

MAMMALS OF BATAM ISLAND, RHIO ARCHIPELAGO.

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This paper is supplementary to one recently published by Mr. Gerrit S. Miller, jr.^a on the mammals of the Rhio-Linga Archipelago. The island of Batam was twice visited by Mr. C. Boden Kloss at the instigation of Dr. W. L. Abbott, once in September, 1905, and again in March and April, 1906. The results of Mr. Kloss's first visit are embodied in Mr. Miller's paper, while the results of the second trip are here given. Batam, or Battam, about 15 miles long by 12 miles wide, is the second largest island of the Rhio Archipelago and lies about 10 miles south-southeast of Singapore Island. The channel between it and Singapore, however, contains several small islands, so that the greatest stretch of water between the two is less than 5 miles. The deepest water between it and Singapore is about 50 fathoms.

The following list contains two species not previously known from Batam, records eight other mammals not before noted on the island, while a new subspecies of one species previously known is here described.

TRAGULUS PERFLAVUS Miller.

1906. *Tragulus perflavus* MILLER, Proc. U. S. Nat. Mus., XXXI, 1906, p. 251.

One specimen, the type, taken in September, 1905, and five taken in March and April, 1906. The additional specimens taken by Mr. Kloss since the type was first known confirm in every way the characters of the species. Two of them are even more yellow on the upper parts than is the type. Three other examples collected on Pulo Galang by Mr. Kloss are in every way identical with this species.

SCIURUS VITTATUS Raffles.

1906. *Sciurus peninsularis* MILLER, Proc. U. S. Nat. Mus., XXXI, 1906, p. 263.

Thirteen skins and skulls collected at Senimba Bay, two in September, 1905, eleven in March, 1906. This series of skins does not differ

^a Proc. U. S. Nat. Mus., XXXI, pp. 247-286, September 11, 1906.

essentially from skins of *Sciurus peninsularis* Miller,^a of the Malay Peninsula. Mr. Bonhote^b has recently shown that the latter is identical with *Sciurus vittatus* Raffles.^c

MUS CONCOLOR Blyth.

1906. *Mus concolor*, MILLER, Proc. U. S. Nat. Mus., XXXI, 1906, p. 267.

Four skins and skulls, collected at Senimba Bay, two in September, 1905, and two in March, 1906. It is possible that these specimens may not be typical *Mus concolor*. The only examples of true *M. concolor* in the Museum are too immature for use in making suitable comparisons. Mr. Kloss's specimens are quite close to *Mus surdus* Miller,^d of Simalur Island, from which they differ mainly in smaller size of skull, shorter rostrum, and greater interorbital width.

MUS BATAMANUS, new species.

Type.—Adult male, skin and skull, Cat. No. 143232, U.S.N.M., collected at Senimba Bay, Batam Island, off southern end of Malay Peninsula, March 30, 1906, by Mr. C. Boden Kloss. Original number 75.

Diagnostic characters.—Similar to *Mus jerdoni* Blyth, but tail shorter than head and body, and, as compared with a Tenasserim example of *M. jerdoni*, duller colored, and with slightly heavier interorbital region.

Color.—Upper parts generally an ill-defined grizzle of dull ochraceous buff^e and blackish, much lighter and duller on the sides, and with much less admixture of black; underparts generally similar to Ridgway's No. 9 gray. Ears blackish brown; feet whitish. Tail, bicolor, dark brownish above, whitish beneath. The soft or typical hairs above have dull ochraceous tips and No. 6 gray bases; on the lower parts their tips are whitish and bases No. 8 gray. The pelage is everywhere beset with grooved and flattened spines, longest and most numerous above, where their bases are slate gray in color and the tips slate black. On the underparts the spines are less numerous, smaller and whitish throughout. On the sides the bases of the spines grow lighter in color, becoming whitish as the belly is reached. Many of the spines on the upper sides of the body are tipped with dull ochraceous buff, and as the belly is approached all the spines are so tipped.

Skull.—The skull of *Mus batamanus* does not differ conspicuously from skulls of *Mus jerdoni*; the palatine foramina are shorter and

^aSmithsonian Miscell. Coll., XLV, p. 10, November 6, 1903.

^bProc. Zool. Soc. London, 1906, I, pp. 5, 6, published June 7, 1906.

^cFor a consideration of the Sumatran forms of this species and the status of *Sciurus peninsularis*, see Lyon, Smithsonian Miscell. Coll., XLVIII, 1906, p. 278.

^dProc. U. S. Nat. Mus., XXVI, p. 460, February 3, 1903.

^eColor terms in this paper are taken from Ridgway's Nomenclature of Colors for Naturalists.

wider, the posterior edge of the palate more emarginate, and the interorbital region is slightly heavier.

Measurements of type.—Total length, 267 mm.; head and body, 148; tail, 129; hind foot, without claws, 31; greatest length of skull, 36.3; basal length, 30.5; condylo-basal length, 34.5; zygomatic width, 15.3; interorbital constriction, 6.5; maxillary tooth row (alveoli), 6.2; mandible back of condyle to front of symphysis, 19.7; mandibular tooth row, 5.9.

Specimens examined.—One, the type.

MUS LINGENSIS Miller.

1906. *Mus lingensis* MILLER, Proc. U. S. Nat. Mus., XXXI, 1906, p. 266.

One skin and twelve skulls collected at Senimba Bay in September, 1905, and eight skins and skulls March and April, 1906. This series, as a whole, is exactly like a series of topotypes from Linga. This species shows much variation in the size of the skull. In the series from Batam, the greatest length of the largest skull, Cat. No. 143217, U.S.N.M., with teeth considerably worn, is 48.3 mm., while in Cat. No. 143221, U.S.N.M., a skull in every way adult, with teeth slightly worn, the same measurement is 42.5 mm. Similar differences in size are found in examples from Linga.

MUS sp. near RATTUS.

1906. *Mus near rattus*, MILLER, Proc. U. S. Nat. Mus., XXXI, 1906, p. 266.

Four specimens taken September, 1905, and twelve taken in March and April, 1906. This rat is extremely variable. The series of skins falls into two groups—those with bellies nearly white, like specimens of *Mus jarak* Bonhote, from southern Johore, and those with dirty, buffy-gray bellies, much like a specimen of *Mus griseiventer* Bonhote, from Johore. Some individuals are nearly intermediate between these extremes of coloration of the under parts. As great differences are found in the color of the upper parts, some individuals being colored like a small Norway rat, while others are nearly as dark as a black rat. As a rule, those specimens darkest above are lightest beneath, but there are exceptions. The skulls also show many inconstant variations.

MUS FIRMUS Miller.

Three adults, skins and skulls, collected at Senimba Bay, March, 1906, do not differ from topotypes of this species from Linga.

ARCTOGALIDIA SIMPLEX Miller.

1906. *Arctogalidia simplex* MILLER, Proc. U. S. Nat. Mus., XXXI, 1906, p. 268.

An adult female taken in September, 1905.

TUPAIA FERRUGINEA BATAMANA, new subspecies.

1906. *Tupaia ferruginea*, MILLER, Proc. U. S. Nat. Mus., XXXI, 1906, p. 271.

Type.—Adult female, skin and skull, Cat. No. 142151, U. S. N. M., collected at Senimba Bay, Batam Island, south of Malay Peninsula, September 15, 1905, by Mr. C. Boden Kloss. Original number 2.

Diagnostic characters.—Very similar to *Tupaia ferruginea* Raffles, of Singapore and Malay Peninsula, but tail grayer, skull and teeth heavier.

Color.—*Tupaia ferruginea batamana* so closely resembles the typical form that no detailed description is necessary; in the majority of specimens the tail is grayer than it is in the mainland animal.

Skull and teeth.—The skull of *Tupaia ferruginea batamana* averages longer and wider than skulls of the typical form and the sagittal crest is longer and more prominent. The angle of the mandible is heavier. The molar teeth are heavier throughout. For the greater size of the skull of the insular subspecies over the mainland form, see table of measurements, page 657. The difference in size is very strikingly brought out by placing the two series of skulls side by side so that the zygomatic arch of one touches that of the next. When the eight skulls of each series are so arranged, it is found that the skulls of *Tupaia ferruginea batamana* make a row longer by the width of half a skull than the corresponding row of *Tupaia ferruginea*. If the two series are arranged longitudinally, the row of island skulls extends about a third of a skull beyond the row of mainland skulls.

Measurements.—External and cranial measurements of the type: Total length, 360 mm.; tail vertebrae, 160; hind foot without claws, 43; ear, 17; greatest length of skull, 53; basal length, 46.5; palatal length, 28.8; zygomatic breadth, 27.5; greatest width between outer surfaces of molars, 17.5; interorbital constriction, 15.4; breadth of brain case above roots of zygomata, 20; mandible, front of symphysis to back of condyle, 35.2. For cranial measurements of the series, see table, page 657.

Specimens examined.—Eight, two skins and skulls collected in September, 1905, and six in alcohol, collected at the same time but not received until the later collection was sent in.

Remarks.—The characters of this subspecies were pointed out by Mr. Miller, who had at his disposal the two skins and skulls only. The six additional specimens later received from Mr. Kloss confirm in every way the characters that were previously shown to be present.

Measurements of skulls of *Tupaia ferruginea* and of *Tupaia ferruginea batamana*.

Name.	Locality.	Cat. Number.	Sex and age.	Length of sagittal crest.		Greatest length of skull.	Zygom-atic width.	Front of first incisor to back of last molar.	
				mm.	mm.			mm.	mm.
<i>Tupaia ferruginea</i>	Singapore	105078	Female adult					25.4	27.5
Do	do	105079	do	4.5	48.7			24.7	26.5
Do	do	105080	Male adult	5.7	49.7			24.8	27
Do	Tringanu	105024	Female adult	5	50.3			24.3	27.9
Do	do	105033	do	5.6	50.1			25.4	27.1
Do	Pahang	115191	do	6	51.8			24.8	28
Do	Johore	112578	Male adult	5	50.7			26.3	27.5
Do	Tenasserim	124284	do	6.6	52			25.6	27.3
<i>Tupaia ferruginea batamana</i>	Batam	142151	Female adult	7	53			27.5	29
Do	do	142152	do	8	51.8			26.2	27.8
Do	do	143255	do	6.8	52.3			26.9	28.6
Do	do	143256	do	7	52.3			26.8	28.6
Do	do	143257	do	8.2	50			26.2	27.5
Do	do	143252	Male adult	7.7	52.6			27.2	28.7
Do	do	143253	do	10	52.7			27.3	28.2
Do	do	143254	do	9.4	53.1			27	27.9

^aType.

In addition to the foregoing, Mr. Kloss saw the following species on Batam, but was unable to secure specimens:

Sus oi,^a

Sus rhionis.

Macaca fascicularis.

Presbytis cristata.

The following were reported to Mr. Kloss by the natives as occurring on Batam:

Tragulus kanchil.

Petaurista sp.

Sciuropterus sp.

Sciurus tenuis.

Ratufa sp.

Paradoxurus sp.

Cynocephalus^b sp.

Macaca nemestrina.

Presbytis sp. with white breast.

^a See Kloss, Journ. Straits Branch, Royal Asiatic Society, XLV, pp. 55-60, pls. I-III, made from photographs of Batam specimens obtained by Mr. J. P. Romenij.

^b See Miller, Proc. Biol. Soc., Washington, XIX, p. 41, February 26, 1906.