

Neusticomys monticolus. By Jay B. Packer and Thomas E. Lee, Jr.

Published 26 June 2007 by the American Society of Mammalogists

***Neusticomys* Anthony, 1921**

Neusticomys Anthony, 1921:2. Type species *Neusticomys monticolus* Anthony, 1921, by original designation.

Daptomys Anthony, 1929:6. Type species *Daptomys venezuelae* Anthony, 1929, by original designation.

CONTEXT AND CONTENT. Order Rodentia, suborder Myomorpha, family Cricetidae, subfamily Sigmodontinae, tribe Ichthyomyini, genus *Neusticomys*. The genus *Neusticomys* includes 6 extant species: *N. ferreirai*, *N. monticolus*, *N. mussoi*, *N. oyapocki*, *N. peruviansis*, and *N. venezuelae* (Nowak 1999; Percequillo et al. 2005; Voss 1988). A key to the 6 species of *Neusticomys* follows.

1. Pelage dull grayish black *N. monticolus*
Pelage glossy brown 2
2. Dental formula i 1/1, c 0/0, p 0/0, m 2/2, total 12
..... *N. oyapocki*
Dental formula i 1/1, c 0/0, p 0/0, m 3/3, total 16 3
3. Total body length ≤ 200 mm 4
Total body length > 205 mm 5
4. Feet dark brown *N. ferreirai*
Feet and ears cream colored *N. mussoi*
5. Orbicular apophysis absent *N. venezuelae*
Orbicular apophysis present but small *N. peruviansis*

***Neusticomys monticolus* Anthony, 1921**

Montane Ichthyomyine

Neusticomys monticolus Anthony, 1921:2. Type locality “Nono Farm, ‘San Francisco’ near Quito [Provincia Pichincha], Ecuador.”

CONTEXT AND CONTENT. Context same as for genus. *N. monticolus* is monotypic (Voss 1988).

DIAGNOSIS. *Neusticomys monticolus* (Fig. 1) is distinguished by its dull grayish black pelage; other *Neusticomys* have glossy brown-black pelage (Voss 1988). *N. monticolus* also has a narrower rostrum (with philtrum present) that is more rounded at the tip, a shorter head and body, and smaller incisors but proportionally larger molars than *N. oyapocki*, *N. peruviansis*, and *N. venezuelae* (Voss 1988).

Neusticomys monticolus is similar in size to *N. mussoi* and *N. ferreirai* but is distinguished from *N. ferreirai* by its lighter-colored feet (Percequillo et al. 2005). It is distinguished from *N. mussoi* by several characters, including grayish black pelage rather than brown; pinnae with the internal side grayish black and not contrasting in color with dorsal pelage rather than yellowish and contrasting; a longer pollex; a less flattened skull (Fig. 2) in dorsal profile with nasals not compressed laterally; and a more inflated braincase (Ochoa G. and Soriano 1991).

GENERAL CHARACTERS. *Neusticomys monticolus* is a small (length of head and body, 98–131 mm; mean body mass, 40 g), semiaquatic cricetid with dull gray-black pelage that is slightly paler ventrally than dorsally (Voss 1988). Adult pelage is composed of thick, velvety wool hairs with occasional long, fine, blackish guard hairs (Voss 1988). The muzzle has many stiff, short, silver guard hairs around the mouth and nose. Mystacial vibrissae (formed in a graduated array) are black, whereas the lowermost mystacial vibrissae are silvery white. Ankles, wrists, and metapodials are dark like the rest of the pelage, but digits on both pes and manus are usually silvery white (Voss 1988). Pinnae are among the largest (9–10 mm) in any of the ichthyomyine rodents and are visible above the fur. The tail, 82–111 mm in length, is uniform gray-black in

color (Nowak 1999). Unlike those of most other cricetids, the tail of *N. monticolus* is densely covered in fur and its epidermal scales are greatly reduced and only sometimes visible. Variations in coloration include white tips to the tail, partially bicolored tails, white midpectoral blazes, and irregular white dorsal spotting. Over time, older museum specimens lose their gray color and fade to rusty brown (Voss 1988).

Mean measurements for body and skull characters of 4 *N. monticolus* (in mm; range in parentheses) from Venezuela (Ochoa and Soriano 1991) are: length of head and body, 113.5 (112–116); total length, 208.3 (192–223); length of hind foot, 25.3 (24–26); length of ear, 9.8 (9–10); condyloincisive length, 23.9 (22.0–24.9); length of diastema, 6.1 (5.0–6.3); length of upper toothrow, 4.0 (3.9–4.1); length of incisive foramina, 4.5 (4.2–4.9); width of incisor tips, 1.4 (1.2–1.5); width of incisive foramina, 2.1 (1.9–2.2); width of palatal bridge, 2.9 (2.4–3.1); length of nasals, 8.8 (7.5–9.6, *n* = 3); width of nasals, 2.9 (2.5–3.1); least interorbital breadth, 5.0 (4.9–5.1); zygomatic breadth, 12.7 (11.7–13.3); width of braincase, 11.8 (11.5–12.2); width of zygomatic plate, 1.1 (1.0–1.1); width of M1, 1.4; height of incisors, 4.5 (4.0–5.1); depth of incisors, 1.4 (1.2–1.4); width across occipital condyles, 7.1 (6.9–7.5).

Means (in mm; range in parentheses) for 5 specimens (3 males, 2 females) from Guarumal, Ecuador (Voss 1988) are: length of head and body, 111.2 (105–116); length of tail, 107.8 (104–111); length of hind foot, 25.8 (25–26); length of ear, 10.8 (10–11); condyloincisive length, 24.8 (24.2–25.7); length of diastema, 6.2 (6.0–6.5); length of maxillary molars, 4.0 (3.9–4.1); length of incisive foramina, 4.6 (4.5–4.8); breadth of incisor tips, 1.4 (1.4); width of incisive foramina, 2.1 (2.0–2.2); width of palatal bridge, 2.9 (2.7–3.1); length of nasals, 9.6 (9.4–9.8); width of nasals, 2.8 (2.7–3.0); least interorbital width, 4.8 (4.6–5.0); zygomatic width, 13.1 (12.7–13.4); width of braincase, 12.2 (12.1–12.3); width of zygomatic plate, 1.1 (1.0–1.2); width of M1, 1.4 (1.4–1.5); height of incisor, 4.8 (4.6–5.1); depth of incisor, 1.4 (1.4–1.5); width across occipital condyles, 7.1 (7.0–7.2). Four specimens (3 males, 1 female) from Papallacta, Ecuador (Voss 1988), were slightly smaller than other Ecuadorian samples: length of head and body,



FIG. 1. An adult male *Neusticomys monticolus* from 60 km north of Quito, Tandayapa Valley Pichincha, Ecuador. Photographed by T. Lee, Jr.



FIG. 2. Dorsal, ventral, and lateral views of cranium and lateral view of mandible of a male *Neusticomys monticolus* (ACUNHC 900) from 60 km north of Quito, Tandayapa Valley, Pichincha, Ecuador. Greatest length of skull is 25.92 mm. Specimen courtesy of the Abilene Christian University Natural History Collection. Used with permission of the photographer, S. Butman.

104.5 (101–108); length of tail, 96.8 (92–101); length of hind foot, 25.0 (24–26); length of ear, 10.2 (10–11); condyloincisive length, 23.6 (23.2–24.1); length of diastema, 5.8 (5.6–6.0); length of maxillary molars, 4.1 (4.0–4.2); length of incisive foramina, 4.7 (4.3–4.9); width of incisor tips, 1.2 (1.1–1.3); width of incisive foramina, 2.1 (2.0–2.2); width of palatal bridge, 2.8 (2.6–2.9); length of nasals, 9.4 (9.2–9.6); width of nasals, 2.6 (2.4–2.7); least interorbital width, 4.6 (4.4–4.9); zygomatic width, 12.2 (11.9–12.6); width of braincase, 12.0 (11.9–12.0); width of zygomatic plate, 1.1 (1.1); width of M1, 1.4 (1.3–1.4); height of incisor, 4.4 (4.1–4.7); depth of incisor, 1.2 (1.2–1.4); width across occipital condyles, 6.8 (6.7–6.9). Four specimens from Antioquia, Colombia, had narrower braincases (\bar{X} = 11.4 mm, range = 11.2–11.5 mm) and large entoconid-hypoconid lobes of m3, but otherwise were similar in dimensions for characters reported above (Voss 1988).

Mean lengths (in mm; range in parentheses) of the hindgut of 5 *N. monticolus* are: small intestine, 549 (505–571); cecum, 19 (16–22); large intestine, 61 (52–70); and total hindgut, 629 (590–651). Some specimens of *N. monticolus* have a bordering fold that intersects the lesser curvature of the stomach between the esophagus and the pyloric sphincter and does not contact the incisura angularis (Voss 1988). These differences in the position of the bor-

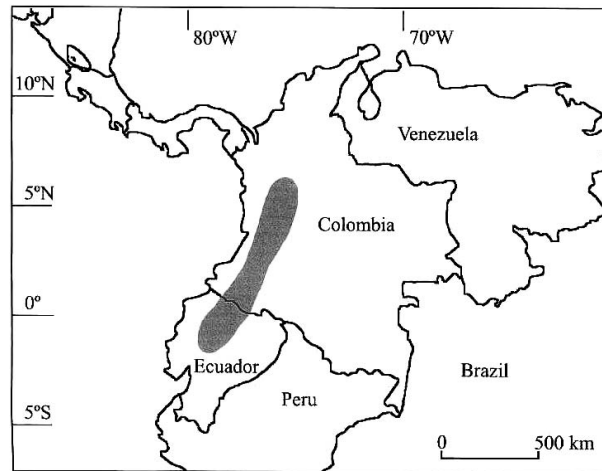


FIG. 3. Geographic distribution of *Neusticomys monticolus* based on Voss (1988).

dering fold relative to the esophagus and pyloric sphincter were thought to be diagnostic between *N. venezuelae* and *N. monticolus* (Carleton 1973). However, no such distinction existed in a larger sample of specimens examined by Voss (1988). *N. monticolus* has 13 ribs, 19 thoracolumbar vertebrae, 4 sacral vertebrae, and <30 to 30–33 caudal vertebrae.

DISTRIBUTION. Distribution of *N. monticolus* (Fig. 3) is limited to the Andes of Colombia and Ecuador, from ca. 2°S to 6°25'N latitude (Eisenberg and Redford 1999; Tirira 1999; Voss 1988). Elevation ranges from 1,800 to 2,350 m in Colombia and from 1,850 to 3,754 m in Ecuador (Lee et al. 2006; Voss 1988). There are no known fossils of *N. monticolus* (Voss 1988).

FORM AND FUNCTION. Dental formula is $i\ 1/1, c\ 0/0, p\ 0/0, m\ 3/3$, total 16. *N. monticolus* has 3 pairs of mammae: 1 thoracic behind the forelimbs, 1 abdominal, and 1 inguinal. Like other Ichthyomyini, *N. monticolus* has the complete set of accessory reproductive glands that is believed to be primitive for cricetid rodents: 1 pair each of preputial, bulbourethral, dorsal and anterior prostate, vesicular, and ampullary, and at least 1 pair of ventral prostate glands (Voss 1988; Voss and Linzey 1981). The spermatozoa of *N. monticolus*, like those of other ichthyomyines, have flattened heads that are oval in outline with 1 large acrosomal hook (Voss 1988).

In *N. monticolus*, the carotid circulation pattern is similar to that of other congeners and also to that of the ichthyomyine genus *Chibchanomys*. In this pattern the common carotid artery bifurcates behind the auditory bulla to form the external and internal carotid arteries. The internal carotid gives rise to the stapedia artery then enters the braincase through the carotid canal between the bulla and basioccipital bone (Voss 1988). The supraorbital branch of the stapedia artery supplies the ophthalmic circulation in *N. monticolus*, but some specimens show an internal maxillary circulation that may be supplied directly by the internal carotid artery rather than by the infraorbital branch of the stapedia (Voss 1988).

The pes, the edge of the metatarsals, and the skin between digits are fringed with a continuous row of stiff hairs (Voss 1988). This feature is less developed in *N. monticolus*, as well as other congeners, compared to other ichthyomyines. In addition, the pes of *Neusticomys* also is narrower than that of other ichthyomyines and is assumed by Voss (1988) to be less specialized for aquatic locomotion. The 3 middle metatarsals are the longest hind foot elements. Webbing does not extend quite to the 1st interphalangeal joints of digits II–IV; in these taxa, digits I and V are usually free of conspicuous webs (Voss 1988). The hyoid musculature of *N. monticolus* lacks the stylohyal cartilage but other hyoid structures are similar to those in *Sigmodon* and *Oryzomys* (Voss 1988).

ONTOGENY AND REPRODUCTION. Little is known about reproduction in *N. monticolus*. A pregnant specimen of *N. monticolus*, with 2 large embryos, was collected during the early part of the wet season, on 15 May (Voss 1988).

In juveniles, the basicranial axis is straight or nearly so. The ventral angle between the basisphenoid and basioccipital bones increases with age (Voss 1988).

ECOLOGY AND BEHAVIOR. *Neusticomys monticolus* inhabits small, fast-moving streams in montane cloud forests. This species is crepuscular or nocturnal (Voss 1988) and can be trapped in parts of streams where current is strong and near waterfalls (Tate 1931).

Specimens of *N. monticolus* were collected in Guarumal, Ecuador (2,245–2,290 m elevation), from 2 streams that ran through narrow ravines on south-facing slopes. The streams were 40–80 cm wide, 5–10 cm deep, with clear, debris-free water at temperatures of 13–14°C, and with currents of 30–50 cm/s (Voss 1988). Proximate vegetation included numerous thin vines and dwarf bamboo (*Chusquea*) in the lower canopy, unbuttressed trees 10–15 m high, tree ferns, shrubby and herbaceous dicots, ferns, Cyclanthaceae, Araceae, and terrestrial Orchidaceae. Exposed surfaces of tree trunks, branches, exposed roots, logs, and rocks were covered with wet moss and nearby ground was composed of detritus—moss, leaves, and decaying litter. Nearby slopes contained mature cloud forest (20–25 m high) containing an array of orchids, bromeliads, and other vascular epiphytes. The substrate was coarse sand, gravel, bedrock, and larger cobble. Small waterfalls (up to 2 m in height) were common. Specimens of *N. monticolus* also were collected from larger (2–4 m wide; 25–35 cm deep), swifter-running (90–110 cm/s) streams within páramo habitat at higher elevations in Papallacta, Ecuador (3,070 m and 3,600–3,754 m—Voss 1988). This cold, grassland community is characterized by high winds and clouds and is dominated by dense bunch grasses and loosely spread thickets of *Polylepis* (Rosaceae) with large terrestrial bromeliads (*Puya*) along sheltered stream edges. Low areas are marshy, with sphagnum and mats of cushion plants. Frost and light snowfall occur in this area in July and August (Voss 1988).

The diet of *N. monticolus* is exclusively aquatic arthropods (Voss 1988). Stomachs of 8 *N. monticolus* collected in Guarumal, Ecuador, contained Coleoptera (Helodidae), Diptera (Tipulidae), Ephemeroptera (Baetidae and Leptophlebiidae), Plecoptera (Perlidae), and Trichoptera (Calamoceratidae and Hydropsychidae—Voss 1988). *N. monticolus* preys upon smaller arthropods than does its lowland relatives (Voss 1988, Voss et al. 1982).

The distribution range of *N. monticolus* overlaps with those of 2 other semiaquatic ichthyomyines, *Anotomys leander* and *Ichthyomys hydrobates*. However, true sympatry is documented only with *A. leander* in high-elevation streams where the species utilize different areas of the same streams (Voss 1988). *A. leander* was collected near rocks or logs in areas of strong current, whereas *N. monticolus* was collected in sheltered areas along stream edges (Voss 1988). Habitat requirements and range of *N. monticolus* do not overlap with any other like-sized aquatic carnivorous mammals, although 4 species of small, nonaquatic, predominantly carnivorous mammals are known to share their range: *Caenolestes fuliginosus*, *Cryptotis thomasi*, *Akodon bogotensis*, and *Thomasomys erro* (Voss 1988). Other sympatric nonvolant small mammals (*Chilomys instans*, *Microrozomys minutus*, *Thomasomys aureus*, *T. baeops*, *T. cinnameus*, and *T. paramorum*) consume terrestrial arthropods; there is little dietary overlap with *N. monticolus*, which consumes aquatic arthropods (Voss 1988). There is no genetic information for *N. monticolus*.

CONSERVATION STATUS. The International Union for Conservation of Nature and Natural Resources (IUCN) lists the status of *N. monticolus* as lower risk and least concern (www.iucnredlist.org).

REMARKS. The generic name *Neusticomys* is derived from the Greek word “neusticos,” which means able to swim. The specific epithet *monticolus* comes from the Latin word “monticola,” meaning a dweller in the mountains. Other English names used for *N. monticolus* include South American fish-eating rat, South American water rat, South American aquatic rat, montane water rat, montane fish-eating rat, montane ichthyomyine, and montane aquatic rat. There are only 47 specimens of *N. monticolus* known (Voss 1988).

We thank the Biology Department at Abilene Christian University, and acknowledge the Math, Science Research Council Grant to Thomas E. Lee, Jr., for supporting our project. We also thank Santiago Burneo and Diego Alvarado-Serrano of Pontificia Universidad Católica del Ecuador and the Alvarado family for their logistical support in Ecuador, where we obtained the specimen used in the photographs.

LITERATURE CITED

- ANTHONY, H. E. 1921. Preliminary report on Ecuadorean mammals. No. 1. American Museum Novitates 20:1–6.
- ANTHONY, H. E. 1929. Two genera of rodents from South America. American Museum Novitates 383:1–6.
- CARLETON, M. D. 1973. A survey of gross stomach morphology in New World Cricetinae (Rodentia, Muroidea), with comments on functional interpretations. Miscellaneous Publications, Museum of Zoology, University of Michigan 146:1–43.
- EISENBERG, J. F., AND K. H. REDFORD. 1999. Mammals of the Neotropics, the central Neotropics. University of Chicago Press, Chicago, Illinois.
- LEE, T. E., JR., J. B. PACKER, AND D. ALVARADO-SERRANO. 2006. Results of a mammal survey of the Tandayapa Valley, Ecuador. Occasional Papers, Museum of Texas Tech University 250: 1–9.
- NOWAK, R. M. 1999. Walker's mammals of the world. 6th ed. Johns Hopkins University Press, Baltimore, Maryland.
- OCHOA G., J., AND P. SORIANO. 1991. A new species of water rat, genus *Neusticomys* Anthony, from the Andes of Venezuela. Journal of Mammalogy 72:97–103.
- PERCEQUILLO, A. R., A. P. CARMIGNOTTO, AND M. J. DE J. SILVA. 2005. A new species of *Neusticomys* (Ichthyomyini, Sigmodontinae) from central Brazilian Amazonia. Journal of Mammalogy 86:873–880.
- TATE, G. H. H. 1931. Random observations on habits of South American mammals. Journal of Mammalogy 12:248–256.
- TIRIRA, S. D. 1999. Mamíferos del Ecuador. Simbioe, Quito, Ecuador.
- VOSS, R. S. 1988. Systematics and ecology of ichthyomyine rodents (Muroidea): patterns of morphological evolution in a small adaptive radiation. Bulletin of the American Museum of Natural History 188:259–493.
- VOSS, R. S., AND A. V. LINZEY. 1981. Comparative gross morphology of male accessory glands among Neotropical Muridae (Mammalia: Rodentia) with comments on systematic implications. Miscellaneous Publications, Museum of Zoology, University of Michigan 159:1–41.
- VOSS, R. S., J. L. SILVA L., AND J. A. VALDES L. 1982. Feeding behavior and diets of Neotropical water rats, genus *Ichthyomys* Thomas, 1893. Zeitschrift für Säugetierkunde 47:364–369.

Associate editors of this account were RON GETTINGER, KRISTOFER HELGEN, BETTY MCGUIRE, and PAMELA OWEN. Editors were VIRGINIA HAYSSSEN and MEREDITH HAMILTON.

JAY B. PACKER AND THOMAS E. LEE, JR., DEPARTMENT OF BIOLOGY, ABILENE CHRISTIAN UNIVERSITY, BOX 27868, ABILENE, TEXAS 79699.