

Peromyscus simulus. By Heather R. Roberts, David J. Schmidly, and Robert D. Bradley

Published 5 June 2001 by the American Society of Mammalogists

Peromyscus simulus Osgood, 1904

Sinaloan Mouse

Peromyscus spicilegus simulus Osgood, 1904:64–65. Type locality “San Blas, Tepic, Mexico.”

Peromyscus boylei simulus Osgood, 1909:151. Reclassification into *P. boylei*.

Peromyscus boylii simulus Miller and Kellogg, 1955:495. Emendation of previous spelling.

Peromyscus simulus Carleton, 1977:41. Elevation to species status.

CONTEXT AND CONTENT. Order Rodentia, suborder Sciuromorphi, family Muridae, subfamily Sigmodontinae, genus *Peromyscus*, subgenus *Peromyscus*. *Peromyscus simulus* is monotypic (Carleton 1977, 1989; Schmidly and Bradley 1995).

DIAGNOSIS. *Peromyscus simulus* is the smallest member of the *P. boylii* species group. Cranium of *P. simulus* (Fig. 1) is smaller overall and has a shorter rostrum and molar toothrow than other taxa in this group (Carleton 1977; Schmidly and Bradley 1995). Also, parietal is narrower and less shelf-like; zygomata are robust and squared anteriorly; and supraorbital shelf is weakly developed (Carleton 1977; Carleton et al. 1982; Osgood 1904). Phallus has smallest dimensions of any member of the *P. boylii* and *P. aztecus* species groups (mean length = 3.92 mm, $n = 7$ —Bradley and Schmidly 1987). *P. simulus* differs from members of the *P. aztecus* species group by having an hourglass-shaped interorbital region and the absence of furrowing (fluting) and lappets associated with the glans penis (Bradley and Schmidly 1987; Carleton 1977). Specifically, *P. simulus* differs from *P. spicilegus* in smaller body size (Carleton 1977), cranial characters (Carleton 1977; Hooper 1955, 1958; Schmidly and Bradley 1995), phallus morphology (Bradley and Schmidly 1987; Carleton 1977; Carleton et al. 1982), and karyotype (Carleton et al. 1982; Schmidly and Schroeter 1974). In areas of sympatry with *P. spicilegus*, hybridization is not evident (Baker and Greer 1962).

GENERAL CHARACTERS. *Peromyscus simulus* is small in size for the genus. Tail is as long as head and body, is moderately haired, and generally is well tufted at the end; it may or may not be slightly bicolored. Hind foot is medium in length. Skull is small in length with a rounded interorbital region. The hourglass-shaped interorbital region is typical of the *P. boylii* species group. Auditory bullae are small. The following characters (means and parenthetical ranges in mm) are based on 157 individuals from 11 populations and include both males and females considered to be adults (Schmidly and Bradley 1995): total length, 198.1 (191.3–207.0); length of tail, 99.7 (90.4–105.8); length of head and body, 99.5 (93.4–107.0); length of hind foot, 22.6 (21.9–25.0); length of ear, 18.4 (17.4–19.4); greatest length of cranium, 26.8 (26.2–27.4); length of rostrum, 10.4 (10.2–10.6); length of nasals, 9.3 (8.9–9.7); postpalatal length, 9.1 (8.8–9.4); zygomatic breadth, 13.7 (13.2–14.1); breadth of braincase, 12.2 (11.9–12.0); mastoid breadth, 11.3 (11.0–11.5); least interorbital width, 4.2 (4.0–4.3); length of molar toothrow, 4.0 (3.8–4.1); length of incisive foramen, 4.8 (4.6–5.2); length of auditory bulla, 5.1 (4.9–5.3); depth of braincase, 9.4 (9.2–9.6); length of mesopterygoid fossa, 4.7 (4.5–5.0); length of bony palate, 4.2 (4.0–4.4); rostral breadth, 4.7 (4.6–4.8); greatest breadth across molars, 5.3 (5.0–5.5); postdental palatal breadth, 3.9 (3.7–4.1); and width of mesopterygoid fossa, 2.3 (2.3–2.4).

Upperparts of pelage are tawny; dusky hairs are concentrated medially and form a poorly defined stripe of black. Sides have a broad lateral line without distinct contrast. Orbital ring is black. Ears are dusky with partially concealed black hairs at base. Feet are white and forearms are sooty. Hind legs are dusky extending to and slightly beyond metatarsal joint. Underparts are creamy white

with a tawny pectoral spot frequently present. Tail may be slightly blackish above, white below (Osgood 1904).

Geographic and nongeographic variation across 11 populations of *P. simulus* showed significant differences in 18 of 23 external and cranial measurements. Smaller individuals were collected in more northern, inland localities and larger individuals were from southern, coastal populations. Sexual dimorphism and age discrimination were not evident (Schmidly and Bradley 1995).

DISTRIBUTION. *Peromyscus simulus* occurs in western Mexico (Fig. 2) on the coasts of Sinaloa and Nayarit (Carleton 1989; Carleton et al. 1982; Goodwin 1954; Schmidly and Bradley 1995). Throughout this region, the Sinaloan mouse occurs from sea level to 200 m, in coastal lowlands, plains, and river valleys near the Sierra Madre Occidental.



FIG. 1. Dorsal, ventral, and lateral views of skull and lateral view of mandible of *Peromyscus simulus* from 5 mi E Concordia, Nayarit, Mexico (male, Texas Cooperative Wildlife Collection, Texas A&M University, 45600). Greatest length of skull is 25.2 mm.

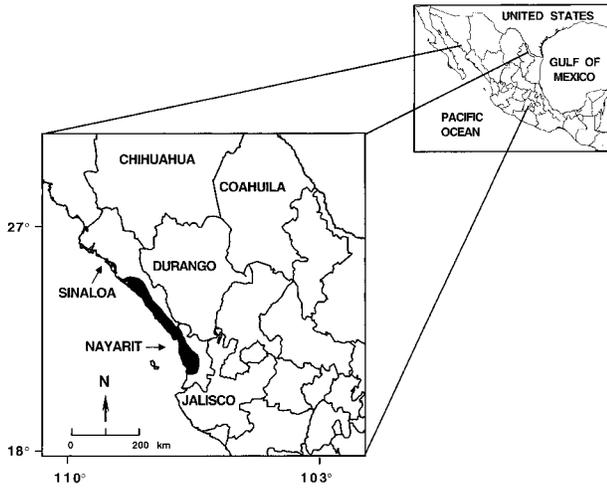


FIG. 2. Distribution of *Peromyscus simulus* in western Mexico (Schmidly and Bradley 1995).

The traditional distribution of *P. simulus* was thought to extend from Mazatlán, Sinaloa, in the north to San Blas, Nayarit, in the south. However, a study of museum specimens extended its distribution 100 km north to San Ignacio, Sinaloa, and 50 km to the south of San Blas, Nayarit (Schmidly and Bradley 1995). *P. simulus* has no fossil record.

FORM AND FUNCTION. Glans penis is short in length and rod-shaped, not furrowed or fluted, with well-developed dorsal and moderately developed ventral lappets, ca. one-fourth length of hind foot, and longer than wide. Ventral surface is covered with dense triangular-shaped spines and dorsal surface is sparsely covered. Protractile tip is smaller than in other taxa classified in the *P. boylii* species group. Baculum is rod-shaped, long, and wide, with base 3 times wider than shaft; cartilaginous tip is minute (Bradley and Schmidly 1987; Carleton 1977; Carleton et al. 1982). The following character means (in mm) are based on 7 individuals from 1 population (Bradley and Schmidly 1987): length of distal tract, 8.9; length of glans, 5.6; length of protractile tip, 1.4; greatest width of glans, 1.4; length of baculum, 7.9; length of cartilaginous tip, 0.2; width of baculum at base, 1.1; and greatest width of baculum, 0.4.

ONTOGENY AND REPRODUCTION. In Nayarit, Mexico, pregnant females and males with scrotal testes were caught in February and September. Juveniles were caught in May (Carleton et al. 1982).

ECOLOGY. *Peromyscus simulus* inhabits lowland tropical forests of the arid upper tropical zone west of the Sierra Madre Occidental (Carleton et al. 1982; Schmidly and Bradley 1995). Although the Sinaloan mouse has been captured at numerous localities throughout its range, it most frequently occurs in flood plains and is absent from drier hillsides. Mangrove swamps, palm groves, arroyos, and *Acacia* thickets have provided numerous captures. However, *P. simulus* also has been collected in the thorn scrub of southern Sinaloa near Mazatlán (Baker and Greer 1962).

GENETICS. The diploid karyotype for *P. simulus* is 48 with a fundamental number (FN) of 52 (Carleton et al. 1982). The X chromosome is a large submetacentric and the Y chromosome is a medium-sized metacentric (Carleton et al. 1982; Schmidly and Schroeter 1974). Karyotype is similar to that of *P. boylii boylii*, *P. b. utahensis*, and *P. b. rowleyi* (Hsu and Arrighi 1968; Lee et al. 1972; Schmidly and Schroeter 1974) but differs considerably from that of *P. madrensis* in morphology of the sex chromosomes (Carleton et al. 1982). *P. boylii simulus* initially was reported from San Blas, Nayarit, to exhibit FN = 82, much higher than that of other samples of *P. boylii* (Schmidly and Schroeter 1974). However, taxonomic revisions later placed these specimens with *P. spicilegus*.

An allozyme study of 16 species of *Peromyscus* determined that *P. simulus* exhibited very few derived character states (Sullivan et al. 1991). However, phenetic analyses revealed that *P.*

simulus exhibited a sister taxon relationship with *P. ochraeater*, which supports findings based on morphology of the glans penis (Huckaby 1973, 1980). *Peromyscus simulus* may be the sister taxon to a clade containing *P. b. rowleyi*, *P. beatae*, *P. levipes*, and an undescribed potential subspecies of *P. boylii* from Michoacan (Bradley et al. 1996). Thus, *P. simulus* may be more closely related to the *P. boylii* species group than to the *P. truei* species group.

REMARKS. The taxonomy and classification of *P. simulus* has a complex history. It initially was described by Osgood (1904) as a subspecies of *P. spicilegus*. Later, it was classified as a subspecies of *P. boylei* (Osgood 1909). This arrangement resulted in possible combinations of 5 subspecies of *P. boylii* (*evides*, *levipes*, *rowleyi*, *simulus*, and *spicilegus*) occurring sympatrically at several localities in western Mexico. Subsequent studies (Baker and Greer 1962; Carleton 1977; Hooper 1955; Schmidly and Schroeter 1974) eventually identified morphological, karyotypic, and ecological characteristics that, along with the observation of sympatric coexistence of various combinations of these subspecies, resulted in the elevation of *P. b. simulus* to species status (Carleton 1977).

The specific name *simulus* is derived from the Latin term meaning similar. This may be referring to the observation that this taxon appears very similar in external appearance to other taxa within the genus *Peromyscus*.

We thank F. D. Yancey II for assistance in producing photographs of skull and mandible, and G. Baumgardner (Texas Cooperative Wildlife Collection) for loan of specimens.

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- Editors of this account were ELAINE ANDERSON, VIRGINIA HAYSSSEN, and SERGE LARIVIÈRE. Managing editor was VIRGINIA HAYSSSEN.
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