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Cratogeomys neglectus.

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Cratogeomys Merriam, 1895

Geomys Thomas, 1893:271. Type species *Geomys merriami.*
Cratogeomys Merriam, 1895:150. Renaming of *Geomys merriami* Thomas.
Platygeomys Merriam, 1895:162. Type species *Geomys gymnurus* Merriam.

CONTEXT AND CONTENT. Order Rodentia, family Geomyidae, subfamily Geomyinae, tribe Geomyini. The following key to the 8 species of *Cratogeomys* is modified from Hall (1981), with additional data from Russell (1968b) and Lee and Baker (1987).

1 Dorsal outline of lambdoidal crest convex posteriorly, never sinuous. Paroccipital processes small, not enlarged into flange-like knobs. Angular processes short, breadth across angular processes less than greatest length of mandible 2
Dorsal outline of lambdoidal crest sinuous. Paroccipital processes enlarged into flange-like knobs. Angular processes long, breadth across angular processes more than greatest length of mandible 3
2 Occlusal surface of M3 quadriform, posterior loph not elongated; squamosals not overlapping parietals; basioccipital parallel-sided or hourglass-shaped 4
Occlusal surface of M3 obcordate, posterior loph elongated and displaced toward labial side; squamosals expanded medially, with increasing age progressively overlapping parietals and completely covering parietals in old adults; basioccipital strongly wedge-shaped, its anterior end distinctly narrower than its posterior end ..... *C. merriami*
3 Condylobasal length usually <50 mm; rostrum relatively short (<38% of condylobasal length) ..... *C. neglectus*
Condylobasal length >50 mm; rostrum relatively long (>38% of condylobasal length) 5
4 Condylobasal length usually <46 mm and length of palate usually <31 mm; 2n = 42 chromosomes ..... *C. goldmani*
Condylobasal length usually >46 mm and length of palate usually >31 mm; 2n = 46 chromosomes ..... *C. castanops*
5 Pelage harsh and bristly, occurring only on the Pacific Coastal Plain ..... *C. fumosus*
Pelage soft and lax, not occurring on the Pacific Coastal Plain 6
6 Skull larger (condylobasal length; males 66.7–71.3 mm and females 60.1–64.6 mm) and broader (squamosal breadth; males 43.1–52.3 mm and females 41.6–47.8 mm) ..... *C. gymnurus*
Skull smaller (condylobasal length 56.5–65.0 mm in males and 50.4–59.1 mm in females) and narrower (squamosal breadth 36.7–41.1 mm in males and 32.0–41.6 mm in females) 7
7 Zygomata expanded laterally, zygomatic breadth 41.6–43.2 mm in females (adult male unknown) ..... *C. zinseri*
Zygomata not expanded laterally, zygomatic breadth 31.3–39.4 mm in females and 37.6–45.0 mm in males ..... *C. tylorhinus*

Cratogeomys neglectus (Merriam, 1902)

Querétaro Pocket Gopher

Platygeomys neglectus Merriam, 1902:68. Type locality "Cerro de la Calentura, about 8 miles northwest of Pinal de Amoles, Querétaro, Mexico, elevation 9000 feet."
Cratogeomys neglectus Hooper, 1948:303. First use of current name combination.
Pappogeomys neglectus Russell, 1968b:739. Renaming of genus.

CONTEXT AND CONTENT. Context as for genus. *C. neglectus* belongs to the *gymnurus* species group (Russell 1968b). *C. neglectus* is monotypic.

DIAGNOSIS. Pelage of *C. neglectus* is soft and glossy, similar to *C. tylorhinus* (Cervantes et al. 1993) but more pale and less chestnut (Fig. 1). *C. neglectus* is small (average length of head and body usually <200 mm) and, among congeners, only *C. goldmani* is smaller (Goldman 1939). Skull is small and short compared to other species in *gymnurus* group, with condylobasal length usually <50 mm (Fig. 2). Skull of *C. neglectus* differs from other species in the *gymnurus* group in possessing a more rounded braincase and in lacking the angularity of *C. tylorhinus* (Cervantes et al. 1993).

GENERAL CHARACTERS. *Cratogeomys neglectus* has the characteristic fusiform body shape, powerful forelegs, reduced external ears, and short tail typical of fossorial mammals and all pocket gophers of the family Geomyidae. Adult males of *C. neglectus* reach a maximum weight of ca. 500 g and adult females 360 g (Monterrubio and León, in press). Tail of *C. neglectus* is long and thin (41% of length of head and body), and hind feet are short (usually <45 mm). Dorsal portion of body is densely furred, whereas hair on belly is sparse. Dorsal hairs are dark gray at base and ochraceous at tips, whereas hairs on underparts are grayish at base and ochraceous red at tips. Hairs in throat region and on undersides of hind feet are whitish, those in auricular area are dark brown, and tail hairs are sparse and reddish (Russell 1968b). Cheek pouches are well developed and open external to buccal cavity. Large and procumbent incisors of *C. neglectus* remain outside mouth, even when mouth is closed.

External measurements (in mm) of holotype (adult male, skin and skull, specimen number 81218 in the United States National Museum of Natural History) are: total length, 310; length of tail, 96; length of hind foot, 42 (Merriam 1902). Mean and parenthetical range (in mm) for 7 females are: total length, 274 (260–304); length of tail, 86.4 (73–95); length of hind foot, 38.4, (34–46); and mean weight (g), 321 (290–360). The same measurements for 7 males are: total length, 286 (220–370); length of tail, 87.8 (65–120); length of hind foot, 40.7 (36–46); and mean weight of 3 males, 318 (183–460—Merriam 1902). One adult male weighed 500 g (Monterrubio and León, in press).

FIG. 1. Adult male *Cratogeomys neglectus* from La Cañada, 0.3 km southwest of Pinal de Amoles, Querétaro, México (specimen number MZFC 7046 from Museo de Zoología, Departamento de Biología, Facultad de Ciencias, Universidad Nacional Autónoma de México). Photograph by T. C. Monterrubio.

FIG. 2. Dorsal, ventral, and lateral views of cranium and lateral view of mandible of *Cratogeomys neglectus* from La Cañada, 0.3 km southwest of Pinal de Amoles, Querétaro, México (adult male specimen number MZFC 1128 from Museo de Zoología, Departamento de Biología, Facultad de Ciencias, Universidad Nacional Autónoma de México). Occipitonasal length is 48 mm.

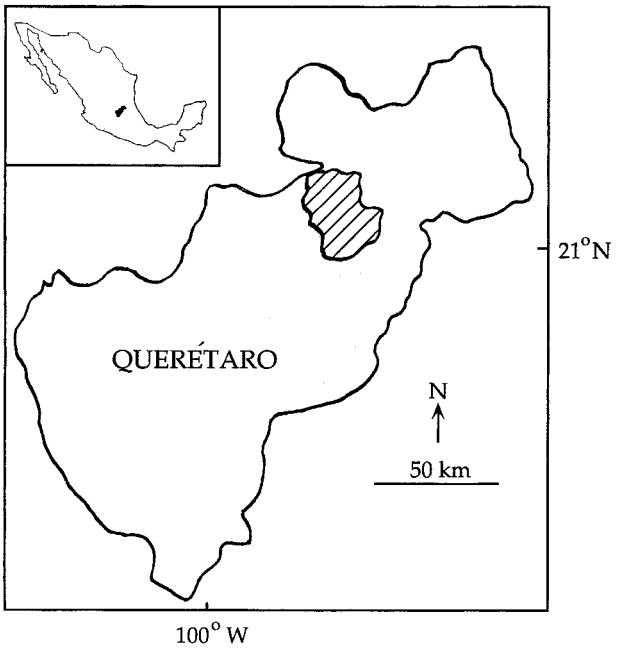

FIG. 3. Geographic distribution of *Cratogeomys neglectus*, modified from Monterrubio (1995).

Braincase is smooth and round, and platycephalic specializations are highly developed (e.g., mandible wide, angular processes long, cranium relatively broad posteriorly, squamosal breadth averaging ca. 70% of condylobasal length, and squamosal breadth greater than zygomatic breadth). Lambdoidal crest in *C. neglectus* is only weakly developed, frontal is flat interorbitally, rostrum is decidedly short (usually <38% of condylobasal length), and zygomatic arches are parallel instead of divergent anteriorly (Merriam 1902; Russell 1968b). Cranial measurements (in mm) of holotype (Merriam 1902) are: basal length, 44.7; occipitonasal length, 48.9; interorbital breadth, 8.4; length of nasal, 15; length of diastema, 20.4; zygomatic breadth, 32.5; length of upper molar series, 10; width of rostrum, 11.8; and width of incisors, 7.9. Mean and parenthetical range (in mm) for cranial measurements of 7 females are: basal length, 44.9 (42.4–50.3); occipitonasal length, 47.0 (45.6–51.3); interorbital constriction, 7.7 (7.2–8.4); length of nasal, 15.4 (13.0–18.0); length of diastema, 19.7 (17.5–20.8); zygomatic breadth, 33.3 (30.7–37.2); length of upper molar series, 31.6 (30.2–35.0); width of rostrum, 10.8 (9.9–11.4); and width of incisors, 7.1 (6.2–8.0). The same measurements in 7 males are: basal length, 44.7 (36.0–51.8); occipitonasal length, 48.4 (36.7–56.5); interorbital constriction, 8.2 (7.6–8.7); length of nasal, 15.4 (11.2–20.0); length of diastema, 19.2 (15.0–23.6); zygomatic breadth, 31.6 (24.4–40.7); length of upper molar series, 10.2 (8.6–12.7); width of rostrum, 10.7 (8.9–12.1); and width of incisors, 7.3 (5.8–8.7—Merriam 1902).

DISTRIBUTION. The Querétaro pocket gopher is endemic to the Sierra del Doctor, an isolated mountain range in the Pinal de Amoles municipality in the northeastern portion of the state of Querétaro, México (Fig. 3). This region is located in the geologic subprovince of Carso Huasteco within the Sierra Madre Oriental geographic region. The Querétaro pocket gopher occurs from 2,570 to 2,896 m (Monterrubio and León, in press). Unlike all other species of the *gymnurus* group, the distribution of this species is not associated with the transvolcanic belt of central México (Russell 1968b). Fossils of *C. neglectus* are not known, although *Cratogeomys* is known from the Late Blancan (latest Pliocene) of southern Arizona (Tomida 1987).

FORM AND FUNCTION. Skull of *C. neglectus* is stout, robust, and bears prominent sites for origin and insertion of muscles. *C. neglectus* is strongly platycephalic. Dental formula of *C. neglectus* is i 1/1, c 0/0, p 1/1, m 3/3, total 20.

ONTOGENY AND REPRODUCTION. A pregnant female was collected in April near La Cañada, Querétaro (León et al. 1990). This specimen contained 2 embryos with crown-rump measurements of 25.4 and 29.7 mm, respectively. The reproductive season appears to begin in early spring, when a general increase in digging activity occurs (Monterrubio 1995).

ECOLOGY. The Querétaro pocket gopher is restricted to a small number of highland localities where it is often locally abundant. *C. neglectus* usually lives in ecotonal habitats between oak and pine forests. Tunnels constructed by *C. neglectus* are usually located on hillside slopes and intermountain valleys and are easily identified by conspicuous mounds of dark soil. These mounds are common in agricultural fields (e.g., corn, potatoes, and apples), but are rarely observed in grasslands (Monterrubio and León, in press). The Querétaro pocket gopher is most active in agricultural areas adjacent to pine forests with abundant young trees and shrubs. The main tree species found in areas inhabited by *C. neglectus* are: *Alnus jorullensis, Arbutus xalapensis, Buddleia cordata, Cero-*

carpus macrophylus, Cupressus lindleyi, Forestiera reticulata, Pinus leiophylla, Pinus teocote, and *Quercus rugosa.* Some of the more abundant shrubs are *Baccharis conferta, Calea orizabaensis, Cornus excelsa, Eupatorium hidalgense, Fuchsia encliandra, Fuchsia microphylla, Monina xalapensis,* and *Senecio angulifolius* (Zamudio et al. 1992).

Soils inhabited by *C. neglectus* include litosol, ortic luvisol, and chromic luvisol (INEGI 1986). The average depth of burrow systems is 276 mm (Monterrubio 1995). These systems consist of a main tunnel with as many as 25 secondary tunnels (Monterrubio 1995). Generally, each tunnel system is occupied by 1 pocket gopher.

The Querétaro pocket gopher eats roots and stems of native Gramineae, such as *Bouteloua* and *Muhlenbergia,* which are used also in nest construction (Monterrubio 1995). *C. neglectus* also consume roots and stems of other plants, including *Alchemilla procumbens, Baccharis conferta, Brassica campestris, Eryngium serratum, Oenothera rosea, Stachys agraria,* and *Verbena elegans,* as well as the roots of young trees, such as *Alnus jorullensis* and *Arbutus xalapensis.* The Querétaro pocket gopher is considered a pest by local people because of the damage it causes to fruit trees and to corn and potato crops. Captive *C. neglectus* eat alfalfa, carrots, lettuce, and potatoes (Monterrubio 1995). Daily intake ranged from 80 to 125 g wet weight. Nest materials found in burrows of *C. neglectus* included small stems of corn plants, grass (*Muhlenbergia*), and leaves of *Arbutus xalapensis, Baccharis conferta,* and *Oenothera rosea* (Monterrubio and León, in press).

The fauna commonly associated with burrow systems of *C. neglectus* includes spiders (Araenidae), centipedes (Chilopoda), beetles (Coleoptera), springtails (Collembola), flies (Diptera), and crickets (Orthoptera). The most common vertebrate species found in and around the mounds and tunnels produced by *C. neglectus* include the lizard species *Sceloporus grammicus* and *S. jarrovi.*

Snakes that inhabit the area include *Crotalus aquilus* and *Pituophis deppei* (Dixon et al. 1972), which are reported by local people to prey on the Querétaro pocket gopher (Monterrubio and León, in press). Local people report that the tejon (*Nasua nasua*) and long-tailed weasels (*Mustela frenata*) also prey on *C. neglectus.* Other carnivores reported in the area that are potential predators of *C. neglectus* include the coyote (*Canis latrans*) and the gray fox (*Urocyon cinereoargenteus*—Monterrubio and León, in press).

BEHAVIOR. The Querétaro pocket gopher is fossorial and solitary, and burrow systems constructed by individual *C. neglectus* are distinctly spaced. Most construction of the burrow system occurs during early morning and late afternoon, and wet and cold weather tend to reduce the activity levels of the Querétaro pocket gopher (Monterrubio 1995; Monterrubio and León, in press). Captive *C. neglectus* spend most daylight hours sleeping, although they are very active in early morning when they feed aggressively. In captivity, when 1 individual senses the proximity of another, it produces a clicking sound by scraping its lower incisors against the upper incisors accompanied by an excited respiratory "hiss" (Monterrubio 1995).

Captive *C. neglectus* manipulate and shake food items prior to chewing them (Monterrubio 1995). After feeding, individuals use their front feet to clean the rostrum, nape, head, cheek pouches, and ears. *C. neglectus* sleeps deeply and is difficult to awaken, even when shaken. When sleeping, the Querétaro pocket gopher places its head between its front feet and under its belly, leaving exposed only the dorsal surface of its body (Monterrubio 1995; Monterrubio and León, in press).

GENETICS. The Querétaro pocket gopher has a karyotype with 2n = 40 and FN = 76, based on examination of 1 male and 1 female collected 5.6 km south of Pinal de Amoles, at 2,560 m. The X chromosome is a large submetacentric, and the Y chromosome is a large acrocentric. The mitochondrial cytochrome *b* gene of *C. neglectus* differs from *C. tylorhinus* by only 2–4 transitions, or ca. 0.5–1.0% sequence divergence (Monterrubio et al. 2000). This is low compared to levels of intraspecific and interspecific variation for other species of the genus (4.9–6.3%—DeWalt et al. 1993).

CONSERVATION STATUS. The Querétaro pocket gopher is listed as requiring "special treatment" by the Mexican Ministry of Ecology (Ceballos and Arita 1997; SEDESOL 1994). According to the International Union for the Conservation of Nature, insufficient information is available on the status of *C. neglectus* to assign it to a specific category for protection. However, because of its limited geographic range and its reputation as an agricultural pest by local residents, *C. neglectus* may be severely threatened with extinction (Cervantes et al. 1995).

REMARKS. The genus *Platygeomys* (Merriam 1895) was deemed inseparable from *Cratogeomys* by Hooper (1946). *Cratogeomys* contains 8 species that can be distinguished from species of the genus *Pappogeomys* by the following characters: absence of a nasal patch; posterior surfaces of M1 and M2 lacking any trace of enamel; sagittal crest developed in adults of both sexes; and lateral angles of zygomata enlarged into plate-like expansions. *Cratogeomys* was regarded as a subgenus of *Pappogeomys* (Russell 1968a), with *Pappogeomys* representing the ancestral lineage and *Cratogeomys* the derived lineage within the *Pappogeomys–Cratogeomys* clade (Russell 1968b). Within *Cratogeomys,* 2 species groups are recognized (Russell 1968b): the generalized *castanops* group (*C. castanops, C. goldmani,* and *C. merriami*) and the more specialized *gymnurus* group (*C. fumosus, C. gymnurus, C. neglectus, C. tylorhinus,* and *C. zinseri*). Allozymic variation in geomyids suggests that the magnitude of genetic and morphologic differentiation between the subgenera *Cratogeomys* and *Pappogeomys* warrants recognition of both taxa at the generic level (Honeycutt and Williams 1982). This taxonomy has been followed by most subsequent workers (e.g., Castro-Campillo and Ramirez-Pulido 1992; DeWalt et al. 1993; Ramirez-Pulido et al. 1996), although Patton (1993) preferred Russell's (1968b) taxonomy.

The generic name *Cratogeomys* comes from the Greek roots *kratos* (strong), *geo* (earth), and *mys* (mouse): the "strong earth-mouse." The species name *neglectus* comes from the Latin word for "isolated" or "neglected," which likely refers to the isolated geographic distribution of this species or to the fact that it was among the most recently described species in the genus. The common name in Spanish is tuza queretana.

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