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**Title:** Geographic Distribution and Taxonomy of the Chipmunks of Wyoming

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**Release Date:** April 11, 2010 [EBook #31951]

**Language:** English

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

\*\*\* START OF THE PROJECT GUTENBERG EBOOK GEOGRAPHIC DISTRIBUTION AND TAXONOMY OF THE CHIPMUNKS OF WYOMING \*\*\*

**Geographic Distribution and  
Taxonomy  
of the Chipmunks of Wyoming**

By

**JOHN A. WHITE**

**University of Kansas Publications**

**Museum of Natural History**

**Volume 5, No. 34, pp. 583-610, 3 figures in text**

**December 1, 1953**

**University of Kansas  
LAWRENCE  
1953**

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UNIVERSITY OF KANSAS PUBLICATIONS, MUSEUM OF NATURAL HISTORY

Editors: E. Raymond Hall, Chairman, A. Byron Leonard,  
and Robert W. Wilson

Volume 5, No. 34, pp. 583-610, 3 figures in text

UNIVERSITY OF KANSAS  
Lawrence, KansasPRINTED BY  
FERD VOILAND, JR., STATE PRINTER  
TOPEKA, KANSAS  
1953

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**PURPOSE**

The purpose of the following account is to: (1) Show what kinds of chipmunks occur in Wyoming; (2) point out the interrelationships between these kinds; and (3) account, where possible, for the present distribution of these animals in Wyoming.

**METHODS, MATERIALS, AND ACKNOWLEDGMENTS**

Capitalized color terms in the following accounts are of Ridgway, "Color Standards and Color Nomenclature," Washington, D.C., 1912.

The measurements of the skull that were used in this study were made as shown in White (1953:566, fig. 1). These are: Greatest length of skull, zygomatic breadth, cranial breadth, length of nasals, length of lower tooth-row, condylo-alveolar length of mandible, and inner mandibular length.

Of the external measurements, only the total length and the length of the tail are recorded in table 1. Some field collectors measured the ear from the notch and others from the crown; most collectors measured the length of the hindfoot to the nearest millimeter rather than in tenths of a millimeter as would have been desirable. Consequently, I decided against using the length of the ear and hindfoot in this report.

When the word "significantly" is used in comparisons, it is meant to show that there is a significant statistical difference between two or more samples. Whenever eight or more specimens from one locality were available, the mean, range, standard deviation, standard error of the mean, and coefficient of variability were calculated.

Only adult specimens were used in comparison. "Aging" of specimens is discussed on page 587 of this paper.

The geographic range of each species and subspecies is not described in writing, for, the localities are plotted on maps along with the geographic range of each subspecies, and under "specimens examined" the locality of each specimen or series of specimens is listed.

In the synonymy of each subspecies there appears, first the first usage of a name, second the first usage of the name combination now employed, and third, pure synonyms.

A total of 757 specimens of chipmunks are listed as examined in the course of preparing this report. Additional specimens were less carefully examined in the Biological Surveys Collection in Washington, D.C. Specimens used in my study, unless otherwise specified, are in the Museum of Natural History, University of Kansas. The symbols representing the collections containing specimens studied are as follows:

- BS—United States Biological Surveys Collection.
- FC—Collection of James S. Findley.
- MM—Museum of Zoology, University of Michigan.
- NM—United States National Museum.
- KU—Museum of Natural History, University of Kansas.

I am grateful to Professor E. Raymond Hall for guidance in my study and thank Doctors Robert W. Wilson, E. Lendell Cockrum, Keith R. Kelson, A. Byron Leonard, Rollin H. Baker, and others at the Museum of Natural History and Department of Zoology, University of Kansas, for encouragement and advice. My wife, Alice M. White, made the illustrations and helped me in many ways.

For permission to borrow and to study specimens, I thank Dr. W. H. Burt of the Museum of Zoology, University of Michigan, Miss Viola S. Schantz of the United States Fish and Wildlife Service, Mr. Colin C. Sanborn of the Chicago Natural History Museum, and Mr. James S. Findley.

Assistance with field work is acknowledged from the Kansas University Endowment Association, the National Science Foundation and the United States Navy, Office of Naval Research, through contract No. NR161 791.

## VARIATION

Secondary sexual variation in chipmunks is small; the females are slightly larger than the males. This difference in size is so slight that it can be ignored when making taxonomic comparisons, for, large samples of males and females of like age and from the same locality were compared and were found statistically not to be significantly different. This is in agreement with Johnson (1943:70) and Hall (1946:329).

Variations of taxonomic worth are treated in the accounts of species and subspecies.

Individual variation is slight, for, the analyses of measurements of the skulls of series of specimens of like age, reveal markedly low coefficients of variability resembling those published by Larrison (1949).

The age-categories here recognized are based primarily on the structure of the skull.

*Juveniles*.—Nasals proportionally shorter and more pointed anteriorly than in other categories; zygomatic arches more appressed to cranium; suture separating basisphenoid and presphenoid noticeably "open"; deciduous P4 and p4 show no wear through enamel; M3 and m3 not yet erupted; peglike deciduous P3 strongly leaning posteriorly; molars show no wear through enamel; parietals paperlike or thin; skull convex dorsally; 1 to 1½ months of age.

*Young*.—Nasals of adult proportions; zygomatic arches still noticeably appressed

anteriorly to cranium; suture between basisphenoid and presphenoid still "open"; nasals rounded, no longer so pointed as in juveniles; deciduous P4 and p4 show wear through enamel layer, and in some specimens, permanent P4 and p4 can be seen beneath; roots of deciduous P4 and p4 clearly show erosion beneath; M3 and m3 fully erupted; peglike deciduous P3 still present; parietals noticeably thicker and less paperlike; skull flattened (not so convex dorsally), but not so flattened as in adults; 1½ to 4 months of age.

In both juveniles and young the P4 and p4 are deciduous and differ in occlusal pattern from the permanent P4 and p4. In the deciduous P4 the anterior cingulum is projected strongly anteriorly forming the apex of the sharpest angle of a triangle, whereas the permanent P4 is trapezoidal in occlusal pattern. In the deciduous p4 the protoconid and metaconid are close together giving this tooth a triangular appearance in occlusal pattern, whereas this pattern in permanent p4 is trapezoidal (see Hall 1926:390).

*Subadults.*—Adult configuration of skull reached; suture between basisphenoid and presphenoid completely closed; nasals rounded anteriorly; permanent P4 and p4 show no wear through enamel layer; wear through enamel layer of molars noticeable, especially through protocones; peglike permanent P3 slanting only slightly posteriorly; skull only slightly convex dorsally; parietals solid and resistant to pressure; lambdoidal crest weakly developed; 4 to 10 months of age.

*Adults.*—Lambdoidal crest well developed; supraorbital ridges pronounced; P4 and p4 show wear through enamel layer and frequently as worn as molars; noticeable wear on lophs and lophids of molars; occlusal pattern always visible; ten months to 2 years of age.

*Old adults.*—Ridges and crests extremely well developed; occlusal pattern of molariform teeth obliterated or nearly so; P3 noticeably worn; 2 to 4 years or older.

The hypohyal and ceratohyal bones of the hyoid apparatus are distinct from one another in juveniles and young, but are fused in subadults, adults, and old adults.

Lack of suitable material prevented me from studying chipmunks younger than juveniles. The patterns of growth of these younger chipmunks probably closely follow the changes described by Hall (1926) for *Citellus beecheyi*.

The tip of the baculum in juveniles and young is proportionally longer, in relation to the shaft, than in subadults, adults, and old adults.

Juvenal (juveniles and young) pelage in chipmunks is characterized by silkiness and sparseness, especially on the venter. The coloration of this juvenal pelage resembles that of adults in winter pelage which is duller than adult summer pelage. Adult pelage (subadults, adults, and old adults) is not so silky as juvenal pelage, but there are more hairs, especially on the venter. The color pattern is the same in both juvenal and adult pelages.

Chipmunks are born naked and blind and in about two weeks the "body is covered with silken hair clearly demonstrating the color pattern so characteristic of chipmunks...." (Shaw 1944:282). This "silken hair" is replaced by adult summer pelage, and juvenal chipmunks which are molting into adult summer pelage closely resemble the adult males, and later on in the summer, the adult females. Adult females molt later, as a rule, than adult males probably because of lactation. Summer molt begins, on chipmunks in Wyoming and South Dakota, in the latter part of June and is completed by the latter part of August or the first part of September.

Summer molt begins, topographically, in the region of the head and progresses posteriorly to the base of the tail, for, the tail does not molt into summer pelage. The winter molt starts at the same time at the tip of the tail and at the base of the tail, and from each place proceeds anteriorly. The sequence described above is the rule; exceptionally, there are some specimens which molted in patches. In most skins, molts are easily detected because distinct molt-lines were formed. The above description of molting is based on study of a large series of specimens of *Eutamias minimus silvaticus* taken in several seasons of the year.

The summer pelage is bright, more especially on the sides. In late summer the pelage on the tail is markedly worn, and the hairs around its outer margin are broken. In texture, the summer pelage is not so soft as winter pelage, and this is probably owing to the presence of large amounts of "kinky" underfur in the winter pelage.

The winter pelage is soft, dull in color, and gives the specimen a grayish or an umbrous appearance. The guard hairs are longer than in the summer pelage.

#### KEY TO THE SPECIES OF THE CHIPMUNKS OF WYOMING

1. Dorsal stripes faint; general tone of upper parts grayish. *Eutamias dorsalis*, p. 603
- 1'. Dorsal stripes distinct; general tone of upper parts tawny (not grayish).
  2. Venter yellowish or buff; tip of baculum more than 30 per cent of length of shaft; shaft of baculum not widened at base. *Eutamias amoenus*, p. 602
  - 2'. Venter white; tip of baculum less than 29 per cent of length of shaft—if more than 29 per cent, shaft widened at base.

3. Size small to medium; greatest length of skull less than 34 mm.; shaft of baculum not widened at base; outermost dorsal dark stripe never obsolete  
 3'. Size large; greatest length of skull rarely less than *Eutamias minimus*, p. 590  
 34 mm.; shaft of baculum widened at base; outermost dorsal dark stripe often obsolete, never strongly evident. *Eutamias umbrinus*, p. 606

#### ACCOUNTS OF SPECIES AND SUBSPECIES

#### *Eutamias minimus* (Bachman)

*Diagnosis.*—Size small; tip of baculum of adults less than 28 per cent of length of shaft; outermost dorsal dark stripes distinct; skull small to medium; when skull medium, zygomatic breadth not proportionally narrower.

*Comparisons.*—From *Eutamias amoenus luteiventris*, the only subspecies of that species in Wyoming, *E. minimus* differs in: Size smaller; tip of baculum in adults less than 28 per cent of length of shaft; zygomatic arches proportionally wider; underparts white or with less yellow or tawny.

From *E. umbrinus*, *E. minimus* differs in: Size smaller; general tone of upper parts lighter; base of baculum not widened but almost as narrow as least diameter of shaft.

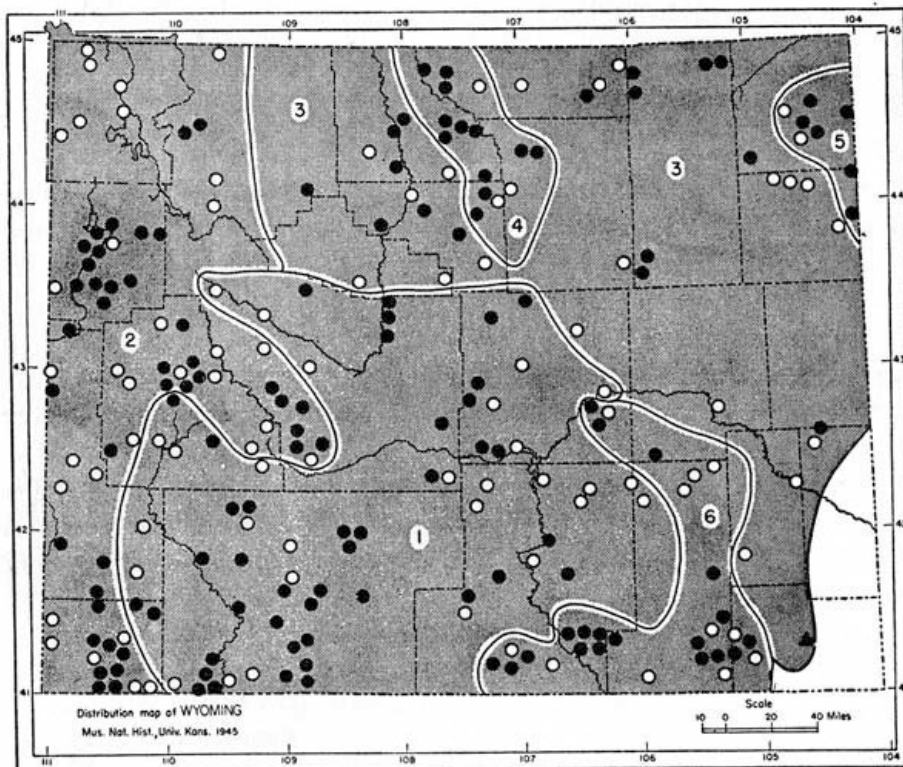


FIG. 1. Known occurrence and probable geographic distribution of the subspecies of *Eutamias minimus* in Wyoming. The symbols for locality records are as follows: Circles, specimens reported but not examined; solid circles, precise localities of specimens examined; solid triangles, localities of specimens examined, known only to county.

- |                             |                            |
|-----------------------------|----------------------------|
| 1. <i>E. m. minimus</i>     | 4. <i>E. m. confinis</i>   |
| 2. <i>E. m. consobrinus</i> | 5. <i>E. m. silvaticus</i> |
| 3. <i>E. m. pallidus</i>    | 6. <i>E. m. operarius</i>  |

From *E. dorsalis utahensis*, the only subspecies of this species in Wyoming, *E. minimus* differs in: Dorsal dark stripes distinct and usually blackish; skull smaller; tip of baculum of adults less than 28 per cent of length of shaft.

*Remarks.*—This is the smallest of the species of chipmunks in Wyoming, and in the state can be readily distinguished from the other species by the smaller size and by the characteristic proportions of the baculum.

*E. minimus* occurs in all the Life-zones of Wyoming, and inhabits open country, such as in the great expanses where sagebrush (*Artemisia* sp.) is predominant, or inhabits the edges of forests, never occurring in the forest proper.

Analyses of measurements of the skull indicate that of the six subspecies of *E. minimus* that are found in Wyoming, two are small (*E. m. minimus* and *E. m. consobrinus*) and the other four are large (*E. m. pallidus*, *E. m. confinis*, *E. m. silvaticus*, and *E. m. operarius*).

Within these size-groups the subspecies can be distinguished by differences in color pattern.

**Eutamias minimus minimus** (Bachman)

*Tamias minimus* Bachman, Jour. Acad. Nat. Sci. Philadelphia, 8(pt. 1):71, 1839.

*Eutamias minimus*, Miller and Rehn, Proc. Boston Soc. Nat. Hist., 30:42, December 27, 1901.

*Type*.—Obtained on Green River, near mouth of Big Sandy Creek, Sweetwater County, Wyoming. Age, sex, collector, and date when obtained, not surely known.

*Diagnosis*.—Size small; general tone of upper parts pale grayish brown; baculum small.

*Description*.—*Color pattern*: Crown Pinkish Buff mixed with grayish white; facial stripes Snuff-Brown mixed with black; anterior margin of ear Drab washed with Cinnamon; hairs inside posterior part of pinna Light Pinkish Cinnamon; posterior margin of ear and postauricular patch grayish white; median dorsal dark stripe black with Sayal Brown along margins; lateral pair of dark stripes Sayal Brown more or less mixed with Fuscous; pairs of light dorsal stripes grayish white and tinged with Buff; rump and thighs Smoke Gray; dorsal surface of tail Fuscous Black mixed with Cinnamon-Buff; ventral surface of tail Sayal Brown or Clay Color, Blackish Brown mixed with Cinnamon-Buff around margins; antipalmar and antipalmar surfaces of feet Pale Pinkish Buff; underparts creamy white. *Skull* and *Baculum*: Small but proportionally the same as in other subspecies of *E. minimus*.

*Comparisons*.—From *E. m. consobrinus*, the subspecies to the west and south, *E. m. minimus* differs in: Over-all tone of upper parts lighter; underside of tail lighter.

From *E. m. pallidus*, the subspecies to the north and northeast, *E. m. minimus* differs in: Size smaller; skull shorter and narrower; mandible shorter and shallower; baculum shorter; slightly paler.

From *E. m. confinis*, the subspecies in the Big Horn Mountains, *E. m. minimus* differs in: Size smaller; skull shorter and narrower; mandible shorter and shallower; baculum shorter; paler.

From *E. m. operarius*, the subspecies to the east and southeast, *E. m. minimus* differs in: Size smaller; skull shorter and narrower; mandible shorter and shallower; baculum shorter; paler.

*Remarks*.—*E. m. minimus* is the smallest of the chipmunks that occur in Wyoming. This pale little squirrel is found in the Red Desert in Sweetwater County, where the features distinctive of the subspecies are most strongly developed. Specimens from western Sweetwater County and northwestern Uinta County are intergrades between *E. m. minimus* and *E. m. consobrinus* and are referable to *E. m. minimus*.

*Specimens examined*.—Total number 167.

*Sublette Co.*: 60 mi. SE Jackson [Teton County], 1 (MM); 2 mi. SE Big Sandy, 1.

*Fremont Co.*: 40 mi. E Dubois, 1; 12 mi. N and 3 mi. W Shoshoni, 4,650 ft., 2; 9 mi. N and 3 mi. E Shoshoni, 4,700 ft., 2; 7 mi. N and 3 mi. E Shoshoni, 4,700 ft., 3; 2½ mi. W Shoshoni, 4,800 ft., 1; Granite Mountains, 6; Mount Crooks, 8,600 ft., 6.

*Natrona Co.*: 27 mi. N and 1 mi. E Powder River, 6,075 ft., 2; 15 mi. N and 1 mi. W Waltman, 1; 9 mi. S and 9 mi. W Waltman, 6,950 ft., 1; 16 mi. S and 11 mi. W Waltman, 6,950 ft., 2; Sun Ranch, 5 mi. W Independence Rock, 6,000 ft., 4; 9 mi. W and 1 mi. N Independence Rock, 1; 5 mi. W and 1 mi. S Independence Rock, 2.

*Uinta Co.*: 15 mi. WSW Granger [Sweetwater County], 1; 10 mi. SW Granger [Sweetwater County], 10 (MM).

*Sweetwater Co.*: Farson, 6,580 ft., 11; 5 mi. E Farson, 1; 27 mi. N Table Rock, 1 (MM); 27 mi. N and 37 mi. E Rock Springs, 6,700 ft., 1; 25 mi. N and 38 mi. E Rock Springs, 6,700 ft., 3; Junction of Big Sandy Creek and Green River, 6,400 ft., 7 (3MM); 17 mi. N and 6 mi. W Rock Springs, 7,000 ft., 1; Thayer Junction, 9 (MM); Table Rock, 1 (MM); Wamsutter, 1 (MM); Green River, 4 (MM); Bitter Creek, 2 (FC); 13 mi. S and 14 mi. E Rock Springs, 6,650 ft., 2; 18 mi. S Bitter Creek, 6,800 ft., 2; 22 mi. SSW Bitter Creek, 5; 26 mi. S and 21 mi. W Rock Springs, 3; Kinney Ranch, 6,800 ft., 21 mi. S Bitter Creek, 15; 30 mi. S Bitter Creek, 2; 32 mi. S and 22 mi. W Rock Springs, 1; 32 mi. S and 22 mi. E Rock Springs, 7,025 ft., 12; 33 mi. S Bitter Creek, 6,900 ft., 6; 3 mi. W Green River, and 2 mi. N Utah Boundary, 1; 1/2 mi. N Junction Henrys Fork and Utah Boundary, 2; 1 mi. N Linwood, Utah, 1 (MM).

*Carbon Co.*: 18 mi. NNE Sinclair, 6,500 ft., 2; Rawlins, 1; 30 mi. E Rawlins, 6,750 ft., 2; Bridgers Pass, 18 mi. SW Rawlins, 7,500 ft., 1.

*Additional records* (Howell 1929:38): *Lincoln Co.*: Fontanelle; Opal. *Sublette Co.*: Big Piney; Green River at junction with New Fork; Muddy Creek, near Big Sandy

Creek. *Fremont Co.*: Jackeys Creek, 3 mi. S Dubois; Wind River near mouth of Meadow Creek; Ft. Washakie; Green Mountains, 8 mi. E Rongis. *Natrona Co.*: Bitter Creek, near Powder River; Rattlesnake Mountains; Casper; Independence Rock. *Sweetwater Co.*: Eden, Steamboat Mountain; Superior; Maxon; Green River, 4 mi. N Linwood, Utah; Henrys Fork, at mouth of Burnt Fork. *Carbon Co.*: Canyon Creek, 12 mi. S Alcova; Ferris Mountains; Shirley; Shirley Mountains; 8½ mi. SE Lost Soldier [= Bairoil]; Ft. Steele; Sulphur Springs. *Albany Co.*: Spring Creek, 10 mi. W Marshall; Sheep Creek. *County uncertain*: Little Sandy River; Green River.

***Eutamias minimus consobrinus* (J. A. Allen)**

*Tamias minimus consobrinus* J. A. Allen, Bull. Amer. Mus. Nat. Hist. 3:112, June, 1890.

*Eutamias minimus consobrinus*, Miller and Rehn, Proc. Boston Soc. Nat. Hist. 30:42, December 27, 1901.

*Eutamias lectus* J. A. Allen, Brooklyn Inst. Mus. Sci. Bull. 1:117, March 31, 1905 (not in Wyoming), type from Beaver Valley, Utah.

*Eutamias consobrinus clarus* Bailey, Proc. Biol. Soc. Washington, 31:31, May 16, 1918, type from Swan Lake Valley, Yellowstone National Park, Wyoming.

*Type*.—Male, adult, skull and skin, No. 186456 (NM); from near Barclay, Parley's Canyon, Wasatch Mountains, Salt Lake County, Utah; obtained on October 31, 1888, by Vernon Bailey; original No. 361.

*Diagnosis*.—Size small; over-all tone of upper parts grayish brown; baculum small, as in *E. m. minimus*.

*Description*.—*Color pattern*: Crown Smoke Gray mixed with Ochraceous-Tawny; upper facial stripe Fuscous; other facial stripes Fuscous or Fuscous Black mixed with Tawny; hairs inside posterior part of pinna Light Ochraceous-Buff; anterior margin of ear Ochraceous-Tawny; posterior margin of ear and postauricular patch grayish white; median dorsal dark stripe black with Ochraceous-Tawny along margins; other dorsal dark stripes black mixed with Ochraceous-Tawny; median pair of dorsal light stripes grayish white with Ochraceous-Tawny along margins; lateral pair of light dorsal stripes white; sides Ochraceous-Tawny or Light Sayal Brown; rump and thighs Smoke Gray mixed with Cinnamon-Buff; dorsal surface of tail Fuscous Black mixed with Cinnamon-Buff; ventral surface of tail Sayal Brown, Fuscous Black along margin, and Cinnamon-Buff or Ochraceous-Buff along outermost edge; antipalmar and antiplantar surfaces of feet Light Pinkish Cinnamon or Pinkish Buff; underparts grayish white mixed slightly with Buff. *Skull* and *Baculum*: Small but proportionally the same as in other subspecies of *E. minimus*.

*Comparisons*.—From *E. m. pallidus*, the subspecies to the east, *E. m. consobrinus* differs in: Color darker; size smaller; skull narrower and shorter; baculum shorter.

From *E. m. confinis*, the subspecies from the Big Horn Mountains, *E. m. consobrinus* differs in: Over-all tone of upper parts less grayish; underside of tail lighter; skull narrower and shorter; baculum shorter.

For comparisons with *E. m. minimus* see the account of that subspecies.

*Remarks*.—Specimens of this subspecies from the area between the Uinta Mountains and the mountains of the Wyoming and Wind River ranges, are clearly intergrades between *E. m. consobrinus* and *E. m. minimus* and are here referred to *E. m. consobrinus*. These specimens are paler than typical *E. m. consobrinus* and considerably darker than *E. m. minimus*. These intergrades came from an area where the habitat is intermediate between that of *E. m. consobrinus* and *E. m. minimus* but more nearly like that of *E. m. consobrinus*.

*Specimens examined*.—Total number, 135.

*Yellowstone Park*: Fishing Bridge, 1 (MM).

*Park Co.*: SW slope Whirlwind Peak, 9,000 ft., 1.

*Teton Co.*: N end Blacktail Butte, 6,600 ft., 1 mi. E Moose, 1; Bar BC Ranch, 6,500 ft., 2½ mi. NE Moose, 2; 3¾ mi. E Moose, 6,300 ft., 3; 3¾ mi. E and ¾ mi. S Moran, 6,210 ft., 2; 5 mi. S Moran, 1 (FC); 2 mi. S Elk Ranch, 2 (FC); 7 mi. S Moran, 1 (FC); 19 mi. E and 2 mi. S Moran, 1; Flat Creek Pass, 1 (MM); Flat Creek-Crystal Creek Divide, 1 (MM); Flat Creek-Granite Creek Divide, 5 (MM); Dry Hollow, Jackson, 1 (MM); Jackson, 4 (MM); Jenny Lake, 2 (MM); Sheep Creek, Jackson, 1 (MM).

*Lincoln Co.*: 3 mi. N and 11 mi. E Alpine, 5,650 ft., 2; 13 mi. N and 2 mi. W Afton, 6,100 ft., 2; 10 mi. N and 2 mi. W Afton, 6,100 ft., 2; 6 mi. N and 2 mi. E Sage, 6,050 ft., 1; Kemmerer, 1; Cumberland, 14 mi. S and 1 mi. W Kemmerer, 6,550 ft., 6.

*Sublette Co.*: 5 mi. E and 9 mi. N Pinedale, 9,200 ft., 12; 10 mi. NE Pinedale, 8,000

ft., 2; W end Half Moon Lake, 7,900 ft., 5; 3 mi. E and 5 mi. N Pinedale, 7,500 ft., 3; 2¼ mi. NE Pinedale, 7,500 ft., 3; 4 mi. W Pinedale, 7,200 ft., 2; 19 mi. W and 2 mi. S Big Piney, 7,700 ft., 1; 31 mi. N Pinedale, 8,025 ft., 2.

*Fremont Co.*: Togwotee Pass, 3 (1 FC); Moccasin Lake, 10,100 ft., 19 mi. W and 4 mi. N Lander, 1; 16 mi. S and 5½ mi. W Lander, 8,650 ft., 1; 23½ mi. S and 5 mi. W Lander, 8,600 ft., 1; 3 mi. E and 1/2 mi. N South Pass City, 7,900 ft., 7; Mosquito Park R.S., 9,500 ft., 17½ mi. W and 2½ mi. N Lander, 1; 4 mi. S and 8½ mi. W Lander, 9,200 ft., 1.

*Uinta Co.*: 1/2 mi. S Cumberland [Lincoln County], 1; 2 mi. W Fort Bridger, 6,070 ft., 1; 8½ mi. W Fort Bridger, 6,700 ft., 17; 1/2 mi. S Mountain View, 6,900 ft., 2; 6 mi. S and 2½ mi. E Robertson, 8,200 ft., 3; 8 mi. S and 2½ mi. E Robertson, 8,300 ft., 1; 9 mi. S Robertson, 8,000 ft., 5; 9½ mi. S and 1 mi. W Robertson, 8,600 ft., 2; 10 mi. S and 1 mi. W Robertson, 8,700 ft., 4; 13 mi. S and 2 mi. E Robertson, 9,200 ft., 7; 2 mi. E and 12 mi. S Robertson, Ashley Nat. For., 9,000 ft., 1; 11½ mi. S and 2 mi. E Robertson, 9,200 ft., 1; 4½ mi. S and 4 mi. E Robertson, 8,025 ft., 1.

*Additional records* (Howell 1929:48): *Yellowstone Park*: Bunsen Peak; Swan Lake Valley; Canyon; Lake Station; Firehole River; Summit Lake; Snow Pass. *Park Co.*: Beartooth Lake; Whirlwind Peak, near Pahaska Tepee; Valley; Needle Mountain. *Teton Co.*: Elk, Jackson Hole; Teton Pass. *Lincoln Co.*: Thayne; head of La Barge Creek; Smith Fork, 7,000 to 8,000 ft. *Sublette Co.*: 12 mi. N Kendall; Merna; Fremont Lake; Surveyor Park, 12 mi. NE Pinedale; Bronx; Little Sandy Creek; Stanley; Big Sandy. *Fremont Co.*: Lake Fork, Wind River Mountains; Fremont Peak; South Pass City. *Uinta Co.*: Bear River Divide, 14 mi. N Evanstone; Evanstone; Ft. Bridger; Spring Valley; Henry's Fork, 5 mi. W Lone Tree; Lone Tree; Sage Creek (exact locality unknown).

### ***Eutamias minimus pallidus* (J. A. Allen)**

*Tamias quadrivittatus* b. var. *pallidus* J. A. Allen, Proc. Boston Soc. Nat. Hist. 16:289, 1874.

*Eutamias minimus pallidus*, Howell, Jour. Mamm. 3:183, August 4, 1922.

*Lectotype*.—Skull and skin, No. 11656/38311 (NM); from Camp Thorne, near Glendive, Dawson County, Montana; obtained on July 18, 1873, by J. A. Allen; original No. 200.

*Diagnosis*.—Size large; over-all tone of upper parts pale grayish brown; baculum large.

*Description*.—*Color pattern*: Crown Pale Smoke Gray mixed with Clay Color; facial stripes Fuscous Black mixed with Clay Color; anterior margin of ear and hairs inside posterior part of pinna Pale Pinkish Buff; posterior margin of ear and postauricular patch grayish white; median dorsal dark stripe black with Clay Color along margins; other dorsal dark stripes Fuscous mixed with Clay Color; median pair of dorsal light stripes Pale Smoke Gray; lateral pair of dorsal light stripes creamy white; sides Cinnamon-Buff; rump and thighs Smoke Gray mixed with Pale Buff; dorsal surface of tail Fuscous Black slightly mixed with Warm Buff; ventral surface of tail Pinkish Cinnamon or Pinkish Buff, with Fuscous Black along margin and Warm Buff along outermost edge; antipalmar and antiplantar surfaces of feet Pinkish Buff, Warm Buff or Pale Yellow-Orange; underparts white with dark underfur. *Skull and Baculum*: Large but of same proportions as in other subspecies of *E. minimus*.

*Comparisons*.—From *E. m. silvaticus*, the subspecies from the Black Hills, *E. m. pallidus* differs in: Paler; underside of tail paler; sides paler.

From *E. m. confinis*, the subspecies from the Big Horn Mountains, *E. m. pallidus* differs in: Over-all tone of upper parts paler; sides paler; underside of tail paler.

From *E. m. operarius*, the subspecies from the mountains in south-central Wyoming, *E. m. pallidus* differs in: Over-all tone of upper parts paler; sides paler; underside of tail paler.

For comparisons with *E. m. minimus* and *E. m. consobrinus*, see the accounts of those subspecies.

*Remarks*.—Specimens from near Buffalo, Johnson Co., are intergrades between *E. m. pallidus* and *E. m. confinis* and are referable to *E. m. confinis*. Specimens from near Sundance (not in Bear Lodge Mountains), Crook Co., are intergrades between *E. m. pallidus* and *E. m. silvaticus* (Howell 1929:55). Specimens from the Laramie Range in Converse Co. are intergrades between *E. m. pallidus* and *E. m. operarius*, and referable to *E. m. operarius*. Specimens from near Greybull, Big Horn Co., are intergrades between *E. m. pallidus* and *E. m. minimus* and are referable to *E. m. pallidus*. These specimens show no intergradation with *E. m. confinis* which occurs but a short distance to the east in the Big Horn Mountains. Intergradation between *E. m. pallidus* and *E. m. minimus* probably exists in northeastern Natrona Co. and southwestern Johnson Co.

Comparisons of specimens of *E. m. pallidus* and *E. m. cacodemus*, indicates that, in my



opinion, *E. m. cacodemus* is entitled to subspecific recognition, for, the relationship between *E. m. pallidus* to *E. m. cacodemus* is the same as that between *E. m. pallidus* and *E. m. confinis*.

*Specimens examined*.—Total number, 58.

*Park Co.*: 2 mi. S and 2 mi. E Meteetse, 5,750 ft., 3.

*Big Horn Co.*: 6 mi. NW Greybull, 3,800 ft., 6; Greybull, 4 (BS); 7 mi. S Basin, 3,900 ft., 5.

*Sheridan Co.*: 5 mi. NE Clearmont, 3,900 ft., 1.

*Campbell Co.*: 5 mi. N and 8 mi. W Spotted Horse, 9; 6 mi. W and 4 mi. S Rockypoint, 4,200 ft., 1; 4 mi. S and 3 mi. W Rockypoint, 5; Middle Butte, 6,010 ft., 38 mi. S and 19 mi. W Gillette, 3; South Butte, 6,000 ft., 17½ mi. W and 40½ mi. S Gillette, 2; Ivy Creek, 8 mi. W and 5 mi. N Spotted Horse, 6.

*Crook Co.*: Moorcroft, Belle Fourche Valley, 8 (BS).

*Washakie Co.*: 15 mi. W Tensleep, in badlands, 1 (BS); 8 mi. S and 8 mi. W Worland, 1; 10 mi. S Tensleep, near No Wood Creek, 2 (BS).

*Goshen Co.*: Rawhide Buttes, 12 mi. S and 1 mi. W Lusk, 1.

*Laramie Co.*: unspecified, 1.

*Additional records* (Howell 1929:44): *Big Horn Co.*: Otto; Hyattville. *Sheridan Co.*: Powder River at mouth of Clear Creek; Sheridan; Arvada. *Weston Co.*: Thornton; Upton; Pine Ridge; Newcastle. *Hot Springs Co.*: head of Bridger Creek; Willow Creek, 10 mi. SW Thermopolis. *Washakie Co.*: 10 mi. S Manderson; Otter Creek, Bighorn Basin. *Johnson Co.*: Powder River Basin, near Pumpkin Buttes. *Natrona Co.*: Merino. *Converse Co.*: Douglas. *Platte Co.*: Guernsey; 15 mi. SW Wheatland. *Goshen Co.*: Rawhide Butte. *Localities for which counties are unknown*: Owl Creek Mountains; North Platte River.

### ***Eutamias minimus confinis* Howell**

*Eutamias minimus confinis* Howell, Jour. Mamm. 6:52, February 15, 1925.

*Type*.—Female, adult, skull and skin No. 168957 (NM); from head of Trapper Creek, west slope of Bighorn Mountains, Big Horn County, Wyoming; obtained on July 7, 1910, by Merrit Cary; original No. 1956.

*Diagnosis*.—Size large; over-all tone of upper parts grayish brown; baculum large, as in *E. m. pallidus*.

*Description*.—*Color pattern*: Crown Clay Color mixed with Pale Smoke Gray; upper facial stripe Fuscous Black; other facial stripes Fuscous Black slightly mixed with Tawny; anterior margin of ear Yellow Ocher or Ochraceous-Orange; hairs inside posterior part of pinna Yellow Ocher or Ochraceous-Orange; posterior margin of ear Smoke Gray; postauricular patch buffy white or Smoke Gray; dorsal dark stripes black or Fuscous Black more or less mixed with Tawny or Tawny-Olive; dorsal light stripes creamy white, sometimes washed with Pale Smoke Gray; sides Raw Sienna or Cinnamon-Buff; rump and thighs Pale Smoke Gray mixed with Tawny-Olive; dorsal surface of tail black mixed with Clay Color; ventral surface of tail Clay Color, black along margin and Light Buff or Light Ochraceous-Buff along outermost edge; antipalmar and antiplantar surfaces of feet Pinkish Buff; underparts creamy white sometimes with grayish underfur. *Skull and Baculum*: Large but proportionally the same as in other subspecies of *E. minimus*.

*Comparisons*.—From *E. m. silvaticus*, the subspecies from the Black Hills, *E. m. confinis* differs in: General tone of upper parts darker, more reddish and less grayish; ventral surface of tail more tawny; skull and baculum of same size and proportions.

From *E. m. operarius*, the subspecies from the Laramie Range and other mountains of south-central Wyoming, *E. m. confinis* differs in: Rump and thighs darker; sides darker; general tone of upper parts more grayish.

For comparisons with *E. m. minimus*, *E. m. consobrinus*, and *E. m. pallidus*, see the accounts of those subspecies.

*Remarks*.—This subspecies is endemic to the Bighorn Mountains. Intergradation between *E. m. confinis* and *E. m. minimus* and between *E. m. pallidus* and *E. m. confinis* have already been discussed in the accounts of those subspecies.

*Specimens examined*.—Total number, 85.

*Big Horn Co.*: 12 mi. E and 2 mi. S Shell, 7,900 ft., 2; 13 mi. E and 2 mi. N Shell, 8,500 ft., 2; 13 mi. E Shell, 8,300 ft., 1; 17 mi. E and 3 mi. S Shell, 9,000 ft., 8; 17½ mi. E and 4½ mi. S Shell, 8,500 ft., 11; 19 mi. E and 4½ mi. S Shell, 9,600 ft., 1; 9 mi. E and 9 mi. N Tensleep, 8,200 ft., 4.

*Sheridan Co.*: Medicine Wheel Ranch, 9,000 ft., 28 mi. E Lovell, 11; 38 mi. E Lovell, Big Horn Nat. For., 9,600 ft., 10; 5½ mi. W and 1½ mi. S Junction U.S. Highway 14 and Wyoming [State Highway] 14, 8,480 ft., 2.

*Washakie Co.*: 9 mi. E and 4 mi. N Tensleep, 7,000 ft., 26; 3 mi. SE Tensleep, 4,300 ft., 1.

*Johnson Co.*: 5½ mi. W and 1 mi. S Buffalo, 6,500 ft., 4; 7½ mi. W and 1 mi. S Buffalo, 6,500 ft., 2.

*Additional records* (Howell 1929:46): *Sheridan Co.*: 20 mi. from Sheridan. *Washakie Co.*: Head of Canyon Creek. *Johnson Co.*: Head of North Fork of Powder River.

### ***Eutamias minimus silvaticus* White**

*Eutamias minimus silvaticus* White, Univ. Kansas Publ. Mus. Nat. Hist. 5 (19):259-262, April 10, 1952.

*Type*.—Female, adult, skull and skin, No. 20050 (KU); from 3 mi. NW Sundance, 5,900 ft., Crook County, Wyoming; obtained on July 4, 1947, by H. W. Setzer; original No. 1692.

*Diagnosis*.—Size large; over-all tone of upper parts brownish gray; sides Ochraceous-Buff; baculum as in *E. m. pallidus*.

*Description*.—*Color pattern*: Crown Sayal Brown washed with Cinnamon-Buff; facial stripes Fuscous Black mixed with Clay Color; anterior margin of ear Ochraceous-Orange; hairs inside posterior part of pinna Ochraceous-Buff; posterior margin of ear and postauricular patch grayish white; dorsal dark stripes Fuscous Black more or less mixed with Ochraceous-Buff; medial dorsal light stripes Pale Smoke Gray with Ochraceous-Buff along margins; lateral dorsal light stripes grayish white or white with Ochraceous-Buff along margins; sides Ochraceous-Buff; rump and thighs Smoke Gray washed with Ochraceous-Buff; dorsal surface of tail black interspersed with Ochraceous-Buff; ventral surface of tail Ochraceous-Orange, with black along margin and Light Ochraceous-Buff along outermost edge; antipalmar and antiplantar surfaces of feet Light Buff; underparts creamy white sometimes washed with Ochraceous-Buff. *Skull and Baculum*: Large but of same proportions as in other subspecies of *E. minimus*.

*Comparisons*.—From *E. m. operarius*, the subspecies from south-central Wyoming, *E. m. silvaticus* differs in: Underside of tail lighter; general tone of upper parts grayer; sides lighter; skull and baculum of same size and proportions.

For comparisons with *E. m. pallidus* and *E. m. confinis*, see the accounts of those subspecies.

*Remarks*.—Intergradation between *E. m. silvaticus* and *E. m. pallidus* has already been discussed under the account of *E. m. pallidus*.

*Specimens examined*.—Total number, 42.

*Crook Co.*: 15 mi. N Sundance, Black Hills Nat. Forest, 5,500 ft., 6; 15 mi. ENE Sundance, 3,825 ft., 1; 3 mi. NW Sundance, 5,900 ft., 14; 1 mi. N Sundance, Black Hills Nat. Forest, 1.

*Weston Co.*: 1½ mi. E Buckhorn, 6,150 ft., 19; SE Newcastle, 1 (MM).

*Additional records* (Howell 1929:57): *Crook Co.*: Devils Tower; Sundance.

### ***Eutamias minimus operarius* Merriam**

*Eutamias amoenus operarius* Merriam, Proc. Biol. Soc. Washington, 18:164, June 29, 1905.

*Eutamias minimus operarius*, Howell, Jour. Mamm. 3:183, August 4, 1922.

*Type*.—Female, adult, skull and skin, No. 129808 (BS); from Gold Hill, 7,400 ft., Boulder County, Colorado; obtained on October 8, 1903, by Vernon Bailey; original No. 8160.

*Diagnosis*.—Size large; general tone of upper parts dark reddish brown; sides Tawny or Ochraceous-Tawny; baculum large, as in *E. m. pallidus*.

*Description*.—*Color pattern*: Crown Cinnamon-Buff mixed with Pale Smoke Gray; facial stripes Fuscous Black mixed with Sayal Brown; anterior margin of ear and hairs inside posterior part of pinna Cinnamon-Buff; posterior margin of ear and postauricular patch Pale Smoke Gray; dorsal dark stripes black with Ochraceous-Tawny along margins; median dorsal light stripes Pale Smoke Gray with Ochraceous-Tawny along margins; lateral dorsal light stripes white; sides Tawny or Ochraceous-Tawny; rump and thighs Light Grayish Olive; dorsal surface of tail Fuscous Black slightly mixed with Clay Color; ventral surface of tail Sayal Brown or Ochraceous-Tawny with Fuscous Black along margin and Clay Color along

outermost edge; antipalmar and antiplantar surfaces of feet Ochraceous-Buff; underparts grayish white, often washed with Buff. *Skull* and *Baculum*: Large but of same proportions as in other subspecies of *E. minimus*.

*Comparisons*.—For comparisons with *E. m. minimus*, *E. m. pallidus*, *E. m. confinis*, and *E. m. silvaticus*, see the accounts of those subspecies.

*Remarks*.—Specimens from the mountains near Savery in Carbon County and from near Medicine Bow Peak in Carbon and Albany counties are clearly referable to this race on the basis of color pattern. However, in the skull and baculum these specimens resemble *E. m. minimus*.

Specimens from the Laramie Range, 27 mi. N Laramie, show a color pattern which tends toward that of *E. m. pallidus*.

*Specimens examined*.—Total number, 118.

*Natrona Co.*: 2 mi. W and 7 mi. S Casper, 6,370 ft., 2; 10 mi. S Casper, 7,750 ft., 3; 6 mi. S and 2 mi. W Casper, 5,900 ft., 1.

*Converse Co.*: 21½ mi. S and 24½ mi. W Douglas, 7,600 ft., 10.

*Carbon Co.*: Lake Marie, 10,440 ft., 1; 2 mi. S and 1/2 mi. W Medicine Bow Peak, 10,400 ft., 1; 2 mi. S and 2 mi. W Medicine Bow Peak, 10,700 ft., 1; 10 mi. N and 14 mi. E Encampment, 8,000 ft., 2; 8 mi. N and 14 mi. E Encampment, 8,400 ft., 2; 8 mi. N and 16 mi. E Encampment, 8,400 ft., 3; 21½ mi. E and 8 mi. N Encampment, 9,400 ft., 2; 10 mi. E and 6 mi. S Saratoga, 8,800 ft., 1; 8 mi. N and 19½ mi. E Savery, 8,800 ft., 16; 17 mi. E and 7 mi. N Savery, 8,300 ft., 1; 7 mi. N and 19 mi. E Savery, 10,128 ft., 1; 14 mi. E and 6 mi. N Savery, 8,400 ft., 1; 5 mi. N and 5 mi. E Savery, 6,900 ft., 2.

*Albany Co.*: 27 mi. N and 7½ mi. E Laramie, 6,960 ft., 12; 13 mi. E and 9 mi. N Laramie, 7,700 ft., 2; 8¾ mi. E and 6½ mi. S Laramie, 8,200 ft., 1; 5½ mi. ESE Laramie, 8,500 ft., 1; 8 mi. E and 4 mi. S Laramie, 8,600 ft., 1; 2 mi. SE Pole Mountain, 8,200 ft., 19; 3 mi. S Pole Mountain, 8,100 ft., 2; 1 mi. SSE Pole Mountain, 8,350 ft., 3; 3 mi. ESE Browns Peak, 10,000 ft., 15; 2½ mi. ESE Browns Peak, 10,300 ft., 1.

*Laramie Co.*: 5 mi. W Horse Creek P.O., 7,200 ft., 2; 3½ mi. W Horse Creek P.O., 7,000 ft., 3; 2 mi. W Horse Creek P.O., 6,600 ft., 1.

*Additional records* (Howell 1929:51): *Natrona Co.*: Casper Mountains, 7 mi. S Casper. *Carbon Co.*: Bridger Peak; Riverside. *Albany Co.*: Springhill, 12 mi. N Laramie Peak; Eagle Peak; Bear Creek, 3 mi. SW Eagle Peak; Laramie Mountains, 10 mi. E Laramie; Woods [= Woods Landing]; Sherman. *Laramie Co.*: Bluffs near Pole Creek; 6 mi. W Islay.

TABLE 1

Average and Extreme Measurements in Millimeters of Adult Chipmunks that Occur in Wyoming

		Greatest length of skull	Zygomatic breadth	Cranial breadth	Length of nasals	Total length	Length of tail	Length of lower tooth-row	Condylo-alveolar length of mandible
<i>E. m. minimus</i> , S of Bitter Creek, Sweetwater Co.									
Mean	(5)	29.9	16.7	14.8	9.0	188	84.6	4.65	5.51
Min.	♂	29.0	16.5	14.6	8.6	177	81.0	4.52	15.11
Max.		30.9	17.2	15.0	9.8	197	89.0	4.80	16.21
Mean	(6)	30.1	17.2	15.1	8.6	193	85.3	4.69	16.08
Min.	♀	29.0	16.8	14.9	7.9	184	80.0	4.53	15.71
Max.		30.8	17.7	15.5	9.4	200	93.0	4.91	16.58
<i>E. m. consobrinus</i> , near Jackson, Teton Co.									
Mean	(4)	30.1	16.6	14.4	8.6	190	83.0	4.48	15.65
Min.	♀	29.6	16.4	14.3	8.5	190	80.0	4.43	15.28
Max.		30.7	16.9	14.6	8.8	192	86.0	4.59	15.99
Mean	(6)	30.8	17.1	14.5	9.1	200	88.4	4.60	16.05
Min.	♀	30.2	16.9	14.1	8.7	195	85.0	4.43	15.60
Max.		31.3	17.5	15.1	9.5	205	92.0	4.84	16.70
<i>E. m. pallidus</i> , Moorcroft and Rockypoint, Weston Co.									
Mean	(9)	31.8	18.0	15.3	9.3	193	85.8	4.84	16.74
Min.	♂	31.4	17.7	14.9	8.5	185	80.0	4.34	16.23
Max.		32.5	18.7	15.9	9.7	204	91.0	5.02	17.21

Mean	(7)	32.2	18.2	15.5	9.6	205	91.0	4.97	17.02
Min.	♀	31.4	17.8	15.1	9.1	203	86.0	4.70	16.30
Max.		32.9	18.9	16.0	10.3	214	99.0	5.18	17.39
<i>E. m. confinis</i> , Bighorn Mts., near Tensleep, Washakie Co.									
Mean	(9)	31.6	17.8	15.4	9.3	205	89.6	4.78	16.71
Min.	♂	30.4	17.2	14.9	8.9	194	79.0	4.51	16.18
Max.		33.3	19.0	16.2	9.9	228	113.0	5.09	17.70
Mean	(8)	32.4	18.7	15.6	9.6	208	88.8	4.83	17.09
Min.	♀	31.7	17.9	15.3	9.2	189	76.0	4.69	16.49
Max.		33.1	19.3	16.1	9.7	226	103.0	4.93	17.73
<i>E. m. silvaticus</i> , 16 mi. N Custer, Pennington Co., S.D.									
Mean	(19)	32.3	18.2	15.5	9.6	200	86.2	4.85	16.78
Min.	♂	31.5	17.4	15.0	9.1	189	76.0	4.63	16.19
Max.		33.4	19.4	16.1	10.2	210	94.0	5.13	17.74
Mean	(15)	32.6	18.1	15.7	9.5	208	90.2	4.96	16.90
Min.	♀	31.5	17.7	15.0	9.1	189	70.0	4.61	16.26
Max.		33.7	19.2	16.2	10.5	220	105.0	5.29	18.28
<i>E. m. operarius</i> , near Pole Mt., Albany Co.									
Mean	(9)	31.5	17.6	15.2	9.7	193	85.6	4.78	16.52
Min.	♂	30.3	17.0	14.9	8.9	183	77.0	4.58	15.63
Max.		32.4	18.2	15.5	10.6	203	91.0	5.12	17.37
Mean	(8)	32.2	18.0	15.4	9.7	203	85.7	4.86	16.50
Min.	♀	31.1	17.6	15.0	9.2	194	79.0	4.64	15.44
Max.		33.4	18.5	15.8	10.2	212	92.0	5.11	17.21
<i>E. a. luteiventris</i> , near Moran, Teton Co.									
Mean	(20)	33.6	18.2	15.5	10.6	212	94.8	5.14	17.27
Min.	♂	32.2	17.4	14.9	9.8	198	87.0	4.86	16.42
Max.		35.2	18.7	16.2	12.1	221	108.0	5.37	18.39
Mean	(10)	33.8	18.5	15.5	11.1	217	91.7	5.13	17.47
Min.	♀	33.4	18.1	15.1	10.5	203	81.0	5.06	16.89
Max.		34.7	19.0	16.0	11.5	225	100.0	5.32	18.33
<i>E. d. utahensis</i> , W side Green River, 1 mi. N Utah border.									
Mean	(4)	34.7	18.9	16.4	10.8	197	84.5	5.08	17.91
Min.	♂	34.7	18.7	16.4	0.5	191	81.0	5.00	17.77
Max.		34.8	19.2	16.4	11.1	203	88.0	5.15	18.06
Mean	(2)	36.0	19.5	16.3	11.3	211	88.0	5.25	18.87
Min.	♀	35.5	19.4	16.2	11.3	210	86.0	5.22	18.73
Max.		36.6	19.7	16.4	11.4	212	90.0	5.28	19.02
<i>E. u. umbrinus</i> , Mts. S Robertson, Uinta Co.									
Mean	(11)	34.7	18.9	15.7	10.9	218	96.2	5.13	18.04
Min.	♂	34.3	18.3	15.6	10.3	215	81.0	4.79	17.57
Max.		35.2	19.4	16.0	11.7	228	112.0	5.42	18.59
Mean	(4)	35.1	19.2	15.9	11.0	224	96.4	5.17	18.46
Min.	♀	34.9	19.2	15.7	10.3	204	90.0	5.11	18.31
Max.		35.4	20.0	16.2	11.8	234	100.0	5.22	18.98
<i>E. u. fremonti</i> , Togwotee Pass, Fremont Co.									
Mean	(8)	35.6	19.3	15.9	11.4	223	99.0	5.34	19.17
Min.	♂	35.2	18.9	15.8	11.1	216	95.0	5.22	18.72
Max.		36.5	19.7	16.1	11.8	243	111.0	5.57	19.78
Mean	(6)	35.3	19.6	15.9	11.3	229	101.0	5.40	19.02
Min.	♀	34.5	19.3	15.7	10.9	223	92.0	5.35	18.37
Max.		36.0	20.0	16.5	12.0	239	110.0	5.44	19.51
<i>E. u. montanus</i> , near Longs Peak, Boulder Co., Colorado.									
Mean	(5)	35.2	18.8	15.5	10.8	226	96.0	5.20	18.29
Min.	♂	34.7	18.4	15.2	10.1	215	93.0	5.03	17.80
Max.		36.8	19.4	16.2	11.5	232	115.0	5.53	19.36
Mean	(6)	35.7	19.1	15.6	10.9	226	98.0	5.28	18.67
Min.	♀	35.1	18.8	15.1	10.3	215	89.0	5.06	18.09
Max.		36.5	19.5	16.0	11.5	231	105.0	5.58	19.35

**Eutamias amoenus** (J. A. Allen)

*Diagnosis.*—Size medium; over-all tone of upper parts often grayish olive; baculum small or medium, slender; tip of baculum 30 to 38 per cent of length of shaft; skull medium, narrow across zygomata.

*Comparisons.*—From *E. dorsalis utahensis*, the only subspecies of this species in Wyoming, *E. amoenus luteiventris* differs in: Dorsal light and dark stripes distinct; over-all tone of upper parts less grayish (more tawny); tip of baculum less than 38 per cent of length of shaft in adult specimens.

From *E. umbrinus fremonti*, the only subspecies of this species which occurs in the same area with *E. amoenus* in Wyoming, *E. a. luteiventris* differs in: Smaller size; tawny underparts; base of baculum not noticeably widened.

For comparisons with *E. minimus* see the account of that species.

### ***Eutamias amoenus luteiventris* (J. A. Allen)**

*Tamias quadrivittatus luteiventris* J. A. Allen, Bull. Amer. Mus. Nat. Hist., 3:101, June, 1890.

*Eutamias amoenus luteiventris*, Howell, Jour. Mamm., 3:183, August 4, 1922.

*Type.*—Male, adult, skull and skin, No. 11991/37996 (NM); from "Chief Mountain Lake" [Waterton Lake], 3½ mi. N United States-Canadian Boundary, Alberta; obtained on August 24, 1874, by Elliot Coues; original No. 4596.

*Diagnosis.*—General tone of upper parts ochraceous; underparts strongly buffy; tip of baculum in adult specimens, more than 30 per cent and less than 38 per cent of length of shaft.

*Description.*—*Color pattern:* Crown Cinnamon mixed with Smoke Gray; upper two facial stripes black; submalar stripe Fuscous or Fuscous Black mixed with Ochraceous-Tawny; anterior margin of ear Ochraceous-Tawny; posterior margin of ear and postauricular patch Light Buff or buffy white; hairs inside posterior part of pinna Ochraceous-Tawny; median dorsal dark stripe black; lateral pair of dorsal dark stripes black and mixed with Tawny, frequently brownish; median pair of dorsal light stripes white tinged with Pale Smoke Gray; lateral pair of dorsal light stripes creamy white; sides Tawny or Ochraceous-Tawny; rump and thighs Dark Smoke Gray strongly mixed with Cinnamon- Buff; dorsal surface of tail Fuscous Black mixed with Clay Color; ventral surface of tail Light Ochraceous-Tawny, with Fuscous Black around margin and Clay Color around outermost edge; antipalmar and antiplantar surfaces of feet Cinnamon or Cinnamon- Buff; underparts Cinnamon- Buff or Light Ochraceous- Buff. *Skull:* Size medium; moderately narrowed across zygomata. *Baculum:* Slender; not noticeably broadened at base; tip more than 30 per cent of length of shaft.

*Remarks.*—Although there are no records of this subspecies from the Wind River Mountains, it probably occurs there.

The niche that this subspecies occupies is similar to that of *E. m. consobrinus* as shown by the fact that these two subspecies have been taken together at the same places.

Specimens of *E. a. luteiventris* and *E. umbrinus fremonti* have been taken together at the same places.

In general, *E. m. consobrinus* occurs in open country and at the edges of forests, whereas *E. u. fremonti* occurs in the forest. *E. a. luteiventris* occurs in the intermediate habitat, that is to say, not far into the forest, and not so far out into the open as *E. m. consobrinus*.

*Specimens examined.*—Total number, 83.

*Yellowstone Park:* Unspecified, 2.

*Park Co.:* 31½ mi. N and 36 mi. W Cody, 6,900 ft., 6; 29 mi. N and 31 mi. W Cody, 7,200 ft., 1; 28 mi. N and 30 mi. W Cody, 7,200 ft., 1; 16¼ mi. N and 17 mi. W Cody, 5,625 ft., 3; 25 mi. S and 28 mi. W Cody, 6,350 ft., 2.

*Teton Co.:* Two Ocean Lake, 2 (1 FC); Whetstone Creek, 8 (MM); Emma Matilda Lake, 1 (FC); Pacific Creek Road, 2½ mi. E Moran, 1 (FC); Two Ocean Lake Road, 2 (FC); 2 mi. E Moran, 1 (FC); 2½ mi. E and 1/4 mi. N Moran, 6,230 ft., 8; Pacific Creek, 1 (MM); junction of Two Ocean Lake Road and U.S. Highway 187, 2 (FC); Signal Mountain Road, 1 (FC); Leigh Lake, 9 (MM); Indian Paint Brush Canyon, Teton Park, 1 (MM); Teton National Park, 3; 3 mi. E and 1/4 mi. S Moran, 6,200 ft., 1; 3¾ mi. E and 1 mi. S Moran, 6,200 ft., 8; 2½ mi. N and 3½ mi. E Moran, 7,225 ft., 1; Timbered Island, 6,750 ft., 4 mi. N Moose, 5; Bar BC Ranch, 6,500 ft., 2½ mi. NE Moose, 9; Grand Teton, 9,000 ft., Teton Park, 1 (MM); Upper Arizona Creek, Jackson, 1 (MM).

*Lincoln Co.:* 3 mi. N and 11 mi. E Alpine, 5,650 ft., 2.

*Additional records* (Howell 1929:69): *Yellowstone Park:* Mammoth Hot Springs; Roaring Mountain; Bunsen Peak; Yancey; Apollinaris Spring; Canyon; Yellowstone Lake; Upper Geyser Basin; Old Faithful. *Park Co.:* Near head of Clarks Fork; Pahaska, N Fork Shoshone River at Grinnell Creek; Valley. *Teton Co.:* Moran; Teton Mountains; Teton Pass. *Lincoln Co.:* Afton, Salt River Mountains; head of La Barge Creek, 9,100 ft.; Salt River Mountains, 10 mi. SE Afton. *Sublette Co.:* Merna; Stanley.

## *Eutamias dorsalis* (Baird)

*Diagnosis*.—Size medium to large; general tone of upper parts Smoke Gray; dorsal stripes indistinct or obsolete; often brightly colored at base of tail; keel of baculum proportionally high, approximately  $\frac{1}{3}$  of length of tip; skull longer than 34.5 mm.

*Comparisons*.—From *E. umbrinus*, *E. dorsalis* differs in: Dorsal stripes faint; skull smaller; base of baculum not noticeably expanded; general tone of upper parts grayer.

For comparisons with *E. minimus* and *E. amoenus* see the accounts of those species.

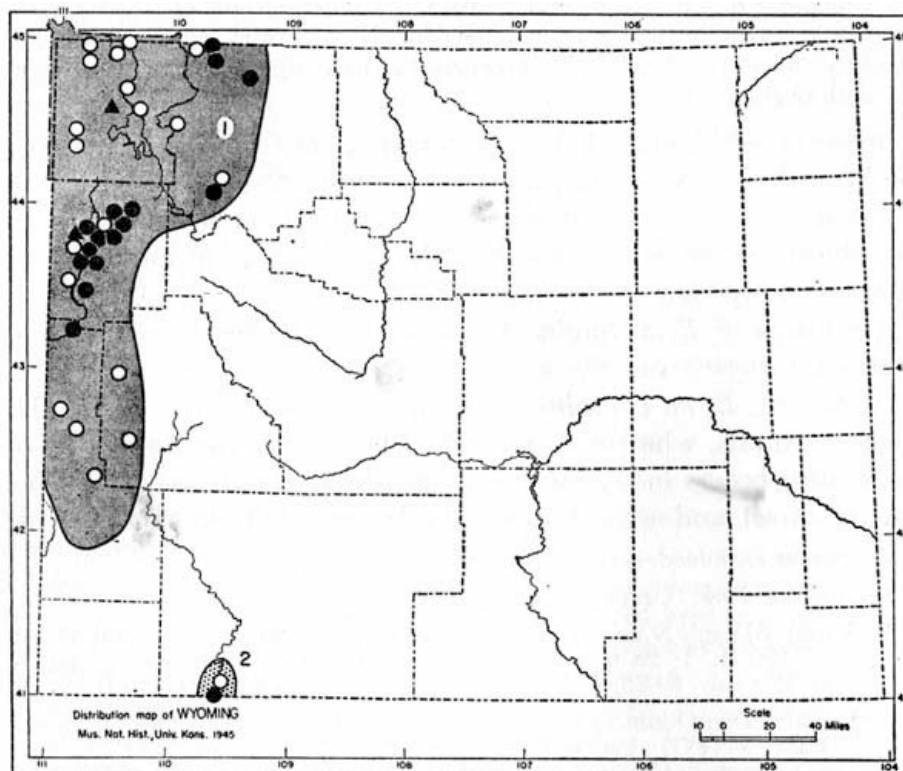


FIG. 2. Known occurrences and probable geographic distribution of *Eutamias amoenus* and *Eutamias dorsalis* in Wyoming. See figure 1 for explanation of symbols.

1. *E. amoenus luteiventris* 2. *E. dorsalis utahensis*

### *Eutamias dorsalis utahensis* Merriam

*Eutamias dorsalis utahensis* Merriam, Proc. Biol. Soc. Washington, 11:210, July 1, 1897.

*Type*.—Male, adult, skull and skin, No. 186457 (NM); from Ogden, Weber County, Utah; obtained on October 9, 1888, by Vernon Bailey; original No. 289.

*Diagnosis*.—Size medium; dorsal stripes faint; baculum not noticeably widened at base.

*Description*.—*Color pattern*: Crown Pale Smoke Gray mixed with Cinnamon; upper facial stripe Fuscous; other facial stripes Sayal Brown mixed with Fuscous or Fuscous Black; anterior margin of ear Ochraceous-Tawny; posterior margin of ear and postauricular patch grayish white; median dorsal dark stripe Fuscous or black; other dorsal dark stripes black and mixed with gray, sometimes barely discernible; dorsal pair light stripes Smoke Gray; lateral pair of light stripes creamy white; rump and thighs Pale Smoke Gray mixed with Cinnamon; dorsal surface of tail Fuscous Black mixed with Tilleul Buff; underside of tail Cinnamon-Buff or Pinkish Buff, Fuscous Black around margin and Tilleul Buff around outermost edge; antipalmar and antiplantar surfaces of feet Cinnamon-Buff; underparts creamy white; sides Pinkish Cinnamon or Light Pinkish Cinnamon. *Skull*: Size medium; braincase well inflated; zygomata strong, moderately appressed to cranium. *Baculum*: Small; keel approximately  $\frac{1}{3}$  of length of tip.

*Remarks*.—Only a few specimens of this subspecies have ever been taken in Wyoming. Little is known about the habits of this chipmunk, which normally is shy and wary.

*Specimens examined*.—Total number, 6.

*Sweetwater Co.*: W side Green River, 1 mi. N Utah border, 6.

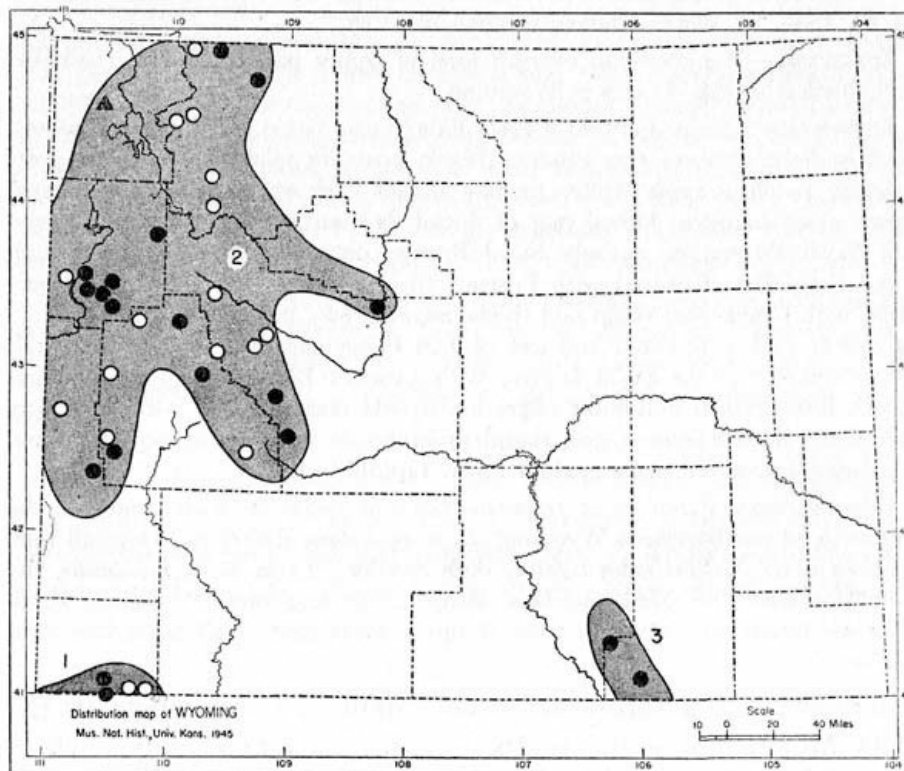


FIG. 3. Known occurrences and probable geographic distribution of the subspecies of *Eutamias umbrinus* in Wyoming. See figure 1 for explanation of symbols.

1. *E. u. umbrinus* 2. *E. u. fremonti* 3. *E. u. montanus*

### ***Eutamias umbrinus* (J. A. Allen)**

*Diagnosis.*—Size large; general tone of upper parts dark; base of baculum widened; outermost dorsal dark stripe barely discernible or lacking; skull rarely shorter than 34.0 mm.

*Comparisons.*—For comparisons with the other species of *Eutamias* in Wyoming, see the accounts of *E. minimus*, *E. amoenus*, and *E. dorsalis*.

*Remarks.*—*E. umbrinus* is the largest of the species of *Eutamias* occurring in Wyoming. This species usually occurs in the Canadian and Hudsonian life-zones in the mountains of northwestern, southwestern, and south-central Wyoming.

### ***Eutamias umbrinus umbrinus* (J. A. Allen)**

*Tamias umbrinus* J. A. Allen, Bull. Amer. Mus. Nat. Hist. 3:96, June, 1890.

*Eutamias umbrinus*, Miller and Rehn, Proc. Boston Soc. Nat. Hist., 30:45, December 27, 1901.

*Type.*—Male, adult, skull and skin, No. 186463 (NM); from Blacks Fork, about 9,500 ft., Uinta Mountains, Summit County, Utah; obtained on September 19, 1888, by Vernon Bailey; original No. 228.

*Diagnosis.*—Size medium; over-all tone of upper parts dark and shadowy; skull smallest of this species in Wyoming.

*Description.*—*Color pattern:* Crown Pale Smoke Gray; facial stripes Fuscous Black or Snuff-Brown; ears Fuscous Black; posterior margin of ear and postauricular patch grayish white; median dorsal dark stripe black with Sayal Brown along margins; lateral pair of dorsal dark stripes Fuscous Black mixed with Sayal Brown, or entirely Sayal Brown; outermost pair of dorsal dark stripes Sayal Brown mixed with Fuscous Black or lacking; sides Sayal Brown mixed with Cinnamon; rump and thighs Sayal Brown mixed with Smoke Gray; antipalmar and antiplantar surfaces of feet Cinnamon-Buff; underside of tail Ochraceous-Tawny or Sayal Brown, with Fuscous Black around margin and Pinkish Buff around outermost edge; underparts creamy white with dark gray underfur. *Skull:* Smooth and rounded; braincase inflated; zygomata strong. *Baculum:* Broadened at base; shaft tapers rapidly to tip.

*Comparisons.*—From *E. u. fremonti*, the subspecies from the north in the mountains of northwestern Wyoming, *E. u. umbrinus* differs in: Over-all tone of upper parts darker; sides lighter; skull smaller. From *E. u. montanus*, the

subspecies from the Medicine Bow Range of south-central Wyoming, *E. u. umbrinus* differs in: Over-all tone of upper parts darker; sides darker; skull smaller.

*Remarks.*—This subspecies occurs only in the foothills of the Uinta Mountains in the southern part of Uinta County. These "foothills" are well-timbered and at an altitude of 7,000 feet and higher.

*Specimens examined.*—Total number, 23.

*Uinta Co.:* 9 mi. S Robertson, 8,000 ft., 15; 10 mi. S and 1 mi. W Robertson, 8,700 ft., 5; 11½ mi. S and 2 mi. E Robertson, 9,200 ft., 1; 2 mi. E and 12 mi. S Robertson, Ashley Nat. Forest, 1; 13 mi. S and 2 mi. E Robertson, 9,200 ft., 1.

*Additional records* (Howell 1929:95): *Uinta Co.:* Henry Fork, 5 mi. W Lone Tree; Lone Tree.

### ***Eutamias umbrinus fremonti* White**

*Eutamias umbrinus fremonti* White, Univ. Kansas Publ., Mus. Nat. Hist. 5:575, December 1, 1953.

*Type.*—Male, adult, skull, skin, and baculum, No. 41790 (KU); from 31 mi. N Pinedale, 8,025 ft., Sublette County, Wyoming; obtained on July 8, 1951, by Rollin H. Baker; original No. 1596.

*Diagnosis.*—Size large; over-all tone of upper parts dark; lower tooth-row longest of this species in Wyoming.

*Description.*—*Color pattern:* Crown Cinnamon-Buff mixed with gray; upper facial stripe Sepia; ocular stripe Chaetura-Drab; submalar stripe Fuscous Black mixed with Sayal Brown; ears black; anterior margin of ear Mars Yellow; posterior margin of ear grayish white; hairs inside posterior part of pinna Dresden Brown; postauricular patch Pale Smoke Gray; median dorsal dark stripe black; lateral dorsal dark stripes black mixed with Sayal Brown; outermost dorsal dark stripes Buckhorn Brown mixed with black or sometimes absent; median pair of dorsal light stripes grayish mixed with Buckhorn Brown; outer pair of dorsal light stripes creamy white; sides Buckhorn Brown; rump and thighs Pale Smoke Gray mixed with Saccardo's Umber; dorsal surface of tail black mixed with Buckhorn Brown; ventral surface of tail Sayal Brown, with Fuscous Black around margin and white or Light Buff around outermost edge; antipalmar and antiplantar surfaces of feet Warm Buff; underparts creamy white with dark underfur. *Skull:* Large; zygomata strong and arched; braincase well inflated. *Baculum:* Broad at base; shaft tapers sharply to tip.

*Comparisons.*—From *E. u. montanus*, the subspecies from the Medicine Bow Range of south-central Wyoming, *E. u. fremonti* differs in: Over-all tone of upper parts darker; underside of tail darker; feet darker; sides darker.

For comparisons with *E. u. umbrinus* see the account of that subspecies.

*Remarks.*—This subspecies normally occurs in the forest as do the other subspecies of *E. umbrinus* in Wyoming. A single specimen taken at 12 mi. N and 3 mi. W Shoshoni, Fremont County, is the exception which probably indicates that *E. umbrinus* does occur outside of its normal habitat and that gene-flow exists between the subspecies of this species.

*Specimens examined.*—Total number, 53.

*Yellowstone Park:* Unspecified, 2.

*Park Co.:* Beartooth Lake, 1 (BS); 16¼ mi. N and 17 mi. W Cody, 5,625 ft., 2.

*Teton Co.:* 1 mi. E and ¼ mi. N Togwotee Pass, 9,800 ft., 2; Amphitheater Lake, Teton Park, 1 (MM); Flat Creek, 4 (MM); head of Cache Creek, 4 (MM); Jackson, Upper Arizona Creek, 2 (MM); Flat Creek-Granite Creek divide, 6 (MM); Flat Creek Pass, 1 (MM); Flat Creek-Gravel Creek divide, 2 (MM).

*Lincoln Co.:* La Barge Creek, near source, 9,000 ft., 1 (BS).

*Fremont Co.:* Togwotee Pass, 12 (FC); 12 mi. N and 3 mi. W Shoshoni, 4,650 ft., 1; Mosquito Park R.S., 9,500 ft., 17½ mi. W and 2½ mi. N Lander, 1; 17 mi. S and 6½ mi. W Lander, 8,450 ft., 3.

*Sublette Co.:* 31 mi. N Pinedale, 8,025 ft., 1; W side Barbara Lake, 10,300 ft., 8 mi. S and 3 mi. W Fremont Peak, 4; 19 mi. W and 2 mi. S Big Piney, 7,700 ft., 5.

*Additional records* (Howell 1929:95): *Park Co.:* Near head of Clark Fork; Whirlwind Peak near Pahaska, N Fork Shoshone River; Valley, Shoshone Mountains; Needle Mountain. *Teton Co.:* Teton Mountains, S Moose Creek. *Lincoln Co.:* Salt River Mountains. *Sublette Co.:* Gros Ventre Range, 12 mi. NW Kendall; Merna; 8 mi. W Stanley; Big Sandy. *Fremont Co.:* Jackey's Creek, 4 mi. SW Dubois; Bull Lake, Wind River Mountains; Lake Fork, Wind River Mountains; Fremont



Peak.

### ***Eutamias umbrinus montanus* White**

*Eutamias umbrinus montanus* White, Univ. Kansas Publ. Mus. Nat. Hist. 5:576, December 1, 1953.

*Type*.—Male, adult, skull, skin, and baculum; 20105 (KU); from 1/2 mi. E and 3 mi. S Ward, 9,400 ft., Boulder County, Colorado; obtained on August 1, 1947, by E. L. Cockrum; original No. 721.

*Diagnosis*.—Size large; over-all tone of upper parts light; sides light.

*Description*.—*Color pattern*: Crown Raw Sienna mixed with gray; upper facial stripe and ocular stripe black mixed with Sepia; submalar stripe Snuff-Brown mixed with black; ear black or Sepia; anterior margin of ear Ochraceous-Tawny; posterior margin of ear and postauricular patch grayish white; hairs inside posterior part of pinna Cinnamon-Buff; median dorsal dark stripe black with Sayal Brown along margins; lateral pair of dorsal dark stripes black mixed with Sayal Brown; outermost pair of dorsal dark stripes Sayal Brown mixed with black or sometimes lacking; median pair of dorsal light stripes Pale Smoke Gray mixed with Clay Color; outer pair of dorsal light stripes creamy white; sides Clay Color; rump and thighs Neutral Gray; dorsal surface of tail black mixed with Cinnamon-Buff; ventral surface of tail Ochraceous-Tawny, with black along margin and Cinnamon-Buff or Ochraceous-Tawny along outermost edge; antipalmar and antiplantar surfaces of feet Cinnamon-Buff; underparts creamy white with dark underfur. *Skull*: Large; zygomata strong and arched; braincase well inflated. *Baculum*: Broad at base; shaft tapers sharply to tip.

*Comparisons*.—For comparisons with *E. u. umbrinus* and *E. u. fremonti*, see the accounts of those subspecies.

*Remarks*.—Although in Wyoming this subspecies is known only from the Medicine Bow Range, one would expect to find it occurring in the Snowy Range and the Laramie Range as well, since there seems to be suitable habitat for this subspecies in those mountain ranges.

*Specimens examined*.—Total number, 3.

*Albany Co.*: 8 mi. ESE Browns Peak, 10,000 ft., 2; 3½ mi. S Wood's Landing, 1.

### **REVIEW AND CONCLUSIONS**

*Eutamias minimus* in Wyoming is divisible into two size-groups of subspecies; the smaller size-group (*E. m. minimus* and *E. m. consobrinus*), which occurs in the western part of the State, is significantly smaller, in measurements of the skull and baculum, than the larger size-group (*E. m. pallidas*, *E. m. confinis*, *E. m. silvaticus*, and *E. m. operarius*) which occurs in the eastern part of the State.

Although all the six subspecies of *E. minimus* in Wyoming can be differentiated from one another by color pattern, this species cannot be divided, by means of color pattern, into two groups, comparable in geographic range, to the two size-groups that were established above on the basis of variations in the skull and baculum.

Thus, the subspecies of *E. minimus* are morphologically differentiated at two distinct levels; one level is based on differences in the skull and baculum, while the other is based on differences in color.

Although there is considerable controversy concerning the glacial chronology in the mountains of western North America (Flint 1947:302-303), it is generally agreed that in Wyoming, in Wisconsinan time (the latest glacial age), glaciers covered a large part of the Yellowstone-Teton-Wind River highlands, the Big Horn Mountains, the southern part of the Laramie Range, the Medicine Bow Range, Sierra Madre Range, and the northern foothills of the Uinta Mountains. With this in mind, a possible explanation of the geographic variation in *E. minimus* of Wyoming, is here attempted.

In Sangamonian time, *E. minimus*-like chipmunks occurred over most of the region which is now Wyoming, and were divided into two size-groups, much as *E. minimus* is today.

When permanent snow fields were formed in Wisconsinan time, these chipmunks were restricted in their ranges, not, of course, occurring on the glaciers.

When the glaciers melted at the end of Wisconsinan time, new habitats were thus "uncovered." The chipmunks which moved into these ice-free areas, then, became adapted to the new habitats. This then accounts for the subspeciation of *E. m. consobrinus*, *E. m. confinis*, and *E. m. operarius*.

The Black Hills were not covered by glaciers. In late Pleistocene time these hills were probably of low relief. Subsequent differential erosion produced relief sufficient to provide a different habitat. The chipmunks that continued to occupy this area adapted

themselves in color to the new habitat and became *E. m. silvaticus*.

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