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**Title:** Comments on the Taxonomy and Geographic Distribution of Some North American Rodents

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**Release Date:** August 30, 2010 [EBook #33578]

**Language:** English

**Credits:** Produced by Chris Curnow, Joseph Cooper, Josephine Paolucci and the Online Distributed Proofreading Team at <https://www.pgdp.net>.

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**BY**

**E. RAYMOND HALL and KEITH R. KELSON**

University of Kansas Publications  
Museum of Natural History

Volume 5, No. 26, pp. 343-371  
December 15, 1952

UNIVERSITY OF KANSAS  
LAWRENCE  
1952

UNIVERSITY OF KANSAS PUBLICATIONS, MUSEUM OF NATURAL HISTORY

Editors: E. Raymond Hall, Chairman, A. Byron Leonard,  
Edward H. Taylor, Robert W. Wilson

Volume 5, No. 26, pp. 343-371  
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UNIVERSITY OF KANSAS  
Lawrence, Kansas

PRINTED BY  
FERD VOILAND, JR., STATE PRINTER  
TOPEKA, KANSAS  
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**Comments on the Taxonomy and Geographic Distribution of Some North American Rodents**

[Pg 345]

**BY**

## E. RAYMOND HALL and KEITH R. KELSON

In preparing maps showing the geographic distribution of North American mammals we have found in the literature conflicting statements concerning the subspecific identity of several rodents. Wherever possible, we have examined the pertinent specimens. Results of our examination are given below.

Our studies have been aided by a contract (NR 161-791) between the Office of Naval Research, Department of the Navy, and the University of Kansas. Also, a grant from the Kansas University Endowment Association has permitted field work that yielded some of the specimens used for comparison. Grateful acknowledgment is made to the persons in charge of the several collections of mammals that we have consulted in order to satisfy ourselves concerning the subspecific status of specimens from many localities.

### ***Marmota flaviventer luteola*** A. H. Howell

A. H. Howell (N. Amer. Fauna, 37:50, April 7, 1915) referred specimens from Bridgers Pass, Wyoming, to *Marmota flaviventer dacota*, on the basis of paler underparts because, according to the data of Howell (*op. cit.*), *M. f. dacota* and *M. f. luteola*, the contiguous subspecies, do not differ significantly in other ways. Casual comparison reveals to us no additional differences between the two. We have examined the three specimens available to Howell from Bridgers Pass (Nos. 18733/25527, 18734/25528, and 18735/25529 U. S. Biol. Surv. Coll.) and find the tone of the underparts to be darker (more nearly russet) than in typical *luteola*. The tone, however, varies considerably, both individually and geographically, in *luteola* and it is possible to match almost exactly the ventral coloration of the specimens from Bridgers Pass with that of specimens from within the geographic range of *luteola*; Nos. 160509, from Bear Creek, 8 miles west of Eagle Peak, Wyoming, 18875 and 18731/25535, from the Laramie Mts., Wyoming, and No. 203744 from Sulphur Springs, Grand County, Colorado, all in the United States Biological Surveys Collection, are examples to the point. Being influenced by the geography of the region, we therefore consider the three specimens from Bridgers Pass best referred to the subspecies *Marmota flaviventer luteola*.

[Pg 346]

### ***Spermophilus variegatus grammurus*** (Say)

A. H. Howell (N. Amer. Fauna, 56:147, May 18, 1938) accorded *Citellus* [= *Spermophilus*] *variegatus utah* Merriam a geographic range that included the Kaibab Plateau of Arizona. Durrant (Univ. Kansas Publ. Mus. Nat. Hist., 6:119, August 10, 1952) assigned to *S. v. grammurus* a geographic range that included southern Utah from the eastern to the western border but in doing this did not mention the rock squirrel of the Kaibab Plateau of Arizona that also might be expected to be referable to *S. v. grammurus*. Howell (*loc. cit.*) had two specimens from the Kaibab Plateau. Of these we have examined the one from Big Spring (161566 BS) and find that it lacks the darker (more tawny) head and posterior back of *C. v. utah* and agrees with *C. v. grammurus*. On this basis we refer the rock squirrel of the Kaibab Plateau to the subspecies *Spermophilus variegatus grammurus* (Say).

### ***Tamias amoenus caurinus*** Merriam

This subspecies was named from the Olympic Peninsula of Washington. A. H. Howell, in his "Revision of the American chipmunks" (N. Amer. Fauna, 52:77, and fig. 5, 1929) regarded the geographic range of *Eutamias* [= *Tamias*] *amoenus caurinus* as the mountains of the Olympic Peninsula and most of Mt. Rainier. The geographic range of the *amoenus* chipmunk on Mt. Rainier almost certainly is continuous with that of *T. a. ludibundus* in the Cascade Mountains of which Mt. Rainier is a westward-projecting arm. There is no contact between the chipmunks of Mt. Rainier and those of the Olympic Peninsula; those on the Peninsula are geographically isolated from all others of the species and are separated from those on Mt. Rainier by approximately eighty miles of low-lying country, which is uninhabited by chipmunks of the species *Tamias amoenus*. Therefore, Howell's (*loc. cit.*) assignment of most of the chipmunks on Mt. Rainier to *caurinus* is open to question and Dalquest, in the "Mammals of Washington" (Univ. Kansas Publ. Mus. Nat. Hist., vol. 2, 1948) evidently thought that Howell had incorrectly identified them. On page 256 Dalquest (*op. cit.*) defined the geographic range of *T. a. caurinus* as restricted to the Olympic Peninsula and showed (fig. 81) Mt. Rainier to be in the geographic range of *T. a. ludibundus*. We would accept Dalquest's (*op. cit.*) arrangement without question and also would follow it because it is the more recent one were it not for the fact that Dalquest gives no reason for his changes. To allow us to decide the matter we have compared the pertinent materials ourselves. Catalogue numbers below are of the United States National Museum, Biological Surveys Collection, and each specimen mentioned by catalogue number is an adult female which shows much wear on the fourth upper premolar.

[Pg 347]

Of *T. a. caurinus*, Nos. 241902 and 241903 are from 2 mi. SW of Mount Angeles; No. 241911 is from "near" head of Dosewallips River, 6000 ft., and No. 241915 is from Canyon Creek, 3 mi. S Soleduc River, 3550 ft. Of *T. a. ludibundus*, Nos. 234776 and 235018 are from Barron, 5000 ft., and No. 230685 is from Suiattle River, 6500 ft. Of specimens in question, from Mount Rainier, No. 90635 is from 6500 ft., west slope; No. 232729 is from 4900 ft., Reflection Lakes, and No. 233114 is from 5300 ft., Indian Henrys.

In comparison with *T. a. ludibundus*, *T. a. caurinus* is grayer on most, or all, parts of the pelage, has less ochraceous on the sides, and the dark stripes on the sides of the head are narrower and less reddish (more grayish). The skull of *caurinus* is larger in certain measurements, as shown

below:

Catalogue number	Occipitonasal length	Zygomatic breadth	Cranial breadth	Length of nasals	Greatest width across upper molars
<i>T. a. ludibundus</i>					
234776	34.0	19.3	15.6	10.2	...
235018	34.1	....	....	10.4	8.0
230685	33.5	18.8	15.5	10.4	7.9
Mt. Rainier					
90635	34.5	19.2	16.3	10.8	8.3
232729	....	18.5	15.3	....	8.2
233114	34.2	18.6	15.7	10.8	8.0
<i>T. a. caurinus</i>					
241911	34.5	19.7	16.2	11.3	8.3
241915	34.2	....	....	10.3	8.3
241902	35.2	....	16.8	11.1	8.1
241903	34.7	....	16.0	10.8	8.4

Howell (*op. cit.*:75) referred three specimens from Glacier Basin, on the northeastern part of Mount Rainier, to *T. a. ludibundus* as he did also one specimen (*loc. cit.*) from Reflection Lakes, on the southern flank of the mountain. Our comparisons indicate the correctness of Howell's identification of the specimens from Glacier Basin; they more closely resemble *ludibundus* than *caurinus*. The specimen from Reflection Lakes, however, is only one of five or six from the same place; the others were lumped by him among the 49 that he recorded from Mount Rainier under the name *caurinus*. The series from Reflection Lakes, so far as we can detect, is not unusually variable and the differences that are apparent are within the normal range of variation ascribable to season, age, and individualism. Also, the series from Reflection Lakes, to us, is not appreciably different from the other series, representing the following places on Mount Rainier: Indian Henrys, 5300 ft.; W slope Mt. Rainier, 6600 ft.; St. Andrews Park, 5500 ft.; Spray Park, 5500 ft.; Paradise Park; Muddy Fork of Cowlitz River; Sunset Park, 5000 ft.; ridge between St. Andrews Park and South Puyallup River, 6000 ft.; and Owyhigh Lakes, 5350 ft.

[Pg 348]

Collectively, or individually, where there are as many as six specimens from a place, the material from Mt. Rainier (Glacier Basin excepted) is intermediate in color between *T. a. ludibundus* and *T. a. caurinus* and no more closely resembles one subspecies than the other. As may be seen from the cranial measurements recorded above, specimens from Mt. Rainier, although intermediate between the two subspecies just mentioned, resemble *ludibundus* in lesser zygomatic breadth and lesser cranial breadth (and, it may be added, in lesser dorsolateral inflation of the braincase), but resemble *caurinus* in longer skull (occipitonasal length), longer nasals and greater breadth across the rows of upper molariform teeth.

In summary: The animals from Mount Rainier, in features of taxonomic import, are almost exactly intermediate between *T. a. caurinus* and *T. a. ludibundus*. Being influenced by considerations of geographic adjacency, we refer the animals on Mount Rainier to *Tamias amoenus ludibundus* (Hollister).

Dalquest's (*op. cit.*: 85) explanation of the probable origin of *Tamias amoenus caurinus* is pertinent here. He writes: "The chipmunks of the Olympic Mountains [*caurinus*] probably reached their present range from the Cascades. Their probable path of emigration was westward from Mt. Rainier, along the glacial outwash train of Nisqualli Glacier, to the moraine and outwash apron of the Vashon Glacier and thence to the Olympics. So similar are the chipmunks of Mt. Rainier and the Olympic Mountains that Howell (1929) included Mt. Rainier in the range of *caurinus*."

[Pg 349]

### **Tamias townsendii cooperi Baird**

Some uncertainty exists concerning the subspecific identity of the Townsend Chipmunk in southern Washington because Dalquest (Univ. Kansas Publ. Mus. Nat. Hist., 2:262, April 9, 1948) identified as *Tamias townsendii cooperi* specimens that he examined from Yocolt, a place well within the geographic range of *T. t. townsendii* as defined by A. H. Howell (N. Amer. Fauna, 52: fig. 7, p. 107, November 30, 1929). Dalquest (*op. cit.*) referred other specimens, that he did not examine, from Mt. St. Helens (90654, 231112 and 231114 BS) to *T. t. cooperi* although Howell (N. Amer. Fauna, 52:109, November 20, 1929) had previously identified them as *E. t. townsendii*. By implication, and on his map, Dalquest (*op. cit.*, fig. 83, p. 261) assigned to *T. t. cooperi* still other specimens, that he had not examined, from: Government Springs, 15 mi. N Carson (230514, 230515, 230559, 230560, and 230563 BS); Stevenson (230513 and 230517 BS); and Skamania (230518 BS). Earlier, Howell (*op. cit.*) had listed the specimens from the three mentioned localities as *Eutamias townsendii townsendii*.

Our examination of specimens in the Museum of Vertebrate Zoology from 1-1/2 mi. W Yocolt (94238 and 94239 MVZ) and from 3-1/2 mi. E and 5 mi. N Yocolt (94240-94244 MVZ) reveals that

the "average" of the coloration is nearer to that of the paler *T. t. cooperi* than to that of the darker *T. t. townsendii* and indicates why Dalquest, we think correctly, identified specimens from Yocolt as *T. t. cooperi*. We have examined also the specimens in the Biological Surveys Collection of the United States National Museum (catalogue numbers given above) and have compared them with specimens (comparable in age and seasonal condition of pelage) of *T. t. townsendii* (notably a series from Lake Quinalt, Washington) and of *T. t. cooperi* (including specimens from Bumping Lake and Blewett Pass, Washington). In color, the specimens from Mt. St. Helens are almost exactly intermediate between *T. t. cooperi* and *T. t. townsendii*. We choose to use for them the name *T. t. townsendii* as did Howell (*op. cit.*:109). The specimens from 15 mi. N Carson, those from Stevenson and the one from Skamania agree in nearly all features of color with the relatively paler *T. t. cooperi*, as Dalquest (*op. cit.*) thought they would, and we, accordingly, use for them the name *Tamias townsendii cooperi*.

In view of the findings resulting from our study of the above mentioned specimens of the Townsend Chipmunk in Washington, it seemed worthwhile to examine the material of the same species from Hood River, Oregon. Howell (*op. cit.*:109) listed one specimen from there as *E. t. townsendii*, but (*op. cit.*: fig. 7, p. 107) mapped the locality as within the geographic range of *E. t. cooperi*. The specimen (89061 BS) is a juvenile having external measurements of only 175, 80 and 31. Although the color is intermediate between that of the two subspecies concerned, greater resemblance is shown to *T. t. townsendii*. We have not examined any other specimen of the species *Tamias townsendii* so young as No. 89061, but suspect that older specimens from the same place would be paler by a slight degree. This suspicion, and more especially the light color of an older specimen from nearby White Salmon, Washington, and the light color of two older specimens from Parkdale, Oregon, which seem to us to be referable to *T. t. cooperi*, influence us to refer the specimen from Hood River to *Tamias townsendii cooperi* Baird.

[Pg 350]

#### **Tamias townsendii townsendii** Bachman

A. H. Howell (N. Amer. Fauna, 52:111, November 30, 1929) referred specimens of the Townsend Chipmunk from the lower elevations on the Olympic Peninsula to *Eutamias townsendii townsendii* but referred specimens from the central mountains on that peninsula to *Eutamias townsendii cooperi*. The subspecies *T. t. cooperi* thus is represented as having a geographic range of two separate parts: (1) The Cascade Mountains from southern British Columbia into southern Oregon, and (2) the area of the Olympic Mountains, the latter area being entirely surrounded by the geographic range of *T. t. townsendii*. Dalquest (Univ. Kansas Publ. Mus. Nat. Hist., 2:261 and 262, April 9, 1948) employed Howell's arrangement.

We have examined the specimens, in the Biological Surveys Collection of the United States National Museum, from the Olympic Peninsula and fail to find significant differences in external measurements or in size or shape of skulls between specimens from the mountains (alleged *T. t. cooperi*) and those from other parts of the Peninsula (assigned to *T. t. townsendii*). Nevertheless, the specimens from the higher parts of the Olympic Mountains resemble *T. t. cooperi* in being less ochraceous than are specimens of *T. t. townsendii* from elsewhere on the Olympic Peninsula, and in this one respect, in series, they more closely resemble *T. t. cooperi*. Even so, the upper parts of the specimens from the mountains are darker than in *T. t. cooperi* of the Cascades. In dark color of the superciliary stripe the specimens in question are referable to *T. t. townsendii*. The over-all gray tone, resembling that of *T. t. cooperi*, upon close inspection is found to be in considerable degree the result of wear, and the difference in grayness from *T. t. townsendii*, when specimens in comparable pelage are compared, is slight. This tendency to lighter color in specimens from higher elevations is seen in other places in Washington within the geographic range of *Tamias townsendii*. We feel, therefore, that the mentioned resemblance in color between specimens from the Olympic Mountains and those of *T. t. cooperi* from the Cascade Mountains is not significant taxonomically. To us, all of the animals of the species *Tamias townsendii* from the Olympic Peninsula seem best referred to the subspecies *Tamias townsendii townsendii* Bachman.

[Pg 351]

#### **Tamias striatus ohionensis** Bole and Moulthrop

A. H. Howell (Jour. Mamm., 13:166, May 14, 1932) referred a specimen (252979 USNM) from Athens, Ohio, to *Tamias striatus fisheri*. Subsequently, Bole and Moulthrop (Sci. Publs. Cleveland Mus. Nat. Hist., 5:83-181, September 11, 1942) named *Tamias striatus ohionensis* and *Tamias striatus rufescens*, both of which occur in Ohio. They (*op. cit.*: 137) also excluded *T. s. fisheri* from the state list of mammals of Ohio. The locality of Athens lies between the ranges of *T. s. ohionensis* and *T. s. rufescens*, as outlined by referred specimens, and thus the identity of the specimen from that place was left in doubt. We have examined the specimen and among named kinds find that it most closely resembles *T. s. ohionensis* in its less widely spreading zygomata, slender incisors and dull-colored pelage. We prefer the specimen to *T. s. ohionensis*.

The subspecific identity of specimen No. 174762 USNM, a skin only, from Nobleville, Hamilton Co., Indiana, assigned by Howell (N. Amer. Fauna, 52:21, November 30, 1929) to *T. s. griseus* and by Lyon (Amer. Mid. Nat., 17(1):191, January, 1936) to *T. s. fisheri*, was left in doubt by Bole and Moulthrop's (*op. cit.*) assignment of specimens to *T. s. ohionensis*. Although the specimen lacks a skull and tail, on the basis of its dull-colored pelage and dark brown (anteriorly) median dorsal stripe, we identify No. 174762 as *T. s. ohionensis*. For the same reason, specimen No. 125445 USNM, from Bascom, Indiana, referred by Howell (*op. cit.*:16) to *T. s. striatus*, and by Lyon (*op. cit.*:191) to *T. s. fisheri*, required re-examination. The specimen appears to be an intergrade between *T. s. striatus* and *T. s. ohionensis*; it is probably best referred to the latter subspecies which it resembles in having short nasals. In color it is intermediate, but it does not

possess the narrowly spreading zygomata of *T. s. ohionensis* and, in this respect, more nearly approaches *T. s. striatus*.

Specimen No. 13815 USNM, an alcoholic, from Wheatland, Knox Co., Indiana, was assigned by Howell (*op. cit.*, 1929:21) to *T. s. griseus* and by Lyon (*loc. cit.*) to *T. s. fisheri*. Although the specimen is much faded and cannot be identified with certainty, we assign it to *T. s. ohionensis*. Allowing for fading, it seems to resemble *ohionensis* more in the lighter color of the anterior part of the median dorsal stripe, than it does either *griseus* or *fisheri*. We are also influenced in making this allocation by Bole and Moulthrop's (*op. cit.*:137) finding intergradation between *T. s. ohionensis* and *T. s. striatus* in a specimen obtained at New Harmony, Posey Co., Indiana.

[Pg 352]

Howell (Jour. Mamm., 13:166, August 9, 1932) referred two specimens from Boone County, Indiana, to *T. s. fisheri*. We have examined a specimen (5675 AMNH) from that place and think it is one of the two seen by Howell. The specimen is a poorly made skin in worn winter pelage with the skull inside. Because it differs from *T. s. fisheri* and agrees with *T. s. ohionensis* in the color of both upper parts and underparts (comparisons made with material of comparable stage of molt), we assign it to the latter subspecies. Howell (*loc. cit.*) referred specimens from Overton (57394), Wooster (57398, 57399, and 57442), and Loudonville (57391-57393), all from Ohio, in the Museum of Zoology of the University of Michigan, to *Tamias striatus fisheri*. We have examined these specimens and find them to be readily separable from *T. s. rufescens* on the basis of darker coloration. The affinities of the specimens in question are with *T. s. fisheri* and *T. s. ohionensis*. As a standard for comparison we have used specimens in the Museum of Zoology, University of Michigan, in comparable pelage of *T. s. ohionensis* from Dearborn County, Indiana, taken in August and specimens of *T. s. fisheri* from "near" summit Butt Mtn. and Little Meadows, both places in Giles County, Virginia, as well as two specimens from Allair, Monmouth County, New Jersey. On the basis of buffy (instead of white) edging of the tail, buffy (not white) light dorsal stripes, and buffy (not black) anterior third of the median dark stripe, the specimens from Overton, Wooster, and Loudonville are referred to *Tamias striatus ohionensis*.

#### **Tamias striatus pipilans** Lowery

A. H. Howell (N. Amer. Fauna, 29:16, November 30, 1929) recorded six specimens of *Tamias striatus striatus* from Greensboro, Alabama. Subsequently, Lowery (Occas. Papers Mus. Zool., Louisiana State Univ., 13:235, November 22, 1943) named *T. s. pipilans* and assigned to it specimens from northeastern Alabama. Lowery did not, however, mention the specimens from Greensboro and, thus, their subspecific identity was placed in doubt. We have examined five of the six specimens mentioned by Howell (*loc. cit.*) (57034-57036, 57588, and 77037 BS) and because of their brilliant color and large size, refer them to *Tamias striatus pipilans* Lowery.

[Pg 353]

#### **Tamias striatus rufescens** Bole and Moulthrop

A. H. Howell (Jour. Mamm., 13:166, August 9, 1932) also referred a specimen (13154), from La Porte, Indiana, in the Chicago Nat. History Museum to *T. s. fisheri*. We find the specimen to be distinguishable from *T. s. fisheri* in darker, richer pelage, brown instead of blackish anterior third of the median dorsal stripe, more buffy light dorsal stripes, and more heavily constructed skull. The specimen most closely resembles *T. s. rufescens* in having, as compared to *T. s. ohionensis*, brighter, more rufescent color, wider incisors, proportionately narrower interorbital region, and more widely spreading zygomatic arches. We refer it to that subspecies.

#### **Sciurus carolinensis pennsylvanicus** Ord

When J. A. Allen considered what name to apply to the gray squirrel of northeastern United States and adjacent parts of Canada, (Monogr. N. Amer. Rodentia, p. 709, 1877) he selected the name *leucotis* of Gapper (Zool. Jour., 5:206, 1830) as applicable. Allen rejected Ord's (Guthrie's Geog., 2nd Amer. Ed., Zool. App., 2:292, 1815) earlier name, *Sciurus Pennsylvanica*, because (*loc. cit.*) "it was given to specimens from the Middle Atlantic States, and hence from a locality bordering upon the habitat of the southern form, and consequently the name is not strictly applicable to the northern type as developed in the Northern and Northeastern States and the Canadas." It must be recalled that Allen had not at that time seen a copy of Ord's exceedingly rare work and was basing his comments on Baird's statements on Ord's treatment of the squirrels.

Subsequently, Rhoads obtained a copy of the second edition of Guthrie's Geography and had Ord's zoological appendix thereto reprinted. The reprinted version (now known generally as Ord's Zoology by Rhoads, 1894) contains (Appendix, p. 19) Rhoads' review of the *pennsylvanicus* vs. *leucotis* controversy. Rhoads concluded that *pennsylvanicus* must apply because it has priority and is available. The habitat was given by Ord as "those parts of Pennsylvania which lie to the westward of the Alleghany ridge," not the "Middle Atlantic States" as Allen thought.

Notwithstanding Rhoads' comments, Bangs (Proc. Biol. Soc. Washington, 10:156, December 28, 1896), in his "Review of the Squirrels of Eastern North America," employed *leucotis* Gapper and rejected Ord's name because it "is a *nomen nudum*" and of uncertain application. There seems to have been no attempt subsequently to review the pertinent names.

[Pg 354]

We are of the opinion that Rhoads' (*loc. cit.*) analysis and conclusions are correct and as cogent today as then. We do not agree with Bangs that *pennsylvanicus* is a *nomen nudum* for the following reasons. The name was based on melanistic individuals and could conceivably be applied to three species of squirrels, the red squirrel, the fox squirrel, and the gray squirrel.

Melanistic red squirrels, *Tamiasciurus hudsonicus*, are everywhere rare and in any case appear as individuals and not populations. Ord (*loc. cit.*) reported that his *Sciurus Pennsylvanica* was *abundant*. Ord, we think, was not referring to the fox squirrel, *Sciurus niger*, because he wrote that *S. Pennsylvanica* "has always been confounded with... [*Sciurus niger*], but it is a different species," and (*loc. cit.*) described *S. niger* as a "Large Black Squirrel" and *Sciurus Pennsylvanica* as a "Small Black Squirrel." Therefore, *pennsylvanicus* Ord can refer only to *Sciurus carolinensis*. Further, melanistic gray squirrels then, as now, were common in western Pennsylvania and exceedingly rare in eastern Pennsylvania. Additionally, Ord described his animal, although admittedly inadequately (small, black, not *S. niger*). The name *Sciurus Pennsylvanica* Ord is clearly not a *nomen nudum* and must replace *leucotis* Gapper.

Allen's (*loc. cit.*) argument that the specimens were not representative of "*leucotis*" because they were from the Middle Atlantic States is based on an initial misunderstanding of the locality. Further, whether or not "topotypes" are representative of a subspecies has no bearing on the availability of the name appended to them. The name and synonymy of the northern gray squirrel are as follows:

#### ***Sciurus carolinensis pennsylvanicus* Ord**

1815. *Sciurus Pennsylvanica* Ord, Guthrie's Geog., 2nd Amer. Ed., 2:292. Type locality, western Pennsylvania.

1894. *Sciurus carolinensis pennsylvanicus*, Rhoads, Appendix of reprint of Ord (*supra*), p. 19.

1792. *Sciurus cinereus* Schreber, Säuget., 4:766. Type locality, eastern United States, probably New York State. (*Nec Sciurus cinereus* Linnaeus.)

1830. *Sciurus leucotis* Gapper, Zool. Jour., 5:206. Type locality, region between York and Lake Simcoe, Canada.

1849. *Sciurus migratorius* Audubon and Bachman, Quad. N. Amer., 1:265 (based on *S. leucotis* Gapper).

1877. *Sciurus carolinensis* var. *leucotis*, J. A. Allen, Monogr. N. Amer. Rodentia, Sciuridae, p. 700 (*et auct.*).

#### ***Sciurus niger rufiventer* Geoffroy**

[Pg 355]

Two specimens (36192/48550, a young male with unworn teeth, and 36193/48551, an adult male with much worn teeth, both in the United States Biological Surveys Collection in the National Museum) were recorded by Bailey (N. Amer. Fauna, 25:75, 1905) as *Sciurus ludovicianus* from Gainesville, Texas. Bailey (*loc. cit.*) further stated that if the name *Sciurus rufiventer* Geoffroy proved usable it would apply to the specimens from Gainesville. Since the name *rufiventer* was revived there would be no question concerning the identity of these specimens had not Lowery and Davis (Occas. Papers, Mus. Zool., Louisiana State Univ., 9:172, 1942) assigned three specimens (not seen by us) to *Sciurus niger limitis* Baird from a point only thirteen miles northwesterly. Lowery and Davis (*loc. cit.*) say that their specimens are intergrades (presumably with *rufiventer*) and Bailey (*loc. cit.*) noted that his two specimens from Gainesville "are in size and color nearer to *ludovicianus* [= *rufiventer*] than to typical *limitis*." Examination of the two specimens from Gainesville convinces us that Bailey was correct and the specimens therefore are referable to *Sciurus niger rufiventer*. More in detail, the color agrees with that of *rufiventer* and differs from that of *limitis* and from that of darker specimens of *Sciurus niger ludovicianus* (in the restricted sense used by Lowery and Davis, *op. cit.*: 104). Also the size is larger than in *limitis* and as in *rufiventer* or *ludovicianus*. Selected measurements of Nos. 36192/48550 and 36193/48551 are, respectively, as follows: Total length, 505, 500; length of tail, 237, 228; length of hind foot, 72, 70; basilar length of Hensel, 48.5, 48.6; zygomatic breadth, 35.1, 36.0; length of nasals, 21.4, 22.3; alveolar length of maxillary tooth-row, 11.8, 11.1; width across posterior tongues of premaxillae, 17.5, 18.4.

#### ***Sciurus variegatoides rigidus* Peters**

Harris (Occas. Papers Mus. Zool., Univ. Michigan, 266:1, June 28, 1933) named *Sciurus variegatoides austini* with type locality at Las Agujas, Province of Puntarenas, Costa Rica. Later, in his revision of the species *Sciurus variegatoides*, he (Misc. Publs. Mus. Zool., Univ. Michigan, 38:19, September 7, 1937) referred specimens from Chomes, Costa Rica, to *S. v. austini* and (*op. cit.*:24) specimens from Puntarenas, Province of Puntarenas, to *S. v. rigidus*, an inland subspecies. The geographic arrangement of these referred specimens seemed to warrant a reconsideration of the material. We have examined specimens of *S. variegatoides* in the Museum of Zoology, University of Michigan, from the following localities in Costa Rica: Puntarenas (62703-62706), Las Agujas (65118 [type of *S. v. austini*], 59847-59850), Río Las Agujas (65114-65117), Agua Caliente (66483), Zarcéro (75757-75761, 75765), Cartago (67546, 67547), and Esparta (75762-75764). The specimens listed by Harris (*op. cit.*, 1937:19) as from Chomes, in the Museum of Zoology of the University of Michigan, are not now in that museum and we have not seen them.

[Pg 356]

Harris (*op. cit.*:19) characterized *S. v. austini* as differing from *S. v. rigidus* in having brightly rufous legs (Ochraceous-Orange) in *S. v. rigidus* and a dorsal coloration resulting from a mixture of shiny black and silver (Ochraceous-Orange mixed with black in *S. v. rigidus*). We find that in

the color of the legs of the paratypes of *S. v. austini* there is considerable variation ranging from bright rufous in No. 65116 to much darker and duller in No. 59849. In six of the ten specimens of the type series, the color is rufous, but in the other four the color of the legs approaches and overlaps that found in the referred specimens of *S. v. rigidus*. The color of the dorsum of *S. v. austini* is also variable. No. 59850, for example, is dark brown and closely resembles No. 75762, from Esparta, which was referred to *S. v. rigidus*. Further, some specimens referred to *S. v. rigidus* (67546 and 67547) have the bright-colored legs of *S. v. austini* and some (75759, for example) have the black-and-silver back of *austini*. We recognize differences of an average sort between the now-available specimens of the two alleged subspecies, but because of the individual variation that exists, we feel that recognition of two subspecies is not indicated. There is also some variation that is the result of wear and molt and one of us (Kelson) feels that some of the differences are explainable on this basis. Accordingly, we prefer to adopt a more conservative taxonomic arrangement than that of Harris for this group of the Costa Rican squirrels and arrange *Sciurus variegatoides austini* Harris, 1933, as a synonym of *Sciurus variegatoides rigidus* Peters, 1863.

#### **Thomomys bottae alienus** Goldman

Six specimens (21249-21253, 212706 BS) from Rice, Arizona, were referred by Goldman (Proc. Biol. Soc. Washington, 46:76, April 27, 1933) to the subspecies *Thomomys bottae mutabilis* Goldman when he proposed that name as new, but these six specimens were not mentioned by him when he later named *Thomomys bottae alienus* (Jour. Washington Acad. Sci., 28:338, July 15, 1938), to which subspecies the specimens in question might be expected to belong. Examination of the six specimens reveals that they are intergrades between *T. b. mutabilis* and *T. b. alienus* but that the specimens more closely resemble the latter. More precisely, slightly larger size of skull, greater ventral inflation of tympanic bullae, and less depressed occipital region ally the specimens with *Thomomys bottae alienus*, and we identify them as that subspecies. The two subspecies concerned are not so distinct as are most subspecies of *Thomomys bottae*.

[Pg 357]

#### **Thomomys bottae aphrastus** Elliott

Bailey (N. Amer. Fauna, 39:58, November 15, 1915) referred three specimens from San Antonio, Baja California, to *Thomomys bottae nigricans*. These specimens have not, to our knowledge, been re-examined subsequently, although the current taxonomic treatment of the pocket gophers of Baja California by Huey (Trans. San Diego Soc. Nat. Hist., 10(4):245-268, 1 map, August 31, 1945) excludes *T. b. nigricans* from the area of San Antonio. The pertinent specimens are probably Nos. 10810-10812 in the Chicago Natural History Museum. We have examined the specimens and, using the comparative materials listed under the account of *T. b. siccovallis*, find them to be intermediate in most characters between *T. b. aphrastus* and *T. b. martirensis*. Because they more nearly resemble *T. b. aphrastus* in the weakly-spreading zygomatic arches, we refer the specimens from San Antonio to that subspecies.

#### **Thomomys bottae jobobae** Huey

When Huey (Trans. San Diego Soc. Nat. Hist., 10:256, August 31, 1945) named *Thomomys bottae jobobae* from Sangre de Cristo, Baja California, México, he made no mention of a specimen that Bailey (N. Amer. Fauna, 39:58, November 15, 1915) identified as *Thomomys bottae nigricans* from La Huerta, which place is approximately eight miles northwest of Sangre de Cristo. From a geographic standpoint, it seemed unlikely that the specimen from La Huerta would be referable to *T. b. nigricans*. Examination of the specimen (138752 BS) proves it to differ from topotypes of *T. b. nigricans* and to agree with *T. b. jobobae* in richer, more rufescent color, especially ventrally, and smaller, slenderer, more delicate skull. The specimen is therefore tentatively referred to *Thomomys bottae jobobae*. We have not, however, compared it with specimens of *Thomomys bottae juarezensis*, a subspecies the range of which lies to the east on the summit of the Sierra Juárez.

[Pg 358]

#### **Thomomys bottae martirensis** J. A. Allen

Bailey (N. Amer. Fauna, 39:58, November 15, 1915) referred pocket gophers from Piñon on the west slope of the San Pedro Mártir Mountains, Baja California, to the subspecies *Thomomys bottae nigricans*. The subspecific identity of these animals has now been reinvestigated subsequently, although the locality whence they were obtained is far removed from what is now thought to be the geographic range of *T. b. nigricans*; further, several other subspecies are known to occur in the intervening area. We have examined the available material from Piñon (13853-13855 BS) and find the specimens to agree with *Thomomys bottae martirensis* and to differ from *T. b. nigricans* in lighter color, larger, more ridged and angular skull; proportionately greater mastoidal breadth; narrower occipital shelf; more ventrally produced alveolar ramus of the maxillae; and deeply concave posterior border of the temporal root of the zygomatic arch. These specimens thus constitute the northernmost record of *T. b. martirensis* known to us.

#### **Thomomys bottae mohavensis** Grinnell

Bailey (N. Amer. Fauna, 39:73, November 15, 1915) assigned a series of 7 specimens from Lone Willow Spring, California, to the subspecies *Thomomys bottae perpes*. This locality lies at the northern edge of the Mohave Desert. Later, Grinnell (Univ. California Publ. Zool., 17:427, April 25, 1918) named the pocket gophers from approximately the eastern half of the Mohave Desert, *Thomomys perpallidus* [= *bottae*] *mohavensis*, but failed to mention the specimens recorded by Bailey, and thus their subspecific identity is in doubt. We find that *T. b. mohavensis* differs from

*T. b. perpes* in more pallid color (light yellowish as opposed to dark rufescent) larger size, larger and more angular skull, angular (as opposed to more evenly bowed) zygomatic arches, larger and deeper audital bullae, narrower interpterygoid space, and proportionately greater mastoidal breadth. In external measurements, size and angularity of skull, width of interpterygoid space and angularity of the zygomatic arch, the specimens from Lone Willow Spring seem to be intermediate between the two subspecies, but perhaps show more resemblance to *T. b. mohavensis*. Otherwise, the specimens closely resemble *T. b. mohavensis* to which they are here referred. The specimens provide a northern marginal record of occurrence for that subspecies.

Other specimens recorded as *T. b. perpes* by Bailey (*loc. cit.*) from Grapevine Ranch, California, have also not been mentioned in later publications although, from a geographic standpoint, they might be better referred to either *Thomomys bottae pascalis* or *T. b. mohavensis*. Comparison of specimens of *T. b. mohavensis* and *T. b. pascalis* from various localities show *T. b. pascalis* to be larger (including the skull), darker, and to possess a more nearly vertical occipital plane, wider-spread but less angular zygomatic arches, less inflated tympanic bullae, wider braincase (which consequently appears to be less inflated), proportionately longer and slenderer rostrum, and broader nasals distally. Cranially, *T. b. pascalis* differs from *T. b. perpes* in essentially the same ways, but to an event greater degree. In color, *T. b. pascalis* differs from *T. b. perpes* in being duller, less rufescent.

[Pg 359]

The series of four specimens, in the U. S. Biological Surveys Collection, from Grapevine Ranch clearly are not referable to *T. b. perpes*. They do, however, agree with *T. b. mohavensis* in all essential particulars except that in two of the four specimens the braincase is wider and the nasals are wider distally. This width is evidence of intergradation with *T. b. pascalis*. Seemingly, then, they are best referred to *Thomomys bottae mohavensis*.

#### **Thomomys bottae muralis** Goldman

When Goldman (Jour. Washington Acad. Sci., 26(3):112, March 15, 1936) described and named this pocket gopher from Arizona, he arranged it as a full species and stated that there is no evidence of intergradation with other named kinds. We have examined the holotype and three topotypes (202579-202582 BS) and compared them with specimens of other kinds of pocket gophers occurring in northern and central Arizona. The *muralis* gopher is a depauperate form clearly belonging to the *bottae* group. The characters which Goldman (*loc. cit.*) set forth as distinguishing *muralis* from other named kinds are readily apparent and, like Goldman, we see no evidence of intergradation. Nevertheless, the characters which serve to identify the race are, in a general way, those commonly found in populations of depauperate individuals of *Thomomys bottae* and *T. talpoides*. The small size, delicate structure, well-inflated braincase, short premaxillary tongues, and strongly recurved upper incisors, often appear in populations existing in inhospitable areas of shallow, unstable soils. For this reason we feel that the relationships of this population are best shown by arranging *muralis* as a subspecies of *Thomomys bottae*; the name should stand as *Thomomys bottae muralis* Goldman.

As far as known, *T. b. muralis* is completely isolated from other populations of pocket gophers by uninhabitable eroding cliffs. The animals have been found only on isolated terraces in the lower end of Prospect Valley (itself a lateral pocket) within the Grand Canyon of the Colorado River, Hualpai Indian Reservation, Arizona. Consequently it is unlikely that intergradation with other populations could exist at the present time.

[Pg 360]

In short, in arranging *muralis* as a subspecies of *Thomomys bottae*, we are influenced, not by the demonstration of intergradation, but by the degree of morphological differentiation of the population and the probable reasons therefor.

#### **Thomomys bottae mutabilis** Goldman

Goldman (Jour. Washington Acad. Sci., 28:342, July 15, 1938) named the subspecies *Thomomys bottae pinalensis* on the basis of only one specimen, an immature female (245709 BS) from Oak Flat, five miles east of Superior, Pinal Mountains, Arizona. Examination shows it to be indistinguishable in characters of taxonomic importance (coloration, external measurements, shape of skull and size of skull) from specimens of *T. b. mutabilis* of comparable sex and age. No. 245709 is well within the limits of individual variation of *T. b. mutabilis* as is shown by the several specimens (all in the U. S. Biological Surveys Collection) as follow: Nos. 214118, 214670 (topotypes from Camp Verde, Arizona), 212707 (Chiricahua Ranch, 20 mi. E Calva), 208635 (H-bar Ranch, 20 mi. S Payson), and 215762 (Turkey Creek). Therefore, the name *Thomomys bottae pinalensis* is here arranged as a synonym of the earlier name, *Thomomys bottae mutabilis* Goldman (Proc. Biol. Soc. Washington, 46:75, April 27, 1933), the type locality of which is Camp Verde, Yavapai County, Arizona.

#### **Thomomys bottae patulus** Goldman

When Goldman (Jour. Washington Acad. Sci., 26:113, March 15, 1936) named the subspecies *Thomomys bottae desitus*, he assigned to it (*op. cit.*:114) 10 specimens obtained at Wickenburg, Maricopa County, Arizona. He did not mention specimens from Wickenburg when he subsequently named the subspecies *Thomomys bottae patulus* (Jour. Washington Acad. Sci., 28:341, July 15, 1938) and stated that *T. b. patulus* was known only from the type locality in the "bottomland along [the] Hassayampa River, two miles below Wickenburg." Examination in 1950 of specimens referable to *T. b. patulus* in the U. S. Biological Surveys Collection shows all of them, including the holotype, to be labeled "Wickenburg." The 10 specimens from Wickenburg

[Pg 361]



reported by Goldman in 1936 as *T. b. desitus* were included by him among the 16 (actually 17, one being a skull only) upon which he based his description of *T. b. patulus* in 1938. Examination of the field catalogues of 3 of the 4 collectors who obtained the specimens discloses that only the 7 specimens obtained last were recorded as occurring in the Hassayampa River bottoms; the first 10 were recorded only as from "Wickenburg." Briefly, only one subspecies, *T. b. patulus*, is present in the area, and Goldman in 1938 seems to have thought that the two localities were actually the same, and that "2 miles below Wickenburg" was the more precise designation.

#### **Thomomys bottae providentialis** Grinnell

We have examined a specimen, No. 26120/33526, from 12-Mile Spring, California, in the U. S. Biological Surveys Collection, which Bailey (N. Amer. Fauna, 39:73, November 15, 1945) referred to the subspecies *Thomomys perpallidus* [= *aureus*] *perpes*. We find the specimen to be referable to the later named *Thomomys bottae providentialis* on the basis of smaller ear, more massive, more ridged and angular skull, greater interorbital breadth, deeper and thicker rostrum, less globular bullae, and U-shaped rather than V-shaped interpterygoid space. Therefore, 12-Mile Spring is the northernmost locality of occurrence of the subspecies *T. b. providentialis*.

#### **Thomomys bottae sanctidiegi** Huey

In his discussion of the pocket gophers of Baja California, Huey (Trans. San Diego Soc. Nat. Hist., 10:245-268, map, August 31, 1945) made no mention of specimens from Ensenada, Baja California, recorded by Bailey (N. Amer. Fauna, 39:58, November 15, 1915) as *Thomomys bottae nigricans*. We have examined the specimens from Ensenada available to Bailey in the U. S. Biological Surveys Collection, Nos. 137724, 139890, and 139891, subadult, immature, and adult, respectively. As compared with *Thomomys bottae sanctidiegi* from the mouth of the Tiajuana River (No. 126028) and *T. b. nigricans* (topotypes), the one adult specimen from Ensenada agrees with *T. b. sanctidiegi* and differs from *T. b. nigricans* in lighter color, larger and more angular skull, and more inflated braincase. The specimens from Ensenada differ from the adjacent subspecies to the south, *Thomomys bottae proximarinus* [to judge from Huey's (*op. cit.*) characterization of that subspecies] in lighter color, and larger, more robust skull. Accordingly, the specimens from Ensenada are referred to *Thomomys bottae sanctidiegi*.

[Pg 362]

#### **Thomomys bottae siccovallis** Huey

Bailey (N. Amer. Fauna, 39:58, November 15, 1915) listed a specimen from Mattomi, Baja California, as *Thomomys bottae nigricans*. When Huey (Trans. San Diego Soc. Nat. Hist., 10:259, August 31, 1945) revived the name *Thomomys [bottae] aphrastus* Elliot, and named (*op. cit.*:258) *Thomomys bottae siccovallis* he made no mention of the specimen, from Mattomi, which, on geographic grounds, would be expected to be *T. b. aphrastus*, *T. b. martirensis* J. A. Allen, or *T. b. siccovallis*. We have examined an adult male (10832 CNHM), probably the specimen seen by Bailey (*loc. cit.*), from Mattomi, and have compared No. 10832 with six topotypes (10813-10816, 10819 and 10820 CNHM) of *T. b. martirensis*, the type and one topotype (10798 CNHM) of *T. b. aphrastus* and with the original description of *T. b. siccovallis*. The specimen from Mattomi seems to be unique in the large size of the tympanic bullae. The specimen in question differs from *T. b. martirensis* also in shorter and wider skull, shorter and wider rostrum, and longer and wider molariform teeth. In these features resemblance is shown to the holotype of *T. b. aphrastus* and even greater resemblance is shown to *T. b. siccovallis* to which the specimen from Mattomi is referred.

#### **Thomomys monticola mazama** Merriam

This subspecies of the Cascades of Oregon and *Thomomys monticola nasicus* of the territory immediately to the east of the Cascades, in the same state, were originally described (Merriam, Proc. Biol. Soc. Washington, 11:214 and 216, respectively, July 15, 1897) and redescribed (Bailey, N. Amer. Fauna, 39:123 and 125, respectively, November 15, 1915) as distinguished from each other by paler color, smaller tympanic bullae and longer nasals in *T. m. nasicus*. The holotypes do differ in these respects. The assigned (by Bailey, *loc. cit.*) specimens indicate that the opposite condition obtains with respect to the size of bullae; that is to say, the bullae are smaller in *T. m. mazama*. In these referred specimens from Oregon the nasals are actually and relatively longer in *T. m. nasicus*, which averages paler (less black and more red). Certain specimens of the two subspecies that are comparable as to sex, age and season, are indistinguishable in color.

This is the background against which Bailey (*op. cit.*:125), contrary to his statement of geographic ranges (*op. cit.*:123, 125) and map (*op. cit.*:fig. 5, p. 23), assigned, in his list of specimens examined, two specimens ([\*\* Male] ad. 79817 and [\*\* Female] ad. 79818 BS) from Pengra, west of the Cascades, to the subspecies *T. m. nasicus*. In the specimens from Pengra the bullae are angular as in referred specimens of *nasicus* (unlike those of the holotype), the rostra are intermediate in length between those of the two subspecies concerned, and the color is light as in *T. m. nasicus* but can be matched by that of certain specimens of *T. m. mazama*, for example by that of No. 79821 BS from Diamond Lake, Oregon. Consequently, on morphological grounds, the two specimens from Pengra can be assigned to *T. m. mazama* almost as well as to *T. m. nasicus*. Having regard for the geographic relations, we assign them to *T. m. mazama*.

[Pg 363]

In making this tentative identification we are aware that the acquisition of more nearly adequate material from Oregon, and critical study of such material, may bring a subspecific arrangement of the populations of *Thomomys monticola* different from the current one.

### **Thomomys talpoides bullatus** Bailey

Bailey (N. Amer. Fauna, 39:101, November 15, 1915) identified as *Thomomys talpoides clusius* two specimens (66465 and 66523 BS) from Pass (= Parkman) and one specimen (66464 BS) from Dayton, in Wyoming. We have examined these specimens and find that they lack the broad braincase and narrow nasals of *clusius* and in these and in other features the three specimens resemble *T. t. caryi* and *T. t. bullatus* more than they resemble any other named kinds. Although structurally, and in color, intermediate between the two subspecies named immediately above, the specimens show greater resemblance (large size and narrow braincase) to the latter and are referred by us to *Thomomys talpoides bullatus*.

### **Thomomys talpoides clusius** Coues

Bailey (N. Amer. Fauna, 39:102, November 15, 1915) identified as *Thomomys talpoides bullatus* an adult male (147347 BS) from the J. K. Ranch, 5900 ft., on Meadow Creek, Wind River, Wyoming [= Wind River of Bailey, *loc. cit.*] and a young female (168666 BS) from Sage Creek, 8 mi. NW Fort Washakie, Wyoming. The rosaceous tone of these pale individuals is more as in some populations of *T. t. ocius* and *T. t. clusius* to the southward. Also, the skull of the male, although large, is distinctly narrower than in *T. t. bullatus* and we think shows the influence of the *T. t. tenellus* stock. All features considered, we refer the specimens to *T. t. clusius*.

[Pg 364]

### **Thomomys talpoides glacialis** Dalquest and Scheffer

Vernon Bailey (N. Amer. Fauna, 39:119, November 15, 1915) listed 19 specimens from Roy, Washington, as *Thomomys douglasi yelmensis* Merriam. Our examination of 26 specimens (205039-205051, 205072-205077, and 206545-206551 BS) labeled as "Roy," and presumably including those listed by Bailey (*loc. cit.*), leads us to identify all 26 as *Thomomys talpoides glacialis* on the basis of widely spreading zygomatic arches and decidedly ochraceous hue of underparts.

### **Geomys bursarius jugossicularis** Hooper

Seven skins with skulls (35104/47369-35110/47375 BS) from Las Animas, Colorado, probably formed the basis for Cary's (N. Amer. Fauna, 33:129, August 17, 1911) record of *Geomys lutescens* from that locality. Comparison of the material reveals that the animals are referable instead to the later named subspecies, *Geomys lutescens jugossicularis* Hooper (Occas. Papers Mus. Zool., Univ. Michigan, 420:1, June 28, 1940), on the basis of (1) more reddish color, (2) deeper zygomatic plate, (3) shorter jugal as expressed as a percentage of the length of the part of the zygomatic arch anterior to the jugal, and (4) larger area of inner face of jugal exposed when skull is viewed from directly above. Possibly it is noteworthy that the specimens from Las Animas are larger than Hooper's holotype and one topotype; this larger size is indicative of intergradation with *G. b. lutescens* as represented by the specimens examined by us from Pueblo.

Our examination of an adult female, No. 128242 BS and a juvenal female, No. 128243 BS, from 15 mi. E Texline, Texas, recorded by Bailey (N. Amer. Fauna, 25:132, October 24, 1905) under the name *Geomys lutescens* reveals that the specimens are referable to *Geomys bursarius jugossicularis* instead of to *Geomys bursarius major* on the basis of (1) mastoid part of tympanic bulla more inflated posteriorly, (2) narrowness of frontals between posterior tongues of the premaxillae and, (3) lighter color.

### **Liomys irroratus irroratus** Gray

When Hooper and Handley (Occas. Papers Mus. Zool., Univ. Michigan, 514:1-34, October 29, 1948) published a revised map (*op. cit.*:3) showing the geographic distribution of the subspecies of *Liomys irroratus* they did not mention a specimen from Agusinapa, Guerrero, which inferentially from their map would be *L. i. irroratus* although it previously had been recorded as *L. i. torridus* by Goldman (N. Amer. Fauna, 34:55, September 7, 1911). We have examined the specimen (70228 BS), which retains the upper deciduous premolar. Its long foot (32 mm.) and broad cranium (13 mm.) are the bases for identifying the specimen as *Liomys irroratus irroratus* instead of *L. i. minor*, which is smaller.

[Pg 365]

### **Liomys irroratus minor** Merriam

When Hooper and Handley (Occas. Papers Mus. Zool., Univ. Michigan, 514:1-34, October 29, 1948) published a revised map (*op. cit.*:3) showing the geographic distribution of the subspecies of *Liomys irroratus* they did not mention five specimens from Tlapa, Guerrero, which inferentially from their map would be *L. i. irroratus* although these specimens previously had been recorded as *L. i. torridus* by Goldman (N. Amer. Fauna, 34:55, September 7, 1911). We have examined the five specimens (70221-70225 BS), three of which retain the upper deciduous premolars and two of which have the upper fourth premolar unworn. The short, wide rostrum is unlike the long slender rostrum of topotypes of *L. i. torridus* of comparable age, and agrees with the condition in topotypes of *L. i. minor* of comparable age. It is on this basis of wider rostrum that we refer the five specimens from Tlapa to *Liomys i. minor* which Hooper and Handley (*op. cit.*:13) described as differing from the geographically adjacent *L. i. irroratus* in "short and strongly tapered rostrum." We would add that we have not independently verified this difference between *L. i. minor* and *L. i. irroratus* for want of specimens of *L. i. irroratus* comparable in age to the five individuals from Tlapa.

The map of Hooper and Handley (*loc. cit.*) inferentially excludes Tlalixtaquilla, Guerrero, from the

geographic range of *L. i. minor* (and places Tlalixtaquilla within the range of *L. i. irroratus*) although Goldman (*op. cit.*:56) previously had identified specimens from this place as *L. i. minor*. Our examination of the two immature specimens (70227 and 70230 BS) from Tlalixtaquilla reveals that they closely resemble the holotype of *L. i. minor* and leads to the conclusion that they are *Liomys irroratus minor*.

#### **Perognathus amplus pergracilis** Goldman

When Bole (*Sci. Publ. Cleveland Mus. Nat. Hist.*, 5(2):6, December 4, 1937) named and described *Perognathus longimembris salinensis*, he listed as comparative material of *P. l. bangsi*, a specimen in the Museum of Comparative Zoology from Parker, Yuma Co., Arizona. There was some reason to doubt the identification of the specimen since it is the only record of occurrence of the subspecies from east of the Colorado River. There is no specimen of *Perognathus longimembris* from Arizona in the Museum of Comparative Zoology. There is one specimen of pocket mouse (18213, a skin only) from 30 miles east of Parker. We think that this is the specimen seen by Bole because at one time according to the label, it had been identified as *Perognathus panamintinus* [= *longimembris*] *bangsi*. If the identification of this skin-only had been made by means of Osgood's key (*N. Amer. Fauna*, 18:14-15, September 20, 1900), the animal would have "keyed out" to *P. longimembris* because the total length is recorded on the label as 130. Seth B. Benson has subsequently examined the specimen. The label now bears in handwriting the name of *P. amplus pergracilis* and is followed by Benson's initials as the identifier. Although we lack adequate comparative material, we consider the specimen to be *P. amplus pergracilis* Goldman, because the skin answers well to the description of *P. a. pergracilis* and because of the name currently on the label with Benson's initials.

[Pg 366]

#### **Perognathus longimembris panamintinus** Merriam

In the current literature, Californian specimens of the little pocket mouse stand identified as *Perognathus longimembris nevadensis* from Oasis and vicinity of Benton Station (Grinnell, *Univ. California Publ. Zool.*, 40:147, September 26, 1933). When one of us (Hall, *Mammals of Nevada*, p. 360, July 1, 1946) reported specimens from southwestern Nevada as *Perognathus longimembris panamintinus* he did so on the basis of study of specimens which included those from Oasis (in the California Museum of Vertebrate Zoology) that he at that time (in ms.) identified as *P. l. panamintinus*. Those specimens from Oasis have the hair on the underparts white all the way to the base as also do specimens from Morans, 5000 ft. (29583/41638 BS), in contrast to the plumbeous underparts of *P. l. nevadensis*. It is on this basis that we identify specimens from the places mentioned above as *Perognathus longimembris panamintinus*. "Vicinity of Benton Station" as given by Grinnell (*loc. cit.*) is interpreted to include Morans, Mono County.

#### **Dipodomys agilis martirensis** Huey

Elliot (*Field Columb. Mus., Zool. Ser., Publ.* 79, 3(12):221, August 15, 1903) referred specimens from Rosarito and Rosarito Divide, San Pedro Mártir Mts., Baja California, to *Perodipus* [= *Dipodomys*] *agilis*. According to the currently known distribution of *Dipodomys agilis* in Baja California (see Huey, *Trans. San Diego Soc. Nat. Hist.*, 11:237, April 30, 1951), the specimens seemed likely to belong to the subspecies *D. a. martirensis*. An examination of the specimens (10644, 10690-10693 CMNH from Rosarito, and 10694 from Rosarito Divide) shows that, on the basis of large ear and comparatively narrow braincase, they are in fact referable to *D. a. martirensis*. Only No. 10693, with its broader braincase, seems atypical. Comparative materials used are in the Chicago Natural History Museum as follows: *D. a. martirensis*: Baja California: San Matias Spring, 2. *D. a. simulans*: Baja California: Ensenada, 8. California: Dulzura, 1 (topotype); San Luis del Rey, 3.

[Pg 367]

#### **Dipodomys agilis simulans** (Merriam)

J. A. Allen (*Bull. Amer. Mus. Nat. Hist.*, 5:184, August 18, 1893) listed as *Perodipus agilis* a specimen (6306/4941 AMNH) from Valladares, Baja California. Subspecies of this species were subsequently named without mentioning this specimen that, on geographic grounds, might be either *D. a. martirensis* or *D. a. simulans*. Certain measurements of the specimen are as follows: Total length, 288; length of tail, 171; length of hind foot (dry), 41.0; greatest length of skull, 39.5; width of maxillary arch at middle, 4.5. The long tail and wide (4.5) maxillary arch are characteristic of *Dipodomys agilis simulans* and constitute the basis for identifying the specimen as of that subspecies.

#### **Baiomys taylori analogus** Osgood

The geographic range currently assigned to *Baiomys taylori paulus* (J. A. Allen) is separated in two parts by the geographic range assigned to *B. t. analogus*. The southern, separated part of the range of *B. t. paulus* rests wholly on ten specimens from Colima, Colima, identified as *B. t. paulus* by Osgood in his "Revision of the mice of the American genus *Peromyscus*" (*N. Amer. Fauna*, 28, April 17, 1909) where (p. 255) he places as a synonym of *Peromyscus taylori paulus* J. A. Allen, 1903, *Peromyscus allex* Osgood, 1904. The later name was based on these ten specimens (33422/45445-33427/45450, 33429/45452, 33432/45455, and 33435/45458 BS) from Colima. Osgood had a choice of synonymizing *P. allex* under *P. paulus* or *P. t. analogus*. According to Osgood's concept, *analogus* was blackish and large; *allex* was grayish and small; and *paulus* was fawn colored and intermediate in size. The more nearly equal size of *paulus* and *allex* probably influenced Osgood in making his choice. After examining the original materials we think there is

more to recommend the alternate choice. For example, two topotypes of equal age of the same sex of *allex* (33424/45447) and *analogus* (120264 BS) are of almost the same size and, respectively, measure as follows: Total length, 107, 108; length of tail, 42, 45; length of hind foot (measured dry), 13.1, 12.8; greatest length of skull, 17.6, 17.7; zygomatic breadth, 9.3, 9.2. Although *analogus* does average darker, a topotype, No. 120267 BS, from Zamora, is indistinguishable from several of the topotypes of *allex*. Consequently, we arrange *Peromyscus allex* Osgood as a synonym of *Baiomys taylori analogus* (Osgood) 1909 and refer the specimens from Colima to the latter.

#### **Peromyscus eremicus eremicus** (Baird)

Osgood (N. Amer. Fauna, 28:242, April 17, 1909) listed a specimen of this subspecies from Sierra Encarnación, Nuevo Leon. A specimen, No. 79614 BS, of this species was obtained on July 31, 1896, at Sierra Encarnación, Coahuila, by Nelson and Goldman. We know of no specimens of this subspecies from Sierra Encarnación, Nuevo Leon, and assume that Osgood referred to the Coahuilan specimen. Further support for this assumption is Osgood's (*loc. cit.*) note that the Sierra Encarnación specimen is aberrant and, to our eye, so is No. 79614 from Coahuila.

#### **Peromyscus merriami merriami** Mearns

Osgood (N. Amer. Fauna, 28:239, April 17, 1909) placed *P. merriami* in synonymy under *Peromyscus eremicus eremicus* (Baird). Because Seth B. Benson, and subsequently the late Wilfred H. Osgood, told one of us (Hall) that *Peromyscus merriami* was specifically distinct from *Peromyscus eremicus eremicus*, we have examined the specimens from Sonoyta, Sonora, and Quitobaquita, Arizona, referred by Mearns (Bull. U. S. Nat. Mus., 56:434-435, and 444, April 13, 1907) to *P. e. eremicus* and *P. merriami*, respectively. We perceive the differences that Mearns (*loc. cit.*) described and recognize *P. merriami* as a species separate from *P. eremicus*.

Also we have compared the type and one topotype of *Peromyscus goldmani* Osgood with the holotype and referred specimens mentioned above, of *P. merriami*, and feel that the two kinds are no more than subspecifically distinct. Accordingly, *P. goldmani* should stand as *Peromyscus merriami goldmani*. This arrangement is made with the knowledge that Burt (Misc. Publ. Mus. Zool., Univ. Michigan, 39:56, February 15, 1938) arranged *P. goldmani* as a synonym of *Peromyscus eremicus*.

#### **Peromyscus truei preblei** Bailey

Osgood (N. Amer. Fauna, 28: 171, April 17, 1909) listed two specimens from Crooked River, 25 miles southeast of Prineville, Oregon, as *Peromyscus truei gilberti* with the notation "approaching *truei*?" Subsequently, Bailey (N. Amer. Fauna, 55: 188, August 29, 1936) named *Peromyscus truei preblei* with type locality at Crooked River, 20 miles southeast of Prineville, a place from which Bailey had two specimens. We think the specimens recorded by the two authors are the same, and, according to the specimen labels, were placed correctly as to locality by Bailey. Our reasons are as follows: (a) The specimens mentioned by Bailey were presumably available to Osgood, but Osgood made no mention of specimens from "20 miles southeast of Prineville," (b) we find no specimens nor other records pertaining thereto, of *Peromyscus truei* from the locality given by Osgood, (c) Osgood indicated that the specimens he saw were not typical of *P. t. gilberti* and (d) *P. m. gilberti*, geographically the nearest subspecies, is recorded otherwise no closer to Prineville than Grants Pass, approximately 175 miles southwest in southwestern Oregon.

#### **Sigmodon hispidus cienegae** A. B. Howell

J. A. Allen (Bull. Amer. Mus. Nat. Hist., 5:28, March 16, 1893) listed as *Sigmodon hispidus arizonae* Mearns one specimen from Granados, Sonora, at a time when *S. h. cienegae* had not been named. We have examined the specimen (5389 AMNH) which has the skull inside and which lacks external measurements. It was taken on November 16, 1890, and is darker than specimens of *S. h. arizonae* collected in September at Fort Verde, Arizona. The color is essentially as in specimens of *S. h. cienegae* from Fairbank, Arizona (March-taken specimens). Because of this agreement in color and because of the geographic origin of the specimen from Granados, we refer the animal to *Sigmodon hispidus cienegae*.

#### **Sigmodon hispidus zanjonensis** Goodwin

Goodwin (Bull. Amer. Mus. Nat. Hist., 79:169, May 29, 1942) listed four specimens from Honduras (El Jaral, 2; and Las Ventanas, 2) as *Sigmodon hispidus saturatus* Bailey. Because these localities fall within the geographic range of *S. h. zanjonensis* we were lead to examine the specimens. Three are young and one (126113 AMNH from Las Ventanas) is an adult female. The underparts of the young are washed with rufous as in *S. h. saturatus*. The adult lacks this rufous as do specimens of *S. h. zanjonensis* and some specimens of *S. h. saturatus*. In the adult the color of the upper parts and size of the upper cheek-teeth are intermediate between the dark-backed, small-toothed *S. h. saturatus* and the paler-backed, large-toothed *S. h. zanjonensis*. The rostrum is intermediate in width but definitely nearer the broad condition which obtains in *S. h. saturatus*. The tail is long, actually and in relation to the body (total length 275, tail 130), as in *S. h. zanjonensis* to which we refer the specimens in question.

#### **Oryzomys couesi couesi** (Alston)

For alleged occurrence at Reforma in Oaxaca, México (Goldman, N. Amer. Fauna, 43:31, September 23, 1918), see under *Oryzomys couesi mexicanus* Allen.

### **Oryzomys couesi mexicanus** J. A. Allen

Goldman (N. Amer. Fauna, 43, September 23, 1918) listed, as in the Field Museum of Natural History [= Chicago Natural History Museum] one specimen from Reforma, Oaxaca, under *O. c. mexicanus* (p. 35) and one specimen from the same place under *O. c. couesi* (p. 31). In the Chicago Natural History Museum we can find only one specimen. It is a young male, skull with skin, in which the last molar has not yet erupted, and bears the catalogue number 13654. It is, in our opinion, referable to *O. c. mexicanus*. Because we suspect that Goldman (*op. cit.*) by error listed this one specimen twice (once under *O. c. couesi* and once under *O. c. mexicanus*) it seems best to exclude Reforma, Oaxaca, from the geographic range of *O. c. couesi*.

### **Oryzomys alfaroi saturator** Merriam

A series of *Oryzomys alfaroi* in the U. S. Biological Surveys Collection obtained at Tumbala, 5000 ft., Chiapas, México, the type locality of *Oryzomys alfaroi saturator*, contains individuals some of which Goldman (N. Amer. Fauna, 43:66, September 23, 1918) referred to the subspecies *O. a. saturator* and one which he referred to *O. a. palatinus*. This latter specimen, to judge from the external measurements given by Goldman (*loc. cit.*), is No. 76328. In comparison with the other material which Goldman saw, we find the specimen to agree with *O. a. palatinus* in pale color and posterior concavity of the posterior border of the palate. In some other diagnostic cranial characters, it is indistinguishable from specimens of *O. a. saturator* from the same locality, and in other characters, notably the slenderness of the rostrum, it is intermediate between the two subspecies concerned. In short, although we see the reasons for Goldman's subspecific identification of this individual, we think, in view of the structural intermediacy of the animal and the characters of the series *en masse*, that it is best referred to *Oryzomys alfaroi saturator*.

[Pg 371]

### **Zapus princeps idahoensis** Davis

Preble (N. Amer. Fauna, 15:23, August 8, 1899) referred two specimens from Henry House and three from 15 miles south of Henry House, both localities in Alberta, Canada, to the subspecies *Zapus princeps princeps*. Subsequently, when *Z. p. kootenayensis* (Anderson, Nat. Mus. Canada, Ann. Rept. 1931, p. 108, November 24, 1932) and *Z. p. idahoensis* (Davis, Jour. Mamm., 15(3):221, August 10, 1934) were named, no mention was made of these specimens although the ranges assigned to *Z. p. kootenayensis* and *Z. p. idahoensis* seemed to isolate the Henry House area from the remainder of the range (as recorded) of *Z. p. princeps*. We have examined the pertinent specimens in the U. S. Biological Surveys Collection (75452 and 75453 from Henry House; 81509-81510 from 15 mi. S Henry House). On the basis of paler color, reduced lateral line, smaller skull, shorter palatal bridge and zygomatic arches, they are, among named subspecies, best referred to *Zapus princeps idahoensis*.

**Transmitted July 30, 1952.**

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