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(Genus Clethrionomys) of the Southern Rocky Mountain Region, by E.
Lendell Cockrum and Kenneth Leonard Fitch**

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*** START OF THE PROJECT GUTENBERG EBOOK GEOGRAPHIC VARIATION IN RED-BACKED MICE (GENUS CLETHRIONOMYS) OF THE SOUTHERN ROCKY MOUNTAIN REGION ***

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**Geographic Variation
in Red-backed Mice (Genus Clethrionomys)
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E. LENDELL COCKRUM and KENNETH L. FITCH

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**Geographic Variation
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E. LENDELL COCKRUM and KENNETH L. FITCH

In the course of the preparation of a synopsis of the North American terrestrial microtines by one of us (Cockrum), and the completion of a Master's thesis on the geographical variation of the red-backed mice of Wyoming by the other (Fitch) we had occasion to study the red-backed mice of the southern Rocky Mountain region (see figure 1). Results of these studies are the recognition of two heretofore unnamed subspecies of the red-backed mouse in the southern Rocky Mountain region, and a clarification of the taxonomic status of two additional kinds.

***Clethrionomys gapperi galei* (Merriam)**

1931. *Clethrionomys gapperi galei*, Hall, Univ. California Publ. Zool., 37:6, April 10.

1897. *Evotomys gapperi galei*, Bailey, Proc. Biol. Soc. Washington, 11:126, May 13.

Type locality.--Ward, 9500 feet, Boulder County, Colorado.

Range.--The Rocky Mountains of extreme southern Alberta, Montana, northwestern and southern Wyoming, and north and central Colorado.

Remarks.--*C. g. galei*, with the largest geographic range of any of the Rocky Mountain subspecies, is also the most variable. Three principal areas of geographic variation were found. These areas are: The mountains of north-central Colorado and southern Wyoming (this area includes the type locality); the Big Horn area probably northwest into Montana (no adult specimens from Montana or Alberta examined); and the Teton area which includes the mountains east and southeast of Yellowstone National Park. Specimens from these areas have noticeable differences in pelage, but no constant cranial differentiation could be detected. Specimens from the Medicine Bow Mountains of southern Wyoming have a more reddish dorsal stripe, and more buff and less gray on the sides than either of the northern geographic variants. The dorsal stripe continues farther anteriorly and is better defined through its entire length. There are fewer differences between the two northern geographic variants than between either one of them and the southern variant. Specimens from the Teton Mountains, however, have grayer sides, and the outer margin of the ear is tipped with chestnut (little or no chestnut shows on the ears of the specimens from the Big Horn Mountains); the dorsal stripe is less distinct (with slightly more gray throughout) than in either of the other geographic variants of the one subspecies. [284]

Three specimens (two adults) are available from the Little Medicine Range in Converse County (22 miles south and 24.5 miles west of Douglas, 7600 feet), Wyoming. Although red-backed mice probably are found in the mountains of Natrona and Albany counties, the population, in the Little Medicine Range is somewhat isolated. In coloration these mice are lighter than any of the three geographic variants described above; the dorsal stripe is narrower; the sides are more buffy; the dorsal stripe does not project anteriorly beyond the ears as it does in the specimens from the Medicine Bow Mountains; and the face is grayer. These specimens resemble the population in the Big Horn Mountains to the north more than the population in the Medicine Bow Mountains. The specimens from the Little Medicine Range, the Big Horn Range, and the Tetons are possibly subspecifically distinct from the southern specimens. Examination of specimens now allocated to *galei* from Montana and Alberta should aid in revealing whether the northern animals are an unnamed subspecies.

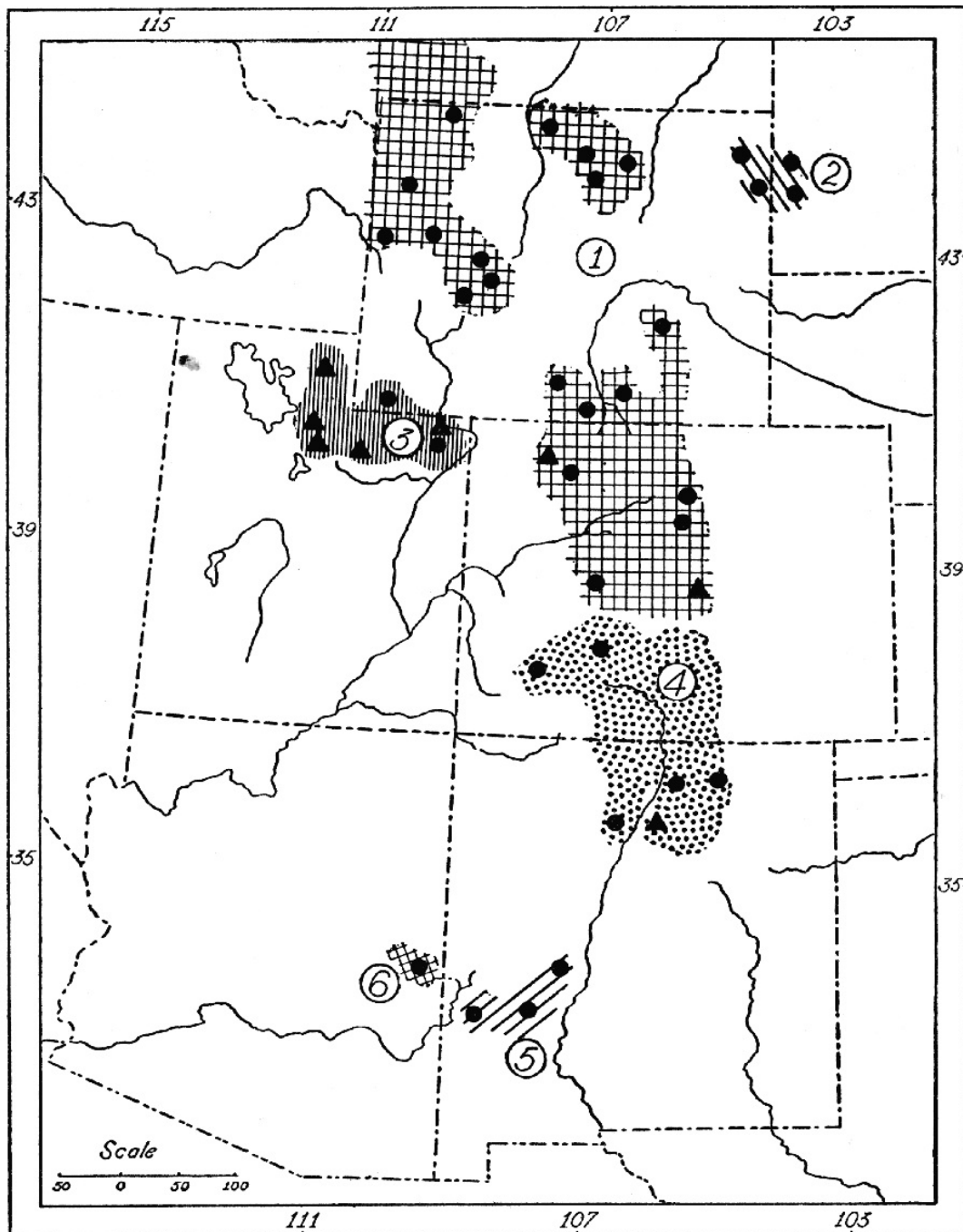
Specimens examined.--Total, 167, distributed as follows and unless otherwise stated, in the collection of the University of Kansas Museum of Natural History:

Wyoming: *Park County*: 28 mi. N and 3 mi. W Cody, 7200 ft., 1. *Big Horn County*: Medicine Wheel Ranch, 28 mi. E Lovell, 9000 ft., 22; 17-1/2 mi. E and 4-1/2 mi. S Shell, 1. *Teton County*: Moran, 6244 ft., 4; Moran, 3 (James Findley Collection); 2-3/4 mi. E Moran, 6300 ft., 1; 3-3/4 mi. E and 1 mi. S Moran, 6200 ft., 10. *Washakie County*: 9 mi. E and 9 mi. N Tensleep, 8200 ft., 3; 9 mi. E and 4 mi. N Tensleep, 7000 ft., 1. *Johnson County*: 4 mi. W and 1 mi. S Klondike, 6500 ft., 1; 6-1/2 mi. W and 2 mi. S Buffalo, 5620 ft., 1. *Lincoln County*: 3 mi. N and 11 mi. E Alpine, 5650 ft., 1. *Sublette County*: 31 mi. N Pinedale, 8025 ft., 1. *Fremont County*: Togwotee Pass, 5 (James Findley Collection); 20-1/2 mi. W and 2 mi. S Lander, 1; Moccasin [=Moccasin] Lake, 19 mi. W and 4 mi. N Lander, 10,100 ft., 3; 18 mi. W and 3 mi. N Lander, 1; Mosquito Park Ranger Station, 17-1/2 mi. W and 2-1/2 mi. N Lander, 9500 ft., 10; 6-1/2 mi. W and 17 mi. S Lander, 8450 ft., 4; 5-1/2 mi. W and 22 mi. S Lander, 8800 ft., 3. *Converse County*: 22 mi. S and 24-1/2 mi. W Douglas, 7600 ft., 3. *Carbon County*: 18 mi. SW Rawlins, 7500 ft., 2; 19 mi. E and 8 mi. N Encampment, 9150 ft., 4; 19-1/2 mi. E and 6 mi. N Savery, 8800 ft., 1; 11 mi. E and 6 mi. N Savery, 8400 ft., 1; 14 mi. E and 6 mi. N Savery, 1. *Albany County*: 3 mi. ESE Browns Peak, 10,000 ft., 59.

Colorado: *Rio Blanco County*: 9-1/2 mi. SW Pagoda Peak, 7700 ft., 2. *Boulder County*: 2-1/2 mi. S Estes Park, 8400 ft., 2; 3 mi. S Ward, 8. *Clear*

Creek County: 2 mi. S Idaho Springs, 8000 ft., 1. *Gunnison County*: Gothic, 8 mi. N Crested Butte, 6 (James Findley Collection). [285]

Additional records.--**Colorado:** *Rio Blanco Co.*: 25 mi. NE Meeker (Cary, N. Amer. Fauna, 33:120, 1911). *El Paso Co.*: Lake Moraine, 10,250 ft. (Warren, Mammals of Colorado, p. 224, 1942).



Click on map to see larger sized image.

FIG. 1.--Geographic ranges of the subspecies of *Clethrionomys gapperi* in the southern Rocky Mountains.

- | | | |
|-----------------------------|----------------------------|-----------------------------|
| 1. <i>C. g. galei</i> | 3. <i>C. g. uintaensis</i> | 5. <i>C. g. limitis</i> |
| 2. <i>C. g. brevicaudus</i> | 4. <i>C. g. gauti</i> | 6. <i>C. g. arizonensis</i> |

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***Clethrionomys gapperi brevicaudus* (Merriam)**

1891. *Evotomys gapperi brevicaudus* Merriam, N. Amer. Fauna, 5:119, July 30.

1897. *Evotomys brevicaudus*, Bailey, Proc. Biol. Soc. Washington, 11:129, May 13.

1942. *Clethrionomys gapperi brevicaudus*, Bole and Moulthrop, Sci. Publ. Cleveland Mus. Nat. Hist., 5:153, September 11.

Type locality.--Three miles N Custer, 6000 ft., South Dakota.

Range.--The Black Hills of South Dakota and Wyoming.

Remarks.--Merriam (N. Amer. Fauna, 5:119, July 30, 1891) named this subspecies on the basis of two specimens collected in the Black Hills of South Dakota in July, 1888, and assigned it to the species *Evotomys* [= *Clethrionomys*] *gapperi*. He reported the diagnostic characteristics as: "Similar to *E. gapperi*, but with larger ears and shorter tail. The hazel of the dorsal area is not so bright as in *gapperi*; the sides are the same golden brown." Of the cranial and dental characteristics he wrote: "Much as in *E. gapperi*."

Bailey (Proc. Biol. Soc. Washington, 11:129, May 13, 1897), in his "Revision of the American voles of the genus *Evotomys*," with one additional specimen available, raised the Black Hills population to specific status, re-emphasizing the shortness of the tail, and pointing out a few slight cranial differences ("zygomatic arches low and flaring out, so that the inner instead of the outer side shows in top view; auditory bullae as large as in *gapperi*, but less rounded").

Bailey (*loc. cit.*) remarked that: "though based on so scanty material, the characters distinguishing the species are fairly pronounced. Its range is isolated and widely separated from that of any other members of the genus by open prairie country and a wide belt of the Transition zone. There seems to be no valid reason for considering it a subspecies."

Additional specimens have been taken in recent years from the Black Hills of South Dakota and northeastern Wyoming. This material has shed light on the relationships and morphological characteristics of the red-backed mice of this region. Bole and Moulthrop (Sci. Publ. Cleveland Mus. Nat. Hist., 5:153, September 11, 1942) listed, as comparative material, eight specimens from Bull Springs, Custer County, South Dakota, under the name *Clethrionomys gapperi brevicaudus* (Merriam). They gave no reason for arranging *brevicaudus* as a subspecies of *C. gapperi*.

Twenty adults (11 skins and skulls, 9 skulls only) from Pennington County, South Dakota (specimens in the University of Michigan Museum of Zoology), have the following measurements (averages of external measurements based on 11 specimens only): Total length, 142 (123-155); tail, 35 (30-39); hind foot, 19.5 (18.6-21.0); basal length, 23.3 (21.7-24.5); condylobasilar length, 23.3 (21.9-24.5); zygomatic breadth, 13.7 (12.9-14.7); lambdoidal breadth, 11.7 (11.3-12.9); alveolar length upper cheek-teeth, 5.5 (5.2-5.8); interorbital breadth, 3.9 (3.6-4.1); length of nasals, 7.7 (7.1-8.5); breadth of rostrum, 3.2 (2.9-3.6); and length of incisive foramina, 5.0 (4.6-5.3).

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Measurements of the type and one "more fully adult topotype" (as given by Bailey, *op. cit.*) are: Total length, 125, 130; tail length, 31, 32; hind foot, 19, 19; basal length, 21.2, 21.8; length of nasals, 6.6, 7.0; zygomatic breadth, 12.5, 12.8; mastoid breadth, 11.3, 11.0; alveolar length of upper molar series, 5.4, 5.3. In every measurement the figures for Bailey's specimens are smaller than the average of the same measurement in the 20 adults from Pennington County, and, in most measurements, are even lower than the minimum of the latter series. Therefore, we conclude that the material available to Merriam (*op. cit.*) and Bailey (*op. cit.*) consisted of only subadults.

In comparison with a series of 23 adult *Clethrionomys gapperi galei* from 28 mi. E Lovell, Big Horn County, Wyoming, *C. g. brevicaudus* has a slightly shorter tail, longer hind foot, greater basal and condylobasilar lengths, greater zygomatic and lambdoidal breadths and conspicuously longer nasals.

In comparison with three adult *C. g. loringi* from Elk River, Sherburne County, Minnesota, *C. g. brevicaudus* has a greater total length, longer hind foot, greater basal length, conspicuously greater zygomatic and lambdoidal breadths, much longer nasals, and a narrower rostrum.

Clethrionomys gapperi brevicaudus, although isolated geographically and although morphologically more distinct than many of the currently recognized subspecies of *C. gapperi*, is probably best arranged as a subspecies of *C. gapperi* rather than as a full species. In certain characters, such as interorbital breadth and breadth of rostrum, it is intermediate between *C. g. galei* and *C. g. loringi*, but it resembles *C. g. galei* more than it does any other named kind.

Specimens examined.--Total, 66. Unless otherwise indicated, specimens from Wyoming are in the University of Kansas Museum of Natural History and specimens from South Dakota are in the University of Michigan Museum of Zoology. Specimens are distributed as follows:

Wyoming: *Crook County:* 3 mi. NW Sundance, 5900 ft., 3. *Weston County:* 1-1/2 mi. E Buckhorn, 6150 ft., 21; 12 mi. SE Newcastle, 1 (Univ. Michigan).

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South Dakota: *Pennington County:* 1/2 mi. E Rochford, 1; 17 mi. NW Custer, 1; 16 mi. NW Custer, 20; 16 mi. SW Rapid City, 1; 3 mi. SE Hill City, 2; 4 mi. SE Hill City, 13; 5 mi. SE Hill City, Harney Peak, 7240 ft., 1. *Custer County:* 1-1/2 mi. E Sylvan Lake, 1.

1897. *Evotomys gapperi galei*, Bailey, Proc. Biol. Soc. Washington, 11:127 (part from Uinta Mts. of Wyoming), May 13.

1941. *Clethrionomys gapperi uintaensis* Doult, Proc. Biol. Soc. Washington, 54:161, Dec. 8.

Type locality.--Paradise Park, 10,050 feet, 45 miles by road northwest Vernal, Uintah County, Utah.

Range.--The Uinta Mountains of northern Utah and southwestern Wyoming.

Remarks.--From the description given by Doult (Proc. Biol. Soc. Washington, 54:161, 1941) in his original description of this subspecies, it appears that he had available for comparisons, only subadult specimens of *C. g. galei*. As judged from the material of *C. g. uintaensis* available to us (1 topotype, KU 38081, and 7 specimens from Uinta County, Wyoming, listed below) and from Doult's (*op. cit.*) description and measurements, the subspecies *C. g. uintaensis* is but weakly differentiated from *C. g. galei*. No marked cranial differences are evident between the two subspecies; the differences in pelage noted by Doult (*op. cit.*:161), however ("Similar to *Clethrionomys gapperi galei* from Ward, Colorado, but head and cheeks grayer; sides and back paler; belly whiter."), do seem to be valid.

On the basis of these differences in pelage and the geographic isolation of the range, we judge that *uintaensis* should be retained as a subspecies of *C. gapperi*. It is clear, however, that *C. g. uintaensis* is less distinct from *C. g. galei* than are the other adjacent subspecies.

Specimens examined.--Total, 8, all in the University of Kansas Museum of Natural History, distributed as follows:

Wyoming: *Uinta County*: 9 mi. S Robertson, 8000-8400 ft., 3; 9 mi. S and 2 mi. E Robertson, 8000 ft., 2; 11-1/2 mi. S and 2 mi. E Robertson, 9200 ft., 1; 14 mi. S and 2 mi. E Robertson, 9000 ft., 1.

Utah: *Uintah County*: Paradise Park, 21 mi. W, 15 mi. N Vernal, 10,050 ft., 1.

Additional, marginal records (Durrant, Univ. Kansas Publ., Mus. Nat. Hist., 6:356, August 19, 1952).--**Utah:** *Rich Co.*: Monte Cristo, 18 mi. W Woodruff, 8000 ft. *Salt Lake Co.*: Emigration Canyon, 8 mi. above forks, 6,000 ft.; Silver Lake Post Office (Brighton), 9,500 ft. *Wasatch Co.*: Wolf Creek Summit, 9,800 ft. *Daggett Co.*: Beaver Dams, 10,500 ft.

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***Clethrionomys gapperi gauti*, new subspecies**

Type.--Male, adult, skin and skull; No. 133515, Biological Surveys Collections, United States National Museum, from Twinning, 10,700 ft., Taos County, New Mexico; obtained on August 7, 1904, by James H. Gaut, original number 3086.

Range.--The Rocky Mountains of north-central New Mexico and south-central Colorado.

Diagnosis.--A brightly colored *Clethrionomys gapperi*; dorsal stripe near Chestnut (capitalized color terms after Ridgway, Color Standards and Color Nomenclature, Washington, D. C., 1912) with an underwash of near Light Ochraceous-Buff and a mixture of black-tipped guard hairs giving an over-all effect of between Tawny and Russet; braincase relatively large; zygomatic width and lambdoidal width large; nasals long.

Comparisons.--As compared with topotypes of *C. g. galei*, the color is lighter, the dorsal reddish stripe slightly narrower, sides brighter, with a wash of Light Ochraceous-Buff, grading ventrally into a slight wash of Pale Ochraceous-Buff, instead of a silvery-white venter characteristic of *C. g. galei*; zygomatic and lambdoidal breadths are greater, nasals slightly shorter, auditory bullae slightly more inflated, teeth larger, and braincase larger.

As compared with topotypes of *C. g. limitis*, *C. g. gauti* is darker, has a greater zygomatic breadth, longer upper tooth-row, longer nasals, and narrower rostrum.

Measurements.--External and cranial measurements of the type, and the average and extreme measurements of four adult males and one adult female from the type locality (including the type) and five miles south of the type locality are: Total length, 144, 147 (140-152); tail, 40, 42 (39-45); hind foot, 20, 19.3 (19-20); condylobasilar length, 22.3, 22.9 (22.2-24.0); zygomatic breadth, 13.6, 13.7 (13.5-14.0); lambdoidal breadth, 11.9, 11.7 (11.4-12.0); alveolar length of upper cheek-teeth, 5.1, 5.2 (5.1-5.4); interorbital breadth, 4.0, 3.9 (3.8-4.0); length of nasals, 7.0, 7.2 (7.0-7.6); breadth of rostrum, 2.9, 3.1 (2.9-3.4); length of incisive foramina, 4.8, 5.1 (4.8-5.3).

Remarks.--Two specimens from a locality 21 mi. W and 3 mi. N Saguache, Saguache County, Colorado, although referred to this subspecies on the basis of paler pelage, inflation of auditory bullae, and heavier teeth, show characters of *C. g. galei* in the narrowness across the zygomata and lambdoidal crest. Four specimens from Silverton (1 adult and 3 young adults) are referable to this subspecies on the basis of color of pelage and cranial proportions but are smaller than either *C. g. gauti* or *C. g. galei*.

The specimen from Pecos Baldy, Pecos Mountain, San Miguel County, New Mexico, referred by

Bailey (N. Amer. Fauna, 52:192) to *Clethrionomys gapperi galei*, is here referred to *C. g. gauti* on geographical grounds.

The name *gauti* is proposed in honor of the collector of the type specimen, James H. Gaut.

Specimens examined.--Total, 14, distributed as follows and, unless otherwise stated, in the Biological Surveys Collection: [290]

Colorado: *Saguache County*: 21 mi. W and 3 mi. N Saguache, N 38°, 106° 31', 9100 ft., 2 (Univ. Kansas Mus. Nat. Hist.). *San Juan Co.*: Silverton, 4.

New Mexico: *Taos County*: Twining, 10,700 ft., 3; 5 mi. S Twining, 11,400 ft., 3. *Sandoval County*: Goat Peak, Jemez Mountains, 1. *Colfax County*: 15 mi. SW Cimarron, 9000 ft., 1 (Amer. Mus. Nat. Hist.).

Additional records.--**New Mexico:** *San Miguel Co.*: Pecos Baldy, Pecos Mountain, 1 (Bailey, N. Amer. Fauna, 52:192, 1932).

***Clethrionomys gapperi limitis* (Bailey)**

1913. *Evotomys limitis* Bailey, Proc. Biol. Soc. Washington, 26:133, May 21.

Type locality.--Willow Creek, a branch of the Gilita, 8500 ft., Mogollon Mountains, Catron County, New Mexico.

Range.--Known from the Mogollon, San Mateo, and Magdalena mountains of western New Mexico.

Remarks.--Bailey (Proc. Biol. Soc. Washington, 26:133, May 21, 1913) described this animal as a species and gave as general characteristics: "Size slightly larger than *E.* [= *Clethrionomys gapperi*] *galei*; colors duller, grayer and less buffy; skull and dentition heavier." He further characterized the skull as: "Larger, heavier and conspicuously more ridged than in *galei*; bullae large and especially deep; dentition heavy throughout." The type of *C. limitis*, as judged from the measurements given by Bailey (*loc. cit.*), is an exceptionally old male.

Our comparison of six adult topotypes with a series of *C. g. galei* from Wyoming (18 adults from 3 mi. SSE Browns Peak, 10,000 ft., Albany County, in Univ. Kansas Mus. Nat. Hist.) and with three near-topotypes of *C. g. galei* (3 mi. S Ward, 9000 ft., Boulder County, Colorado, in Univ. Kansas Mus. Nat. Hist.) revealed that most of the differences noted by Bailey (*loc. cit.*) are not evident when individuals of comparable ages are examined. Some specimens of *C. g. galei* exceed *C. limitis* in ridging of the skull and size of the teeth although conspicuous ridges and large teeth are supposedly distinctive of *C. limitis*. The bullae, although averaging larger in *C. limitis*, can be matched in size by those of specimens of *C. g. galei* from Wyoming.

The differences evident between *C. limitis* and *C. g. galei* are of the kind and degree that serve to separate subspecies in the species *Clethrionomys gapperi* and, although actual evidence of intergradation is lacking, we think that the relationships of *limitis* are better expressed by arranging it as a subspecies of *C. gapperi* than by retaining it as a full species.

Specimens examined.--Total, 7, all in the Biological Surveys Collection, distributed as follows: [291]

New Mexico: *Catron County*: Willow Creek, 8500 ft., Mogollon Mountains, 4. *Socorro County*: San Mateo Peak, 10,000 ft., San Mateo Mountains, 2; Copper Canyon, 9000 ft., Magdalena Mountains, 1.

***Clethrionomys gapperi arizonensis*, new subspecies**

Type.--Female, adult, skin and skull; No. 158401, Biological Surveys Collection, United States National Museum; from Little Colorado River, 8300 ft., White Mountains, Apache County, Arizona; obtained September 12, 1908, by C. Birdseye, original number 152.

Range.--Known only from the White Mountains of eastern Arizona.

Diagnosis.--Dorsal stripe near Chestnut, with an underwash of between Tawny and Russet, and a mixture of black-tipped hairs, resulting in an overall effect of near Chestnut. Skull wide across zygomatic arches and narrow across mastoids; rostrum narrow and posterior border of palate straight.

Comparisons.--This subspecies needs close comparison only with the adjacent subspecies *C. g. limitis*. As compared with topotypes of *limitis*, *C. g. arizonensis* has darker pelage, narrower rostrum, greater width across zygomatic arches, lesser lambdoidal breadth, longer nasals, wider palate, and more inflated auditory bullae. The posterior border of the hard palate is straight in five skulls of the series that are complete (two skulls have the palatal regions broken); all *C. g. limitis* examined have a median posterior projection on the posterior border of the hard palate.

Measurements.--External and cranial measurements of the type, and the average and extreme measurements of three adult males and two adult females from the type locality (including the type) are: Total length, 160, 145.6 (137-160); tail, 44, 40.8 (37-46); hind foot, 18.5, 19.3 (18-20); condylobasilar length, 23.3, 22.8 (22.1-23.5); zygomatic breadth, 13.8, 13.4 (12.6-13.8); lambdoidal breadth, 11.5, 11.4 (11.0-11.6); alveolar length upper cheek-teeth, 5.5, 5.4 (5.2-5.5); interorbital breadth, 3.8, 3.9 (3.8-4.0); length of nasals, 7.6, 7.1 (6.9-7.6); breadth of rostrum, 3.1, 3.1 (3.0-3.2); length of incisive foramina, 5.5, 5.2 (5.0-5.5).

Remarks.--Hall and Davis (Proc. Biol. Soc. Washington, 47:55, February 9, 1934) reported 12 specimens of red-backed mice from Hannagan Meadow, 9500 to 9600 ft., and ten from Hannagan Creek, 8600 ft., all in Greenlee County, Arizona. Although they pointed out most of the cranial differences here described as diagnostic of *C. g. arizonensis*, they did not name the animals as new since they had no seasonally comparable materials; thus they were unable to evaluate the differences noted in pelage. We have not examined the material referred to by Hall and Davis (*loc. cit.*), but, on the basis of their description, here refer it to *C. g. arizonensis*.

Specimens examined.--Total, 7, all from the type locality and all in the Biological Surveys Collection in the United States National Museum.

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Grateful acknowledgment is made of the opportunity to study the specimens from New Mexico and Arizona in the Biological Surveys Collection of the United States National Museum and the material from South Dakota in the University of Michigan Museum of Zoology, as well as for the financial support afforded one of us (Cockrum) by the University of Kansas from its Research appropriation. Cockrum's work was part of a larger investigation of the geographic distribution of all North American native mammals, aided by a contract between the Office of Naval Research, Department of the Navy, and the University of Kansas (NR. 161-791). Also, assistance with some of field work was given by the Kansas University Endowment Association.

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