description is as follows: "It is cinnamon brown, darker on the middle of the back and whitish gray on the belly. The whiskers

<sup>1</sup> For detailed treatment of the subject see North American Fauna, no. 12, July 23, 1896. Note on the name *Anaplogonia*: Proc. Biolog. Soc. Washington, XIII, p. 154, June 13, 1900.

<sup>2</sup> "Nota. L'*Arvicola fulvus* de M. Millet, Faune-de-Maine-et-Loire, se rapporte à l'*Arv. rubidus* [= *Evotomys hercynicus rubidus*] et non à notre *Fulvus*. Le même erreur existe dans plusieurs musées d'Allemagne." Monogr. de Micromamm., pp. 99. 1839.

<sup>3</sup> The original description is as follows: "Pelage roux-fauve en dessus; d'un gris roussâtre sur les côtés; d'un blanc teint de jaunâtre en dessous; queue velue; un peu plus courte que la moitié du corps, noirâtre en dessus blanchâtre en dessous; pieds blanchâtres; oreilles courtes, ovales, arrondies, très-velues en dedans et en dehors. Longueur du corps et de la tête 3 pouces 9 lignes [95 mm.], de la queue 22 lignes [47mm.] . . ." This copy was kindly furnished by Mr. Witmer Stone.

<sup>4</sup> Cat. Mamm. Museum d'Hist. Nat., Paris, p. 187. 1803. The original description, a copy of which was recently made for me by Miss Thora Steinger, is as follows: "Queue plus courte que la moitié du corps, et plus velue que dans les précédens [?]; les poils sont tous cendrés dans leur presque totalité et fauves seulement à l'extrémité; les ongles sont jaunes, les oreilles presque entièrement cachés par les poils."

<sup>5</sup> "... in der Insel Laaland zwischen dem *Elymus arenarius* im Sande am Ufer der Ostsee. . ."

also are brown.”<sup>1</sup> The plate represents a misshapen animal with slender body, disproportionately large head, and no ears. In color it is light woodbrown reddening toward fawn. The name appears to have been left unused until 1834, when Melchior applied it, not without considerable misgiving,<sup>2</sup> to the redbacked mouse of Denmark. Melchior recognized the insufficiency of Schreber's description and plate (he suggests that the latter is a “bad drawing of a badly stuffed specimen”) and suspected that the redbacked mouse might be an undescribed species. He preferred, however, to use the name *glareolus* provisionally for the animal until specimens could be obtained from the type locality.<sup>3</sup> Subsequent authors have accepted Melchior's use of the name, but have lost sight of the difficulties that it involves. These difficulties are: that nothing in Schreber's description or plate points to the redbacked mouse, while both strongly suggest a young *Microtus agrestis*; that *Mus glareolus* inhabited the beach, a locality where *Evotomys* is rarely seen, but where *Microtus* generally abounds; and finally that if the name, as it undoubtedly must, be assumed to receive fixity of application to the redbacked mouse not earlier than 1834, it is certainly antedated by the *Hypudæus hercynicus* of Mehlis (1831) and possibly by the *Lemmus rubidus* of Baillon (1834) also. Therefore, if the name *glareolus* is not transferred to the synonymy of *Microtus agrestis*, its most proper disposition, it must be placed in that of *Evotomys hercynicus*.

**Hercynicus.** *Hypudæus hercynicus* Mehlis, Isis, Jahrg. 1831, p. 876, 1831, is the first tenable name for the small redbacked mouse of central Europe. The type locality is in the higher part of the Harz Mountains, Germany.<sup>4</sup>

<sup>1</sup> “Sie ist zimmtbraun, mitten auf dem Rücken dunkler, und auf dem Bauche weissgrau. Die Bartborsten sind ebenfalls braun.”

<sup>2</sup> “Den her beskrevne siellandske [Art] kan altsaa ei være Pallas's *mus rutilus*, og den maa altsaa enten være en aldeles ny Art, eller Schreber's *mus glareolus*, som man hidtil ikkun kiender af et Exemplar, fundet i Lolland af vor berømte Landsmand Conferentsraad O. Fr. Müller; dette sidste anseer Forf. for sandsynligt, og har derefter valgt Benævnelsen da den Schreberske Figur (Tab. 190), skjøndt den synes at være en slet tegning efter et slet udstoppet Exemplar, dog har endeel Lighed med vores. Sagen vilde Først med Sikkerhed kunne oplyses, naar man var saa heldig at erholde et lollandsk Exemplar til Sammenligning, hvilket hidtil ikke har villet lykkes Forf.” Den danske Stats og Norges Pattedyr, p. 119. 1834.

<sup>3</sup> Redbacked mice are now known to be common in Laaland; but *Microtus agrestis* abounds there also, robbing the fact of the significance it would otherwise have.

<sup>4</sup> “Sie ist in dem höhern Harze, z. B. am Bruchberge und in dessen nähern Umgebungen häufig. . .”

**Nageri.** *Hypudæus nageri* Schinz, Synopsis Mammalium, II, p. 237, 1845, is the first name based on the large, boreal redbacked mouse of the Alps. The type was collected on Mt. St. Gotthard near Andermatt.<sup>1</sup>

**Pratensis.** *Arvicola pratensis*, F. Cuvier, Histoire Naturelle des Mammifères, VII, Table Générale et Methodique, 1842 (Description and figure in same volume, livr. 68, March, 1834) is probably the redbacked mouse of northern France, *Evotomys hercynicus rubidus*. Type locality, Abbeville, Somme, France.

**Riparius.** *Arvicola riparius* Yarrell, Proc. Zool. Soc. London, 1832, p. 109, May 22, 1832, is the only name thus far based on the redbacked mouse of England. It is antedated by *Arvicola riparius* Ord 1825, a name applied to the common meadowmouse of the eastern United States (= *Microtus pennsylvanicus*). No definite type locality is given in the original description.

**Rubidus.** "*Lemmus rubidus* Baillon, Mém. Soc. Emul. Abbeville, 1834." This name I have been unable to verify. That it was originally applied to the redbacked mouse of the vicinity of Abbeville, Somme, France, was shown by DeSelys-Longchamps in 1847.<sup>2</sup> It is tenable for the dark race of *Evotomys hercynicus* occurring in Belgium and northern France.

**Rufescens.** *Arvicola rufescens* De Selys-Longchamps, Essai monographique sur les Campagnols des Environs de Liège, p. 13, 1836, is a synonym of *Evotomys hercynicus rubidus*. That it was based on specimens taken at Waremmes, Belgium, I have recently been informed by the author himself.

**Rufocanus.** *Hypudæus rufocanus* Sundvall, Oefversigt af Kongl. Vetenskaps-Akademiens Förhandlingar, Årg. 3, p. 122, May 13, 1846. This is the first and only name for the European member of the subgenus *Craseomys*.

**Rutilus.** *Mus rutilus* Pallas, Nov. Spec. Quadr. e Glir. Ord. p. 246, 1778, was based on a short-tailed arctic redbacked mouse from Siberia east of the Obi. No specimens from this region are available for comparison with the European animal to which the name *rutilus* is now applied.

<sup>1</sup> "Habitat in valle ursorum montis St. Gotthardi."

<sup>2</sup> Revue zoologique par la Société Cuvierienne, 10<sup>e</sup> année, p. 309. October, 1847.

## THE GENUS EVOTOMYS AND ITS SUBGENERA.

## Genus EVOTOMYS Coues.

1874. *Evotomys* COUES, Proc. Acad. Nat. Sci. Philadelphia, p. 186. Type, *Mus rutilus* PALLAS.

1899. *Anaptogonia* COPE, Journ. Acad. Nat. Sci. Philadelphia, 2d ser., x1, p. 201 (part).

*Generic characters.*—Teeth rooted as in *Phenacomys*; palate terminating in a thin-edged shelf between alveoli of posterior molars.

*Remarks.*—The genus *Evotomys* as thus defined includes two well characterized subgenera, one represented by the aberrant *Evotomys rufocanus* alone, the other containing the typical species. It is a boreal genus of circumpolar distribution, extending south to the transition zone in America, and apparently somewhat farther in Europe.

## Subgenus EVOTOMYS Coues.

*Type.*—*Evotomys rutilus* Pallas.

*Characters.*—Skull smooth and rounded, the postorbital processes obsolete; teeth relatively much smaller than in *Microtus*, the molar row considerably shorter than diastema; roots of molars fully formed relatively early in life; root of posterior lower molar not forming an obvious swelling where it comes in contact with root of incisor.

*Remarks.*—The subgenus *Evotomys* is a very compact and well characterized group. It contains all the known species of the genus, *Evotomys rufocanus* excepted, and its range is coincident with that of the genus.

## Subgenus CRASEOMYS subgen. nov.

*Type.*—*Evotomys rufocanus* (Sundevall).

*Characters.*—Skull as strongly angular as in *Microtus*, the postorbital processes well developed; teeth relatively as large as in *Microtus*, the molar row about equal to diastema; roots of molars developed late in life; root of posterior lower molar lying in a distinct capsule on lingual side of incisor root.

*Remarks.*—The subgenus *Craseomys* shows a distinct approach to *Microtus* in the general character of the skull, and in the encapsuled posterior lower molar. The palate, on the other hand, and the molar roots, are typical of *Evotomys*.

## THE EUROPEAN SPECIES OF EVOTOMYS.

Ten forms, species and subspecies, of redbacked mice are now known to inhabit Europe. Their characters are as follows:

## SYNOPSIS OF THE REDBACKED MICE OF EUROPE.

Skull strongly angular as in *Microtus*, the postorbital processes well developed; teeth large, rooted late in life, the maxillary molar row about as long as diastema; posterior lower molar distinctly encapsuled; red area of back very strongly contrasted with clear gray sides (subgenus *Craseomys*) .....EVOTOMYS RUFOCANUS

Skull much less angular than in *Microtus*, the postorbital processes obsolete or very small; teeth small, rooted early in life, the maxillary molar row conspicuously shorter than diastema; posterior lower molar not encapsuled; red area of back not very sharply contrasted with yellowish gray of sides (subgenus *Evotomys*).

Tail densely furred, forming about 20 percent of total length, its pencil at least one-fourth as long as caudal vertebræ.

## EVOTOMYS RUTILUS

Tail sparsely furred, forming about 33 percent of total length, its pencil never more than one-sixth as long as caudal vertebræ.

Greatest length of skull about 26 mm.; hind foot 20 (18) or more.

Ratio of tail vertebræ to total length 35 to 38; skull broad and rounded, the zygomata light, generally convergent anteriorly and never abruptly flaring.

## EVOTOMYS NAGERI

Ratio of tail vertebræ to total length 32 to 36; skull narrow and ridged, the zygomata heavy, abruptly flaring anteriorly and generally convergent posteriorly.

Nasals narrow (greatest width of both together distinctly less than half length); ratio of tail vertebræ to total length generally 34 to 36.

## EVOTOMYS NORVEGICUS

Nasals broad (greatest width of both together about half length); ratio of tail vertebræ to total length about 33 .....EVOTOMYS VASCONIÆ

Greatest length of skull about 24 mm.; hind foot 20 (18) or less .....EVOTOMYS HERCYNICUS

Skull relatively broad and audital bullæ relatively large; dorsal red area (in winter pelage) ill defined and much intermixed with gray .....*E. h. helveticus*

Skull relatively narrow and audital bullæ relatively small; dorsal red area never conspicuously mixed with gray. Summer pelage clear russet slightly darkened by chestnut tipped hairs; winter pelage more yellowish.

*E. h. hercynicus*

Summer pelage bister, mars brown, Vandyke brown, Prouts brown, mummy brown, etc., never clear russet; winter pelage so far as known never strongly tinged with yellowish.

Summer pelage with red dorsal area sharply defined and very narrow .....*E. h. suecicus*

Summer pelage with red dorsal area broad, diffuse.

Hind foot usually more than 18 (17); ratio of tail vertebræ to total length about 36.

*E. h. rubidus*

Hind foot usually less than 18 (17); ratio of tail vertebræ to total length about 31.

*E. h. britannicus*

Subgenus **CRASEOMYS** Miller.

EVOTOMYS RUFOCANUS (Sundevall).

1846. *Hypudæus rufocanus* SUNDEVALL, Oefversigt af Köngl. Vetenskaps. Akademiens Förhandlingar, Årg. 3, p. 122, May 13, 1846.

1897. *Evotomys rufocanus* BAILEY, Proc. Biolog. Soc. Washington, XI, p. 122. May 13, 1897.

*Type locality*.—Lappmark, Sweden (specimens mentioned from Altawaara, Karesuando, Lule, and Pite).

*Faunal position*.—Upper and middle boreal zones.

*Geographic distribution*.—Northern Europe, south in the mountains of Norway to Dovre.<sup>1</sup>

*General characters*.—Size large (hind foot, 20 (18) or more; greatest length of skull, 26); fur long and dense; dorsal stripe narrow-bright, and sharply contrasted with clear gray of sides.

*Color*.—A specimen in fresh autumnal pelage has a well defined dorsal stripe of a color intermediate between the hazel and cinnamon rufous of Ridgway,<sup>2</sup> evenly but not conspicuously sprinkled with black-tipped hairs. This stripe begins between the eyes and extends

<sup>1</sup> Collett, *Nyt Mag. for Naturvidenskaberne*, XXXVI, p. 280, March, 1898.

<sup>2</sup> *Nomenclature of Colors*, pl. IV, Nos. 12 and 16.

nearly to base of tail. Ears colored like dorsal stripe. Sides an indescribable grizzle of hair brown, whitish, black, and slate color, the general effect clear light gray. Whole underparts soiled buffy white, darkened by the slaty bases of the hairs, which show through irregularly on the surface, especially when the fur is disarranged. Cheeks, muzzle, and sides of head similar to sides of body, but slightly darker. Tail sharply bicolor, brownish above, dirty white below. Feet dirty white.

In a half-grown specimen from Finmark, Norway, loaned by Mr. Robert Collett, the dorsal stripe is bister scarcely tinged with red except in the region between the ears. Here it is dull russet. Otherwise the coloring is essentially as in the adult.

*Skull.*—The skull of *Evotomys rufocanus* has the general appearance of that of a medium sized *Microtus* with teeth slightly weaker than usual. Braincase relatively deeper than in *Microtus agrestis* from Upsala, Sweden, slightly longer than broad, squarely truncate posteriorly, its outline carried squarely forward by the large postorbital processes. It is strongly marked by ridges for muscular attachment. Interorbital region narrow, with a deep longitudinal median furrow. Rostral protuberances<sup>1</sup> smaller than in the species of true *Evotomys* and placed close to root of zygomatic process of maxillary. Rostrum short, deep, and heavy. Palate and ventral aspect of skull much as in *Evotomys norvegicus* except for the relatively larger teeth and audital bullæ, the latter even larger than in *Microtis agrestis*.

Measurements of an adult skull from Tanen, Postanger, Finmarken, Norway: Greatest length 26; basal length 26; basilar length 25; zygomatic breadth 15.4; mastoid breadth 13.6; interorbital constriction 4; diastema 8; palatal length 13; occipital depth (in median line) 7.6; frontopalatal depth (at middle of molar series) 78; mandible 17; maxillary toothrow (alveoli) 6.8; mandibular toothrow (alveoli) 6.

*Teeth.*—The teeth of *Evotomys rufocanus* as compared with those of other members of the genus<sup>2</sup> are chiefly remarkable for their large size, great strength, and sharply pointed salient angles. In robustness the teeth perhaps slightly surpass those of an adult *Microtus agrestis* from Upsala, Sweden, though this appearance may be due to the broader dentine spaces. It is especially noticeable in the mandibular

<sup>1</sup> See Proc. Acad. Nat. Sci., Philadelphia, 1898, p. 361.

<sup>2</sup> Among the European members of the subgenus *Evotomys*, I can find no tangible differential characters in the teeth. In the larger species the teeth are slightly larger than in the smaller ones; but the proportions and the pattern of enamel folding remain the same.

teeth and in the second and third upper molars. The triangles in the upper molars are closed throughout; those of the lower molars are occasionally and apparently quite irregularly open. In arrangement the triangles are essentially as in *Evotomys norvegicus*. In the first lower molar, however, the anterior loop is longer, and deeply cut by a well developed reentrant angle on the inner side (scarcely indicated in *E. norvegicus*) which isolates a third closed triangle fully equaling the others of the same side in size. In the posterior upper molar the two external reentrant angles are approximately equal in depth, while in *E. norvegicus* the more anterior of the two is exceedingly shallow and often obsolete.

*Measurements*.—A well made skin from Quickjock, Sweden, measures: total length 150; tail vertebræ 40; hind foot with claws 19.8; hind foot without claws 18.

*Specimens examined*.—Five, from the following localities: Norway; Stabursnaes, Porsanger, 1, Tanen, Finmarken, 2. Sweden; Quickjock, 1, Torneå, 1.

*Remarks*.—*Evotomys rufocanus* is so readily distinguishable by its subgeneric characters that it needs no special comparison with other members of the genus.

#### Subgenus **EVOTOMYS** Coues.

#### **EVOTOMYS RUTILUS** (Pallas).

1778. *Mus rutilus* PALLAS, Nov. Spec. Quadr. e Glir Ord, p. 246.

1874. *Evotomys rutilus* COUES, Proc. Acad. Nat. Sci., Philadelphia, p. 187.

1899. *A[naptogonia] rutila* COPE, Journ. Acad. Nat. Sci., Philadelphia, 2d ser., XI, p. 201.

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

*Faunal position*.—*Evotomys rutilus* is strictly confined to the upper boreal zone.

*Geographic distribution*.—Arctic Europe and Asia, south in Norway to Tromsø.<sup>1</sup>

*General characters*.—Size small (total length about 125, hind foot 18, greatest length of skull 24); tail forming about 20 percent of total length, very densely haired, its pencil at least  $\frac{1}{4}$  as long as vertebræ; dorsal stripe clear bright chestnut, sharply but not conspicuously contrasted with color of sides.

*Color*.—An adult male from northern Sweden taken in December has the dorsal stripe clear bright chestnut, faintly darkened by a slight admixture of black-tipped hairs. Sides ochraceous buff.

<sup>1</sup> Collett, Nyt Mag. for Naturvidenskaberne, XXXVI, p. 282. March, 1898.

Belly dirty white or cream color, darkened by the plumbeous bases of the hairs which show through irregularly at the surface. Feet whitish. Ears like dorsal stripe. Tail sharply bicolor, brownish tinged with red above, dirty white below. Fur everywhere slaty plumbeous at base.

Individual variation among adult skins is too inappreciable to need special comment. I have seen no immature specimens.

*Skull.*—The skull of *Evotomys rutilus* is small, smooth, and rounded, in general appearance hardly distinguishable from that of *E. hercynicus*. The zygomata are rather abruptly though not very widely flaring anteriorly, so that in the malar region the two arches are parallel with each other and with the main axis of the skull. Rostral protuberances small but well developed and standing out conspicuously in front of zygomatic processes of maxillaries. Lateral outline of nasals nearly straight from base to tip. Posteriorly the nasals extend slightly beyond nasal branches of premaxillaries. They are squarely truncate. Postorbital processes essentially obsolete. Braincase low and flat (the skull distinguishable by this character alone from that of any of the members of the *hercynicus* group), subrectangular in outline when viewed from above. Palate normal except that the foramina immediately in front of lateral bridges are so large and numerous that the bridges are generally somewhat encroached upon and rendered imperfect. Audital bullæ as in *E. hercynicus*, therefore slightly smaller than in *Microtus agrestis* and much smaller than in *Evotomys rufocanus*.

Measurements of an adult skull from Lapland: Greatest length 24; basal length 22.4; basilar length 20.6; zygomatic breadth 13; mastoid breadth 11.8; interorbital constriction 4; nasals 7; incisive foramen 5; diastema 7.4; palatal length 10.8; occipital depth (in median line) 7; frontopalatal depth (at middle of molar series) 6; mandible 13.8; maxillary toothrow (alveoli) 5; mandibular toothrow (alveoli), 5.

*Teeth.*—The teeth of *Evotomys rutilus* present no characters of special importance. Relatively to the size of the skull they are proportioned as in *E. hercynicus*. I can see no tangible specific characters in the enamel pattern.

*Measurements.*—Two specimens from northern Sweden measure respectively: Tail vertebrae 34 and 39; pencil 11 and 9; hind foot with claws 18 and 18.4; hind foot without claws 17.

*Specimens examined.*—Five, from the following localities: Norway: South Varanger, Finmark, 2. Sweden: Karesuando, 1; Lapland, 2.

*Remarks.*—This arctic species is instantly recognizable by its small

size, bright colors, and very short densely haired tail. It is in no way closely related to any of the other European members of the genus.

EVOTOMYS NORVEGICUS sp. nov.

1898. *Microtus glareolus* COLLETT, Nyt Mag. for Naturvidenskaberne, XXXVI, p. 278. March, 1898. (Not *Mus glareolus* of Schreber.)

*Type*.—Adult ♀ (skin and skull) no. 84674 United States National Museum, collected at Bergen, Norway, May 31, 1898, by Thora Steineger. Original number 20.

*Faunal position*.—This species is probably characteristic of the middle and lower boreal zones.

*Geographic distribution*.—The forested portions of Norway, north to the Saltdal (67° N.).<sup>1</sup>

*General characters*.—Size large, skull of adults about 26 mm. in greatest length, total length of adults 150–170, hind foot 20 or more; ratio of tail vertebrae to total length 33–36; skull narrow and noticeably ridged for muscular attachment, the zygomata heavy and abruptly flaring; color rather dull.

*Color*.—*Summer pelage*: Dorsal stripe fairly well defined, extending from forehead to rump. It is dark, dull ferruginous, slightly varied with light wood-brown and much darkened by a uniform sprinkling of black tipped hairs. Face, cheeks and sides light wood-brown fading to broccoli-brown on lower part of sides, especially posteriorly. Rump wood-brown tinged with red in median line and forming no noticeable contrast with color of back. Whole ventral surface pale drab-gray, irregularly tinged with yellowish along median line, the plumbeous bases of the hairs appearing irregularly at surface. Feet dull white. A dark shade at inner side of ankle. Sides of muzzle slightly yellower than face. Ears nearly naked externally, covered with very short reddish hairs internally. Tail sharply bicolor, dark brown above, whitish below.

*Skull*.—The skull of *Evotomys norvegicus* is large, and, for a true *Evotomys*, rather strongly ridged and angled. In this respect it surpasses all other European members of the genus, *E. (Craseomys) rufocanus* excepted. The zygomata are heavily built, and so abruptly flaring anteriorly that the greatest zygomatic breadth is near anterior extremity of molar; back of this region the arches distinctly converge. Rostral protuberances well developed, placed close to base of zygomata. Postorbital processes distinct but very small. Braincase moderately high and rounded, distinctly rectangular in outline when viewed

<sup>1</sup> Collett, Nyt Mag. for Naturvidenskaberne, XXXVI, p. 278.

from above. Lateral outline of nasals bowed inward near middle. The nasals are squarely truncate posteriorly a little in front of tips of nasal branches of premaxillæ. Palate normal, the lateral bridges well developed, and the foramina in front of bridges small. Audital bullæ as in *E. hercynicus*.

Measurements of an adult skull (the type): Greatest length 26.8; basal length 25; basilar length 23; zygomatic breadth 14.6; mastoid breadth 11.6; interorbital constriction 4; nasals 8; incisive foramen 5.2; diastema 7.8; palatal length, 11.8; occipital depth (in median line) 7.4; frontopalatal depth (at middle of molar series) 6.8; mandible 16; maxillary toothrow (alveoli) 5.8; mandibular toothrow (alveoli) 5.4.

*Teeth*.—The teeth of *Evotomys norvegicus* present no tangible characters by which they may be distinguished from those of *E. rutilus* and *E. hercynicus*. They are, of course, larger in proportion with the greater size of the skull.

*Measurements*.—Average of nineteen specimens from the neighborhood of the type locality: total length 163; tail vertebræ 56.3; hind foot with claws 20.8. For details see table, page 106.

*Specimens examined*.—Twenty-one from the following localities: Norway: Asker, 1; Bergen, 4; Granvin, 14, Opheim, 2.

*Remarks*.—*Evotomys norvegicus* needs no close comparison with *E. rutilus* of the upper boreal zone or *E. hercynicus* of the transition zone and upper austral zone. From both of these it is separated by its much larger size; while from *E. rutilus* it is immediately distinguishable by its long, thinly haired tail. The only European species with which it is likely to be confused are the geographically remote *E. nageri* of the Alps and *E. vasconicæ* at present known from the Pyrenean foothills only. Both of these animals agree with *E. norvegicus* in size, but the former is readily separable from it by the long tail, pale sides, and broad smooth skull, while the latter differs in its shorter, less hairy tail, duller color, and heavier molar teeth.

This species is the '*glarcolus*' of authors dealing with the fauna of Norway exclusively. A form of *E. hercynicus* is, however, included under the name *glarcolus* by those who refer to the Scandinavian fauna as a whole.

#### EVOTOMYS NAGERI (Schinz).

1845. *Hypudæus nageri* SCHINZ, Synopsis Mammalium, 11, p. 237. (Mt. St. Gotthard, Switzerland.)  
 1862. *Myodes bicolor* FATIO, Revue et Magasin de Zoologie, 2d ser., XIV, p. 257. July, 1862. (Genthal, Berne, Switzerland.)

1867. *Hypudaus glarcolus* FATIO, Les Campagnols du Bassin du Léman, p. 28 (part).

*Type locality*.—Mount St. Gotthard, Switzerland.

*Faunal position*.—This species is probably characteristic of the middle and lower boreal zones; at lower elevations it is replaced by *E. hercynicus helveticus*.

*Geographic distribution*.—Evergreen forests of the Alps, except in the lower valleys; exact limits of range not known.

*General characters*.—Size large, skull of adults about 26 mm. in greatest length, total length of adults 150–170, hind foot 20 (18) or more; ratio of tail vertebræ to total length 35–38; skull broad and little ridged for muscular attachment, the zygomata weak and gradually flaring; colors dull.

*Color*.—*Summer pelage*: Dorsal stripe well defined, extending from forehead to rump. It is cinnamon rufous slightly varied with pale broccoli-brown and inconspicuously darkened by a sprinkling of black tipped hairs; the resulting color very nearly chestnut. Face, cheeks, and sides light hair-brown fading to smoky gray on lower part of sides. Rump light broccoli-brown tinged with red in median line and forming a noticeable though not very strong contrast with color of back. Whole ventral surface pale smoke-gray, faintly tinged with yellowish along median line, the plumbeous bases of the hairs appearing irregularly at surface. Feet dull white. A dark shade at inner side of ankle. Sides of muzzle pale Isabella color. Ears thinly haired, dull reddish. Tail bicolor, dark brown above, whitish below.

*Skull*.—The skull of *Evotomys nageri*, while of the same size as that of *E. norvegicus*, is readily distinguishable by its relatively broader braincase, more slender rostrum, shorter, broader interorbital region, and lighter, less abruptly flaring zygomata. The latter flare so gradually that the greatest zygomatic breadth is at the posterior extremity of the jugals, from which point the arches converge forward. Rostral protuberances well developed, placed slightly further forward than in *E. norvegicus*. Postorbital processes nearly obsolete, though slightly more apparent than in *E. rutilus*. Nasals rounded posteriorly, terminating in line with nasal branches of premaxillæ. The dorsal profile of the nasals is more rounded than in *E. norvegicus*, and the constriction near middle is less abrupt. Braincase broad and so rounded and slightly angular that the usual rectangular outline is much obscured. Audital bullæ more globular than in *E. norvegicus*, the difference, however, appreciable on comparison only.

Measurements of an adult skull ( $\delta$ ) from Brünig, Switzerland:

Greatest length 26.4; basal length 24; basilar length 22; zygomatic breadth 14.6; mastoid breadth 12.8; interorbital constriction 4.4; nasals 8; incisive foramen 4.8; diastema 7; palatal length 12; occipital depth (in median line) 7.2; frontopalatal depth (at middle of molar series) 6.8; mandible 15; maxillary toothrow (alveoli) 6; mandibular toothrow (alveoli) 6.

*Teeth.*—Except that the incisors are slightly less robust the teeth of *Evotomys nageri* do not differ from those of *E. norvegicus*.

*Measurements.*—Average of thirty-six specimens from the neighborhood of the type locality: total length 156; tail vertebrae 56.9; hind foot with claws 20.3; hind foot without claws 19.2. For details see table, page 105.

*Specimens examined.*—Eighty-two, from the following localities: Switzerland: Andermatt, 41; Brünig, 30; Meiringen, 11.

*Remarks.*—*Evotomys nageri* is a much larger animal than its near geographical ally, *E. hercynicus helveticus*. From the large *E. vasconia* of the Pyrenees it is distinguishable by its relatively much longer tail, paler sides, heavier teeth and broader, less angular skull. For comparison with *E. norvegicus* see description of latter.

#### EVOTOMYS VASCONIÆ sp. nov.

*Type.*—Adult ♂ (skin and skull) no. 86994 United States National Museum, collected at Montrejeau, Hautes-Pyrenees, France, July 4, 1899, by Robert T. Young.

*Faunal position.*—*Evotomys vasconia* is probably a boreal Pyrenean species whose range extends downward in the cool woodlands to the foothills.

*Geographic distribution.*—Although nothing is at present known of its geographic distribution this animal probably occurs throughout the isolated boreal region of Spain and southern France.

*General characters.*—Closely related to *Evotomys norvegicus*, but with shorter, more thinly haired tail, duller colors, broader nasals, and heavier teeth.

*Color.*—*Summer pelage:* Essentially as in *E. norvegicus*, but dorsal stripe less well defined and less red—more nearly cinnamon-rufous than ferruginous. Sides and flanks slightly darker than in *E. norvegicus*. Winter pelage not known.

*Skull.*—The skull of *Evotomys vasconia* is of essentially the same form and size as that of *E. norvegicus*. The zygomata are heavily built and abruptly flaring, therefore quite different from those of *E. nageri*. Nasals short and broad, the greatest width of both together

about one half length. Audital bullæ shorter and broader than in *E. norvegicus*.

Measurements of an adult skull (the type): Greatest length 25.8; basal length 23.6; basilar length 21.8; zygomatic breadth 14; mastoid breadth 12; interorbital constriction 4.2; nasals 7.4; incisive foramen 5; diastema 7; palatal length 11.4; occipital depth (in median line) 7; fronto-palatal depth (at middle of molar series) 6.6; mandible 15.4; maxillary toothrow (alveoli) 6; mandibular toothrow (alveoli) 5.6.

*Teeth*.—The teeth are more heavily built than in *E. norvegicus*, the difference most noticeable in the second and third molars.

*Measurements*.—Average of two specimens from the type locality: total length 160; tail vertebræ 52; hind foot with claws 20.2; hind foot without claws 18.5. For details see table, page 106.

*Specimens examined*.—Two, both from the type locality.

*Remarks*.—The discovery of *Evotomys vasconia* completes an illustration of the distribution of a boreal group of mammals in western Europe. Three isolated but closely related species of large European redbacked mice are now known, one each in the boreal zone of Norway, the Alps, and the Pyrenees.<sup>1</sup> The small *E. hercynicus* occupies the lower zones throughout the region intermediate between the ranges of *E. norvegicus* and the two other large species. That these are similarly isolated from each other is scarcely to be doubted. *Evotomys hercynicus* has been traced southward to the lower Garonne, less than 150 miles from the type locality of *E. vasconia*, while there is no apparent barrier to its occurrence throughout the lowlands from the Department of Gironde to the Gulf of Lyons, thus effectually separating *E. vasconia* from *E. nageri*.

## EVOTOMYS HERCYNICUS (Mehlis).

(Synonymy under subspecies.)

*Type locality*.—Harz Mountains, Germany.

*Faunal position*.—*Evotomys hercynicus* is probably a characteristic species of the transition and upper austral zones.

*Geographic distribution*.—Non-mountainous portions of Europe, from southern France and the valleys of northern Switzerland, north to

<sup>1</sup> Montréjeau, the type locality of *E. vasconia*, is probably in the Transition zone. *Evotomys*, however, can readily descend to this level at the base of a mountain chain by taking advantage of local conditions (see Miller, Science, NS., VIII, pp. 615-618. November 4, 1898.) Mr. Young's specimens were taken in heavy woods.

Scotland, northern Sweden (Quickjock) and southern Finland (Tammerfors). Limits of range not known.

*General characters.*—Size small, skull of adult about 24 mm. in greatest length, total length of adult animal 140–150 mm., hind foot 20 (18) or less; ratio of tail vertebræ to total length generally between 30 and 35.

*Color.*—See descriptions of subspecies.

*Skull.*—The skull of *Evotomys hercynicus* is readily distinguishable from that of other European members of the subgenus *Evotomys*. From skulls of *E. norvegicus*, *E. nageri* and *E. vasconicæ* its small size immediately separates it; while from *E. rutilus* it differs in higher, more rounded braincase and less prominent<sup>1</sup> rostral protuberances. On the whole the skull perhaps most closely resembles that of *E. nageri*, from which it is separated chiefly by smaller size and by the parallel zygomata. From the skull of *E. norvegicus* the differently shaped zygomatic arches will always serve to distinguish it. Among themselves the skulls of the different races show no diagnostic characters, except in the case of *E. hercynicus helveticus*.

*Teeth.*—Except in their small size the teeth of *Evotomys hercynicus* present no peculiarities.

*Measurements.*—See descriptions of subspecies.

*Specimens examined.*—One hundred and ninety-one. For details see lists under subspecies.

*Remarks.*—*Evotomys hercynicus* is separable from *E. rutilus* by its long, thinly haired tail and deeper, narrower skull, and from *E. norvegicus*, *E. vasconicæ*, and *E. nageri* by its much smaller size. It is a widely distributed, plastic species, its extensive, nearly unbroken range and great variability as compared with the other red-backed mice of Europe dependent on the physiographic conformation of the life zones which it inhabits. Five races are represented by the material thus far brought together.

#### EVOTOMYS HERCYNICUS HELVETICUS subsp. nov.

1867. *Hypudæus glareolus* FATIO, Les Campagnols du Bassin du Léman, p. 28 (part).

*Type.*—Adult male (skin and skull), in British Museum, collected at Montauban, Haute Savoie, France (near Geneva, Switzerland) at altitude of 900 m., November 8, 1899, by Alphonse Robert. Original number, 22.

<sup>1</sup> That is, less far removed from base of zygomata.

*Geographic distribution.*—Lowlands between the Alps and Jura.

*General characters.*—Skull broader and audital bullæ larger than in any of the other known races of *Evotomys hercynicus*. Size rather large (hind foot 19 (18), total length 145); tail forming 31–33 percent of total length. Winter pelage: dorsal red area diffuse, hazel, much intermixed with gray; belly slightly washed with buff; tail nearly black above.

*Color.*—Summer pelage not known. *Winter pelage:* red dorsal area very diffuse and ill defined, extending from eyes to base of tail, but not widely spreading over sides. In color it is hazel, slightly darkened by black tipped hairs, and intermixed with broccoli-brown or ecru drab (the subterminal color bands) and grayish white. The brown and gray is always noticeable and occasionally almost in excess of the red. Sides and cheeks broccoli-brown or ecru drab, inconspicuously sprinkled with black. Face slightly darker than cheeks. Belly whitish gray washed with cream buff and darkened by the slaty underfur. The buff wash is variable. It is nearly absent in two specimens among eighteen, and in a few it is considerably more heavy than usual, spreading noticeably over cheeks, face and sides. Tail very conspicuously bicolor, blackish above, buffy white beneath. Feet white. Ears like dorsal stripe. A tuft of whitish hairs springs from near posterior base of conch. This tuft forms a distinct spot in some specimens.

*Skull.*—The skull of *Evotomys hercynicus helveticus* is slightly larger than that of the other races, the braincase is less elongated and the audital bullæ are larger. The differences are not easily described, but on comparison of series of skulls they at once become apparent.

Measurements of skull of type: greatest length 24; basal length 22.2; basilar length 21; zygomatic breadth 13.6; mastoid breadth 11.8; greatest breadth of braincase above roots of zygomata 11.4; interorbital constriction 4; nasals 7; incisive foramen 5; diastema 6.8; palatal length 11; occipital depth (at front of basioccipital) 7; frontopalatal depth (at middle of molar series) 6.2; mandible 15; maxillary tooththrow (alveoli) 6; mandibular tooththrow 5.6.

*Measurements.*—Average of sixteen topotypes: total length 138; tail vertebræ 44.6; hind foot with claws 19.2; hind foot without claws 17.9. For details see table, page 107.

*Specimens examined.*—Twenty, from the following localities: France, Montauban (near Geneva, Switzerland) 17; Switzerland, Vand (near Lausanne) 1 (skull); St. Gallen, 2.

*Remarks.*—This animal is so well differentiated from true *Evotomys*

*hercynicus* in both cranial characters and color that I hesitate to give it a trinomial name. So far as known it is confined to the low country lying between the Alps and the Jura, where it is probably insulated. If intergradation with *E. hercynicus hercynicus* does occur it is to be looked for in the region about St. Gallen or in extreme southwestern Bavaria. The two specimens from St. Gallen though closely agreeing with the type in color show an approach to the usual narrow form of skull. At Marxheim, Bavaria, about 50 miles northeast of St. Gallen, *E. h. hercynicus* occurs in its most extreme phase.

### EVOTOMYS HERCYNICUS HERCYNICUS (Mehlis).

1831. *Hypudaeus hercynicus* MEHLIS, Isis, 1831, p. 876.

1857. *Arvicola glareolus* BLASIUS, Fauna der Wirbelthiere Deutschlands, I, Säugethiere, p. 337 (part). Not *Mus glareolus* SCHREBER.

*Type locality*.—Harz Mountains, Germany.

*Geographic distribution*.—Dry interior region of Germany and western Russia. Limits of range not known.

*General characters*.—Most brightly colored of the races of *Evotomys hercynicus*. Size rather large (hind foot 19 (18), total length 140); tail forming 30–33 percent of total length. Red dorsal area in both pelages well defined and narrow, rufous, not intermixed with gray. Belly very slightly washed with buff. *Sides and rump in summer pelage strongly contrasted with back*. Tail always brown above.

*Color*.—*Summer pelage*: dorsal stripe narrow and well defined, not tending to spread over sides. It is rufous slightly varied with yellowish wood-brown, and rather thickly sprinkled with black-tipped hairs. Face, cheeks and sides pale yellowish wood-brown tinged with gray and fading to grayish white on belly. Rump like sides, strongly contrasted with dorsal stripe. Feet grayish white. A dark shade at ankle. Sides of muzzle essentially like cheeks. Ears thinly haired, like dorsal stripe in color. Tail sharply bicolor, brown above (darker at tip), soiled white below. *Winter pelage*: dorsal stripe slightly less sharply defined than in summer, the rufous paler and warmer, considerably varied with yellowish wood-brown, but very inconspicuously sprinkled with black-tipped hairs. Face, cheeks, and sides more yellowish wood-brown than in summer, and scarcely tinged with gray. Rump slightly suffused with color of dorsal area, and therefore less contrasted with back than in summer. Feet pure white.

*Skull*.—Measurements of an adult (♂) skull from Brunswick, Germany: greatest length 24; basal length 22.2; basilar length 20;

zygomatic breadth 13.8; mastoid breadth 11; interorbital constriction 4; nasals 5.8; incisive foramen 4.8; diastema 6.6; palatal length 10.8; occipital depth (in median line) 7; frontopalatal depth (at middle of molar series) 6; mandible 14; maxillary toothrow (alveoli) 5.6; mandibular toothrow (alveoli) 5.

*Measurements.*—Average of seventeen specimens from Brunswick, Germany: total length 141.5; tail vertebræ 46.6; hind foot with claws 19; hind foot without claws 18.5. Average of twenty specimens from Marxheim, Bavaria, Germany, total length 137; tail vertebræ 44.3; hind foot with claws 18.8; hind feet without claws 17.8. For details see table, page 108.

*Specimens examined.*—Eighty-four, from the following localities: Germany, Brunswick, 56 (12 in alcohol); Marxheim (on one of the branches of the upper Danube), Bavaria, 27; Roumania, Busetinari, 1.

*Remarks.*—*Evotomys hercynicus hercynicus* is characterized by its light bright color and narrow, clear rufous dorsal stripe, which in summer is sharply contrasted with the pale sides and rump.

#### EVOTOMYS HERCYNICUS SUECICUS subsp. nov.

*Type.*—Adult female (skin and skull) no. 85046, United States National Museum, collected at Upsala, Sweden, August 6, 1898, by J. Alden Loring. Original number 5009.

*Geographic distribution.*—This race is, so far as known, confined to non-boreal Sweden.

*General characters.*—Dorsal red area dull ochraceous rufous, narrower than in any of the other forms of *Evotomys hercynicus*. Rump and buttocks noticeably gray in contrast with back. Ratio of tail vertebræ to total length 28–30. Size large (hind foot 19 (18), total length 145). Only summer pelage known.

*Color.*—*Summer pelage:* dorsal stripe very narrow, neither sharply defined nor tending to spread over sides. It is dull ochraceous rufous, much lightened by an irregular suffusion of pale wood-brown and very faintly darkened by a sprinkling of black-tipped hairs. Face, cheeks and sides light broccoli-brown, fading abruptly to pale smoke gray on ventral surface. Belly irregularly clouded by the slaty underfur. Rump scarcely darker than sides, well contrasted with dorsal stripe. Feet light gray. A dark shade at ankle. Sides of muzzle very faintly yellowish than cheeks. Ears thinly haired, essentially like dorsal stripe in color. Tail sharply bicolor, dark brown above, whitish below. Winter pelage not known.

*Measurements.*—Average of seven specimens from the type locality: total length 139; tail vertebræ 40; hind foot with claws 19; hind foot without claws 17.8. For details see table, page 109.

*Specimens examined.*—Seven, all from the type locality.

*Remarks.*—In *Evotomys hercynicus succicus* the colors are darkened about as in *E. h. rubidus*, but the dorsal red area is at the same time distinctly narrowed. The difference is readily seen when a number of specimens are laid with the sides in contact. In *E. h. rubidus* as in *E. h. hercynicus*, the gray of the sides is then quite hidden, while in *E. h. succicus* it is still conspicuously visible.

### EVOTOMYS HERCYNICUS RUBIDUS (Baillon).

1828. *Arvicola fulvus* MILLET, Faune de Maine-et-Loire, II, p. 40. Not of GEOFFROY and DESMAREST.

1834. "*Lemmus rubidus* BAILLON, Mém. Soc. Émul. Abbeville, 1834."

1834. ? *H[ypudæus] glareolus* MELCHIOR, Den danske Stats og Norges Patentedyr, p. 116.

1836. *Arvicola rufescens* DE SELYS-LONGCHAMPS, Essai Monographique sur les Campagnols des Environs de Liège, p. 13.

1842. *Arvicola pratensis* CUVIER, Histoire Naturelle des Mammifères, VII, Table Generale et Methodique (Described and figured in Livr. 68 of same work, 1834).

*Type locality.*—Abbeville, Somme, France.

*Geographic distribution.*—Humid coast district of Belgium and northern France, probably extending north to Denmark. Limits of range quite unknown.

*General characters.*—Size as in *E. hercynicus hercynicus*, but tail relatively longer, forming 33 to 37 percent of total length. Red dorsal area in winter pelage broad and diffuse, dull ferruginous, not intermixed with gray. Belly heavily washed with buff. Tail dark brown above.

*Color.*—Summer pelage not known. *Winter pelage:* red dorsal area diffuse and ill defined, extending from eyes nearly to base of tail and tending to spread slightly over sides. In general color it is very nearly mars brown or Prouts brown, though occasionally approaching russet, the general effect resulting from a mixture of cinnamon rufous, vinaceous rufous, and black. Sides and cheeks dull brownish buff thickly sprinkled with black. The color of sides fades insensibly into that of back and abruptly into the strongly buff-tinged gray of the belly. The buff wash on the ventral surface is variable but always conspicuous. On sides and belly the slaty underfur appears irregularly at the surface. Face slightly darker than cheeks. Tail sharply bi-

color, dark brown above, soiled white below. Feet white, distinctly tinged with brown. Ears like dorsal stripe. A few very inconspicuous whitish hairs on back of ear.

*Skull.*—The skull is as in typical *Evotomys hercynicus*.

*Measurements.*—Average of eighteen specimens from Waremme, Belgium: total length 134; tail vertebræ 46.9; hind foot with claws 19.2; hind foot without claws 18.3. For details see table, page 107.

*Specimens examined.*—Thirty-seven, from the following localities: Belgium; Waremme, 34 (7 in alcohol). France; Dinon, Brittany, 1 (Miller coll.); exact locality unknown, 2 (Miller coll.).

*Remarks.*—*Evotomys hercynicus rubidus* is distinguished from *E. h. hercynicus* by its darker, duller color, from *E. h. britannicus* by its larger hind foot, and from *E. h. succicus* by its broad ill defined dorsal stripe. It differs furthermore from all the other races of *Evotomys hercynicus* in its relatively longer tail.

While the race finds its full development in Belgium and in northern France the limits of its range are still unknown. It probably occupies the entire coast district of northern central Europe.

A single specimen from Cadillac, Gironde, France (♀ ad. no. 86-980, R. T. Young, collector) is in many ways so peculiar that I hesitate to refer it to *Evotomys hercynicus rubidus* or to any of the known forms of the species. Taken on June 25, 1899, it represents the perfectly developed summer pelage. In general color it is a brownish cinnamon rufous, becoming slightly paler and more ochraceous on the sides; ventral surface and feet solid whitish buff. Tail dull brown above, whitish below. Measurements: total length, 139; head and body, 96; tail vertebræ, 41; hind foot, 19 (18); ratio of tail vertebræ to total length, 30. The skull is peculiar in the unusual width of the incisive foramina.

#### EVOTOMYS HERCYNICUS BRITANNICUS subsp. nov.

1832. *Arvicola riparius* YARRELL, Proc. Zool. Soc., London, 1832, p. 109.

May 22, 1832. Not of ORD, 1825.

1898. *Evotomys glareolus* THOMAS, The Zoologist, 4th ser., II, p. 101. March, 1898. Not *Mus glareolus* of SCHREBER.

*Type.*—Adult female (skin and skull), no. 2944, Miller collection, taken at Basingstoke, Hampshire, England, August 6, 1894, by Gerrit S. Miller, Jr.

*Geographic distribution.*—England and Scotland.

*General characters.*—In color similar to *Evotomys hercynicus rubidus*, but slightly darker. Summer pelage with red of dorsal area

tending to spread widely over sides, *with which as well as with rump it forms no marked contrast*. Feet and tail shorter than in *E. hercynicus rubidus*.

*Color*.—*Summer pelage*: dorsal stripe broad, very ill defined and spreading irregularly over sides. Its general color is mummy brown or somewhat more red, resulting from a slightly different combination of the tints that produce the mars brown of *E. hercynicus rubidus*. Sides and cheeks broccoli-brown slightly tinged with buff and like the back thickly sprinkled with black tipped hairs. Underparts buff, sometimes clear and pale, often dark and brownish. Rump forming no distinct contrast with back. Ears like dorsal stripe. Tail bicolor but not very conspicuously so, blackish brown above, dull white below. Feet whitish, much tinged with brown. *Winter pelage* as in *E. hercynicus rubidus*.

*Measurements*.—Average of twenty specimens from southern England: total length 146; tail vertebræ 46.6; hind foot with claws 17.8; hind foot without claws 16.8. For details see table, page 109.

*Specimens examined*.—Forty-three (Miller collection) from the following localities: England: Aberia, Merionethshire, 3; Basingstoke, Hampshire, 19; Eversley, Hampshire, 9; Graftonbury, Hereford, 2; Leigh Woods, Clifton, 2; Lilford, Northants, 1; New Forest, Hants, 4; Oundle, Northants, 1. Scotland: Dumphail, Elgin, 4.

*Remarks*.—The British redbacked mouse needs comparison with only one of the Continental races, *Evotomys hercynicus rubidus*. With this form it agrees in color, though carrying the peculiarities to a slightly greater extreme. In general size it equals the other races: but the hind foot is distinctly smaller, while in shortness of tail it is exceeded by *E. hercynicus suecicus* only. This animal is the '*glareolus*' of all authors dealing exclusively with British mammals.

MEASUREMENTS OF THIRTY-SIX SPECIMENS OF EVOTOMYS  
NAGERI.

Locality.	Number.	Sex.	Total length.	Head and body.	Tail vertebrae.	Hind foot. (c.u.)	Hind foot. (s.u.)	Ratio of tail vert. to total length.
Switzerland: Andermatt.	85703	♂	145	93	52	20	19	35+
“ “	85707	♂	148	95	53	19	18	35+
“ “	85711	♂	149	93	56	20	19	37+
“ “	85700	♀	147	92	55	19	18	37+
“ “	85704	♀	184	112	72	20	19	38+
“ “	85705	♀	148	93	55	20	19	37+
“ “	85708	♀	145	93	52	20	19	35+
“ “	85709	♀	171	106	65	20	19	38
“ “	85710	♀	160	101	59	20	19	36+
“ “	85714	♀	148	92	56	20	19	37+
“ “	85715	♀	165	106	59	20	19	35+
“ “	85716	♀	170	105	65	20	19	38+
“ Brünig.	85795	♂	162	105	57	21	20	35+
“ “	85796	♂	161	104	57	22	20	35+
“ “	85797	♂	149	95	54	20	19	36+
“ “	85805	♂	154	100	54	20	19	35+
“ “	85806	♂	154	99	55	20	19	35+
“ “	85813	♂	155	99	56	21	20	36+
“ “	85798	♀	176	105	71	20	19	39+
“ “	85799	♀	155	100	55	20	19	35+
“ “	85800	♀	149	97	52	20	19	35—
“ “	85803	♀	150	94	56	20	19	37+
“ “	85808	♀	171	109	62	21	19	36+
“ “	85809	♀	146	94	52	20	19	35+
“ “	85810	♀	151	100	51	20	19	33+
“ “	85811	♀	151	97	54	21	20	35+
“ Meiringen.	85910	♂	165	106	59	22	20	35+
“ “	85913	♂	157	102	55	20	19	35+
“ “	85914	♂	146	91	55	20	18	37+
“ “	85916	♂	157	99	58	21	20	36+
“ “	85917	♂	147	95	52	21	20	35+
“ “	85909	♀	152	98	54	20	19	35+
“ “	85911	♀	166	105	61	21	20	36+
“ “	85912	♀	157	102	55	21	20	35+
“ “	85915	♀	173	109	64	20	19	37—
“ “	85919	♀	144	94	50	21	20	34+

MEASUREMENTS OF NINETEEN SPECIMENS OF EVOTOMYS  
NORVEGICUS.

Locality.	Number.	Sex.	Total length.	Head and body.	Tail vertebrae.	Hind foot. (c. u.)	Hind foot. (s. u.)	Ratio of tail vert. to total length.
Norway: Bergen	84672	♂ <sup>1</sup>	167	—	56	21.5	—	33+
" "	84673	♂	159	—	54	20.5	—	33+
" "	84675	♂	164	—	56	20.5	—	34+
" Graven, Hardanger	84678	♂	153	—	52	21	—	34—
" " "	84680	♂	157	—	55	21	—	35+
" " "	84683	♂	166	—	56.5	21	—	34+
" " "	84684	♂	175	—	60.5	20.5	—	34+
" " "	84685	♂	172	—	57.5	20.5	—	33+
" " "	84686	♂	161	—	55.5	21	—	34+
" " "	84687	♂	152	—	55	20.5	—	36+
" Bergen	84674	♀ <sup>2</sup>	165	—	57	21.5	—	34+
" Graven, Hardanger	84676	♀	156	—	57	21	—	36+
" " "	84677	♀	164	—	54	20	—	32+
" " "	84679	♀	172	—	57	21	—	33+
" " "	84681	♀	169	—	57	20.5	—	33+
" " "	84682	♀	173	—	60	21	—	34+
" " "	84688	♀	160	—	55.5	21	—	34+
" " "	84689	♀	165	—	57	20.5	—	34+
" Opheim	4462 <sup>3</sup>	♀	156	—	57	21	—	36+

MEASUREMENTS OF TWO SPECIMENS OF EVOTOMYS  
VASCONIÆ.

Locality.	Number.	Sex.	Total length	Head and body.	Tail vertebrae.	Hind foot. (c. u.)	Hind foot. (s. u.)	Ratio of tail vert. to total length.
Montréjeau, France	86994	♂ <sup>4</sup>	162	107	53	20.4	19	33—
" "	86995	♀	159	105	51	20	18	32+

<sup>1</sup>U. S. National Museum.

<sup>2</sup>Type.

<sup>3</sup>Miller collection.

<sup>4</sup>Type.

MEASUREMENTS OF SIXTEEN SPECIMENS OF EVOTOMYS HER-  
CYNICUS HELVETICUS.

Locality.	Num-ber.	Sex.	Total length	Head and Body.	Tail verte-bræ.	Hind foot. c. u.	Hind foot. s. u.	Ratio of tail vert. to total length.
Montaubau, Hte. Savoie, Fr.	102019	♀	152	101	51	20.6	19	33+
" " "	102020	♂	133	91	42	20	18	31+
" " "	102021	♂	134	90	44	18.4	17	32+
" " "	102022	♂	128	88	40	19.8	18	31+
" " "	102023	♂	142	97	45	19	18	31+
" " "	102024	♂	157	107	50	19.4	18	31+
" " "	102025	♂	150	100	50	19.5	18	31+
" " "	102026	♂	143	100	43	20	19	30+
" " "	102027	♂	123	86	37	19	18	30+
" " "	102028	♂	137	93	44	19.5	18	31+
" " "	102029	♂	138	93	45	18.6	17	32+
" " "	102031	♂	141	95	46	19	18	32+
" " "	102032	♂	135	91	44	18.4	17	32+
" " "	102033	♂	134	90	44	18.4	17	32+
" " "	102034	♂	127	83	44	19	18	34+
" " "	21	♂	140	95	45	19.5	18	32+

MEASUREMENTS OF EIGHTEEN SPECIMENS OF EVOTOMYS  
HERCYNICUS RUBIDUS.

Locality.	Num-ber.	Sex.	Total length.	Head and Body.	Tail verte-bræ.	Hind foot. c. u.	Hind foot. s. u.	Ratio of tail vert. to total length.
Waremme ; Belgium.	86028	♂	149	96	53	19	18	36+
" " "	86029	♂	134	86	48	19	18	35+
" " "	86036	♂	130	86	44	20	19	34+
" " "	86037	♂	131	85	46	19	18	35+
" " "	86042	♂	125	81	44	19	18	35+
" " "	86043	♂	139	90	49	19	18	35+
" " "	86030	♀	127	82	45	19	18	35+
" " "	86033	♀	127	82	45	19	18	35+
" " "	86038	♀	146	93	53	20	19	36+
" " "	86039	♀	123	81	42	20	19	34+
" " "	86040	♀	123	77	46	20	19	37+
" " "	86041	♀	130	85	45	18	17	34+
" " "	86044	♀	144	96	48	20	19	33+
" " "	86045	♀	129	82	47	20	19	36+
" " "	86046	♀	139	92	47	19	18	34-
" " "	86047	♀	155	101	54	19	18	35-
" " "	86049	♀	128	85	43	19	18	33+
" " "	86050	♀	133	87	46	19	18	34+

MEASUREMENTS OF FORTY-FIVE SPECIMENS OF EVOTOMYS  
HERCYNICUS HERCYNICUS.

Locality.	Num-ber.	Sex.	Total length.	Head and body.	Tail verte-bræ.	Hind foot (c. u.)	Hind foot (s. u.)	Ratio of tail vert. to total length.
Germany: Brunswick.	85291	♂	132	91	42	18	17	31+
"	85292	♂	139	94	44	19	18	31+
"	85293	♂	141	94	46	19	18.5	32+
"	85294	♂	143	100	43	19	18	30+
"	85295	♂	138	94	43	19	18	31+
"	85298	♂	138	91	44	20	19	31+
"	85299	♂	142	98	43	20	19	30+
"	85301	♂	132	89	42	19	18	31+
"	85302	♂	145	98	47	19	18	32+
"	85303	♂	137	90	44	19	18	32+
"	85301	♂	137	95	42	19	17	30+
"	85315	♂	147	102	45	19	18	31+
"	85646	♂	158	108	50	18	17	31+
"	85296	♀	147	98	45	19	17	30+
"	85297	♀	145	99	45	19	18	31+
"	85305	♀	152	102	48	20	19	31+
"	85320	♀	132	92	40	18	17	30+
"	101993	♀	134	92	42	17	16	31+
"	101994	♀	137	91	46	18	17	33+
"	101995	♀	135	92	43	19	17.4	32
"	101996	♀	143	98	45	19.4	18	31
"	101997	♀	143	98	45	19	18	31
"	101998	♀	126	85	41	19	18.8	32+
"	102001	♀	130	90	40	—	—	30+
"	102003	♀	125	90	35	18.8	18	29+
"	102006	♀	132	88	44	18	17	33+
"	102010	♀	140	92	48	19	18	34+
"	102002	♂	133	89	44	19	17.8	33+
"	102004	♂	144	94	50	19.4	18	34+
"	102005	♂	133	89	44	19	17.8	33+
"	102007	♂	141	94	47	19	18	33+
"	102008	♂	136	88	48	19	18	34+
"	102009	♂	138	95	43	19	17	31+
"	102013	♂	134	90	44	18.6	17.4	33+
"	102014	♂	140	95	45	18.6	17.6	33+
"	102017	♂	130	86	44	19.4	18	33+
"	102018	♂	140	93	47	19	18	33+

MEASUREMENTS OF TWENTY-SIX SPECIMENS OF EVOTOMYS  
HERCYNICUS BRITANNICUS.

Locality.	Number.	Sex.	Total length.	Head and body.	Tail vertebrae.	Hind foot (c. u.).	Hind foot (s. u.).	Ratio of tail vert. to total length.
England; New Forest.	2968 <sup>1</sup>	♂	138	—	43	18	—	31+
“ “ “	2969	♂	138	—	42	17	—	30+
“ Eversley.	2970	♂	146	—	44	18	—	30+
“ “	2971	♂	148	—	45	18	—	30+
“ “	2972	♂	146	—	46.6	18	16.5	31+
“ “	2973	♂	148	—	51	17.8	17	33+
“ Basingstoke.	2974	♂	147	—	48	18	—	32+
“ “	2975	♂	139	—	46	17.8	—	33+
“ “	2976	♂	139	—	41	18	17	30—
“ “	2977	♂	139	—	44	18	17	31+
“ Eversley.	2979	♂	137	—	43	17.4	16.6	31+
“ New Forest.	2937	♀	134	—	41	18	16.6	30+
“ Eversley.	2938	♀	145	—	47	17	—	32+
“ “	2940	♀	140	—	46	17	16	32+
“ Basingstoke.	2941	♀	141	—	46.8	17.8	—	33+
“ “	2942	♀	158	—	52	19	—	32+
“ “	2943	♀	140	—	47.6	18.4	17	33+
“ “	2944	♀ <sup>2</sup>	156	—	51	17.4	16.6	32+
“ “	2945	♀	159	—	52	17	—	32+
“ “	2946	♀	160	—	54	18	—	33+
“ “	2947	♀	147	—	44	18	17	30—
“ “	2949	♀	158	—	51	18	—	32+
“ “	2950	♀	161	—	54	18	—	33+
“ “	2951	♀	137	—	42	18	17	30+
“ “	2952	♀	137	—	43	18	17	31+
“ Eversley.	2956	♀	150	—	51	18.8	17	34

MEASUREMENTS OF SEVEN SPECIMENS OF EVOTOMYS  
HERCYNICUS SUECICUS.

Locality.	Number.	Sex.	Total length.	Head and body.	Tail vertebrae.	Hind foot (c. u.).	Hind foot (s. u.).	Ratio of tail vert. to total length.
Sweden: Upsala.	85047	♂	135	90	40	19	17.5	29+
“ “	85048	♂	135	94	41	20	18	29+
“ “	85049	♂	137	92	42	19	17	30+
“ “	85050	♂	134	92	38	19	18	29+
“ “	85051	♂	143	99	40	18	17	28—
“ “	85052	♂	148	103	43	19	18	29+
“ “	85046	♀ <sup>3</sup>	146	96	42	19	18	29+

<sup>1</sup> Miller collection.<sup>2</sup> Type.<sup>3</sup> Type.