2-14-1981

A New Species of *Rhynchomys* (Muridae) from the Philippines

Guy G. Musser
American Museum of Natural History

Patricia W. Freeman
University of Nebraska-Lincoln, pfreeman1@unl.edu

GENERAL NOTES

A NEW SPECIES OF *RHYNCHOMYS* (MURIDAE) FROM THE PHILIPPINES

". . . Mr. Whitehead has made a most wonderful and unexpected discovery, that of a new and peculiar Mammal-fauna inhabiting the Luzon highlands, and, so far as is yet known, mostly isolated on a small plateau on the top of Monte Data, in the centre of Northern Luzon, at an altitude of from 7000 to 8000 feet." With this dramatic announcement, Oldfield Thomas (1898:377) introduced to naturalists the spectacular rats found by Whitehead: *Crateromys schadenbergi, Carpomys melanurus, C. phaeurus, Batomys granti, Chrotomys whiteheadi, Celaenomys silaceus,* and *Rhynchomys soricoides.* One of the most interesting of these to Thomas was *R. soricoides,* which he had previously named and briefly described in 1895. This shrew-rat is medium-sized with a very long muzzle, small eyes, short dense fur, dark brown upperparts, gray underparts, a short brown tail, and brown feet. Its very long and slender rostrum, small zygomatic plates, small white incisors, and tiny basined teeth indicated adaptations for special foods, possibly soft-bodied invertebrates. Nothing quite like *Rhynchomys* had been discovered before, either in the Philippines or elsewhere.

Thomas based his description of *R. soricoides* on five individuals collected by Whitehead, all from Mount Data. Two others were obtained from Mount Data during 1946 and subsequently reported by Sanborn (1952). *Rhynchomys* was represented by these specimens until 1961, when an example was caught on Mount Isarog in the southeastern part of Luzon. That specimen, which forms the nucleus of our report, is significant because it indicates that *Rhynchomys* occurs on at least one other highland in Luzon, and because some of its morphological features fall outside the range of variation of the series taken on Mount Data. The differences in external and cranial characters between the two samples suggest to us that the specimen from Mount Isarog was drawn from a population that is reproductively isolated from that on Mount Data. We hypothesize that the specimen represents a new species, which we name and describe below.

Rhynchomys isarogensis, *new species*

Holotype.—An adult male (scrotal testes; basisphenoid suture fused and indistinct) collected on 14 April 1961 by D. S. Rabor (original field number, 1434), and deposited in the Field Museum of Natural History, Chicago (FMNH 95123). The skin is in good condition except for small bare patches on the venter. The cranium is slightly damaged: most of the left and part of the right jugals, and both right upper molars are missing (Fig. 1). The angular process of the left dentary and the M_2 of each dentary are missing.

Measurements.—See Table 1. External measurements are those of collectors (except for length of hindfoot, which we measured) and were taken from skin labels. Cranial measurements were taken with a craniometer attached to a Wild M5 microscope or dial calipers graduated in tenths of mm. Limits of the cranial measurements are explained by Musser (1970) except for: *length of rostrum,* from tip of nasals perpendicular to a line connecting anteriolateral margins of dorsal maxillary roots of zygomatic arches; *length of palatal bridge,* from posterior edges of incisive foramina to anterior border of mesopterygoid fossa; *length of palate behind toothrow,* from posterior alveolus of toothrow to end of palate; *length of bulla,* excluding bony eustachian tube; *incisive foramina to* M^1, from back edge of incisive foramina to anterior margin of toothrow; *length of dentary and* I_1, from back of dentary to tip of incisor; and *length of dentary minus* I_1, total length of dentary. Morphological features of FMNH 62289 and 62290 (Table 1) match the five specimens collected by Whitehead, which were studied by Musser at the British Museum.

Type locality.—Mount Isarog, at 5,500 ft, southeastern peninsula of Luzon Island, Camarines Sur Province, the Philippines (Fig. 2).

Distribution.—Known only from Mount Isarog.

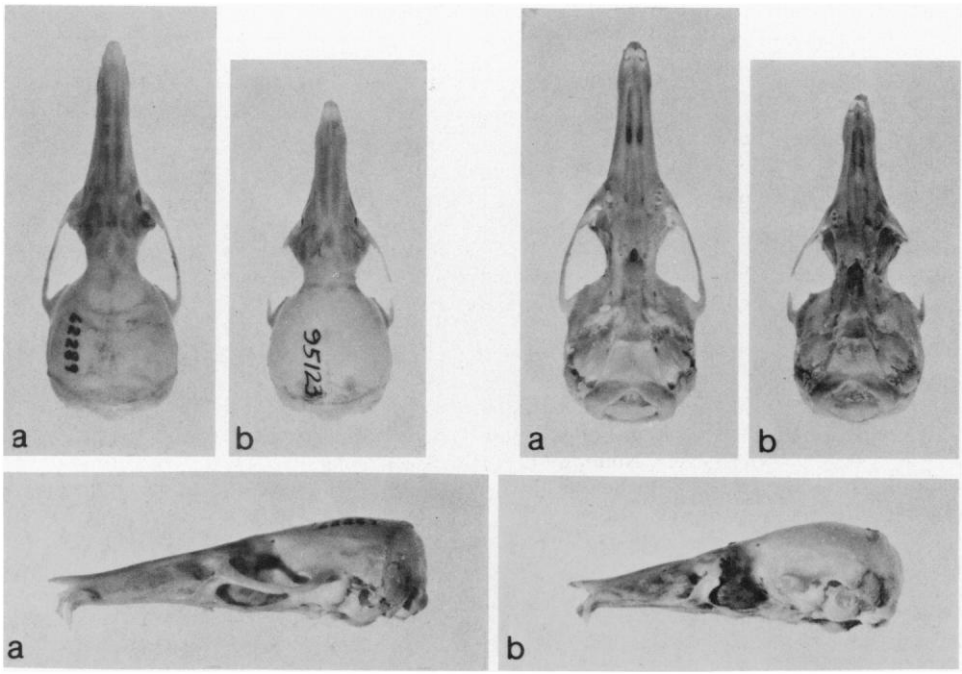

FIG. 1.—Dorsal, ventral, and lateral views of *Rhynchomys* crania: a, *R. soricoides* (FMNH 62289); b, *R. isarogensis* (FMNH 95123). Both crania are from adults of comparable age. Approximately natural size.

Referred material.—The holotype.

Etymology.—Named for the mountain on which the holotype was collected.

Diagnosis.—A species of *Rhynchomys* resembling *R. soricoides* but distinguished from it by the following features: body smaller (Table 1); tail relatively shorter, dark brown above and unpigmented below except for a narrow midventral strip (instead of monocolored dark brown); feet white (instead of dark brown); cranium and mandibles smaller (Table 1); braincase round and more inflated, larger relative to rest of cranium; palate anterior to the upper molars more arched transversely; mandibular condyles longer and thicker transversely.

Description and comparison.—A stout body, tail much shorter than the head and body, small eyes, and very long muzzle characterize *R. isarogensis*; most of its body proportions are similar to those of *R. soricoides* (see the live-pose depicted in Thomas, 1898: pl. 31), except length of tail, which is shorter relative to length of head and body (length of tail/length of head and body are 76%, 68%, and 56% in FMNH 62290, 62289, and 95123, respectively). Upperparts of the head and body of *R. isarogensis* are covered by thick, short, and soft brown fur, velvety to the touch. The coloration is like that in *R. soricoides,* but the pelage is not as thick and long, and the ears are paler. The underparts appear whitish gray (hairs are white for most of their lengths with short gray bases), instead of gray or dark gray as in *R. soricoides*. Dorsal surfaces of the feet are white, the palmar and plantar surfaces (including the pads) are unpigmented, and the claws are gracile. *R. soricoides* has dark brown feet, disproportionally smaller pads, and more robust claws. The tail of *R. isarogensis* is short and scantily haired. Its dorsal surface is brown, its ventral surface unpigmented except for a narrow midventral brown strip extending from base to tip. The tail hairs are short, three

TABLE 1.—*Measurements (in mm) of* Rhynchomys soricoides *and* R. isarogensis *from Luzon.*

Measurements	*R. soricoides*		*R. isarogensis*
	FMNH 62290 ♀ young adult	FMNH 62289 ♀ adult	FMNH 95123 ♂ adult
Length of head and body	188	195	187
Length of tail	143	132	105
Length of hindfoot	42	41	37
Length of ear (from notch)	21	20	18
Greatest length of skull	46.7	49.3	43.1
Length of nasals	18.8	20.2	16.7
Length of rostrum	20.8	22.2	17.5
Breadth of rostrum	6.8	7.3	7.3
Zygomatic breadth	16.8	18.2	16.8
Interorbital breadth	6.7	6.3	6.7
Breadth of braincase	16.4	16.5	16.3
Height of braincase	12.5	12.1	12.2
Breadth across zygomatic plate	1.6	2.2	2.0
Length of diastema	15.4	16.7	13.2
Palatilar length	23.1	23.4	19.7
Palatal length	24.4	25.4	20.9
Postpalatal length	15.3	17.0	15.1
Length of incisive foramina	7.0	7.5	5.9
Breadth across incisive foramina	2.0	2.0	2.0
Length of palatal bridge	13.6	14.3	11.8
Length of palate behind toothrow	5.2	4.8	4.3
Breadth of palate at M^1	4.9	5.3	5.0
Breadth of mesopterygoid fossa	2.1	2.1	2.0
Breadth across incisor tips	1.5	1.5	1.3
Length of bone in front of incisors	1.1	1.0	0.9
Length of bulla	5.4	5.0	4.6
Height of bulla	4.9	4.5	3.8
Alveolar length of M^{1-2}	2.3	2.2	2.1
Length of M^1		1.4	1.4
Breadth of M^1		0.8	0.9
Incisive foramina to M^1	5.6	6.5	5.7
Length of dentary and I_1	33.0	35.2	29.2
Length of dentary minus I_1	27.4	29.0	25.7
Alveolar length of M_{1-2}	2.3	2.3	1.9

emerge from each tail scale, and there are 20 scales per cm (measured about one-third from the base of the tail). *R. soricoides* has a hairier tail, dark brown all over, and larger scales on the tail (16 per cm), probably correlated with its larger size.

The basic conformation of the cranium of *R. isarogensis* is like that of *R. soricoides*—the two are contrasted in Fig. 1. The latter was also illustrated and described by Thomas (1898) and Musser (1969). The primary cranial differences between the two species are in size and proportions, especially width of the cranium relative to its length, rostral proportions, and shape and proportions of the braincase. The cranium of *R. isarogensis* is smaller than that of *R. soricoides* (Table 1) and proportioned differently. Breadths of rostrum, interorbital region, zygomatic plate, incisive foramina, palatal bridge, and mesopterygoid fossa are similar in the two species, indicating that the cranium of *R. isarogensis* is wider relative to its length. The rostrum of *R. isarogensis* is absolutely shorter than in *R. soricoides* and shorter relative to length of the cranium (length of rostrum/greatest length of skull is 45% in FMNH 62289 and 41% in FMNH 95123). *R. isarogensis* also has a round, more inflated braincase than *R. soricoides;* the braincase is about the same size in the two species, indicating that it is relatively larger in *R. isarogensis.* The mandibles of the two species are similar in shape, those of *R. isarogensis* are smaller and have more robust mandibular condyles.

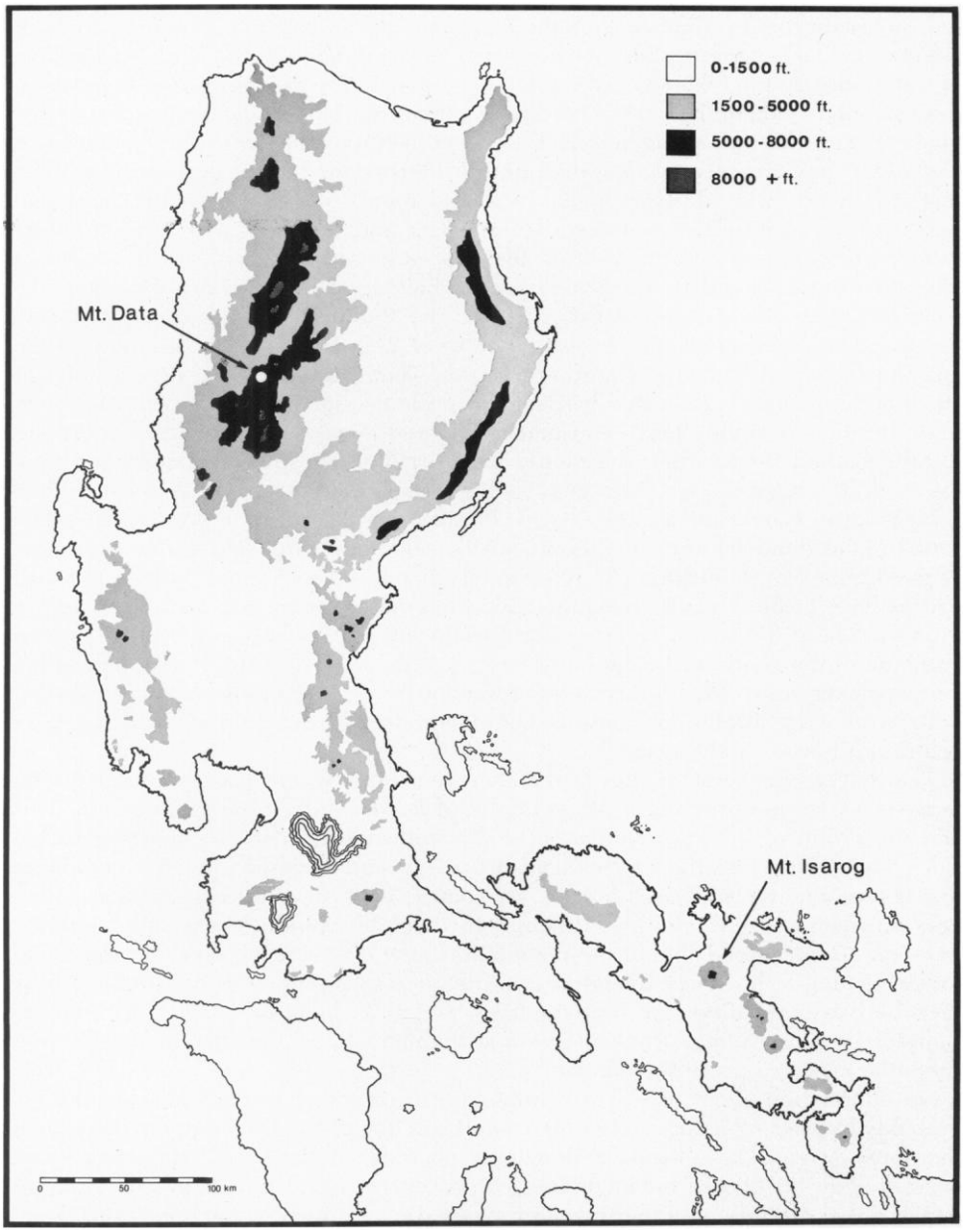

FIG. 2.—The distribution of highlands on the island of Luzon in the Philippines.

The incisors and molars of *R. isarogensis* are white and shaped like those in *R. soricoides*. We found no important dental differences between the two species except possibly a proportional one: the molar row is longer relative to the lengths of palate and cranium in *R. isarogensis*.

Discussion.—Mount Isarog, a volcanic peak that rises to about 6,500 ft above sea level, is located in a region where rains occur year-round, but with a discrete period of maximum rainfall from November to February (Inger, 1954). The upper slopes of

the mountain are presumbably clothed in montane forest, that according to Inger (1954), gradually merges with lowland forest at about 2,500 ft, the actual transitional elevation determined by seasonal rainfall and other factors. Mount Isarog is separated from the highlands of the central cordillera containing Mount Data by extensive lowlands (Fig. 2; also, see King and McKee, 1949). If montane forest occurred at lower elevations and was more widespread during Pleistocene glacial periods, it is likely that the distribution of *Rhynchomys* was also more extensive than it is now, and possibly even continuous between Mount Data and Mount Isarog. The structural differences between specimens from the two mountains may reflect differentiation after the original population became isolated. Raising of sea level or submergence of parts of Luzon would have also transformed the southeastern Camarines Peninsula into an island, cutting off gene exchange between populations in the mountains there and those in the highlands of northern Luzon. That Camarines was once insular instead of peninsular is indicated by geologic evidence, for Dickerson (1924:41) noted that: "In the low divide between Calauag Bay and Ragay Gulf, an excellent 9-meter terrace marked by coralline limestone, which is found resting uncomfortably upon the truncate edges of Vigo [Miocene] shales, clearly evidences a stage during which a Pleistocene Camarines island existed. Based upon the study of the terrace on the south end of Bondoc Peninsula [the finger-like southeast extension of Luzon just east of the Camarines Peninsula], it is probable that a wide channel existed at a still earlier stage of the Pleistocene connecting the greater Limon Bay with the southern Sibuyan Sea to the south." During late Pleistocene, in Dickerson's (1924:47) reconstruction of the southern Luzon landscape, "... the waters of the Pacific Ocean had a free passage across the northern end of Bondoc Peninsula, and the Camarines island with its smoking sulphurous volcanoes of Mayon, Isarog, and Bulusan, dominated the central Philippine archipelago."

The diagnostic characteristics of the specimen from Mount Isarog are outside the range of variation observed in the examples of *R. soricoides* from Mount Data. This, and the origin of the specimen from an isolated mountain in southeastern Luzon, caused us to recognize the specimen as distinctive, and representative of a population that is reproductively isolated from *R. soricoides*. To recognize *isarogensis* as a montane subspecies of *soricoides* would imply incomplete reproductive isolation with the potential to interbreed should the populations ever contact each other. The morphological evidence, however, though drawn from one specimen, supports an hypothesis that the two populations are reproductively isolated; it can be falsified by studying samples of *Rhynchomys* from intervening highlands, and possibly by results from breeding experiments in the laboratory.

No information about habits or habitat of *R. isarogensis* is available, but the rats probably live in a montane environment similar to that of *R. soricoides*. On the plateau that forms Mount Data, stands of Benguet pine occur on the sides, and mossy forest, consisting mostly of oaks and mountain yew, covers the top above the pine belt (Rabor, 1955). Rabor (1955) noted that two shrew-rats were trapped in thick cover in mossy forest on the perpendicular sides of a deep gully close to the top of the plateau, at about 2,250 m. He stated that shrew-rats were rare in the highland localities; even the Igorot trappers knew nothing of their habits. Additional description of mossy forest in Philippine mountains is provided by Dickerson (1928).

The endemic murids of the Philippines comprise one of the most poorly known groups of rodents in the Far East. Knowledge about their distributions over the archipelago, elevational spread on the mountainous islands, habitats, and biologies is scanty at best. Endemic to Luzon, isolated on mountain tops, restricted to mossy forest, possibly unique in diet, *Rhynchomys* is one of those murids about which we know very little. The specimen from Mount Isarog adds to the geographic and phyletic

scope of the genus but contributes nothing to understanding its biology. The murids of the Philippines in general and Luzon in particular need extensive survey and intensive study.

Figure 2 was drawn by H. Sommer and photographed by J. Coxe; the crania were photographed by R. Testa; we appreciate their help. Musser examined specimens at the British Museum (Natural History) through the courtesy of Mr. J. E. Hill. Mrs. F. P. Hufty of Archbold Expeditions Inc. supported Musser's work, both in the field and museum.

Literature Cited

DICKERSON, R. E. 1924. Tertiary paleogeography of the Philippines. Philippine J. Sci., 25:11–50.

DICKERSON, R. E., ET AL. 1928. Distribution of life in the Philippines. Bur. Sci., Manila, Monogr. 21:1–322.

INGER, R. F. 1954. Systematics and zoogeography of Philippine Amphibia. Fieldiana-Zool., Chicago Mus. Nat. Hist., 33:181–531.

KING, P. B., AND E. M. MCKEE. 1949. Terrain diagrams of the Philippine Islands. Bull. Geol. Soc. Amer., 60:1829–1836.

MUSSER, G. G. 1969. Results of the Archbold Expeditions. No. 91. A new genus and species of murid rodent from Celebes, with a discussion of its relationships. Amer. Mus. Novitates, 2384:1–41.

———. 1970. Species-limits of *Rattus brahma*, a murid rodent of northeastern India and northern Burma. Amer. Mus. Novitates, 2406:1–27.

RABOR, D. S. 1955. Notes on mammals and birds of the central northern Luzon highlands, Philippines. Part I: notes on mammals. Silliman J., 2:193–218.

SANBORN, C. C. 1952. Philippine Zoological Expedition 1946-1947. Fieldiana-Zool., Chicago Mus. Nat. Hist., 33:89–158.

THOMAS, O. 1895. Preliminary diagnoses of new mammals from Northern Luzon, collected by Mr. John Whitehead. Ann. Mag. Nat. Hist., Ser. 6, 16:160–164.

———. 1898. On the mammals obtained by Mr. John Whitehead during his recent expedition to the Philippines. Trans. Zool. Soc. London, 14:377–412.

GUY G. MUSSER[1] AND PATRICIA W. FREEMAN[2], [1]*Archbold Expeditions, The American Museum of Natural History, Central Park West at 79th St., New York, NY 10024;* [2]*Field Museum of Natural History, Roosevelt Road at Lake Shore Drive, Chicago, IL 60605.* *Submitted 25 February 1980. Accepted 14 August 1980.*

J. Mamm., 62(1):154–159, 1981

CHROMOSOMAL VARIATION WITHIN FOUR SPECIES OF HARVEST MICE (*REITHRODONTOMYS*)

Chromosomal variation among harvest mice (genus *Reithrodontomys*) was recently reviewed by Carleton and Myers (1979). Two subgenera (*Aporodon* and *Reithrodontomys*) and approximately 19 species are currently recognized (Hooper, 1952; Jones and Genoways, 1970; Jones and Lawlor, 1965) and eight species representing both subgenera have been karyotyped. Considerable chromosomal variation exists (diploid numbers and numbers of autosomal arms range from 2n = 38 to 52 and FN = 48 to 80, respectively); however, intraspecific variation is known only in the number of supernumerary chromosomes present in the karyotype of *R. megalotis* (Blanks and Shellhammer, 1968).

Carleton and Myers (1979) proposed tentative hypotheses concerning evolutionary relationships among harvest mice based on standard karyotypes. Ideally, characters used for species comparisons should be interspecifically variable while remaining intraspecifically stable. Although chromosomal complements of harvest mice meet the first criterion, the degree of intraspecific variation is poorly known. In this paper we document chromosomal variation within four species of harvest mice of the subgenus *Reithrodontomys* (*R. fulvescens, R. humulis, R. megalotis,* and *R. sumichrasti*) and discuss systematic implications of this variation.