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MAMMALS COLLECTED BY DR. W. L. ABBOTT  
ON PULO LANKAWI AND THE  
BUTANG ISLANDS.\*

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The first half of December, 1899 Dr. W. L. Abbott spent in exploring Pulo Lankawi and the Butang Islands. Pulo Lankawi, or as it stands on some maps, Langkawi, or Lancava, and the Butang or Buton Islands are situated near the west coast of the Malay Peninsula at the northern extremity of the Straits of Malacca, about 75 miles north of Penang. Lankawi is separated from the mainland by ten miles or more of water, the Butangs by a space about double as great. The distance from the western end of Lankawi to the Butang group is about fifteen miles in a northwesterly direction. The collection of mammals, numbering about eighty specimens, all of which have been presented to the United States National Museum, represents thirteen species, of which all are closely related to those of the adjacent mainland.

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*Mus vociferans lancavensis* subsp. nov.

*Type*.—Adult female (skin and skull), No. 104,173 United States National Museum. Collected on Pulo Lankawi, December 6, 1899. Original number 122.

*Characters*.—Not as large as *Mus vociferans vociferans* from Trong, Lower Siam; color more conspicuously ochraceous; tail with less brown on dorsal surface; skull with median portion of parietals more elevated above general outline of braincase.

*Color*.—The color so closely resembles that of true *Mus vociferans* that no detailed description is necessary. When series of specimens are compared, however, it is at once seen that those from Pulo Lankawi are distinctly more yellow than those from the type locality of the species. The difference is due in part to a slight reduction in the number of dark hairs on the back in the insular animal, but to a certain extent also to a change in the ochraceous ground color. The latter, particularly on the cheeks, flanks, and outer side of thighs, is visibly though faintly more yellow than in the Trong specimens. Underparts cream-buff. Tail whitish above and below distally, bicolor at base. The brown dorsal area scarcely reaches middle of tail, while in true *Mus vociferans* it extends beyond middle and often nearly to tip.

*Skull and teeth*.—In size and general form the skull agrees with that of *Mus vociferans vociferans*, but when viewed from the side a slight though very constant difference in the form of the braincase becomes apparent. In both animals the middle portion of the parietals is convex, rising as a distinct though low prominence above the level of the interparietal and that of the frontals. This convexity is so exaggerated in *Mus vociferans lancavensis* that skulls are easily recognized either by sight or touch.

Teeth similar to those of true *Mus vociferans*.

*Measurements*.—External measurements of type: total length, 520; head and body, 209\*; tail vertebræ, 311\*; hind foot, 45; hind foot without claws, 42. Average of five specimens, including the type: total length, 543 (520-559); head and body, 222 (209-229); tail vertebræ, 321 (311-330); hind foot, 46 (45-47); hind foot without claws, 43 (42-44).

*Specimens examined*.—Five skins and nine skulls, all from the type locality.

*Remarks*.—While this insular race is distinguished from true *Mus vociferans* by no one constant character the sum of its peculiarities are enough to make it readily distinguishable. The slight difference in size is chiefly due to the shorter tail of the insular form. †

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\*Collector's measurement.

†In seven topotypes of *Mus vociferans* the tail averages 342 mm., with extremes of 323 mm. and 380 mm.

**Mus surifer flavidulus** subsp. nov.

*Type*.—Adult female (skin and skull), No. 104,330 United States National Museum. Collected on Pulo Lankawi, December 4, 1899. Original number 109.

*Characters*.—Smaller than *Mus surifer surifer* from Trong, Lower Siam; tail usually a little shorter than head and body; ground color of sides and upper parts yellower (less tawney) than in the mainland form, and dark shading less conspicuous; belly cream-buff instead of white; skull smaller than that of the typical race, the braincase smaller and less ridged.

*Color*.—The color is as in true *Mus surifer* except that throughout the pelage there is a stronger tendency to yellowish tints. Ground color of sides and back light orange-buff, rarely as deep as in the Trong animal, which often approaches tawny-ochraceous. Underparts pale cream-buff or yellowish white. The dark brown hairs of the upperparts are distributed as in *Mus surifer surifer*; but they appear to be fewer in number. Feet and tail as in the mainland animal, the latter sharply bicolor nearly to tip, its distal extremity whitish above and below.

*Skull and teeth*.—Skull distinctly smaller than that of *Mus surifer*, and in general of much the same form. The braincase is, however, broader in proportion to the length of the skull, and the supraorbital ridges are less conspicuously developed. The interparietal is similar to that of the mainland animal and does not approach the peculiar triangular form found in the representative of the species occurring on the Butang Islands.

Teeth as in typical *Mus surifer*.

*Measurements*.—External measurements of type: total length, 355; head and body, 197; tail vertebrae, 158; hind foot, 37.6; hind foot without claws, 36. Average of ten specimens including the type: total length, 335 (305-369); head and body, 175 (159-197); tail vertebrae, 160 (146-172); hind foot, 39 (37-42); hind foot without claws, 37 (36-40).

Cranial measurements of type: greatest length, 44; basal length, 37; basilar length, 34.8; palatal length, 18; least width of palate between anterior molars, 5; diastema, 12.6; length of incisive foramen, 6.4; combined breadth of incisive foramina, 3.6; length of nasals, 17; combined breadth of nasals, 5; zygomatic breadth, 20; interorbital breadth, 7; mastoid breadth, 15; breadth of braincase above roots of zygomata, 17; depth of braincase at front of basioccipital, 11; frontopalatal depth at posterior extremity of nasals, 10; least depth of rostrum immediately behind incisors, 7.8; maxillary toothrow (alveoli), 6.8; width of front upper molar, 2.2; mandible, 23.6; mandibular molar series (alveoli), 6.6.

*Specimens examined*.—Thirteen skins, twenty skulls, and one specimen in alcohol, all from Pulo Lankawi.

*Remarks*.—By its small size and yellowish color this race is readily distinguishable from that of the mainland as well as from that of the nearby Butang Islands.

*Mus surifer butangensis* subsp. nov.

*Type*.—Adult male (skin and skull) No. 104,309 United States National Museum. Collected on Pulo Adang, Butang Islands, December 16, 1899. Original number 157.

*Characters*.—More robust than *Mus surifer surifer* from Trong, Lower Siam; tail distinctly shorter than head and body; ground color of sides and upper parts darker and less bright than in the mainland form, and dark shading more diffuse; belly dirty buff; skull with the rostrum deeper, the braincase relatively narrower and more ridged, and the interparietal more distinctly triangular in outline.

*Color*.—The color differs from that of the typical race in the dullness of the fulvous tints. These are very nearly ochraceous-buff in marked contrast with the orange-buff of *Mus surifer surifer* and *M. surifer flavidulus*. The sprinkling of blackish hairs is very diffuse, adding to the peculiar aspect of the animal. Underparts soiled cream-buff. Tail and feet as in the related forms.

*Skull and teeth*.—The skull, while not actually larger than in the mainland race is more angular and heavily ridged. The rostrum when viewed from the side is distinctly deeper and the braincase appears to be slightly narrower, though the latter character is not very well marked. The outline of the interparietal is nearly a perfect isosceles triangle the base of which (the anterior edge) is about one and one half times as long as either side. Teeth as in typical *Mus surifer*.

*Measurements*.—External measurements of type: total length, 374; head and body, 203; tail vertebrae, 171; hind foot, 43; hind foot without claws, 41. Average of twelve specimens from the type locality: total length, 353 (311-381); head and body, 194 (178-210); tail vertebrae, 159 (133-171); hind foot, 41 (38.5-43); hind foot without claws, 38 (37-41). Average of three specimens from Pulo Rawi; total length, 353 (336-356); head and body, 192 (184-203); tail vertebrae, 160 (152-165); hind foot, 39 (38.5-40); hind foot without claws, 36.8 (36.5-37).

*Specimens examined*.—Fifteen; twelve from Pulo Adang, and three from Pulo Rawi, Butang Islands.

*Remarks*.—The three skins from Pulo Rawi agree very closely with those from the type locality though in color they are slightly less dull.

*Mus pannosus* sp. nov.

*Type*.—Adult male No. 104,110 United States National Museum. Collected on Pulo Adang, Butang Islands, December 14, 1899. Original number 146.

*Characters*.—Similar to *Mus tambelanicus* Miller, but with larger ears, pelage of upper parts less suffused with red, and entire underparts grizzled with gray. Audital bullae larger than in *Mus tambelanicus*.

*Color*.—Back a rather coarse grizzle of light wood-brown and blackish brown the two colors mixed in nearly equal proportions. Sides very



dull buff-yellow heavily sprinkled with dark brown. Ventral surface dull, pale, buff, strongly suffused with drab-gray, particularly along median line. Chin and throat usually dull buffy white scarcely tinged with gray.

*Skull.*—The skull is similar to that of *Mus tambelanicus* except that the audital bullæ are very noticeably larger and less depressed on the outer side. Teeth as in *Mus tambelanicus*, that is, like those of *Mus alexandrinus*, only larger.

*Measurements.*—External measurements of type: total length, 406; head and body, 203; tail vertebræ, 203; hind foot, 41; hind foot without claws, 38. Average of seven specimens from the type locality: total length, 386 (373-406); head and body, 196 (184-203); tail vertebræ, 190 (184-203); hind foot, 40 (38-41.5); hind foot without claws, 38 (35-39). An adult male from Pulo Rawi measures: total length, 409; head and body, 203; tail vertebræ, 196; hind foot, 39; hind foot without claws, 36.

*Specimens examined.*—Ten (three in alcohol) from Pulo Adang, and three from Pulo Rawi, Butang Islands.

*Remarks.*—The close resemblance of this species to *Mus tambelanicus*, and its unlikeness to the small *Mus alexandrinus* of the adjacent mainland suggest that the two large animals are less closely related to the latter than I at first supposed *Mus tambelanicus* to be. While of the same general form as the roof rat they are heavier animals with coarser more shaggy fur.

*Mus cremoriventer* subsp. ?

Two specimens (one in alcohol) from Pulo Lankawi and a third from Pulo Adang differ from true *Mus cremoriventer* in a strong yellowish suffusion of the entire pelage. As they were taken at practically the same season as the original specimens of *M. cremoriventer* there is little probability that the differences are due to individual variation. Without further material, and particularly in the absence of series of the yellowish *Mus flaviventer* from the Anambas, it seems unwise to attempt to define the present race.

*Ratufa melanopepla* Miller.

One specimen, Pulo Lankawi, December 9, 1899.

*Sciurus concolor* Blyth.

Two specimens from Pulo Lankawi and three from Pulo Adang. They agree in all essential characters with skins from Trong, Lower Siam, but whether the same as the true *concolor* of Malacca it is at present impossible to determine.

*Tragulus umbrinus* sp. nov.

*Type.*—Adult male (skin and skull) No. 104,414, United States National Museum. Collected on Pulo Lankawi, December 7, 1899. Original number, 134.

*Characters*.—Similar to *Tragulus canescens*\* of the adjacent mainland, but smaller in size and much darker in color. Throat stripes blackish brown with scarcely a trace of pale speckling. Belly heavily washed with fulvous gray.

*Color*.—Ground color of back a deeper, brighter orange-buff than in *T. canescens* and blackish clouding much in excess of buff. Sides and flanks as in the mainland animal but conspicuously darker, owing to the greater admixture of brown. Entire neck from crown to shoulders, and laterally to outer white throat stripes, blackish seal-brown, many of the hairs with a subterminal orange-buff area about 3 mm. in length. The buff rings give the dark area a speckled appearance, but they are not sufficiently numerous to produce grizzling, except occasionally at the sides of the neck. Upper surface of head and face slightly darker than back; cheeks and ill defined streak over and in front of eye paler. *Lateral dark throat stripes clear blackish seal-brown scarcely speckled with buff*. Collar like sides of body, only more finely grizzled. Chest and posterior half of belly white, the intermediate region heavily clouded with yellowish gray, darker and clearer along median line. Outer surface of legs dull ochraceous somewhat clouded with dark brown.

*Skull and teeth*.—Skull as in *Tragulus canescens*, but slightly smaller. Relative size of teeth as in the mainland animal, therefore considerably greater than in *T. napu*.

*Measurements*.—External measurements of type: total length, 596; head and body, 520; tail vertebræ, 76; hind foot, 135; hind foot without hoof, 123; ear from meatus, 34; width of ear, 22. External measurements of a second adult male from the type locality: total length, 584; head and body, 508; tail vertebræ, 76; hind foot, 128; hind foot without hoof, 115.

Cranial measurements of type: greatest length, 112; basal length, 108; basilar length, 100; zygomatic breadth, 48; mandible, 90; maxillary toothrow (alveoli), 30; mandibular toothrow (alveoli), 47.

*Weight*.—Weight of type 3.63 kg. Weight of second adult, 3.4 kg.

*Specimens examined*.—Three, all from the type locality.

#### *Tragulus javanicus* (Gmelin).

Thirteen specimens from Pulo Lankawi and two from Pulo Adang are indistinguishable from those taken on the mainland.

#### *Lutra barang* F. Cuvier.

One adult female, Pulo Lankawi, December 10, 1899. Measurements: total length, 1090; head and body, 673; tail vertebræ, 419; hind foot, 128.

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\*See *antea*, p. 185.

**Tupaia ferruginea** Raffles.

Two specimens from Pulo Lankawi and one each from Pulo Adang and Pulo Rawi are indistinguishable from those taken in Trong, Lower Siam.

**Galeopithecus volans** (Linnæus).

Two specimens, both from Pulo Adang.

**Emballonura peninsularis** Miller.

Nine specimens (one skin), Pulo Rawi, Butang Islands, December 19, 1899.

**Semnopithecus obscurus** Blyth.

Two were taken on Pulo Lankawi, December 5, 1899.