A REVIEW OF THE LONG-WHISKERED RICE RAT, *ORYZOMYS BOMBYCINUS* GOLDMAN

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ABSTRACT.—The taxonomy and natural history of the long-whiskered rice rat, *Oryzomys bombycinus* Goldman, is reviewed. This species, known previously from a few localities in Costa Rica, Panamá, and Colombia is here definitely reported for the first time from Nicaragua and Ecuador. The currently recognized subspecies are provisionally retained on the basis of coat color. Habitat preferences and other ecological information are discussed.

Dr. Peter T. Franck, Middle America Research Unit, National Institutes of Health, Canal Zone, recently submitted a small collection of mammals from Nicaragua to the Mammal Identification Service, Division of Mammals, Smithsonian Institution. Among these specimens was a series of four *Oryzomys bombycinus*. These specimens constitute a considerable range extension from the nearest known locality in Costa Rica and attempts to determine their subspecific status led to this study. Fifty-seven specimens were examined. Only two additional specimens are known to be in existence.

Oryzomys bombycinus

Goldman (1912) named *Oryzomys bombycinus* on the basis of three specimens from Cerro Azul, 2500 ft, near the headwaters of the Chagres River, Panamá Prov., Panamá (the type locality) and one specimen from "Cerro Brujo" (= Cerro Bruja, 1000 ft), Colón Prov., Panamá. Goldman compared his new species with *Oryzomys carrikeri* J. A. Allen (= *Oryzomys capito carrikeri*) and *Oryzomys talamancae* J. A. Allen (= *Oryzomys capito talamancae*).

O. bombycinus differs most strikingly from *O. capito* in having noticeably longer vibrissae. The vibrissa over each eye is especially long. The English vernacular name "long-whiskered rice rat" is used for the first time. Cranially, *Oryzomys bombycinus* differs from *O. capito* in that throughout its length the parieto-temporal suture corresponds in position with the temporal ridge; in *O. capito* a portion of the parietal dips below the ridge posteriorly.

Oryzomys bombycinus bombycinus Goldman

This subspecies is characterized by relatively pale coloration (see below). *O. b. bombycinus* has been recorded from one additional locality since Goldman's original description. This locality (6 mi. E El Valle, Panamá Prov., Panamá) is to be found in Handley (1966*a*).

Specimens examined.—Total, 29. PANAMÁ. *Coclé*: El Valle, 8° 36′ N, 80° 08′ W, 2000–3000 ft, 1 ♂ (USNM 304809). *Panamá*: 6 mi. from El Valle (= 6 mi. E El Valle), 1 ♂ (USNM 304810); "Cerro Azul" (= Cerro Prominente, 9° 13′ N, 79° 18′ W), 2500–3000 ft, 1 ♂, 2 ♀♀ (USNM 171103–05, the last the holotype); "Cerro Azul" (= La

Zumbadora, 9° 14′ N, 79° 21′ W), between 850–3200 ft, 18 ♂♂, 4 ♀♀, 1 ? (USNM 305647–58, 306916–25). *Colón*: Cerro Bruja, 9° 29′ N, 79° 34′ W, 1000 ft, 1 ♂ (USNM 171529).

Oryzomys bombycinus alleni Goldman

This subspecies is distinguished from the geographically adjacent subspecies, *O. b. bombycinus*, by darker coloration (see below). Goldman (1915) named *Oryzomys nitidus alleni* on the basis of three specimens from Tuís (about 35 mi. E Cartago), Cartago Prov., Costa Rica. Goodwin (1946) gave the elevation of Tuís as 2250 ft. For comparison with "*O. n. alleni*," Goldman used specimens from Ecuador (which are *O. bombycinus*), some of which had been identified by Thomas as the rat originally described by the latter as "*Hesperomys laticeps* var. *nitidus*" (see Thomas, 1884, 1927).

S. R. Hedges of the British Museum (Natural History) kindly sent me two specimens (BM 85.4.1.5–6) said to represent two of Thomas' 17 paratypes of *Hesperomys laticeps nitidus* along with three specimens (BM 85.4.1.9–10, 85.4.1.38) said to be representatives of the 12 "*Hesperomys laticeps*" mentioned on the same page as the original description of *nitidus*. The latter were taken from the same localities (Amable María and Junín, Perú) as the specimens Thomas assigned to *nitidus*.

An examination of these five Peruvian specimens shows that none represents *O. bombycinus*. All appear to belong somewhere in the *Oryzomys capito–Oryzomys alfaroi* complex. The external characters Thomas used to distinguish "*nitidus*" from typical "*laticeps*" seem reversed in these specimens. For a discussion of the affinities of "*nitidus*," see Hershkovitz (1966).

At any rate, Goldman (1915) claimed that certain cranial characters distinguished *Oryzomys nitidus alleni* from supposed specimens of *Oryzomys nitidus nitidus* (actually not *nitidus*, but *O. bombycinus*) from Ecuador. These cranial characters are ". . . higher braincase . . . braincase much more distended; interorbital constriction about the same, but supraorbital ridges more strongly divergent and frontal region decidedly broader posteriorly." The supposed differences are at least mostly owing to age. The three original specimens of *O. b. alleni* on which the description was based range from subadult to juvenile. Now that adults of *O. b. alleni* are available I cannot see that the braincase is appreciably higher in *alleni* than in the Ecuadoran specimens. There may be a slight tendency for the braincase to be more expanded laterally in *alleni* and there may be some diagnostic value in the supraorbital ridge and frontal characters, but not enough specimens are available to enable one to say for sure. Specimens of *O. b. bombycinus* from Cerro Azul, Panamá, show both types of supraorbital-frontal development and the two specimens from the vicinity of El Valle, Panamá, show both extremes.

In 1918, Goldman treated *alleni* as a subspecies of *bombycinus* and found it necessary to distinguish between it and the nominate race. He regarded the color of the two subspecies as identical but reported that *O. b. bombycinus* had a braincase that was "lower, flatter, much less distended, especially anteriorly; frontal region narrower posteriorly." Judging from the material before me, these differences do not hold.

In the same publication Goldman reported a specimen of *alleni* from Guápiles, Limón Prov., Costa Rica. Goodwin (1946) gave the elevation of Guápiles as 100 ft although the American Geographical Society of New York's Map of Hispanic America (the so-called "millionth map") of 1928 shows the elevation as about 1000 ft and Alfred L. Gardner (personal communication) has informed me that it actually is 240 meters. Handley (1966*a*) listed *O. b. alleni* as occurring at "Upper Río Changena, 2400 ft, Bocas del Toro, Panamá."

Four additional specimens of *O. b. alleni* are now available from Nicaragua. These specimens were live-trapped between 15 and 24 September 1967 by Manuel Correa and Lloyd Gauld in the vicinity of a campsite on the Kurinwas River at "12° 51′ 30″ N, 84° 05′ W" and at a place 5½ miles down river from the campsite, Depto. Zelaya. Elevations

ranged from less than 10 to about 25 meters. The terrain on the river downstream from the campsite "is extremely low and frequently flooded and is composed almost entirely of dense palm swamp" (Peter T. Franck, personal communication). The camp was set "where the ground is higher and high forest, partially cut over for mahogany some 15–20 years previously, is just beginning." The trapping areas were characterized by various combinations of cleared areas, grassy areas, logging roads, second growth and high forest, and dense brushy areas.

Other mammals live-trapped in the vicinity of the campsite included *Didelphis marsupialis tabascensis* J. A. Allen, *Philander opossum fuscogriseus* (J. A. Allen), *Oryzomys palustris* (Harlan), *Nectomys alfari alfari* (J. A. Allen), and *Proechimys semispinosus centralis* (Thomas). *Philander opossum fuscogriseus, Sciurus richmondi* Nelson, and *Proechimys semispinosus centralis* were taken about 1½ miles downstream from the campsite, and *Oryzomys caliginosus chrysomelas* J. A. Allen and *Ototylomys phyllotis fumeus* J. A. Allen from about 5½ miles downstream from the campsite.

Weights in grams for the Nicaraguan specimens are: male, 56; females, 39, 45, 56. The Costa Rican animals weighed: males, 47, 59, 64; females, 48.5, 75.5.

Specimens examined.—Total, 17. NICARAGUA. *Zelaya*: Río Kurinwas, 12° 51′ 30″ N, 84° 05′ W, *ca.* 10 m, 1 ♀ (USNM 392860); within ½ mi. of the previous locality, 10–25 m, 1 ♂, 1 ♀ (USNM 392861–62); 5½ mi. downstream from first locality, < 10 m, 1 ♀ (USNM 392863). COSTA RICA. *Limón*: Cariari (*ca.* 83° 31′ W, 10° 22′ N), *ca.* 100 m, 3 ♂♂, 3 ♀♀ (LSU 13171–75, 15326); Guápiles (elev., 240 m), 1 ♀ (CM 1326); *Cartago*: Tuís (elev. = 2250 ft according to Goodwin, 1946), 2 ♂♂, 1 ♀? (AMNH 9922/7962, 9624/7964, and 9631/7971, the holotype). PANAMÁ. *Bocas del Toro*: Río Changena, 9° 06′ N, 82° 34′ W, 2500–2600 ft(?), 4 ♀♀ (USNM 319475–78).

Oryzomys bombycinus orinus Pearson

Pearson (1939) named this subspecies on the basis of four specimens. Two, including the holotype, were caught on Mt. Pirre along the Río Limón, Darién, Panamá (7° 51′ N, 77° 44′ W) at 4700 feet. The other two were taken at Loma Caña, a nearby ridge at an elevation of 4900 feet.

According to Pearson, the skull of *O. b. orinus* resembles that of *O. b. bombycinus* except that it "is smaller, more delicate, with narrower rostrum and palate. Interpterygoid fossa of *O. orinus* [sic] less pointed anteriorly and the palatal foramina are shorter." These supposed differences may prove to have some statistical significance when more specimens of *O. b. orinus* become available, but judging from a comparison of Pearson's paratypes with recently collected *O. b. bombycinus* (which show a good deal of individual variation in these characters) it seems just as likely that they are the result of sampling error. Supposed differences in size of the feet and degree of bicoloration of the tail are probably invalid. For mean and extreme measurements from throughout the range of *O. bombycinus*, see Table 1. For the geographic range of the species see Fig. 1.

O. b. orinus does appear to be darker and more richly colored dorsally and laterally, as noted by Pearson. It is characterized also by a darker venter. *O. b. alleni* differs from *O. b. bombycinus* in the same ways as does *O. b. orinus*; if *alleni* and *orinus* had adjacent geographic ranges, instead of being separated from each other by the range of *bombycinus*, I would make no taxonomic distinction between the two.

Nine specimens in addition to Pearson's original four are assigned to *orinus*. One of these was taken at Cerro Tacarcuna, Darién, Panamá by Charles O. Handley, Jr., three others by Wilmot A. Thornton on the Río Raposo, Valle, Colombia (only one of the latter was available for study—the others are at the Universidad del Valle, Cali, Colombia). The Colombian specimens are those responsible for Handley's (1966*b*) mention of *O. bombycinus* on the Pacific coast of Colombia. The Ecuadoran specimens Goldman (1915)

TABLE 1.—*Means and ranges for variates in* Oryzomys bombycinus. *Sample sizes are given in parentheses. External measurements were taken in the field by the collectors. Some condyloincisive lengths include an anterior projection of the premaxillae between the incisors.*

Variate	*Oryzomys bombycinus alleni*					*Oryzomys bombycinus bombycinus*		*Oryzomys bombycinus orinus*				
	Nicaragua		Costa Rica		Panamá	Panamá		Panamá		Colombia	Ecuador	
	♂	♀♀	♂♂	♀♀	♀♀	♂♂	♀♀	♂♂	♀♀	♂	♂♂	♀♀
Total length	236	215.3 (3) 198–230	230	226.0 (3) 206–238	231.3 (4) 225–235	239.2 (13) 202–264	232.5 (4) 214–254	241.7 (3) 235–250	221,226	240	236,252	228,231
Length of tail	126	111.3 (3) 99–118	111	103.3 (3) 96–110	116.0 (4) 115–119	120.1 (13) 100–130	114.8 (4) 109–124	120.0 (3) 110–126	109,119	125	117,119	114,119
Length of hind foot	28	—	32.0 (3) 31–33	30.8 (4) 30–31	28.8 (4) 27–30	30.1 (15) 27–33	29.8 (4) 28–31	27.3 (3) 27–28	25,26	30	28,28	28,29
Length of ear	20	—	18.0 (3) 17–19	18.3 (3) 18–19	18.0 (4) 17–20	18.7 (13) 16–21	18, 21	19, 20	18,18	17	16,19	18,19
Length of skull	33.3	28.7, 29.8	31.1 (3) 28.9–33.2	30.3 (3) 29.4–31.1	30.8 (3) 29.6–31.6	30.1 (13) 27.5–32.5	30.2 (4) 28.5–31.8	30.6, 30.9	29.9	30.3	30.3,31.0	31.0
Condyloincisive length	29.7	26.8 (3) 25.3–28.6	27.4 (3) 25.4–29.1	26.9 (3) 26.1–27.6	27.6 (3) 26.2–28.6	27.1 (12) 24.8–29.3	27.0 (4) 25.4–29.0	27.7, 30.0	26.8	27.1	26.9,28.0	27.9
Zygomatic breadth	—	13.7, 15.2	14.8 (3) 14.3–15.1	14.7 (3) 14.5–15.0	14.4, 14.9	14.6 (15) 13.3–15.6	14.7 (4) 13.7–15.8	15.3, 15.5	14.7,14.8	—	14.3,14.5	14.5
Width of rostrum	6.1	5.1 (3) 4.9– 5.5	5.4 (3) 5.1– 5.6	5.3 (3) 5.1– 5.4	5.4 (4) 5.2– 5.6	5.3 (15) 4.6– 5.6	5.3 (4) 5.0– 5.6	5.5, 5.5	4.7, 4.9	5.6	5.2, 5.7	5.1, 5.2
Interorbital constriction	6.3	5.4 (3) 5.2– 5.5	5.5 (3) 5.4– 5.6	5.3 (3) 5.2– 5.3	5.7 (4) 5.6– 5.8	5.3 (15) 5.1– 5.6	5.1 (4) 4.9– 5.2	5.0, 5.3	5.2, 5.3	5.4	5.3, 5.6	5.3, 5.4
Length of nasal suture	12.4	10.7, 11.4	12.1 (3) 10.8–13.2	11.0 (3) 9.0–12.5	11.6 (4) 11.0–12.1	11.4 (15) 10.9–12.7	11.7 (4) 10.8–12.3	11.8, 12.1	11.2,11.6	11.9	11.2,11.9	10.3,11.6
Length of incisive foramen	4.4	3.8 (3) 3.6– 4.1	4.1 (3) 4.1– 4.2	4.1 (3) 4.0– 4.1	4.3 (4) 3.9– 4.5	4.4 (15) 3.9– 5.4	4.5 (4) 4.0– 4.8	4.3 (3) 4.0– 4.7	4.1, 4.1	4.6	3.9, 4.1	3.7, 4.5
Length of upper diastema	8.3	7.3 (3) 7.0– 7.9	7.5 (3) 7.0– 7.8	7.4 (3) 6.9– 7.8	7.6 (4) 7.2– 7.9	7.6 (15) 6.7– 8.3	7.6 (4) 7.0– 8.3	7.8 (3) 7.6– 8.0	7.3, 7.7	8.3	7.2, 8.1	7.2, 7.3
Maxillary alveolar length	4.6	4.3 (3) 4.2– 4.4	4.6 (3) 4.5– 4.7	4.4 (3) 4.3– 4.5	4.5 (4) 4.3– 4.6	4.4 (15) 4.3– 4.7	4.4 (4) 4.2– 4.5	4.2 (3) 4.0– 4.4	4.3, 4.5	4.3	4.2, 4.6	4.3, 4.4

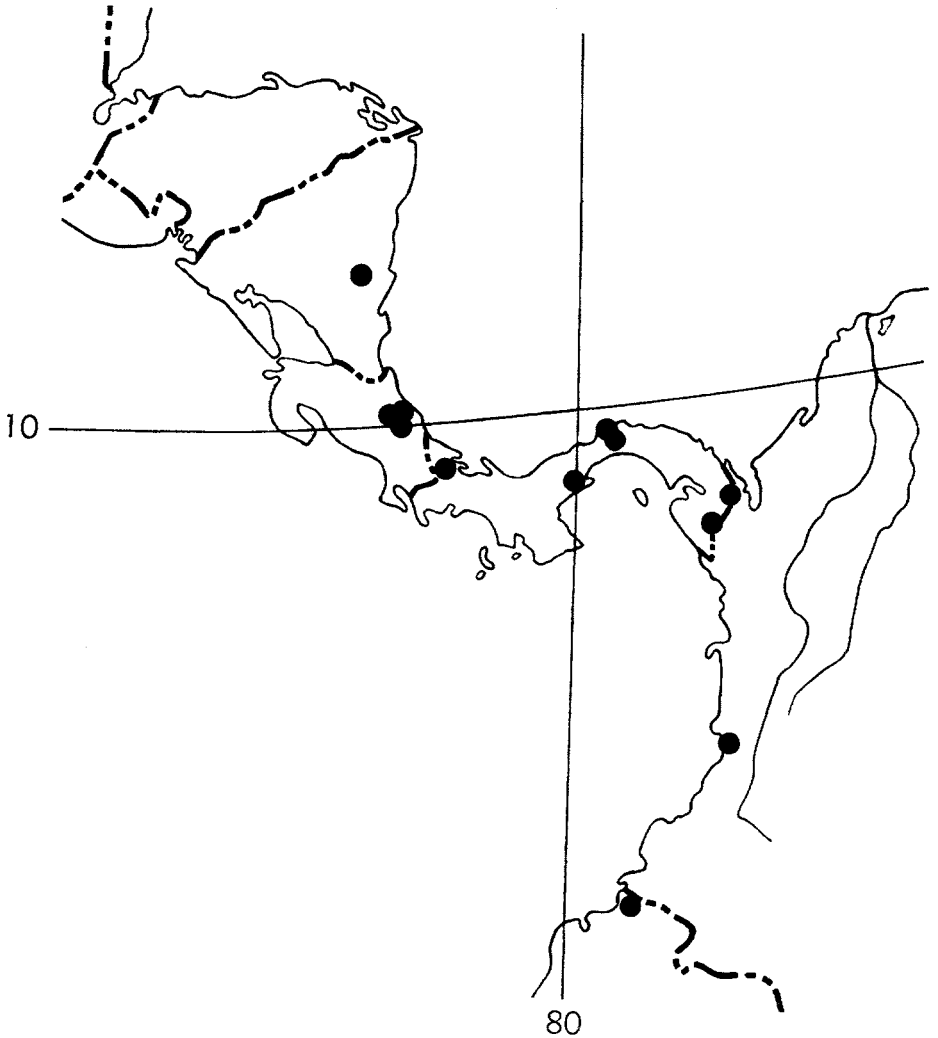

FIG. 1.—Localities of record for *Oryzomys bombycinus*. Specimens from western Panamá and to the north and west are *O. b. alleni*. Those from central Panamá are *O. b. bombycinus*. Specimens from eastern Panamá and South America are *O. b. orinus*.

called "*Oryzomys nitidus*" and used in his comparisons with *alleni* also are regarded as *orinus*.

When more specimens are available, it may be worthwhile to recognize some of the South American populations at the subspecific level. Although the Colombian and Ecuadoran specimens show the generally dark coloration characteristic of *orinus*, those from Carondelet, Ecuador, appear rather dull, those from San Javier are quite maroon in color; the single Colombian specimen available for study is the darkest adult seen of the species. Goldman (1918) noted that the Ecuadoran specimens were darker than typical *bombycinus* and stated that the zygomata of the latter were "more strongly bowed

outward, the sides less nearly parallel." In 1920 he wrote that the braincase in typical *bombycinus* was broader and the auditory bullae larger. These skull characters may have some diagnostic value but more specimens are needed in order to determine their usefulness.

Specimens examined.—Total, 11. PANAMÁ. *Darién*: Cerro Tacarcuna (8° 10′ N, 77° 18′ W), 4000 ft, 1 ♂ (USNM 338260); Mt. Pirre (7° 51′ N, 77° 44′ W), 4700 ft, 2 ♂♂ (ANSP 19708–09, the last the holotype); Loma Caña, 4900 ft, 2 ♀♀ (ANSP 19706–07). COLOMBIA. *Valle*: Río Raposo, Virology Field Station, 27 km S Buenaventura, 1 ♂ (USNM 334698). ECUADOR. *Esmeraldas*: Carondelet (*ca.* 1° 07′ N, 78° 48′ W), 60 ft, 1 ♀, 1 ? (USNM 113293–94); San Javier (1° 04′ N, 78° 47′ W), 60 ft, 2 ♂♂, 1 ♀ (USNM 113292, 113296–97).

NATURAL HISTORY

Oryzomys bombycinus is a terrestrial rodent that seems to be restricted to relatively undisturbed tropical evergreen forest from near sea level to an elevation of at least 4900 feet. Trapping records indicate the species prefers the cooler, more humid and moist situations in the forest. Many of the specimens from Cerro Azul, Panamá, were taken among mossy rocks and logs along a forest stream in what would appear to be typical habitat. Another was caught under a log in a hillside thicket of *Heliconia*. The specimen from Cerro Tacarcuna, however, was taken in a rather open area.

Alfred L. Gardner (personal communication) wrote that his specimens from Cariari, Costa Rica, were taken "under felled trees in a small mature banana grove and adjacent mature forest in a relatively well-drained area (. . . on a small knoll, therefore not subject to periodic flooding)."

O. bombycinus has been taken in live traps baited with banana and in snap traps baited with corn, cocao, oatmeal, and meat.

O. bombycinus resembles *O. capito* in that the juvenal pelage is much darker than that of the adult. A female (USNM 305650) apparently is in juvenal pelage and has not reached adult size, although when caught she contained four embryos, each 5 millimeters in crown-rump length.

Reproductive data arranged by months are: JANUARY (Cerro Azul, Panamá): 28, male with testis 8 × 3; 31, male with testis 10 × 4. FEBRUARY (Cerro Azul, Panamá): 4, male with testis 7 × 3. MARCH (Tuís, Costa Rica): 15, very young individual trapped. JUNE (Cerro Azul, Panamá): 9–13, immature specimens trapped; 10, female with four embroys (3R, 1L), each 7 millimeters in crown-rump length; female in immature pelage with four embryos (3R, 1L), 5 CR; male with testis 11. JULY (Tuís, Costa Rica): 15, juvenile. SEPTEMBER (Kurinwas River, Nicaragua): 15, molting female with two embryos; 24, lactating female.

ACKNOWLEDGMENTS

The following have been most helpful by allowing me to examine specimens in their care: Caroline A. Heppenstall, Carnegie Museum (CM); Richard G. Van Gelder, Karl F. Koopman, Guy G. Musser, and Sydney Anderson of the American Museum of Natural History (AMNH); S. R. Hedges and John Edwards Hill, British Museum (Natural History) (BM); Robert R. Grant, Jr., Academy of Natural Sciences of Philadelphia (ANSP); George H. Lowery, Jr., Museum of Zoology, Louisiana State University (LSU). Alfred L. Gardner

of the last-named museum kindly provided me with habitat data for specimens he collected. Charles O. Handley, Jr., of the Division of Mammals, Smithsonian Institution (USNM), who has collected the majority of specimens taken in recent years, generously allowed me to use his specimens and field notes. I am especially grateful to Miss Nobuko Etoh (now Mrs. Ronald H. Pine) for assistance in recording data and making computations.

The research upon which this publication is based was performed pursuant to contract no. PH-43-67-59 with the National Institutes of Health, Public Health Service, Department of Health, Education and Welfare.

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Mammal Identification Service, Division of Mammals, Smithsonian Institution, Washington, D. C. 20560. Accepted 12 May 1971.