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NEW POCKET GOPHERS FROM THE VICINITY OF
MOUNT TAYLOR, NEW MEXICO

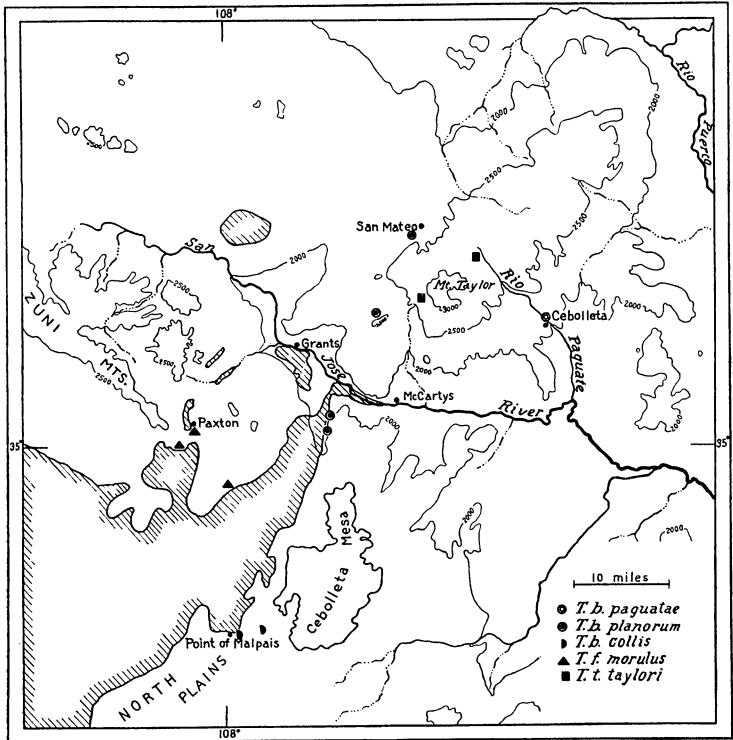
BY EMMET T. HOOPER

A STUDY of the distribution of mammals on and about Mount Taylor in Valencia and McKinley counties, New Mexico, was conducted during May and June, 1939, by a party from the Museum of Zoology of the University of Michigan. Mount Taylor rises 11,390 feet above sea level and about 5000 feet above the surrounding Plateau country (for a description of the Plateau country see Dutton¹). Itself a volcanic pile, it marks the approximate center of extensive surface flows of dark-colored lava. The lava from Mount Taylor caps the surrounding mesas for thirty miles to the north of the summit of the mountain. These lavas are of Tertiary age and in most places have weathered sufficiently to support a layer of topsoil. The surface flows lying to the southwest of Mount Taylor are equally extensive, but are much darker in color, of Recent age, and not weathered sufficiently to yield a continuous soil layer. The latter black flows are known locally as the "malpais." In the area studied, the San Jose River Valley approximately divides the two flows (see Map 1).

A primary aim of the party from the Museum of Zoology was to determine the effects of these volcanic areas, particu-

¹C. E. Dutton, "Mount Taylor and the Zuñi Plateau," *Sixth Ann. Rept., U. S. Geol. Surv.*, 1885, pp. 105-98, Pls. 11-21, Figs. 1-25.

larly the malpais, on the distribution of rodents. The pocket gophers obtained reflect in their morphology the isolation imposed on them by the lava flows and the irregular terrain. A series of gophers from one locality often differs markedly from



Map 1. Localities where pocket gophers were collected in the vicinity of Mount Taylor, New Mexico. Areas partially shaded indicate the malpais. Contour interval, 500 meters (1640 feet).

a series collected only ten or fifteen miles away. In such an instance, even though the air-line distance between those localities is small, the altitudinal difference between them may be comparatively great and a barrier isolates the two populations. In accordance with the present trend to recognize with a subspecific name distinctly differentiated populations of pocket gophers, five geographic races are herein described as new.

Comparative material was borrowed from other collections as follows: United States Biological Survey: *Thomomys talpoides fossor*, southwestern Colorado, 8; *Thomomys bottae aureus*, vicinity of Lake La Jara, New Mexico, 12; *T. b. peramplus*, Tunicha Mountains, Arizona, 12; *T. b. apache*, Bluff City, Utah, 12; *Thomomys fulvus fulvus*, San Francisco Mountain, Arizona, 10. Museum of Vertebrate Zoology: *Thomomys bottae connectens*, vicinity of Albuquerque, New Mexico, 9. I am indebted to Hartley H. T. Jackson and to E. Raymond Hall for the loan of these specimens. This study was made possible by a grant from the Horace H. Rackham School of Graduate Studies, to which I express my gratitude.

Capitalized color terms are from Ridgway.² The phrases "relatively larger" and "relatively narrower" as herein applied to a cranial character, compare, in general terms, the fraction of the basilar length (or occipitonasal length in *Thomomys talpoides*) of that character in two or more series of specimens. All measurements were taken in accordance with current custom with exceptions as follows:

Length of rostrum.—From anterior border of a nasal diagonally, on the same side of the skull, to the point of junction of lacrimal, frontal, and zygomatic plate of maxilla.

Breadth of nasals anteriorly.—Greatest breadth of both nasals.

Breadth of nasals posteriorly.—Breadth of both nasals at a plane across the anterior borders of the maxillae and perpendicular to the longitudinal axis of the skull.

Length of skull exclusive of rostrum and occiput.—Measured along the median dorsal line of the skull from the anterior-most point of frontals to the posterior border of the interparietal.

Mastoid breadth.—Breadth across skull from the mastoid process of a mastoid bulla to the corresponding process on the opposite side of the skull.

² Robert Ridgway, *Color Standards and Color Nomenclature* (Washington, D. C.: Published by the Author, 1912), 44 pp., 53 pls.

Thomomys bottae paguatae, new subspecies

TYPE.—Mature female, skin and skull, University of Michigan Museum of Zoology (U.M.M.Z.) No. 82158; New Mexico, Valencia County, one-half mile north of Cebolleta [Seboyeta Post Office]; collected June 22, 1939, by Emmet T. Hooper; collector's number, 1332.

DISTRIBUTION.—Known only from the vicinity of Cebolleta, but probably ranging southeastwardly toward the Rio Puerco.

CHARACTERS.—Size: large (hind foot of mature female, 31 mm.). Color: hairs of dorsal surface near Ochraceous-Buff terminally and Dark Plumbeous basally; hairs of ventral surface with bases Dark Plumbeous and terminal parts Light Pinkish Cinnamon; hairs of distal third of tail, white, of proximal two-thirds, dusky. Skull: moderately short and broad, with broadly spread zygomata; brain case short and broad; rostrum moderately long and rounded dorsally, not markedly flattened; nasals short (premaxillae extending at least 3 mm. posteriorly beyond them), narrow, and conspicuously broader anteriorly than posteriorly (the posterior breadth averages 66 per cent of the anterior breadth in the specimens examined); bullae rounded and moderately large.

COMPARISONS.—*T. b. paguatae* is similar to *T. b. connectens*, a geographic race ranging to the east of it, except for its darker dorsal and more cinnamon ventral coloration, relatively broader brain case, greater spread of zygomata, narrower nasals, actually and relatively longer premaxillary arms (in specimens examined, arms extend posteriorly beyond nasals not less than 2.9 mm. in *paguatae*, not more than 3.0 mm. in *connectens*), relatively narrower rostrum, and larger and more rounded bullae. From *apache* it differs in larger size, lighter coloration, actually longer and deeper brain case, more decumbent upper incisors, relatively shorter nasals, longer premaxillary arms (extending actually and relatively farther posteriorly beyond nasals), more inflated and rounded auditory bullae, larger exoccipital, and in having the zygomatic plate of the squamosal extending over the auditory tube. It differs from *perampus* as follows: size larger, coloration

lighter, skull broader and more angular (well seen in broad, angular zygomata and larger brain case), nasals actually and relatively shorter and narrowed more posteriorly, premaxillary arms extend posteriorly well beyond nasals, rostrum more rounded dorsally, bullae larger and oval-shaped. It differs from *aureus* as follows: size larger, color lighter, skull broader and more angular, brain case actually and relatively broader anteriorly, zygomata more angular, rostrum actually and relatively longer and relatively narrower (its breadth about 47 per cent of its length, about 52 per cent in *aureus*) and not rounded anteriorly, nasals actually and relatively narrower anteriorly, premaxillae prolonged posteriorly beyond nasals actually and relatively farther, upper incisors more procumbent, exoccipital actually and relatively larger, auditory bullae nearer oval in shape, zygomatic plate of squamosal extending over auditory tube, and interpterygoid space V-shaped.

REMARKS.—*T. b. paguatae* probably inhabits the flood plains and alluvial flats lying to the east and southeast of Mount Taylor. Its range is separated from that of *planorum*, a geographic race ranging near it toward the west, by the San Mateo Mountains. At higher altitudes in the San Mateo Mountains it is replaced by *T. talpoides taylori*. Its affinities are with *connectens* and *planorum*.

SPECIMENS EXAMINED.—New Mexico, Valencia County, vicinity of Cebolleta, 12.

Thomomys bottae planorum, new subspecies

TYPE.—Mature female, skin and skull, U.M.M.Z. No. 82140; New Mexico, Valencia County, one and one-half miles southwest of San Mateo; collected June 10, 1939, by Emmet T. Hooper; collector's number, 1232.

DISTRIBUTION.—Southern McKinley County and northern Valencia County, New Mexico, from the vicinity of San Mateo westward over the plains and slopes of the upper San Jose River Valley and southward on the east side of the malpais at least to eleven miles south-southeast of Grants.

CHARACTERS.—Size: medium, hind foot small (see measure-

ments). Color: hairs of dorsal surface with bases Deep Neutral Gray and terminal parts near Ochraceous-Buff or Pinkish Cinnamon; hairs of ventral surface Pinkish Cinnamon or Orange-Buff terminally and Deep Neutral Gray basally; hairs of proximal two-thirds of tail dusky and of distal third white. Skull: moderately short and broad, with a short, broad brain case, moderately spread zygomata, broad nasals, flattened rostrum (dorsally), small interparietal, and V-shaped interpterygoid fossa.

COMPARISONS.—*T. b. planorum* averages smaller and darker than *T. b. paguatae* and has an actually and relatively shorter rostrum, relatively shorter ascending arms of premaxillae, actually and relatively broader nasals, relatively smaller interparietal, smaller bullae, and relatively narrower shelf of zygomatic portion of squamosal. From *aureus*, *planorum* differs in its darker and more buffy dorsal coloration, pinkish cinnamon (instead of white) ventral coloration, relatively broader skull, actually and relatively shorter brain case, less depressed and actually and relatively narrower rostrum (breadth 48 per cent of length in *planorum*, 52 per cent in *aureus*), relatively narrower nasals, more procumbent upper incisors, smaller auditory bullae, and V-shaped interpterygoid fossa. *T. b. planorum* resembles *T. b. apache* in size and in many cranial features, but differs from that race in its lighter coloration both dorsally and ventrally, much lighter-colored proximal part of the tail, actually and relatively shorter brain case, actually and relatively narrower rostrum, smaller foramen magnum, and smaller auditory bullae. From *peramplus*, *planorum* differs in its slightly smaller size, more buffy (less drab) dorsal coloration, relatively greater spread of zygomata, actually and relatively shorter nasals, actually and relatively shorter, deeper brain case, actually and relatively longer ascending arms of premaxillae (extending farther posteriorly beyond nasals), and more rounded auditory bullae. From *connectens*, *planorum* differs in its smaller size, darker coloration, actually and relatively shorter brain case, actually and relatively narrower and relatively longer rostrum, narrower

zygomata (anteriorly), more procumbent upper incisors, and smaller auditory bullae.

REMARKS.—Four specimens from eleven miles south-southeast of Grants grade toward *paguatae* in size and in length and breadth of rostrum; in other characters they resemble topotypical *planorum*. A specimen of *planorum* (U.M.M.Z. No. 82098), from nine miles south-southeast of Grants, has the broad rostrum and nasals as seen in topotypical *collis*, a race described below. Three specimens taken on Horace Mesa illustrate well the decrease in size that may accompany an increase in altitude and in hardness of the soil. Horace Mesa is about ten miles distant from San Mateo and 1000 feet higher in the San Mateo Mountains. The topsoil layer there is hard and includes an appreciable amount of basaltic lava rubble. The gophers from the mesa are replicas of those from near San Mateo, but are much smaller in size (the basilar length averages 30.8 mm.). In size, these specimens agree well with *T. fulvus morulus*, but in other diagnostic characters they definitely fit with *T. bottae planorum*.

SPECIMENS EXAMINED.—A total of 26 from localities in Valencia County, New Mexico, as follows: one and one-half miles southwest of San Mateo, 18; Horace Mesa, one and one-half miles south of Canyon Lobo Ranger Station, 3; nine miles south-southeast of Grants, 1; eleven miles south-southeast of Grants, 4.

Thomomys bottae collis, new subspecies

TYPE.—Mature male, skin and skull, U.M.M.Z. No. 82108; New Mexico, Valencia County, thirty miles south of Grants, Shuman's Ranch, township 6 north, range 10 west, section 30; collected May 15, 1939, by Emmet T. Hooper; collector's number, 1067.

DISTRIBUTION.—Known only from localities on the northeastern part of North Plains and on a western arm of Cebolleta Mesa. Probably ranging at altitudes approximately between 7000 and 9000 feet on the high plains and mesas south of Grants and north of the Datil Mountains.

CHARACTERS.—Size: medium (hind foot of mature male, about 30 mm.). Color: similar to that of *planorum*, but hairs of ventral surface with bases nearer Neutral Gray and with terminal parts either white or Light Pinkish Cinnamon; hairs of dorsal surface Neutral Gray basally and Ochraceous-Buff or Cinnamon-Buff distally. Skull: comparatively smooth, not markedly angular; brain case shallow and, posteriorly, sloping gradually ventrally—not abruptly truncate; rostrum short and broad, its breadth attributable to the broad nasals and, especially, to the broad upper faces of the ascending branches of the premaxillae; interorbital region constricted comparatively slightly (breadth about 6.7 mm.); upper incisors moderately decumbent.

COMPARISONS.—*T. b. collis* resembles *T. b. planorum* in dorsal coloration and in many characters of the skull. It is distinguishable from that race, however, in characters as follows: smaller size, lighter ventral coloration, less angular skull, actually and relatively less constricted interorbital region, actually and relatively broader rostrum (averaging 8.4 mm. in seven male *collis* and 7.9 mm. in three male *planorum* of comparable age), broader nasals (posteriorly), actually and relatively longer, relatively broader and much less truncate (posteriorly) brain case, and actually and relatively shorter ascending branches of premaxillae. The race *collis* differs from *paguatae* as follows: size much smaller, color averaging darker, skull less angular, brain case relatively longer and less truncate posteriorly, rostrum more flattened dorsally, relatively and actually shorter, and relatively broader, nasals decreasing less in width posteriorly, premaxillae prolonged beyond nasals no more than 2.9 mm. (no less than 3.0 mm. in *paguatae*), zygomatic plate of squamosal narrower, not extending over auditory tube, and auditory bullae smaller and more oval in shape. *T. b. collis* is much darker in coloration than *T. b. aureus*; the brain case is relatively broader and less truncate posteriorly, the rostrum actually broader and relatively longer, the nasals broader posteriorly and truncate instead of acute, the zygomatic spread relatively greater, the upper in-

cisors more procumbent, the auditory bullae smaller and more oval in shape, and the interpterygoid fossa V-shaped.

REMARKS.—The differential characters distinguishing *collis* from *planorum* are chiefly ones of the skull. *T. b. collis* apparently replaces *T. b. planorum* at higher elevations on the east side of the lava beds. One of three specimens (U.M.M.Z. No. 82103) obtained on the North Plains near Point of Malpais, a locality about six hundred feet lower in elevation than the type locality of *collis*, resembles *planorum* about as much as it does *collis*, and indicates that the two races grade one into the other in a belt approximately confined within elevations from 6500 to 7500 feet.

SPECIMENS EXAMINED.—A total of 10 from the following localities in Valencia County, New Mexico: Shuman's Ranch, township 6 north, range 10 west, section 30, 7; twelve miles northeast of Trechado, Point of Malpais, 3.

Thomomys fulvus morulus, new subspecies

TYPE.—Mature female, skin and skull, U.M.M.Z. No. 82094; New Mexico, Valencia County, eight miles southeast of Paxton, Bill Porter's Ranch; collected May 31, 1939, by Emmet T. Hooper; collector's number, 1178.

DISTRIBUTION.—Known only from areas about 7500 feet in elevation on the southeastern foothills of the Zuñi Mountains, northwestern New Mexico.

CHARACTERS.—Size: small (hind foot of mature female, about 28 mm.); ear medium (averages 7 mm. from notch, fresh skin). Color: dark, mass effect of dorsum about Fuscous; hairs of dorsal surface and sides with bases Blackish Plumbeous and terminal parts near Tawny; hairs of ventral surface Blackish Plumbeous basally and Pinkish Cinnamon or Orange-Cinnamon terminally; hairs of dorsal half of tail dusky, of ventral half white. Skull: short and broad; zygomata broadly spread; rostrum narrow; nasals long (about 43 per cent of basilar length), narrow, and acute terminally; premaxillae prolonged little beyond nasals (averaging 1.3 mm. in specimens examined); interpterygoid fossa V-shaped and without median

spine; bullae small and shallow dorsoventrally; pterygoid processes long.

COMPARISON.—From *T. f. fulvus*, *T. f. morulus* differs as follows: dorsal coloration much duller and darker in shade, ventral surface with less of Orange-Cinnamon pigmentation, rostrum actually and relatively broader, broadest near anterior end, pterygoids actually and relatively longer, auditory bullae more elongate and less angular—their anterior borders rounded instead of squarish. *T. f. morulus* is well set apart morphologically from all subspecies of *T. bottae* examined, namely, *aureus*, *apache*, *peramplus*, *connectens*, *paguatae*, *planorum*, and *collis*. Its size is smaller, dorsal coloration much darker, and tail bicolored (dark above and light below), usually for its entire length; the nasals are relatively longer and are acute posterolaterally, not acute posteromedially or truncate; the bullae are smaller, relatively more elongate and shallower dorsoventrally; the interpterygoid fossa lacks a prominent median spine.

REMARKS.—All specimens of *T. fulvus morulus* at hand were taken on the southern side of the Zuñi Mountains in Valencia County, New Mexico, and within one-half mile of the lava fields. The topotypic series was obtained from an area, several square miles in extent, of bright brick-red soil. The range of the race, as presently known, is defined on three sides by flows several miles in width of rough, basaltic lava—an absolute barrier to the dispersal of pocket gophers. The Zuñi Mountains to the north constitute the only avenue open to them for their diffusion outward.

After reviewing the extensive material available to him in the collections contained in the United States National Museum, Goldman³ concluded that “not only are there no characters warranting the recognition of *T. perpallidus* and *T. fulvus* as separate groups, but they are united by forms so closely interrelated that even specific distinction disappears.” At that time he indicated that some geographic races of *perpal-*

³ E. A. Goldman, “New Pocket Gophers from Arizona and Utah,” *Journ. Wash. Acad. Sci.*, 21 (1931): 416–26.

TABLE I

AVERAGE AND EXTREME MEASUREMENTS IN MILLIMETERS OF SUBSPECIES OF *Thomomys bottae* AND *Thomomys fulvus*

	Total Length	Tail	Hind Foot	Ear from Notch, Fresh	Basilar Length	Zygomatic Breadth	Interorbital Constriction	Length of Rostrum	Breadth of Rostrum	Length of Nasal	Breadth of Both Nasals Anteriorly	Breadth of Both Nasals Posteriorly	Extension Posteriorly from Nasals of Tongues of Premaxillae	Length of Skull, Exclusive of Rostrum and Occiput	Mastoid Breadth
<i>T. b. paguatae</i> , Cebolleta, 3 ♀	240	67	30	7.3	36.2	25.6	6.8	17.55	8.2	13.8	4.2	3.1	3.4	25.7	19.8
<i>T. b. planorum</i> , San Mateo, 6 ♀	221	63	28	7.0	34.2	24.3	6.8	16.0	7.7	13.2	4.5	3.3	2.3	22.9	18.6
<i>T. f. morulus</i> , Porter's Ranch and Agua Fria, 6 ♀	201	57	28	7.0	30.7	22.3	6.2	15.0	7.2	13.2	4.1	3.1	1.2	20.9	17.0
<i>T. b. paguatae</i> , Cebolleta, 2 ♂	255	76	30.5	7.5	38.45	27.65	6.8	19.05	8.9	15.15	4.8	3.25	3.65	25.95	20.15
<i>T. b. planorum</i> , San Mateo, 3 ♂	226	67	30	6.3	35.1	24.9	6.1	16.4	7.9	14.2	4.3	3.3	2.5	23.0	18.6
<i>T. b. collis</i> , Shuman's Ranch and Point of Malpais, 7 ♂	220	65	30	6.5	33.9	23.9	6.7	16.2	8.4	13.1	4.2	3.5	2.1	23.5	18.6
<i>T. f. morulus</i> , Porter's Ranch and Agua Fria, 3 ♂	205	58	28	7.5	32.3	24.2	6.2	15.7	7.7	13.7	4.1	3.3	1.5	21.5	17.4
	197-211	51-64	27-28	6.5-8.0	31.5-32.9	23.9-24.4	6.0-6.5	15.5-15.9	7.5-7.9	13.5-13.9	4.0-4.2	3.0-3.5	1.4-1.8	21.0-22.3	17.0-17.7

lidus approach some races of *bottae* so closely in characters of skin and skull that intergradation between the species may be considered complete. In a subsequent paper⁴ he lists as subspecies of *bottae* all geographic races previously regarded as races of *perpallidus* and *fulvus*.

I am not convinced that to treat some races of *fulvus* as races of *bottae* correctly indicates relationships. Topotypical *fulvus* (the subspecies) and *morulus* stand together as a group so distinct from the other races compared in the present paper that until further similarities or evidence of the intergradation of *fulvus* or *morulus* with *apache*, *peramplus*, *connectens*, *aureus*, *paguatae*, *collis*, or *planorum* has been demonstrated, it seems best to treat *fulvus* and *morulus* as subspecies of *T. fulvus*.

When the specimens of all the races presently treated are laid out on the laboratory table, each specimen appears to belong to one of three groups. One group, the most distinctive, includes the specimens of *T. talpoides fossor* and *T. t. taylori*. A second group includes specimens of *T. fulvus fulvus* and *T. f. morulus*. The third group includes the remainder of the specimens; to this group the name *T. bottae* might well apply. Each group is markedly distinct from the other.

SPECIMENS EXAMINED.—A total of 20 from Valencia County, New Mexico, as follows: eight miles southeast of Paxton, Bill Porter's Ranch, 11; fifteen miles southwest of Grants, Agua Fria, 8; sixteen miles southwest of Grants, north side Flagpole Crater, 1.

Thomomys talpoides taylori, new subspecies

TYPE.—Mature female, skin and skull, U.M.M.Z. No. 82132; New Mexico, Valencia County, six miles northeast of the summit of Mount Taylor, near Fernandez Summer Camp; collected June 15, 1939, by Emmet T. Hooper; collector's number, 1256.

DISTRIBUTION.—Known only from the yellow pine and

⁴ E. A. Goldman, "Pocket Gophers of the *Thomomys bottae* Group in the United States," *Proc. Biol. Soc. Wash.*, 48 (1935): 153-57.

Douglas fir belts above 8500 feet in the San Mateo Mountains, Valencia County, New Mexico.

CHARACTERS.—Size: small (hind foot of mature female 29 mm.); ear large (about 8 mm., from notch on fresh skin); dusky auricular patches large. Color: golden brown dorsally, in mass effect; hairs of dorsal surface with terminal parts Tawny and bases Blackish Plumbeous; hairs of ventral surface Light Ochraceous-Buff distally and Blackish Plumbeous basally; hairs of proximal half of tail dusky, of distal half white. Skull: brain case narrow and truncate posteriorly; nasals long and broad; interparietal large (its area averaging about 19 sq. mm. in five mature females); bullae rectangular in shape and moderately inflated.

COMPARISONS.—*Thomomys talpoides taylori* is similar in size and proportions to *Thomomys talpoides fossor*, but differs from that race as follows: dorsal coloration lighter and more golden in hue, postauricular patches larger and muzzle more extensively and intensively dusky, nasals actually and relatively longer (averaging 38 per cent of occipitonasal length, as compared to 35 per cent in *fossor*) and constricted much less posteriorly, interparietal actually and relatively larger (its approximate area averaging 51 per cent of occipitonasal length in *taylori*, 39 per cent in *fossor*), interorbital breadth actually and relatively greater, auditory bullae shorter and more inflated, mastoid bullae more inflated, posterior portion of cranium more truncate and sloping less toward basion.

MEASUREMENTS (in mm.).—Average and extreme measurements of five mature females from Mirabal Spring: total length, 219 (213–26); tail, 66 (63–72); hind foot, 29 (26–31); ear from notch, fresh, 7.8 (7.5–8.0); occipitonasal length, 38.7 (37.9–39.2); zygomatic breadth, 22.1 (21.5–22.7); interorbital constriction, 6.7 (6.4–7.0); length of nasal, 14.8 (14.0–15.5); least width of both nasals anterior to anteriormost points on frontals, 2.6 (2.3–2.9); mastoid breadth, 18.0 (17.4–18.5); greatest breadth of interparietal, 7.2 (6.7–8.3); greatest length of interparietal along longitudinal axis of skull, 5.3 (5.0–5.6).

Approximate area of interparietal (one-half of product of breadth and length), 18.9 sq. mm. (16.8–21.6).

REMARKS.—The type specimen of *taylori* departs from the average of the series examined; the postauricular areas are smaller and the muzzle less dusky. *T. talpoides taylori* inhabits the yellow pine and Douglas fir belts on slopes and meadows in the higher parts of the San Mateo Mountains. At lower elevations, in the pinyon and juniper belts, it is replaced by subspecies of *T. bottae*.

SPECIMENS EXAMINED.—A total of 26 from localities in Valencia County, New Mexico, as follows: Mirabal Spring, southwestern slope of Mount Taylor, 18; Fernandez Summer Camp, six miles northeast of summit of Mount Taylor, 8.

