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Results of the Archbold Expeditions. No. 89 Notes on the Taxonomic Status of *Rattus* *aspinatus* Tate and Archbold and *Mus* *callitrichus* Jentink (Rodentia, Muridae)

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INTRODUCTION

In 1937 the late George H. H. Tate, of the American Museum of Natural History, visited several European and Australian museums of natural history with the primary purpose of examining historic and type specimens of mammals from the Indo-Australian area. He photographed skulls of most of the holotypes and cotypes housed in those institutions. Photographic prints, along with measurements and general descriptive notes on these specimens, are on file at the American Museum of Natural History. Most of Tate's notes and measurements are still in manuscript form, but in 1940 he published some notes that pertained to holotypes and cotypes of monotremes, marsupials, murid rodents, and bats. Apparently the publication received very poor distribution, probably because of World War II, as many later, formal, published works dealing with mammals of the Indo-Australian area, as well as some informal lists of species that I have seen, omit any reference to the paper and do not incorporate any of the taxonomic changes enumerated therein.

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In the course of my studies of systematics of Indo-Australian murids, I have had access to all of Tate's photographs and manuscript notes, as well as to the large collections of murids and holotype material housed at both the American Museum of Natural History and the United States National Museum of the Smithsonian Institution. I have been able to ascertain the taxonomic allocation of several names of Indo-Australian forms of *Rattus* and allied genera, the taxonomic position of which has been doubtful and questioned in the mammalogical literature. This present paper resolves the taxonomic position of one such name (*Rattus aspinatus* Tate and Archbold) that has been questioned in the literature and provides notes on *Mus callitrichus* Jentink, which supplements Tate's (1940) brief discussion of this name.

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ABBREVIATIONS

A.M.N.H., the American Museum of Natural History
L.M., Leiden Museum
U.S.N.M., United States National Museum, Smithsonian Institution

Rattus aspinatus Tate and Archbold

The original description of *Rattus aspinatus* (Tate and Archbold, 1935, p. 9) was based on two specimens: the holotype (A.M.N.H. No. 101281), consisting of a study skin and skull, and a paratype (A.M.N.H. No. 101282), represented only by a study skin (although the skull was later found; see Tate, 1936, p. 570). Both specimens are from Ile-Ile, northern Celebes, and were obtained at an elevation of 500 feet by Gerd Heinrich on December 4, 1930. The species was regarded as a member of the *whiteheadi* group of *Rattus*, and among its diagnostic characteristics were listed its dark and spineless pelage, small size, with the length of the tail shorter than the length of head and body, and its small skull, with a short and narrow rostrum, narrow zygomatic plate, short incisive foramina, and small bullae. Since 1935, *aspinatus* has been listed in the mammalogical literature as a member of the group that includes *R. whiteheadi* (Tate, 1936), and later Ellerman listed it, with question, as a subspecies of *Rattus musschenbroeki*. It has retained that status in the latest published check list of mammals of the Indo-Australian region (Laurie and Hill, 1954, p. 119).

Gerd Heinrich obtained three other specimens of *Rattus* from Ile-Ile at the 500-foot elevation. One (A.M.N.H. No. 101285) was taken on November 30, 1930, and the other two (A.M.N.H. Nos. 101283 and 101284) were obtained on December 4, the same day as the two specimens that Tate and Archbold later described as *aspinatus* were taken. Tate (1936, p. 574) has correctly identified these three specimens as examples of *R. musschenbroeki*. But those examples, along with the holotype and paratype of *aspinatus*, form a series that is graded in size and pelage characteristics. That morphological gradation corresponds to variation in age, ranging from juvenile to adult, rather than to variation indicative of two species. In my opinion, the small series clearly represents the same species—*R. musschenbroeki*.

The youngest specimen of the lot is A.M.N.H. No. 101281, the holotype of *aspinatus*. The upper parts of its head and body are mostly in dark gray juvenile pelage which is soft and spineless. Buffy, subadult pelage has replaced the juvenile pelage over the under parts and in a low crescent along each side of the body. Here along the body the subadult pelage contains short spines. The skull is small and delicate, its sutures either open or incompletely closed; most of the cranial portion is in fragments. Its short rostrum and incisive foramina, and small bullae, fit with the young age of the specimen. The upper and lower first and second molars are only slightly worn, and the lack of any appreciable wear on the upper and lower third molars indicates that these teeth had only recently fully erupted before the individual was captured. The next in age in the series is the paratype of *aspinatus*; it is slightly older than the holotype. New subadult pelage has replaced the juvenile pelage in a slightly higher arc along the sides of the body. The skull is fragmented, but its proportions, size, wear of teeth, and other features are closely similar to these characters of the skull of the holotype.

The other three specimens in the series are older. A.M.N.H. No. 101283 is a subadult, and A.M.N.H. Nos. 101284 and 101285 are adults. In size (table 1) the subadult falls between the juveniles and adults. Adult pelage has replaced subadult pelage over about two-thirds of the body. The molars are moderately worn, to a degree that is intermediate between the two juveniles and two adults. Of the two adults, A.M.N.H. No. 101285 is the next in age. It is in bright and spiny adult pelage; the teeth are conspicuously worn. A.M.N.H. No. 101284 is the oldest of the series. Its pelage, although extremely spiny, is faded and worn. The teeth are well worn, but not so that their cusp patterns are completely obliterated.

The variation due to age in size and features of pelage and skull seen

TABLE 1
 MEASUREMENTS (IN MILLIMETERS) FROM SAMPLES OF *Rattus muschenbroeki* FROM NORTHERN CELEBES
 (The mean and standard deviation, extremes [in parentheses], and size of sample are
 listed, in that order, for each character.)

Locality and Specimens	Sex	Age	Length of Head and Body	Length of Tail	Length of Hind Foot ^c
Ile-Ile					
A.M.N.H. No. 101284	♀	Adult	141	127	31 ^b
A.M.N.H. No. 101285	♀	Adult	142	125 ^b	32 ^b
A.M.N.H. No. 101283	♀	Subadult	130	106	32 ^b
A.M.N.H. No. 101282	♂	Juvenile	103	97	28 ^b
A.M.N.H. No. 101281	♀	Juvenile	98	93	27 ^b
Temboan					
U.S.N.M. Nos. 217709, 217714, 217726, 217729, 217735-217737, 217739, 217741, 217743, 217747	♂ ♂	Adults	141.3±8.4 (130-155)	135.1±8.4 (120-148)	32.7±0.6 (32-34)
U.S.N.M. Nos. 217708, 217710- 217712, 217715, 217716, 217718, 217721, 217727, 217728, 217732, 217733, 217742, 217746	♀ ♀	Adults	139.0±7.3 (130-150)	132.7±8.1 (120-145)	32.4±1.2 (30-35)
U.S.N.M. Nos. 217713, 217734	♀ ♀	Subadults	127.5±3.5 (125-130)	118.5±12.0 (118-127)	31.0±1.4 (30-32)
U.S.N.M. No. 217619	♂	Juvenile	99	93	28

^a Includes claw.

^b Measured on the dry study skin; otherwise all measurements were taken from skin labels.

in the sample from Ile-Ile is similar to that seen in larger samples of *R. musschenbroeki* from elsewhere in northern Celebes. For example, among the 107 specimens of *musschenbroeki* in the United States National Museum is a series of 52 from Temboan, northern Celebes. Variation in age in that series ranges from old adult individuals, the molars of which are worn down almost to their roots, to juveniles in soft and spineless pelage, in which the upper and lower third molars are less than half-way erupted above their respective alveoli. The two extremes are connected by specimens representing an almost complete gradation in age. Measurements of some of these age groups are listed in table 1. In features of skin and skull the specimens in the small sample from Ile-Ile are either closely similar to or match those of comparable ages in the larger series from Temboan. Clearly, then, the name *aspinatus* is based on juvenile examples of *R. musschenbroeki*.

Rattus aspinatus is the second name to be considered a direct synonym of *R. musschenbroeki*. Schwarz (1961, p. 415) examined the holotype of *R. pestivulus* Thomas (1921, p. 248) and considered it an example of *musschenbroeki*. He emphasized similarities in external measurements and mammary formula between the holotype of *pestivulus* and examples of *musschenbroeki* that he examined in the United States National Museum, but he had little to say about the skull. Schwarz's allocation is, however, apparently incorrect. I have before me a photograph, taken by George H. H. Tate, of the skull of the holotype (British Museum [Natural History] No. 21.2.9.11.) of *pestivulus*. It is not an example of *musschenbroeki*. Its long, slitlike, incisive foramina (reaching beyond the anterior roots of the first upper molars), long bony palate (which extends well beyond the last upper molars), large bullae, and wide zygomatic plate, among other cranial features, are not features of skulls of *musschenbroeki*. The configuration of the skull, including what I can make out of the topography of the teeth in the photograph, is characteristic of forms in the subgenus *Rattus*, not of the group of rats that includes *R. musschenbroeki* (see Ellerman, 1949). For the present, *R. pestivulus* should be listed in the subgenus *Rattus* and should not be considered a synonym of *musschenbroeki*. Whether *pestivulus* represents a valid species or is a synonym of an earlier-named form in the subgenus *Rattus* can be determined only by a re-examination of the holotype of *pestivulus*.

Mus callitrichus Jentink

The name *callitrichus* has been associated with Celebes murids since 1879. In that year F. A. Jentink proposed the name as a species of *Mus* represented by 12 specimens from Menado, northeastern Celebes. These

had been obtained by S. C. I. W. van Musschenbroek and were given to the Leiden Museum. Jentink (1888, p. 65) later designated these specimens as "a" to "l." Since then the name has been listed in the scientific literature under three genera of Celebes murids. For example, Meyer (1896) considered *callitrichus* a synonym of *chrysocomus*, now known to be a species of *Rattus*. Later, Tate (1936) associated *callitrichus* with *Lenomys*, but Ellerman (1941, 1949) listed the name under *Rattus*, mainly because a series of mice in the British Museum (Natural History) identified as *callitrichus* were definitely examples of *Rattus*, not of *Lenomys*. The most recent list of rodents of the New Guinea and Celebes regions, that of Laurie and Hill (1954), followed Tate (1936) and listed *callitrichus* as a species of *Lenomys*. Apparently both Ellerman and Laurie and Hill were unaware of Tate's report that was published in 1940. There (p. 6) he correctly associated *callitrichus* with *Eropeplus*. In discussing the 12 specimens in the Leiden Museum that are the basis for *callitrichus*, Tate noted: "All were mounted specimens. Their skulls were extracted and cleaned in 1937. . . . Of that series, specimens 'a,' 'b,' 'c,' 'e,' 'f,' 'h,' 'j' and 'k' are referable to *Eropeplus* Miller; specimens 'd,' 'g,' 'i' and 'l' to *Rattus*. . . . *Eropeplus* skulls 'a' to 'e' had been cleaned years before my arrival at Leiden. Jentink's published measurements of the tooththrow agree closely with specimen 'a' and with that one only. We may consider specimen 'a' lectotype for the species *Mus callitrichus* Jentink."

I have read the notes Tate recorded when he was at the Leiden Museum, and I have before me his photographs of the 12 skulls. Judged from the photographs, specimens "a," "b," "c," "e," and "f" are definitely examples of *Eropeplus*. Both "a" and "e" are adults; the other three are young. Specimens "h," "j," and "k" are either *Rattus* or *Eropeplus*; if they are examples of the latter, they are very young. The other four specimens are referable to *Rattus* as Tate indicated.

There are few specimens of *Eropeplus* in museums aside from the small series in Leiden. The American Museum has one example (A.M.N.H. No. 196592). It is an adult male collected by Gerd Heinrich in June, 1930, from Berg Latimodjong, middle Celebes, at 2200 meters. Tate (1936, p. 585) allocated this specimen to *E. canus* (Miller and Hollister, 1921), a form based on a male from Goenoeng Lechio (U.S.N.M. No. 218707) and a female from Rano Rano (U.S.N.M. No. 219711), both localities in middle Celebes. The results of my comparisons are in harmony with Tate's allocation. Of the three specimens, the type from Goenoeng Lechio is the youngest and appears to be subadult. The specimen from Berg Latimodjong is the oldest, and the example from Rano Rano is a young adult. The three are closely similar to one another in

TABLE 2

EXTERNAL AND CRANIAL MEASUREMENTS (IN MILLIMETERS) FROM SAMPLES OF *Eropeplus*

	<i>E. callitrichus</i>		<i>E. canus</i>		
	L.M. ^a Spec. "a," Type, Adult	L.M. ^a Spec. "e," Adult	U.S.N.M. No. 218707, Type, Subadult ♀	U.S.N.M. No. 219711, Young Adult ♂	A.M.N.H. No. 196592, Adult ♂
Length of head and body	240 ^b	—	195	215	203 ^c
Length of tail	210 ^b	—	265	315	261 ^c
Length of hind foot	48	—	45	50	48
Length of ear	—	—	—	—	30 ^c
Greatest length of skull	—	52.8	46.5	—	47.9
Length of nasals	20.0	16.8	17.2	16.6	18.5
Zygomatic breadth	—	—	21.6	—	23.4
Interorbital breadth	7.7	7.6	5.6	5.7	5.9
Length of diastema	13.0	14.0	11.3	11.9	12.5
Length of incisive foramina	8.0	9.0	6.6	7.0	7.4
Length of palatal bridge	—	—	10.8	10.6	11.3
Alveolar length of M ¹ -M ³	10.4	11.3	10.1	10.1	10.4

^a Measurements taken by Tate and recorded in manuscript notes on file at the American Museum of Natural History.

^b Apparently taken from mounted specimens (Tate, 1940, p. 6) and probably not comparable with other measurements listed here.

^c Flesh measurements taken by collector.

pelage features. Size and cranial differences (table 2) seen between them appear to be due to age.

The only other distributional record of *Eropeplus* are the two specimens from middle Celebes discussed by Ellerman (1941). He allocated these examples to *E. canus*, although he thought they may represent a new subspecies.

Samples of *E. callitrichus* and *E. canus* may represent distinctive populations. This conclusion results from my comparing the three skulls of *canus* with Tate's cranial measurements and photographs of *callitrichus*. The main distinguishing features between the two sets of crania appear to be size, as seen in the longer skull, wider interorbital breadth, and longer diastema and incisive foramina of *callitrichus* (table 2). Otherwise the two samples closely resemble each other in most cranial configurations and proportions. I have no data with which to contrast external features between *canus* and *callitrichus*. If the features seen in the present samples are actually indicative of each population, then those populations are morphologically distinctive. Whether they are reproductively isolated from each other or are distinct morphological segments of one

species (which is more likely) cannot be determined from the material at hand. Until more material is available to assess the morphologic, geographic, and ecologic variation in *Eropeplus canus* and *callitrichus* should be provisionally retained as species and listed as follows:

Eropeplus callitrichus (Jentink), 1879; currently known only from Menado, northeastern Celebes.

Eropeplus canus Miller and Hollister, 1921; occurs in the highlands of middle Celebes; known from Berg Latimodjong, 2200 meters; Goenoeng Lechio (southwest of Lake Lindoe), 6000 feet; Rano Rano, 1800 meters, and Rantekarua, Quarles Mountains, 6000 feet (Ellerman, 1941, p. 140).

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