

# MAMMALS COLLECTED BY DR. W. L. ABBOTT ON THE COAST AND ISLANDS OF NORTHWEST SUMATRA.

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The period from November, 1901, to April, 1902, was spent by Dr. W. L. Abbott in exploration of the coast and islands of northwestern Sumatra. As a result of this work large and exceedingly valuable collections were obtained, all of which have been presented to the United States National Museum. This paper contains an account of the mammals, numbering 492 specimens.

## ITINERARY AND DESCRIPTION OF LOCALITIES.

Leaving Singapore about the middle of October, Dr. Abbott sailed northward through the Strait of Malacca. His first collecting station was at Loh Sidoh Bay, on the west coast of Sumatra, a few miles south of Acheen Head, the extreme northwestern point of the island. Only four days, November 5 to 8, were spent at this locality, which, to judge by the remarks in the collector's field book, is a moderately hilly region abounding in dense jungle and in cocoanut plantations. Dr. Abbott says of this locality:

It was probably a pretty good place for collecting, but one dare not go far off, and the natives stole my traps. There was a Dutch patrol there, but the sergeant in charge said it was anything but safe.

The next locality visited was the large island forming the northern end of the archipelago off the west coast of Sumatra. It is variously known as Pulo Simalur, Pulo Simaloe, Pulo Si Malu, Pulo Babie, and Hog Island. The first of these names is the one adopted by Dr. Abbott. This island is about 55 miles in length and is moderately high and hilly. Its surface is well wooded. Here about six weeks (November 16, 1901, to January 2, 1902) were spent. Mammals were collected at several localities on the island: Telok Dalam, at about middle of east coast (November 18 to 28); Sibabo Bay, a short distance north of Telok Dalam (December 10 to 17); Sigoeli River, near north end of island (December 19); Pulo Siumat (December 27 to 30), and Labuan Badjan Bay (January 1, 1902), at southern extremity. Pulo

Siunat lies about 5 miles off the eastern coast of Simalur, about half-way between Telok Dalam and Labuan Badjan Bay. It contains about 1,000 acres and is mostly cleared and planted with cocoanuts, etc.

Two small islands, the Tapak or Flat Islands, about 15 miles from the southeastern extremity of Simalur, were next explored (January 4 to 9). Pulo Lasia (pronounced Lahseea), the more northerly and also the smaller, is an uninhabited mass of coral rock covered with dense forest. It is about  $2\frac{1}{2}$  miles long and 2 miles wide. Separated from Pulo Lasia by a strait a mile and a half wide is Pulo Babi, a slightly larger island, also of coral rock, but with more sand and soil than there is on Lasia. Like the smaller island, it is uninhabited, though the forest contains some cocoanut palms, and pigs are very abundant.

Nineteen miles east of Pulo Babi and 31 miles north of Nias lies Pulo Bangkaru, the most westerly and second largest of the Banjak or Banyak (many) Islands, the group next visited (January 16 to February 6). The surface is irregular and heavily forested, its highest point probably rising 1,000 feet above the sea. The island covers an area of about 20 square miles. A week was spent here at an anchorage in Cameleon Bay on the southeast coast. Great Banjak Island, Pulo Tuangku, or Tunanku (spelled Toeankoe on the Dutch charts), is 6 miles east of Pulo Bangkaru and 25 from Singkel, the nearest point in Sumatra. It is about 17 miles long by 5 wide and probably contains 40 or 50 square miles. The highest points are Bukit Teressa, a cone-shaped hill about 1,000 feet in altitude, and Batu Lauteh, which rises to about 800 feet. Both are situated at the north end of the island, where are also the few clearings and paddy fields. Cultivation on any extended scale is prevented by the abundance of pigs and monkeys, but on the islets off the coast cocoanuts are successfully grown.

From the Banjak Islands Dr. Abbott crossed to Tapanuli (or Tappanoeli) Bay on the west coast of Sumatra. Here he spent the last half of February and the month of March, partly at points on the mainland and partly (March 2 to 14) at Pulo Mansalar (also spelled Moesalla, Massalla, Mansalla, and Mensilla), at the entrance to the bay. The principal collecting stations were Tapanuli and Siboga settlements, near the north end of the bay, Jaga Jaga, a stream near the south end, Butik Kebong and Butik Sawa, hills 1,224 and 1,100 feet in height, respectively, lying near the coast just south of the Jaga Jaga, Lobo Pandan Bay, at the south foot of Butik Kebong, and Gumong Panjamurong Udong, a hill on the south side of Lobo Pandan Bay. The country throughout this region is fertile and well forested. Pulo Mansalar, at the mouth of Tapanuli Bay, is 7 miles from the mainland. It is 11 miles long and contains 45 square miles. The heavily forested surface is mountainous, with scarcely any level ground, though the highest point is only 1,660 feet above sea level. The timber is very fine, and much is cut and taken to Siboga for house building.

## SYSTEMATIC LIST OF SPECIES.

## FAMILY TRAGULIDÆ.

## TRAGULUS NAPU (F. Cuvier).

1822. *Moschus napu* F. CUVIER, Hist. Nat. des Mammifères, IV. Pt. 37, [p. 108], November, 1822; Sumatra.

An adult male and three immature specimens were taken at Tapanuli Bay. (For measurements see table, page 442.) These are the first representatives of the species received by the United States National Museum. In all respects they agree with those recently recorded by Stone and Rehn<sup>a</sup> from the Lampong district.<sup>b</sup> *Tragulus napu* proves to be a grayish animal quite distinct from *T. pretiosus* and *T. nigricollis*, but somewhat closely resembling *T. canescens* of the Malay Peninsula. The general appearance is well indicated by the larger figure on Cuvier's plate.

## TRAGULUS AMCÆNUS, new species.

*Type*.—Adult male (skin and skull), Cat. No. 114563, U.S.N.M. Collected on Pulo Mansalar, off Tapanuli Bay, Sumatra, March 8, 1902, by Dr. W. L. Abbott. Original number, 1632.

*Characters*.—A yellowish, dark-necked member of the *napu* group, somewhat closely resembling *Tragulus nigricollis*<sup>c</sup> of Sinkep Island, but smaller and more richly colored. Throat pattern normal, the dark stripes blackish.

*Color*.—*Type*: Upperparts orange ochraceous, darkening toward ochraceous rufous on outer surface of legs, and lightening to a buff considerably yellower than that of Ridgway on sides, the hairs everywhere pale ecru-drab at extreme base and black at tip. The black tips produce a heavy shading on both back and sides. On the former it is slightly in excess of the orange ochraceous, but on sides the two colors, as seen in the skin, are about equally mixed. Throughout, the grizzle caused by the contrasting colors is more coarse and conspicuous than in *Tragulus pretiosus*, a difference which may prove to be seasonal. Neck mostly black, this color clear and unmarked immediately behind occiput, but elsewhere speckled with dull tawny ochraceous. At sides this speckling is rather conspicuous, but on dorsal surface it is not very noticeable except posteriorly. Crown black, slightly speckled with dull tawny ochraceous anteriorly. Cheeks and the usual superciliary stripe dull tawny ochraceous, slightly grizzled with black. Throat markings normal, the dark bands black, slightly speckled with tawny ochraceous:

<sup>a</sup> Proc. Acad. Nat. Sci. Philadelphia, 1902, p. 127, June 4, 1902.

<sup>b</sup> For the opportunity to examine the Lampong material I am indebted to the kindness of Mr. Witmer Stone and the authorities of the Philadelphia Academy of Natural Sciences.

<sup>c</sup> Miller, Proc. Acad. Nat. Sci. Philadelphia, 1902, p. 145, June 11, 1902.

the light stripes pure white. Collar broad and distinct, concolor with sides of body. Underparts and stripe down inner surface of legs white, a narrow brownish longitudinal line along middle of chest, and a faint buffy suffusion on middle of belly. Tail lacking in the type. In an immature female it is similar to back above, but duller and less washed with black, pure white below and at tip.

*Skull and teeth.*—The skull and teeth are rather smaller than in *Tragulus napu* and *T. nigricollis*, about equaling those of *T. pretiosus*. In form they show no peculiarities worthy of note, though the skull is relatively broader than in the Sumatran animal.

*Measurements.*<sup>a</sup>—External measurements of type: Head and body, 520; hind foot, 129 (115); ear from meatus, 32; ear from crown, 27; weight, 2.7 kilograms.

Cranial measurements of type: Greatest length, 108.6 (116);<sup>b</sup> basal length, 101.4 (108); basilar length, 96 (99); occipito-nasal length, 98 (104); length of nasals, 33 (32); greatest breadth of both nasals together, 13 (13.4); diastema, 11 (10.6); zygomatic breadth, 47 (47); least interorbital breadth, 31.4 (31.4); mandible, 86 (88); maxillary tooth row (alveoli), 35 (37); maxillary premolars (crowns), 18.4 (18.4); mandibular tooth row (alveoli), 42 (42); mandibular premolars (crowns), 19 (19).

*Specimens examined.*—Two, both from Pulo Mansalar.

*Remarks.*—While *Tragulus amannus* is very different from the grayish *T. napu* of the near-by mainland, it rather closely resembles the yellowish *T. pretiosus* and *T. nigricollis* from Linga and Sinkep islands off the east coast of Sumatra. The details of its characters, however, readily distinguish it from both of these.

#### TRAGULUS JUGULARIS, new species.

*Type.*—Adult male (skin and skull). Cat. No. 114574, U.S.N.M. Collected on Pulo Mansalar, off Tapanuli Bay, Sumatra, March 8, 1902, by Dr. W. L. Abbott. Original number, 1627.

*Characters.*—Size about as in *Tragulus amannus*. No white anywhere. Apparently rather closely resembling *Tragulus annae* Matschie,<sup>c</sup> but ear smaller, and dark loreal stripe and light bands on throat clearly indicated.

*Color.*—Type: With the exception of the under parts, inner surface of legs, and under surface of tail, the color is almost exactly as in the type of *Tragulus amannus*. The neck, however, is less speckled with tawny ochraceous, and the cheeks and superciliary stripes are somewhat more washed with black. This wash is not enough to obscure

<sup>a</sup>The measurements in this paper are all in millimeters.

<sup>b</sup>Measurements in parentheses are those of an adult male *Tragulus napu* from Tapanuli Bay, Sumatra (No. 114434).

<sup>c</sup>Sitz-Ber. Gesellsch. naturforsch. Freunde zu Berlin, 1897, p. 157.

the strong contrast between the superciliary stripes and the black, very obscurely grizzled crown. Inner surface of legs, under surface of tail, and entire ventral surface behind throat markings orange buff, brighter on legs and middle of chest, duller on tail, and paler and more gray in axillary and hypogastric regions; middle of belly with a distinct dusky wash. The portion of chin normally white is concolor with cheeks, and the light throat stripes are merely indicated by a stronger grizzle of tawny ochraceous in the general black of the throat. This indication, however, is so distinct that it can not be overlooked, and in many specimens it is even more evident than in the type. In none of the 17 examined is it absent. The pattern thus outlined is in every respect normal. Collar of normal extent, but rather more tawny than in *Tragulus amannus*. Ears, naked area around and in front of eyes, feet, and lower half of tarsus and carpus covered with minute blackish hairs.

The series is very uniform in color. Some variation is shown in the distinctness with which the throat markings are indicated, and in the amount of dusky wash on the belly. In many skins the blackish hairs on feet and distal portion of legs are mostly replaced by tawny, but in general the dusky feet are characteristic. None shows distinct white on any part of the body.

*Skull and teeth.*—While the skull is smaller than that of *Tragulus napu*, I can see nothing to distinguish it from that of *T. amannus*, with which it agrees in both size and form. The teeth, on the other hand, particularly the premolars, are distinctly larger than in the related species.

*Measurements.*—External measurements of type: Total length, 578; head and body, 513; tail vertebrae, 65; hind foot, 130 (114); ear from meatus, 28; ear from crown, 25; weight, 2.4 kilograms. Average of five adult males from the type locality: Total length, 587 (575–618); head and body, 514 (505–538); tail vertebrae, 72.6 (65–80); hind foot, 130.2 (126–133); hind foot without hoofs, 115.4 (111–119). Average of ten adult females from the type locality: Total length, 610 (570–670); head and body, 536 (495–590); tail vertebrae, 74.2 (65–80); hind foot, 132.9 (128–138); hind foot without hoofs, 118.5 (111–124). For details see table, p. 442.

Cranial measurements of type: Greatest length, 106; basal length, 99; basilar length, 92; occipito-nasal length, 97; length of nasals, 28.6; greatest breadth of both nasals together, 13; diastema, 8.8; zygomatic breadth, 45; least interorbital breadth, 29; mandible, 85; maxillary tooth row (alveoli), 38.6; maxillary premolars (crowns), 20; mandibular tooth row (alveoli), 45; mandibular premolars (crowns), 20.6.

*Specimens examined.*—Seventeen, all from Pulo Mansalar.

*Remarks.*—The only species with which this animal needs comparison is the *Tragulus annæ*, described by Matschie from specimens from an

unknown locality. The main points of difference are as follows: In *Tragulus annæ* there is no trace of the pale throat markings<sup>a</sup> or of the black loreal stripe,<sup>b</sup> all of which are present in *T. jugularis*; the length of ear is stated to be 37 mm., while in none of the specimens of *T. jugularis* does this measurement, taken with the greatest possible amplitude, exceed 32 mm.

Measurements of *Tragulus* of the *Napu* group.

Name.	Locality.	Number.	Sex.	Total length.	Head and body.	Tail vertebrae.	Hind foot.	Hind foot without hoofs.
				mm.	mm.	mm.	mm.	mm.
<i>Tragulus napu</i> .....	Tapanuli Bay ..	114432	Male young ..	560	480	80	135	120
Do .....	do .....	114433	do .....	425	370	55	120	107
Do .....	do .....	114434	Male adult ...	620	550	70	147	130
Do .....	do .....	114435	Male young ..	530	470	60	135	121
<i>Tragulus amoenus</i> ...	Pulo Mansalar..	141562	Female young	498	433	65	119	117
Do .....	do .....	<sup>a</sup> 114563	Male adult ..	520	520	---	129	115
<i>Tragulus jugularis</i> ..	do .....	114564	Female adult.	590	515	75	128	111
Do .....	do .....	114565	Female young	560	480	80	131	115
Do .....	do .....	114566	Female adult.	595	515	80	135	120
Do .....	do .....	114567	do .....	597	532	65	130	117
Do .....	do .....	114568	do .....	570	495	75	132	118
Do .....	do .....	114569	do .....	580	500	80	138	123
Do .....	do .....	114573	do .....	670	590	80	133	120
Do .....	do .....	114576	do .....	<sup>b</sup> 558	540	<sup>b</sup> 18	133	118
Do .....	do .....	114577	do .....	650	580	70	130	115
Do .....	do .....	114579	do .....	628	558	70	137	124
Do .....	do .....	114580	do .....	608	533	73	133	119
Do .....	do .....	114570	Male adult ...	585	510	75	133	119
Do .....	do .....	114571	do .....	578	505	73	129	115
Do .....	do .....	114572	Male young ..	515	450	65	118	104
Do .....	do .....	<sup>a</sup> 114574	Male adult ...	578	513	65	130	114
Do .....	do .....	114575	do .....	618	538	80	133	118
Do .....	do .....	114578	do .....	575	505	70	126	111

<sup>a</sup> Type.

<sup>b</sup> Tail imperfect.

TRAGULUS KANCHIL (Raffles).

1822. *Maschus kanchil* RAFFLES, Trans. Linn. Soc. London, XIII, p. 262; Bencoolen, Sumatra.

1902. *Tragulus kanchil* STONE and REHN, Proc. Acad. Nat. Sci. Philadelphia, 1902, p. 128, June 4, 1902.

Twelve specimens were taken at Tapanuli Bay, Sumatra. For measurements, see table, page 446. In nine of these the diagonal dark throat stripes are united anteriorly, while in three they are separated by the forward prolongation of the median white stripe. The series is very uniform in both size and coloration, and none of the specimens show any approach toward the peculiarities of the forms inhabiting the Banjak Islands.

<sup>a</sup> Die Halsgegend ist ringsherum tief schwarzbraun und zeigt keine Spur von hellen Binden an der Vorderseite und an der Oberbrust.

<sup>b</sup> Vom Auge zur Nase ist ein dunkler Streif nicht wahrnehmbar, sondern der Kopf ist ebenso gefärbt wie der Rücken und nur über den Augen und auf der Oberlippe ist ein heller Strich angedeutet.

## TRAGULUS BREVIPES, new species.

*Type*.—Adult female (skin and skull). Cat. No. 114326, U.S.N.M. Collected on Pulo Bangkaru, Banjak Islands, January 20, 1902, by Dr. W. L. Abbott. Original number, 1443.

*Characters*.—General size as in *Tragulus kanchil*, but ears and feet much shorter. Coloration slightly paler than in the Sumatran animal, but of exactly the same type. Skull with rostral portion more slender than in the related species.

*Color*.—Back a fine grizzle of black and light orange-buff, the former slightly in excess. Sides buff-yellow, a little clouded by the black hair-tips. Outer surface of legs bright orange-buff, the hairs of the front legs with faintly indicated black tips, those of the hind legs rather strongly shaded with black. Nape-stripe clear black, sharply contrasted with the dull, slightly grizzled, orange-buff sides of neck. Crown blackish, the hairs very obscurely annulated with dull yellowish brown. Cheek from below outer canthus of eye to muzzle dirty cream color, in rather strong contrast with surrounding parts. Under parts and inner surface of legs white. Median line of chest with a narrow, grizzled brown stripe, and middle of belly with an obscure buffy wash. Throat pattern normal, the brown stripes strongly grizzled and considerably darker than sides of neck, confluent in front. Collar narrow but well defined, concolor with sides of neck. Tail clear, dull, orange-buff above, pure white below and at tip.

*Skull and teeth*.—In size and general form the skull closely resembles that of *Tragulus kanchil* and *T. ruscus*, but the rostrum is distinctly narrower than in any of the specimens of the related species—a difference easily appreciable on comparison. Teeth as in *Tragulus kanchil*.

*Measurements*.—External measurements of type: Total length, 520; head and body, 450; tail vertebrae, 70; hind foot, 108 (98).

Cranial measurements of type: Greatest length, 97 (95);<sup>a</sup> basal length, 90 (89); basilar length, 85 (83); diastema, 11.4 (10.4); length of nasals, 29.6 (28); greatest breadth of nasals posteriorly, 12 (12.6); least interorbital breadth, 26 (28); breadth of palate at middle of diastema, 11 (13.6); zygomatic breadth, 42 (42); mandible, 77 (73); maxillary tooth row (alveoli), 34 (32.6); mandibular tooth row (alveoli), 41.4 (35).

*Specimens examined*.—One, the type.

*Remarks*.—In its small feet and pale color *Tragulus brevipes* suggests *T. pallidus*, but the latter is a much more pallid animal and its skull has an exceedingly short, heavy rostrum.

<sup>a</sup>Measurements in parenthesis are those of an adult female *Tragulus kanchil* from Tapanuli Bay, Sumatra (No. 114421).

## TRAGULUS RUSSEUS, new species.

*Type*.—Adult male (skin and skull), Cat. No. 114337, U.S.N.M. Collected on Pulo Tuangku, Banjak Islands, February 15, 1902, by Dr. W. L. Abbott. Original number, 1518.

*Characters*.—Size and general appearance as in *Tragulus fulviventris* Gray,<sup>a</sup> but brown throat stripes not as dark and white stripes often obsolete and occasionally absent.

*Color*.—Type: General color above orange-ochraceous, slightly paler on sides and darkening to raw sienna on neck and outer surface of limbs. The hairs of the back are tipped with black, which, when the fur is undisturbed, forms a dark shading decidedly in excess of the orange-ochraceous. Across shoulders this shading deepens rapidly into the clear black nape stripe. On sides of body and neck the lighter color is in excess of the black, which practically disappears along lower edge of sides, where the color passes into the clear raw sienna of legs and very pale orange-ochraceous with which the under parts are suffused. Crown blackish, strongly grizzled with yellowish brown. Cheeks distinctly paler than neck, the exact color intermediate between the buff-yellow and straw-yellow of Ridgway. Muzzle darker and duller than cheeks. An indistinct pale line borders dark color of crown from ear to muzzle. Ears blackish. Chest and belly pale orange-ochraceous, fading nearly to ochraceous buff in axillary region, and with white markings as follows: (1) A large patch in hypogastric region, continued downward along inner side of hind legs and forward as two narrow stripes to about level of diaphragm; and (2) a narrow stripe on each side of median line of chest. Chin white to about 10 mm. behind median bare area, the posterior outline of the white nearly straight, and 55 mm. in length. Behind this the region usually occupied by the white throat stripes presents a peculiar mottled aspect, due to the fact that the white is mostly replaced by clear orange-ochraceous, which forms no distinct contrast with the collar and dark stripes, both of which are essentially like sides of neck, therefore distinctly grizzled. The white persists as a semilunar spot 20 mm. wide by 10 mm. long (the concavity directed backward), the remnant of the posterior extremity of the median stripe, and a very faint, easily overlooked trace of each of the lateral stripes. The collar sends back a dark median stripe 90 mm. in length between the two white chest stripes. Inner surface of front leg with a few whitish hairs, not enough to produce a white area. Tail white beneath and at tip, concolor with flanks above.

While the type represents the more extreme phase of the species, one specimen (female Cat. No. 114336, U. S. N. M., original number 1507), carries the peculiarities much further. In this the white is all replaced

<sup>a</sup>See Stone and Rehn, Proc. Acad. Nat. Sci. Philadelphia, 1902, p. 131, June 4, 1902.



by orange-ochraceous except a very narrow line along under surface of tail, and two faint traces 20 mm. in length on middle of chest. In the majority of specimens the under parts are as in the type, except that the white areas are slightly more extended and the throat markings are normal in extent and pattern. The dark throat stripes, however, are never as dark as those of *T. kanchil* or as those of the specimen described as *T. fulviventor* by Stone and Rehn.

*Skull and teeth.*—Except that they are larger throughout, the skull and teeth are essentially as in the *Tragulus fulviventor* of Stone and Rehn.

*Measurements.*—External measurements of type: Total length, 505 (440);<sup>a</sup> head and body, 455 (400); tail vertebrae, 60 (40); hind foot, 120 (113); hind foot without hoofs, 110 (103); ear from meatus, 29 (—); ear from crown, 22 (15). Average of eight males from the type locality: Total length, 531 (505–563); head and body, 467 (450–493); tail vertebrae, 65 (55–70);<sup>a</sup> hind foot, 120.3 (116–125); hind foot without hoofs, 107.9 (104–113). Average of four females from the type locality: Total length, 525 (500–540); head and body, 458 (435–470); tail vertebrae, 68.8 (65–70); hind foot, 118.8 (117–120); hind foot without hoofs, 107.3 (106–109). For details see table, page 446.

Cranial measurements of type: Greatest length, 99 (—);<sup>a</sup> length frominion to tip of premaxillaries, 97 (86); basal length, 91 (—); basilar length, 85 (—); length of nasals, 31.4 (24); diastema, 8 (7); zygomatic breadth, 45 (41); least interorbital breadth, 28 (25); width of palate between anterior molars, 17.8 (16.4); front of orbit to tip of premaxillary, 44.4 (41.6); mandible, 78 (73); maxillary toothrow (alveoli), 35 (32); mandibular toothrow (alveoli), 41 (37).

*Specimens examined.*—Fifteen, all from Pulo Tuangku.

*Remarks.*—This species is readily distinguishable from *Tragulus kanchil* by its smaller size, brighter, more fulvous color, the greater extension of the fulvous wash on belly and chest, and the character of the throat markings. It is evidently more closely related to *Tragulus fulviventor*. With this animal it agrees in size and in the general type of coloration, but differs in the very light color of the brown throat markings and the tendency of the white stripes to become obsolete, in the latter peculiarity showing an interesting parallelism with *Tragulus jugularis* of Pulo Mansalar. Of *Tragulus fulviventor* I have examined the specimen described by Stone and Rehn, and Mr. Oldfield Thomas has sent the following measurements of Gray's type, an adult female in the British Museum: Head and body (skin), 450; hind foot with hoof, 122; basal length of skull, 84; palatal length, 59; interorbital breadth, 24.5; combined length of three upper premolars, 18.5; combined length of three lower premolars, 18.5.

<sup>a</sup>Measurements in parentheses are those of the specimen *Tragulus fulviventor* of Stone and Rehn, male adult, No. 642, Philadelphia Academy of Sciences.

Measurements of *Tragulus of the kanchil group.*

Name.	Locality.	Number.	Sex.	Total length.	Head and body.	Tail vertebre.	Hind foot.	Hind foot without hoofs.
<i>Tragulus kanchil</i> ...	Tapanuli Bay ...	114417	Male adult ...	mm. 503	mm. 433	mm. 70	mm. 123	mm. 111
Do .....	do .....	114418	do .....	520	410	80	127	115
Do .....	do .....	114419	do .....	507	432	75	118	107
Do .....	do .....	114420	do .....	537	442	95	128	115
Do .....	do .....	114426	do .....	485	425	60	121	108
Do .....	do .....	114427	do .....	500	430	70	124	111
Do .....	do .....	114421	Female adult .	548	468	80	128	115
Do .....	do .....	114422	do .....	537	457	80	128	114
Do .....	do .....	114423	do .....	545	470	75	120	108
Do .....	do .....	114424	do .....	535	465	70	121	109
Do .....	do .....	114425	do .....	520	450	70	125	113
Do .....	do .....	114428	do .....	495	430	65	121	108
<i>Tragulus brevipes</i> ...	Pulo Bangkaru .	114326	do .....	520	450	70	109	98
<i>Tragulus russicus</i> ...	Pulo Tuangku .	114328	Male adult ...	b 510	480	b 30	118	104
Do .....	do .....	114329	do .....	563	493	70	122	110
Do .....	do .....	114331	do .....	520	455	65	123	110
Do .....	do .....	114333	do .....	540	470	70	120	107
Do .....	do .....	a 114337	do .....	515	455	60	116	104
Do .....	do .....	114339	do .....	c 520	c 415	c 65	118	107
Do .....	do .....	114340	do .....	555	485	70	125	113
Do .....	do .....	114341	Male young ...	500	430	70	110	98
Do .....	do .....	114342	Male adult ...	505	450	55	120	108
Do .....	do .....	114330	Female adult .	540	470	70	119	107
Do .....	do .....	114332	do .....	520	455	65	120	109
Do .....	do .....	114334	Female young	382	327	55	100	89
Do .....	do .....	114335	do .....	500	435	65	110	98
Do .....	do .....	114336	Female adult .	500	435	70	117	106
Do .....	do .....	114338	do .....	510	470	70	119	107

<sup>a</sup>Type.<sup>b</sup>Tail imperfect.<sup>c</sup>Estimated from dry skin.

## FAMILY SUIDÆ.

## SUS VITTATUS Müller and Schlegel.

1839-1844. *Sus vittatus* MÜLLER and SCHLEGEL, Verhandl. over de natuurlijke Geschiedenis der Nederl. overzeesche bezittingen, p. 173; Java.

Nine specimens (skins with skulls) as follows: Simalur Island, 4; Pulo Babi, 3; Pulo Tuangku, 2. For measurements see table, p. 446.

It is possible that more than one form is represented by this series. The pig of Simalur Island is considerably smaller than that of Pulo Babi; and that of Pulo Tuangku, judged by the skulls rather than by the external measurements, is intermediate in size, though near the Pulo Babi animal. In the absence of Javan material, however, it seems unsafe to attempt to distinguish the insular races.

Measurements of *Sus vittatus*.

Locality.	Number.	Sex.	Total length.	Head and body.	Tail.	Hind foot.	Hind foot without hoof.
Simalur Island .....	114177	Female adult .....	mm. 1,185	mm. 1,030	mm. 155	mm. 222	mm. 182
Do .....	114179	do .....	1,245	1,070	175	213	178
Do .....	114180	do .....	1,125	995	130	212	179
Do .....	114178	Male adult .....	1,375	1,175	200	244	206
Pulo Babi .....	114282	Female adult .....	1,320	1,120	200	245	195
Do .....	114283	Male adult .....	1,420	1,200	220	250	210
Pulo Tuangku .....	114415	Female adult .....	1,380	1,170	210	230	190
Do .....	114416	Male adult .....	1,300	1,060	240	265	225

## FAMILY SCIURIDÆ.

## RATUFA FEMORALIS, new species.

*Type*.—Adult female (skin and skull), Cat. No. 114361, U.S.N.M. Collected on Pulo Tuangku, Banjak Islands, January 27, 1902, by Dr. W. L. Abbott. Original number, 1479.

*Characters*.—General appearance as in *Ratufa banguranensis*, but color, particularly of face, feet, and under parts not as dark, and short hair of under surface of tail not forming a conspicuous, dark, median stripe. Pale flank patch more conspicuous than in any other known species.

*Color*.—Type: Upper parts and outer surface of limbs raw sienna, everywhere overlaid with pale ecru-drab, the combination very difficult to describe. The shorter hairs are raw sienna throughout (except slate-gray base), the longer, coarser ones light ecru-drab with indistinct dark tips. Many of the longer hairs are rather distinctly annulated. The general effect is intermediate between the clear, pale, upper surface of *Ratufa affinis* and the distinctly grizzled *R. pyrsonota*. On crown and forehead the brown nearly disappears and the ecru-drab lightens almost to cream color. On sides of body and outer surface of legs the ecru-drab gradually gives place to the raw sienna, which darkens nearly to tawny on forearm. Under parts and inner surface of legs raw sienna, paler and duller than that of back and sides and fading almost to buff in axillary region and at front of thigh. Pale flank patch well defined, whitish cream buff in strong contrast with surrounding parts. Cheeks and chin to level of ears grizzled smoke gray. Patch 10 mm. in diameter at base of whiskers, whitish gray. Ears concolor with cheeks internally, prouts brown externally. Feet prouts brown, blackening on toes, the brown extending around wrists and ankles, but much mixed with raw sienna on inner side. Tail dark prouts brown, irregularly washed with raw umber (somewhat paler than that of Ridgway), perhaps as the result of incipient bleaching. Most of the hairs of the sides of the tail are dull buff from base to about middle. This color produces a faintly suggested light median area on under surface, but not distinctly enough to form any marked contrast with edge or with the short prouts-brown appressed hairs of median line.

*Skull and teeth*.—The skull and teeth closely resemble those of *Ratufa banguranensis*, but the interpterygoid space and nasal branches of the premaxillaries are narrower, and the premolar, both above and below, is larger.

*Measurements*.—External measurements of type: Total length, 690; head and body, 320; tail vertebrae, 370; hind foot, 72 (68). Average of eight adults from type locality: Total length, 700 (670–740); head and body, 321 (310–335); tail, 378 (360–405); hind foot, 72.6 (70–76); hind foot without claws, 67 (65–69). For details see table, page 450.

Cranial measurements of type: Greatest length, 62; basal length, 52; basilar length, 49; length of nasals, 20; least interorbital breadth, 23.4; zygomatic breadth, 37; mandible, 36.6; maxillary molar series (alveoli), 12.8; mandibular molar series (alveoli), 13.6.

*Specimens examined.*—Eight, all from Pulo Tuangku.

*Remarks.*—This squirrel is undoubtedly a near ally of the *Ratufa affinis aureireuter* of Bonhote.<sup>a</sup> It differs so widely, however, from Geoffroy's original description of *Sciurus aureireuter* that I have no hesitation in applying to it a new name.

RATUFA NIGRESCENS, new species.

*Type.*—Adult female (skin and skull), Cat. No. 114556, U.S.N.M. Collected on Pulo Mansalar off Tapanuli Bay, Sumatra, March 11, 1902, by Dr. W. L. Abbott. Original number 1641.

*Characters.*—One of the largest known members of the *affinis-bunguranensis* group. Color pattern as in *Ratufa bunguranensis* and *R. femoralis*, but upper parts and tail darkened almost to black. Pale flank patch obsolete.

*Color.*—*Type:* The upper parts at first sight appear to be black, but on closer inspection the color is seen to be seal brown, which in certain lights shows faint traces of raw umber. On sides of body and neck and outer surface of legs the raw umber slightly predominates and the hairs show a fine grizzle, due to minute annulations of the lighter color. Under parts and inner surface of legs raw umber, paler in axillary region and at front of thigh. Pale flank patch barely indicated by a sprinkling of cream buff hairs. Cheeks and chin to level of ears a fine grizzle of blackish and whitish; region surrounding base of whiskers slightly paler. Ears blackish externally, concolor with cheeks internally. Feet blackish. Tail uniform seal brown like back above, the basal half of the hairs tinged with dull raw umber. This color appears irregularly at the surface when hairs are disarranged, but without forming any noticeable contrast with the seal brown. The under surface of tail appears at first sight the same as the upper, but on disarranging the hairs many of them are seen to be rather thickly annulated with cream buff bands, of which there are usually about six, for the most part confined to the basal half. In certain lights these annulations produce the faint indication of a light median area, most noticeable on basal third of tail.

*Skull and teeth.*—The skull and teeth show no marked peculiarities. In general form the skull is longer and narrower than that of *Ratufa bunguranensis*. Teeth, as in *R. bunguranensis*, therefore relatively smaller than in *R. femoralis*.

*Measurements.*—External measurements of type: Total length, 750; head and body, 340; tail vertebrae, 410; hind foot, 78 (70). Average of five adult females from the type locality: Total length, 728 (705-750)

<sup>a</sup> Ann. and Mag. Nat. Hist., 7th ser., V, June, 1900, p. 495.

head and body, 332 (320-340); tail vertebrae, 396 (365-410); hind foot, 77.2 (75-79); hind foot without claws, 70.4 (69-72). For details see table, page 450.

Cranial measurements of type: Greatest length, 66 (64);<sup>a</sup> basal length, 55 (54); basilar length, 52 (50); length of nasals, 21.4 (21); least interorbital breadth, 25 (26); zygomatic breadth, 38 (40); mandible, 40.4 (40); maxillary tooth row, 13 (12.6); mandibular tooth row, 14 (13).

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

*Remarks*.—The five specimens of *Ratufa nigrescens* show no individual variation worthy of note. This squirrel—one of the most striking of the genus—is immediately recognizable by its rich blackish-brown upper parts and tail and yellowish-brown under parts. The tail is apparently more bushy than in the related species.

#### RATUFA PALLIATA Miller.

1902. *Ratufa bicolor hypoleuca* Stone and Rehn, Proc. Acad. Nat. Sci. Philadelphia, 1902, p. 134, June 4, 1902. Not *Sciurus hypoleucos* Horsfield.

1902. *Ratufa palliata* Miller, Proc. Acad. Nat. Sci. Philadelphia, 1902, p. 147, June 11, 1902; Indragiri River, Sumatra.

An immature female was taken at Tapanuli Bay, Sumatra, March 28, 1902. For measurements see table, page 450. It closely agrees with the original specimens of *Ratufa palliata* and with the skin from the Lampong district, recorded by Stone and Rehn as *R. hypoleuca*.<sup>b</sup>

#### RATUFA LÆNATA, new species.

(Plate XIX.)

*Type*.—Adult male (skin and skull), Cat. No. 114350, U.S.N.M. Collected on Pulo Tuangku, Banjak Islands, January 27, 1902, by Dr. W. L. Abbott. Original number, 1478.

*Characters*.—Externally similar to *Ratufa palliata*, but hind foot not as long (see table of measurements, p. 450); general form of skull as in *R. palliata*, but nasal branches of premaxillaries extending farther behind nasals, and anterior median termination of maxillaries narrower.

*Color*.—The color of *Ratufa lænata* so closely resembles that of *R. palliata* as to need no detailed description. The twelve skins show considerable variation in color, due partly to the greater or less suffusion of dark brown in the mantle, and partly to bleaching. None, however, shows any approach toward *R. bicolor* or *R. melanocephala*.

*Skull and teeth*.—While the general form of the skull shows no characters by which it may be distinguished from that of *Ratufa palliata*, the outline of certain individual bones is peculiar to the Tuangku animal. In *R. palliata* the premaxillaries scarcely extend behind the nasals, while in *R. lænata* their posterior extremity is

<sup>a</sup> Measurements in parentheses are those of a considerably older female of *Ratufa bunguranensis* (No. 104636).

<sup>b</sup> For the opportunity to examine this specimen I am indebted to the kindness of Mr. Witmer Stone and the officers of the Academy of Natural Sciences of Philadelphia.

usually from 2 to 4 mm. behind that of nasals (see Plate XIX). The bony palate in *R. lænata* is narrower relatively to its length than in *R. palliata*, and the anterior extension of the maxillaries which runs forward between the posterior extremities of the premaxillaries to form hinder margin of incisive foramina is very noticeably narrower (see Plate XIX). In most of the skulls the anterior extremity of the interpterygoid space is narrower than in the related species, but their character is not wholly constant.

Teeth as in *Ratufa palliata*.

*Measurements.*—External measurements of type: Total length, 740; head and body, 330; tail vertebrae, 410; hind foot, 76 (68). Average of eleven adults from the type locality: Total length, 732 (710–765); head and body, 334 (325–345); tail vertebrae, 398 (380–420); hind foot, 75.8 (73–79); hind foot without claws, 68.7 (65–71). For details see table, page 450.

Cranial measurements of type: Greatest length, 68.6 (68);<sup>a</sup> basal length, 56.8 (57); basilar length, 52 (53); length of nasals, 22 (21); least interorbital breadth, 27 (29); zygomatic breadth, 41 (42); mandible, 43.4 (42); maxillary molar series (alveoli), 13 (12.8); mandibular molar series (alveoli), 13.6 (13.8).

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

*Remarks.*—The characters which distinguish this squirrel from its nearest ally are of an unusual kind, but their constancy is such that they must be regarded as valid. Three skulls of adult *Ratufa palliata* have been compared with the twelve of *R. lænata*.

*Measurements of Ratufa.*

Name.	Locality.	Number.	Sex.	Total length.	Head and body.	Tail.	Hind foot.	Hind foot without claws.
				mm.	mm.	mm.	mm.	mm.
<i>Ratufa nigrescens</i> ...	Pulo Mansalar..	114554	Female adult.	730	320	410	78	71
Do .....	do .....	114555	do .....	750	340	410	79	72
Do .....	do .....	114556	do .....	750	340	410	78	70
Do .....	do .....	114557	do .....	705	320	385	75	69
Do .....	do .....	114558	do .....	705	340	365	76	70
<i>Ratufa femoralis</i> ...	Pulo Tuangku..	114358	Male adult	710	325	385	71	66
Do .....	do .....	114359	do .....	710	325	385	73	67
Do .....	do .....	114365	do .....	685	310	375	72	67
Do .....	do .....	114360	Female adult.	715	325	390	75	68
Do .....	do .....	114361	do .....	690	320	370	72	68
Do .....	do .....	114362	do .....	680	320	360	70	65
Do .....	do .....	114363	do .....	670	310	360	72	66
Do .....	do .....	114364	do .....	740	335	405	76	69
<i>Ratufa lænata</i> ...	do .....	114346	Male adult	720	335	385	76	68
Do .....	do .....	114348	do .....	720	330	390	76	68
Do .....	do .....	114350	do .....	740	330	410	76	68
Do .....	do .....	114352	do .....	755	338	417	79	71
Do .....	do .....	114353	do .....	685	315	370	72	65
Do .....	do .....	114356	do .....	735	345	390	73	66
Do .....	do .....	114354	do .....	710	340	380	77	70
Do .....	do .....	114357	do .....	725	325	400	77	71
Do .....	do .....	114347	Female adult.	730	330	400	76	69
Do .....	do .....	114349	do .....	730	330	400	75	68
Do .....	do .....	114351	do .....	765	345	420	76	71
Do .....	do .....	114355	do .....	720	330	390	74	67
<i>Ratufa palliata</i> ...	Tapanuli Bay ..	114517	Female young	640	270	370	80	77
Do .....	Indragiri River.	113162	Male adult	770	345	425	84	78

<sup>a</sup>Type.

<sup>a</sup>Measurements in parentheses are those of the type of *Ratufa palliata*.

## SCIURUS MANSALARIS, new species.

*Type*.—Adult male (skin and skull), Cat. No. 114633, U.S.N.M. Collected on Pulo Mansalar, off Tapanuli Bay, Sumatra, March 2, 1902, by Dr. W. L. Abbott. Original number, 1583.

*Characters*.—Size and general appearance about as in *Sciurus tenuis*, but underparts clear gray as in *S. brookei*.

*Color*.—Upperparts, sides of body, and outer surface of limbs a uniform fine grizzle of raw sienna and black, neither of which distinctly predominates, though the raw sienna is slightly in excess on shoulders, flanks, and outer surface of legs. Feet and sides of head like back, but paler and more closely grizzled. Underparts and inner surface of legs mouse gray washed with dull white. On chest and hind legs there is a faint brownish tinge. Hairs of tail with six color bands: (a) extreme base black, (b) 1.5 mm. raw sienna, (c) 2 mm. black, (d) 4 mm. raw sienna, (e) 6 mm. black, (f) 4 mm. whitish cream buff. The general effect above is a coarse grizzle, chiefly of black and whitish cream buff, through which the raw sienna appears when the hairs are disarranged. Below there is a broad median area of dull raw sienna edged with black, this fringed with whitish.

*Skull and teeth*.—The skull very closely resembles that of *Sciurus tenuis* but is a little narrower, longer, and deeper, characters that suggest, though very remotely, the much larger skull of *S. brookei*. Teeth as in *Sciurus tenuis*.

*Measurements*.—External measurements of type: Total length, 255; head and body, 140; tail vertebræ, 115; hind foot, 37 (35). Average of eight specimens from the type locality: Total length, 259 (245–278); head and body, 146.5 (135–158); tail vertebræ, 112 (8–122); hind foot, 37 (36–38); hind foot without claws, 35.4 (33–35). For details see table, page 452.

Cranial measurements of type: Greatest length, 38; basal length, 32; basilar length, 29; length of nasals, 12; least interorbital breadth, 13; zygomatic breadth, 22.6; diastema, 8.8; mandible, 24; maxillary tooth row (alveoli), 7.4; mandibular tooth row (alveoli), 7.

*Specimens examined*.—Eight, all from Pulo Mansalar.

*Remarks*.—This squirrel is readily distinguishable from *Sciurus tenuis* by its clear gray underparts, a character that gives it a close superficial resemblance to the much larger *S. brookei* of Borneo. Its relationships are undoubtedly with *Sciurus tenuis*, as the skull shows only a slight tendency toward the relatively narrow, elongate form characteristic of the Bornean species.

## SCIURUS BANCARUS, new species.

*Type*.—Adult male (skin and skull), Cat. No. 114311 U.S.N.M. Collected on Pulo Bangkaru, Banjak Islands, January 17, 1902, by Dr. W. L. Abbott. Original number, 1422.

*Characters.*—Very similar to *Sciurus mansularis*, but brown of upper parts more tinged with yellow and gray of underparts distinctly washed with whitish cream buff.

*Measurements.*—In size this animal closely agrees with *Sciurus mansularis*, as shown by the table of measurements, page 452.

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

*Remarks.*—The characters which distinguish this squirrel from its relative of Pulo Mansalar are so strictly comparative that it is impossible to state them in such a manner as to insure positive identification of single specimens. Comparison of the eight skins of one form with the ten of the other shows, however, that the slight differences are remarkably constant, so much so that, with the exception of a single specimen from each series, there is no difficulty in assigning every skin to its proper place.

#### SCIURUS TENUIS Horsfield.

1824. *Sciurus tenuis* HORSFIELD, Zoological researches in Java and the neighbouring islands (pages not numbered); Singapore.

Five skins from Tapanuli Bay, Sumatra. They are in all respects typical, and show no approach to *Sciurus mansularis* and *S. bancarus*. For measurements see table, page 452.

*Measurements of Sciurus bancarus, S. mansularis, and S. tenuis.*

Name.	Locality.	Number.	Sex.	Total length.	Head and body.	Tail.	Hind foot.	Hind foot without claws.
<i>Sciurus bancarus</i> ...	Pulo Bangkaru.	114308	Male, adult ..	mm. 262	mm. 150	mm. 112	mm. 36	mm. 32
Do .....	do .....	114309	do .....	266	160	106	36	32
Do .....	do .....	a 114311	do .....	260	145	115	37	34
Do .....	do .....	114312	do .....	265	145	120	35	32.5
Do .....	do .....	114313	do .....	267	142	125	37	34
Do .....	do .....	114315	do .....	255	162	93	35	32
Do .....	do .....	114310	Female, adult	264	155	109	35	32
Do .....	do .....	114314	do .....	275	150	125	37	34
Do .....	do .....	114316	do .....	253	139	114	35	32
Do .....	do .....	114317	do .....	265	145	120	36	33
<i>Sciurus mansularis</i> ..	Pulo Mansalar..	114632	Male, adult ..	245	147	98	38	35
Do .....	do .....	a 114633	do .....	255	140	115	37	35
Do .....	do .....	114634	do .....	270	148	122	36	33
Do .....	do .....	114636	do .....	260	150	110	36	33
Do .....	do .....	114637	do .....	255	145	110	38	35
Do .....	do .....	114635	Female, adult	245	135	110	36	33
Do .....	do .....	114638	do .....	278	158	120	38	35
Do .....	do .....	114639	do .....	263	150	113	37	34
<i>Sciurus tenuis</i> .....	Tapanuli Bay ..	114542	Male, adult ...	255	140	115	35	32
Do .....	do .....	114545	do .....	235	120	115	34	31.4
Do .....	do .....	114543	Female, adult	255	140	115	36	33
Do .....	do .....	114544	do .....	220	117	103	34	32
Do .....	do .....	114546	do .....	235	125	110	36	33

a Type.

#### SCIURUS ALBESCENS (Bonhote).

1901. *Sciurus notatus albescens* BONHOTE, Ann. and Mag. Nat. Hist., 7th ser., VII, May, 1901, p. 446; Acheen, Sumatra.

Six specimens from Loh Sidoh Bay, practically topotypes of the species. For measurements see table, page 456.



This squirrel shows a striking and unexpected resemblance to the *Sciurus abbottii* of the Tambelan Islands. The skins are quite indistinguishable, except that the red element of the underparts is salmon rather than rusty. The skulls show certain slight though constant differences. The rostrum is somewhat broader proportionately to its length in the Sumatran animal, and the audital bullæ are more inflated. The maxillary teeth of *Sciurus albescens*, while of the same general size as in *S. abbottii*, may be distinguished by their less thickened crowns, a character easily appreciated on comparison of the tooth rows viewed from the lingual side.

#### SCIURUS VITTATUS Raffles.

1822. *Sciurus vittatus* RAFFLES, Trans. Linn. Soc. London, XIII, p. 259; Ben-coolen, Sumatra.

1901. *Sciurus vittatus* BONNOTE, Ann. and Mag. Nat. Hist., 7th ser., VII, May, 1901, p. 447. (Part.)

Twelve specimens (two in alcohol, one skull without skin) from Tapanuli Bay, Sumatra. For measurements see table, page 456. The skins present no color variation worthy of note. In none is there any indication of such red in the tail as is characteristic of *Sciurus miniatus*, though a few show a tendency for the light annulations in the pencil to be more tinged with orange than they are elsewhere.

#### SCIURUS SATURATUS, new species.

*Type*.—Adult female (skin and skull). Cat. No. 114629, U.S.N.M. Collected on Pulo Mansalar, off Tapanuli Bay, Sumatra, March 9, 1902, by Dr. W. L. Abbott. Original number, 1633.

*Characters*.—Similar to *Sciurus vittatus* but general color darker, pale lateral stripe less well defined, though of normal extent, and tail noticeably darker than back, its pencil mostly black.

*Color*.—Type: Upper parts and sides a uniform fine grizzle of black and ochraceous, the latter decidedly paler and less bright than that of Ridgway. The two colors are everywhere mixed in nearly equal quantity and the hair is distinctly glossy. Outer surface of legs somewhat paler and more buffy than back; cheeks and inner surface of ear decidedly so. A distinct buff eye ring. Muzzle marked with light grayish buff. Lateral stripes of normal extent, the upper one a light grayish buff, quite different from the grayish white stripe of *S. vittatus*. Tail essentially like back, but grizzle coarse, and black element more noticeable, particularly along edge and at tip, where the pencil is almost entirely black. Under parts and inner surface of legs intermediate between the ochraceous-rufous and tawny of Ridgway, but rather darker than either. This color extends to wrist and almost to heel.

*Skull and teeth*.—The skull and teeth resemble those of *Sciurus vittatus*, though perhaps averaging slightly larger.

*Measurements.*—External measurements of type: Total length, 400; head and body, 215; tail vertebrae, 185; hind foot, 51 (47). Average of five adults from the type locality: Total length, 395 (375–411); head and body, 208 (185–221); tail vertebrae, 187 (180–190); hind foot, 51.4 (51–52); hind foot without claws, 48 (47–49). For details see table, page 456.

Cranial measurements of type: Greatest length, 52 (51);<sup>a</sup> basal length, 43.6 (43); basilar length, 40 (40.2); length of nasals, 16.4 (16); breadth of both nasals together anteriorly, 7.4 (8.2); diastema, 11.6 (11.8); least interorbital breadth, 18 (17.8); zygomatic breadth, 30 (30.4); mandible, 32.4 (31.4); maxillary tooth row (alveoli), 9.6 (9.6); mandibular tooth row (alveoli), 10 (9).

*Specimens examined.*—Five, all from Pulo Mansalar.

*Remarks.*—This is a well-marked form of the *Sciurus notatus* group, closely related to *S. vittatus*, but readily distinguishable by its dark general coloration, dull outer lateral stripe, and black-tipped tail. The series shows no variations worthy of special note.

#### SCIURUS PRETIOSUS, new species.

*Type.*—Adult female (skin and skull), Cat. No. 114325, U.S.N.M. Collected on Pulo Bangkaru, Banjarak Islands, January 20, 1902. Original number, 1442.

*Characters.*—Like *Sciurus saturatus*, but average size less, red of underparts not as bright, tail not darker than back, and pencil not darker than rest of tail. Skull distinctly smaller than that of *Sciurus saturatus*.

*Color.*—In general the color so closely resembles that of *Sciurus saturatus* as to need no detailed description. On comparison of the two series the red of the underparts is seen to be less bright than in the Mansalar squirrel, and the pale element in the grizzle of the upperparts less yellow, though so far as possibility of description is concerned the colors are essentially the same. The most tangible difference is in the amount of black in the tail. In the Pulo Bangkaru animal this shows no tendency to form a black pencil or dark lateral fringe, as in *Sciurus saturatus*.

*Skull and teeth.*—Both skull and teeth are smaller than in *Sciurus saturatus* or *S. vittatus*, but I can detect no differences in form.

*Measurements.*—External measurements of type: Total length, 375; head and body, 200; tail vertebrae, 175; hind foot, 46 (43). Average of seven adults from the type locality: Total length, 387 (372–400); head and body, 207 (192–220); tail vertebrae, 181 (170–195); hind foot, 47.6 (46–49); hind foot without claws, 44.3 (43–46). For details see table, page 456.

<sup>a</sup>Measurements in parentheses are those of an adult female *Sciurus vittatus* from Tapanuli Bay, Sumatra (No. 114518).

Cranial measurements of type: Greatest length, 49.4 (52); basal length, 43 (43.6); basilar length, 40.4 (40); length of nasals, 15 (16.4); breadth of both nasals together anteriorly, 7.4 (7.4); distance from front of nasal to back of frontal, 25 (27.6); diastema, 11.6 (11.6); least interorbital breadth, 18 (18); zygomatic breadth, 29 (30); mandible, 32 (32.4); maxillary tooth row (alveoli), 9 (9.6); mandibular tooth row (alveoli), 9.8 (10).

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

*Remarks*.—The specimens of this squirrel show no noteworthy variations.

**SCIURUS UBERICOLOR**, new species.

*Type*.—Adult female (skin and skull), Cat. No. 114373, U.S.N.M. Collected on Pulo Tuangku, Banjak Islands, February 5, 1902, by Dr. W. L. Abbott. Original number, 1517.

*Characters*.—In general appearance like *Sciurus saturatus* and *S. pretiosus*, but red of underparts darker and duller than in either and median line of belly frequently blackish; tail not distinctly darker than back; outer lateral stripe reduced in both length and width; size nearly as in *S. saturatus*.

*Color*.—The general color is closely similar to that of *Sciurus saturatus* and *S. pretiosus*, but the tone of the upperparts is lighter than in the former and more red than in the latter. Tail more coarsely grizzled than back, but the general effect scarcely darker. Outer lateral stripe of the same dull color as in the related forms, but its length usually less and its width generally not more than half as great (about 5 mm. at middle in type). Underparts a duller red than in the related species, this due chiefly to the darker bases of the hairs. Along median line the dark bases increase sufficiently to form a distinct median dusky stripe in some specimens (including the type). The black lateral stripe tends to extend its inner margin in the same manner.

*Skull and teeth*.—The skull and teeth are essentially like those of *Sciurus saturatus*.

*Measurements*.—External measurements of type: Total length, 405; head and body, 215; tail vertebrae, 195; hind foot, 51 (48). Average of seven specimens from the type locality; total length, 389 (345–415); head and body, 215 (205–225); tail vertebrae, 180 (170–210); hind foot, 49.3 (46–51); hind foot without claws, 45.9 (43–48). For details see table, page 456.

Cranial measurements of type: Greatest length, 52; basal length, 44; basilar length, 41.4; length of nasals, 17; breadth of both nasals together anteriorly, 7; distance from front of nasal to back of frontal, 38; diastema, 13; least interorbital breadth, 19; zygomatic breadth, 34; mandible, 34; maxillary toothrow (alveoli), 9.6; mandibular toothrow (alveoli), 9.8.

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

*Remarks.*—While *Sciurus ubericolor* is darker beneath than in either of the two related forms, its upper parts are not as dark as in *S. saturatus* and the tail is much less suffused with black. The reduction of the pale lateral stripe easily distinguishes it from its allies.

*Measurements of squirrels of the Sciurus notatus group.*

Name.	Locality.	Number.	Sex.	Total length.	Head and body.	Tail.	Hind foot.	Hind foot without claws.
				<i>mm.</i>	<i>mm.</i>	<i>mm.</i>	<i>mm.</i>	<i>mm.</i>
<i>Sciurus albescens</i> ....	Loh Sidoh Bay..	114154	Male adult....	343	193	150	46	42
Do .....	do .....	114155	do .....	350	190	160	45	41.4
Do .....	do .....	114157	do .....	390	200	190	47	44
Do .....	do .....	114158	do .....	370	195	175	46	42
Do .....	do .....	114156	Female adult.	350	170	180	46	42
Do .....	do .....	114159	do .....	373	203	170	47	43.4
<i>Sciurus vittatus</i> ....	Tapanuli Bay..	114518	do .....	405	220	185	48	45
Do .....	do .....	114522	do .....	397	200	197	50	47
Do .....	do .....	114523	do .....	398	206	192	47	43
Do .....	do .....	114524	do .....	390	190	200	48	45
Do .....	do .....	114525	do .....	385	205	180	48	45
Do .....	do .....	114526	do .....	380	215	165	48	45
Do .....	do .....	114519	Male adult....	393	208	185	48	46
Do .....	do .....	114520	do .....	395	210	185	50	47
Do .....	do .....	114521	do .....	380	200	180	48	44
<i>Sciurus saturatus</i> ...	Pulo Mansalar..	114627	do .....	411	221	190	52	48.4
Do .....	do .....	114628	do .....	400	220	180	51	48
Do .....	do .....	<sup>a</sup> 114629	Female adult.	400	215	185	51	47
Do .....	do .....	114630	do .....	390	200	190	52	49
Do .....	do .....	114631	do .....	375	185	190	51	47.4
<i>Sciurus ubericolor</i> ..	Pulo Tuangku..	114366	Male adult....	382	207	175	48	45
Do .....	do .....	114367	do .....	400	220	180	50	47
Do .....	do .....	114369	do .....	375	205	170	46	43
Do .....	do .....	114371	do .....	395	210	185	50	46
Do .....	do .....	114368	Female young	310	175	135	47	39
Do .....	do .....	114370	Female adult.	345	225	<sup>c</sup> 120	49	45
Do .....	do .....	114372	do .....	<sup>b</sup> 415	<sup>b</sup> 205	<sup>b</sup> 210	50	46
Do .....	do .....	<sup>a</sup> 114373	do .....	410	215	195	51	48
Do .....	do .....	114374	do .....	415	225	190	51	47
<i>Sciurus pretiosus</i> ....	Pulo Bangkaru.	114318	Male adult....	375	205	170	48	46
Do .....	do .....	114320	do .....	400	205	195	48	45
Do .....	do .....	114321	do .....	372	192	180	47	44
Do .....	do .....	114322	do .....	390	210	180	47	43
Do .....	do .....	114323	do .....	<sup>c</sup> 335	210	<sup>c</sup> 125	48	45
Do .....	do .....	114324	do .....	400	215	185	48	44.4
Do .....	do .....	114319	Female adult.	400	220	180	49	45
Do .....	do .....	<sup>a</sup> 114325	do .....	375	200	175	46	43

<sup>a</sup>Type.

<sup>b</sup>Estimated from dry skin.

<sup>c</sup>Tail injured.

**SCIURUS EREBUS, new species.**

*Type.*—Adult female (skin and skull). Cat. No. 114537, U.S.N.M. Collected at Tapanuli Bay, northwestern Sumatra, March 17, 1902, by Dr. W. L. Abbott. Original number, 1653.

*Characters.*—Similar to the Bornean *Sciurus pluto* Gray, but larger, red area on legs more extensive, and pale lateral stripe completely obliterated.

*Color.*—Under parts and inner surface of limbs bright chestnut (lighter and more red than that of Ridgway); elsewhere glossy black. On cheeks, feet, and outer surface of front legs the black is slightly grizzled with whitish and red, and along flanks and thighs a few hairs bear a single whitish annulation rather less than 1 mm. in length, but these markings are lost in the general black effect, except on very

close inspection. The black of cheeks extends under chin across an area about 10 mm. in width. On front legs the red area is much wider than the black, and on inner side it extends to naked surface of palm. In *S. pluto* the black area is the more extensive, and it encircles the wrist just above palm. On hind legs the same differences occur. The red area is much wider in the Sumatran than in the Bornean form, and it usually extends to edge of naked sole, though occasionally the black narrowly encircles ankle.

*Skull and teeth.*—The skull and teeth so closely resemble those of *Sciurus pluto* that I can detect no tangible differences.

*Measurements.*—External measurements of type: Total length, 485; head and body, 260; tail vertebrae, 225; hind foot, 58 (53). Average of twelve adults from the type locality: Total length, 473 (430–498); head and body, 247 (230–263); tail vertebrae, 227 (200–240); hind foot, 58.1 (57–59); hind foot without claws, 53 (51–55). For details, see table, page 457.

Cranial measurements of type: Greatest length, 58 (56);<sup>a</sup> basal length, 50 (49); basilar length, 46.6 (46); diastema, 13.6 (13.6); length of nasals, 17.8 (16.6); greatest breadth of both nasals together, 8.8 (8.6); least interorbital breadth, 23 (22.6); zygomatic breadth, 34.6 (34); mandible, 37 (37); maxillary toothrow (alveoli), 11 (11); mandibular toothrow (alveoli), 11 (11.4).

*Specimens examined.*—Twelve, all from Tapanuli Bay.

*Remarks.*—While *Sciurus erebus* rather closely resembles *S. pluto*, it is readily distinguishable from the Bornean animal by its greater size and by the absence of the pale lateral stripe. There is not the slightest indication of this stripe in any of the twelve skins, while in each of five specimens of *Sciurus pluto* it may be easily traced. The difference in extent of the red on the legs is a less constant character.

*Measurements of Sciurus erebus.*

Locality.	Number.	Sex.	Total length.	Head and body.	Tail vertebrae.	Hind foot.	Hind foot without claws.
			mm.	mm.	mm.	mm.	mm.
Tapanuli Bay.....	114530	Male adult.....	180	250	230	58	53
Do.....	114531	.....do.....	483	250	233	57	52
Do.....	114533	.....do.....	430	230	200	58	54
Do.....	114534	.....do.....	155	240	215	57	51
Do.....	114539	.....do.....	470	235	235	59	53
Do.....	114541	.....do.....	165	245	220	58	53
Do.....	114532	Female adult.....	498	263	235	59	55
Do.....	114535	.....do.....	480	245	235	59	55
Do.....	114536	.....do.....	180	255	225	58	53
Do.....	114537	.....do.....	485	260	225	58	52
Do.....	114538	.....do.....	485	245	240	59	53
Do.....	114540	.....do.....	170	245	225	57	52

<sup>a</sup>Type.

<sup>a</sup>Measurements in parentheses are those of an adult male *Sciurus pluto* from British North Borneo (No. 34941).

## RHINOSCIURUS LATICAUDATUS (Müller and Schlegel).

1839-1844. *Sciurus laticaudatus* MÜLLER and SCHLEGEL, Verhandl. over de natuurlijke Geschiedenis der Nederl. overzeesche bezittingen, p. 100; Pontianak, Western Borneo.

An adult female was taken on Pulo Tuangku, Banjak Islands, February 15, 1902. Total length, 360; head and body, 230; tail vertebrae, 130; hind foot, 46 (44). Skull: Greatest length, 59; basal length, 52; basilar length, 49.4; palatal length, 31; diastema, 17; length of nasals, 21; breadth of both nasals together anteriorly, 6; least interorbital breadth, 13; zygomatic breadth, 28.6; mandible, 35.6; maxillary tooth-row (alveoli), 12; mandibular tooth-row (alveoli), 10.4. "Uterus contained one embryo the size of a pea. Mammæ, 4."

## FAMILY MURIDÆ.

## MUS SIMALURENSIS, new species.

*Type*.—Adult female (skin and skull), Cat. No. 114216, U.S.N.M. Collected on Simalur Island December 14, 1901, by Dr. W. L. Abbott. Original number, 1372.

*Characters*.—Like *Mus pannosus* of the Butang Islands, but rather smaller; fur shorter and less coarse; color darker and less yellowish; teeth smaller; mammæ 10, as in other members of the group.

*Fur*.—The fur is rather close and fine in texture, much more so than that of *Mus pannosus*, though it contains many grooved bristles. These, however, are scarcely more stiff than the longer terete hairs. At middle of back the body of the fur is about 14 mm. in length, the scattered long hairs exceeding this by about 6 mm. These long hairs show no distinct tendency to increase in length on rump and lumbar region.

*Color*.—Back and sides a moderately coarse, but not very conspicuous grizzle of black and dull ochraceous buff, the former a little in excess on back, the latter distinctly so on sides, and tips of bristles and longer hairs with metallic iridescence. Underparts buff, rather lighter than that of Ridgway, and somewhat clouded by gray along median line of chest. Feet dull brownish. Ears and tail uniform dark brown.

*Skull and teeth*.—The skull is larger than that of *Mus alexandrinus*, though of essentially the same form. In size it closely approaches that of *Mus pannosus*, but the average length appears to be less than in the Butang animal. In form the skulls of *Mus simalurensis* and *M. pannosus* closely resemble each other, except that the rostrum is more slender in the Simalur rat and the incisive foramina are longer, narrower, and more nearly parallel-sided. Teeth as in *Mus pannosus*, but smaller.

*Measurements*.—External measurements of type: Total length, 402;

head and body, 204; tail vertebrae, 198; hind foot, 42.4 (40). Average of 5 adults from the type locality: Total length, 388 (377-402); head and body, 206 (200-213); tail vertebrae, 182 (176-198); hind foot, 40.4 (39.2-42.2); hind foot without claws, 37.8 (36-40). For details, see table, page 459.

Cranial measurements of type: Greatest length, 47.4 (46);<sup>a</sup> basal length, 41.8 (40); basilar length, 39 (37); diastema, 13 (12.4); length of incisive foramen, 9 (8); combined breadth of incisive foramina, 3.4 (3.8); length of nasals, 18 (17.6); greatest breadth of both nasals together, 5.2 (5.6); zygomatic breadth, 23 (22); least interorbital breadth, 7.4 (7); breadth of brain case above roots of zygomata, 17 (17); depth of brain case at front of basioccipital, 12 (11.4); fronto-palatal depth at posterior extremity of nasals, 11.8 (11.6); mandible, 28 (28); maxillary tooth row (alveoli), 8 (8.4), mandibular tooth row (alveoli), 8 (8.4).

*Specimens examined.*—Thirty-two from the following localities: Simalur Island (main island), 8 (2 in alcohol); Simalur Island (Pulo Siumat), 6 (1 skull without skin); Pulo Lasia, 16 (3 in alcohol; 3 skulls without skins); Pulo Babi, 2 (skulls only).

*Remarks.*—This is a well-defined member of the *Mus rattus* group, most closely related, apparently, to the form occurring on the Butang Islands on the opposite side of Sumatra. Its presence on Simalur and the neighboring islands may have been originally due to human agency, though there is no reason to suppose that the animal has been introduced within historic times.

*Measurements of Mus simalurensis.*

Locality.	Number.	Sex.	Total length.	Head and body.	Tail.	Hind foot.	Hind foot without claws.
			<i>mm.</i>	<i>mm.</i>	<i>mm.</i>	<i>mm.</i>	<i>mm.</i>
Simalur Island .....	114214	Male adult .....	389	213	176	39	36
Do .....	114215	do .....	393	211	182	40	36
Do .....	114213	Female young .....	357	190	167	38	35
Do .....	114216	Female adult .....	402	204	198	42.2	40
Do .....	114217	do .....	380	201	179	40	38
Do .....	114218	do .....	377	200	177	41	39
Pulo Siumat .....	114221	Male adult .....	415	224	191	42	38.6
Do .....	114225	do .....	413	212	201	42.4	40
Do .....	114222	Female adult .....	383	204	179	40	38
Do .....	114223	Female young .....	342	172	170	39.6	37
Do .....	114224	Female adult .....	375	198	177	41.4	38.4
Pulo Lasia .....	114257	Male adult .....	433	225	208	43	39.4
Do .....	114260	do .....	417	205	212	41	39
Do .....	114261	do .....	411	210	201	42.4	40
Do .....	114262	Male young .....	385	178	207	42	40
Do .....	114253	Female young .....	356	176	180	40	38
Do .....	114254	Female adult .....	456	231	225	42.2	40
Do .....	114255	do .....	437	225	212	40.4	39
Do .....	114256	Female young .....	370	182	188	40.4	39
Do .....	114258	Female adult .....	445	227	218	43.4	41.2

<sup>a</sup>Type.

<sup>a</sup>Measurements in parentheses are those of an adult female *Mus pannosus* (No. 104115) from Pulo Adang, Butang Islands.

## MUS SURDUS, new species.

*Type*.—Adult male (skin and skull), Cat. No. 114184, U.S.N.M. Collected on Simalur Island December 11, 1901, by Dr. W. L. Abbott. Original number, 1359.

*Characters*.—Similar to *Mus concolor* Blyth and *Mus pullus* Miller, but larger and paler.

*Fur and external characters in general*.—The fur, tail, ears, feet, etc., are as in *Mus concolor* and *Mus pullus*. Mammæ, i. 2-2, p. 2-2=8.

*Color*.—Back and sides a coarse, inconspicuous grizzle of dull ochraceous buff and blackish brown, the former slightly in excess on back and distinctly predominating on sides. Underparts and inner surface of limbs dirty white, tinged with cream buff. In the type there is a fairly well defined line of demarcation between the color of sides and that of belly. This contrast, though not always so conspicuous, is invariably more noticeable than in the type of *Mus pullus* or the two specimens of *Mus concolor* that I have examined. Ears blackish brown externally, lightly sprinkled with fine, silvery hairs internally. Feet dirty whitish.

*Skull and teeth*.—Both skull and teeth are noticeably larger than in *Mus concolor* and *Mus pullus*, but I can detect no tangible difference in form.

*Measurements*.—External measurements of type: Total length, 265; head and body, 127; tail vertebrae, 138; hind foot, 28 (26). Average of 21 adults from the type locality: Total length, 268 (238-324); head and body, 130 (112-143); tail vertebrae, 139 (119-182); hind foot, 27 (26-28.2); hind foot without claws, 25.4 (24-27). For details see table, page 461.

Cranial measurements of type: Greatest length, 33 (30);<sup>a</sup> basal length, 28.6 (26); basilar length, 26 (23); diastema, 8.8 (8); length of incisive foramen, 6.4 (5.4); combined breadth of incisive foramina, 2.8 (2); length of nasals, 12 (11); greatest combined breadth of nasals, 3.4 (3); zygomatic breadth, 15.4 (13.6); least interorbital breadth, 5 (4); breadth of brain case above roots of zygomata, 13.6 (13); depth of brain case at front of basioccipital, 9.6 (9); frontopalatal depth at posterior extremity of nasals, 7.4 (6.6); mandible, 18.8 (15.4); maxillary tooth row (alveoli), 5.6 (4.6); mandibular tooth row (alveoli), 5.6 (4.6).

*Specimens examined*.—Thirty-two (11 in alcohol), all from the type locality.

*Remarks*.—Though closely related to *Mus concolor* and *Mus pullus* this species appears to be well differentiated. Like *Mus simalurensis* it probably owes its introduction and therefore its existence to prehistoric man.

<sup>a</sup> Measurements in parantheses are those of the type of *Mus pullus*.



Measurements of *Mus surdus*.

Locality.	Number.	Sex.	Total length.	Head and body.	Tail.	Hind foot.	Hind foot without claws.
			mm.	mm.	mm.	mm.	mm.
Malur Island .....	114181	Male adult .....	270	130	140	27	25
Do.....	114182	do .....	270	130	140	27	25
Do.....	114183	do .....	264	130	134	26	24
Do.....	<sup>a</sup> 114184	do .....	265	127	138	27.8	26.4
Do.....	114185	do .....	276	132	144	27	26
Do.....	114186	do .....	249	125	121	26.2	25
Do.....	114187	do .....	270	130	140	26.1	25
Do.....	114190	do .....	266	135	131	27	26
Do.....	114191	do .....	272	129	143	26	25
Do.....	114192	do .....	324	142	182	28	27
Do.....	114193	do .....	285	143	142	28	26
Do.....	114194	do .....	298	143	155	28	26.4
Do.....	114196	do .....	285	134	151	28.2	26
Do.....	114198	do .....	269	129	140	26	24.4
Do.....	114200	do .....	273	133	140	27.2	26
Do.....	114201	do .....	260	135	125	28	27
Do.....	114188	Female adult .....	240	121	119	26	25
Do.....	114189	do .....	243	116	137	27	25
Do.....	114195	do .....	238	112	126	26	25
Do.....	114197	do .....	268	124	144	28	26
Do.....	114199	do .....	251	125	126	26.2	25

<sup>a</sup> Type.

## MUS FIRMUS Miller.

1902. *Mus firmus* MILLER, Proc. Acad. Nat. Sci. Philadelphia, 1902, p. 155; June 11, 1902; Linga Island, off east coast of Sumatra.

An immature rat taken at Tapanuli Bay, 8 specimens (1 in alcohol) from Pulo Tuangku, and 7 (1 skull without skin) from Pulo Bangkaru I can not distinguish satisfactorily from the *Mus firmus* of Linga Island. The skins from Pulo Bangkaru and that from Tapanuli Bay are practically indistinguishable from the original series. Those from Pulo Tuangku are, however, not as clear buff beneath, as the hairs of the lateral portions of the belly have distinct gray bases, and this color appears slightly at surface. The series is too small to prove that this difference is constant. For measurements see table, page 462.

## MUS DOMITOR, new species.

*Type*.—Adult female (skin and skull), Cat. No. 114621, U.S.N.M. Collected on Pulo Mansalar at entrance to Tapanuli Bay, Sumatra, March 4, 1902, by Dr. W. L. Abbott. Original number, 1592.

*Characters*.—Similar to *Mus firmus* but under parts so little tinged with yellow as to form no marked contrast with color of sides. Mammae 8, as in *Mus firmus* and related species.

*Fur and general external features*.—The external characters, other than color, are so like those of *Mus firmus*, *Mus integer*, and the previously known members of the group as to need no description.

*Color*.—Upper parts a fine grizzle of blackish brown and pale, dull buff, the two colors nearly equally mixed on the back, but the buff in excess on the sides, where, however, it is clouded by the appearance

at surface of the gray (very nearly Ridgeway's No. 6) of the under fur. The longer hairs show a distinct bluish luster. Under parts and inner surface of legs gray (about Ridgeway's No. 6) faintly washed with grayish buff, the contrast between the color of this region and that of sides very slight. Head similar to back, but grizzle more fine. Feet dull, dark brown. Ears and tail uniform blackish.

*Skull and teeth.*—The skull and teeth so closely resemble those of *Mus firmus* that I can find no tangible characters by which to distinguish them.

*Measurements.*—External measurements of type: Total length, 490; head and body, 243; tail vertebrae, 247; hind foot, 47 (44). Average of 5 specimens from the type locality: Total length, 457 (400–497); head and body, 227 (200–251); tail vertebrae, 230 (200–252); hind foot, 46.4 (45–48); hind foot without claws, 43.6 (42–45). For details see table, page 462.

Cranial measurements of type: Greatest length, 53 (53);<sup>a</sup> basilar length, 46.4 (46); basilar length, 43.6 (43); length of nasals, 21 (21.4) greatest combined breadth of nasals, 5.8 (5.6); diastema, 15 (15) zygomatic breadth, 26 (27); least interorbital breadth, 8 (8); depth of brain case at front of basioccipital, 13 (13); frontopalatal depth at posterior extremity of nasals, 12.4 (13); mandible, 31.4 (32.4); maxillary tooth row (alveoli), 9 (9.4); mandibular tooth row (alveoli), 9.6 (10).

*Specimens examined.*—Seven (one skull without skin), all from Pulo Mansalar.

*Remarks.*—The distinctness of this species from the *Mus firmus* of the near-by mainland is unquestionable.

*Measurements of Mus firmus and Mus domitor.*

Name.	Locality.	Number.	Sex.	Total length.	Head and body.	Tail.	Hind foot.	Hind foot with out claws
				mm.	mm.	mm.	mm.	mm.
<i>Mus firmus</i> .....	Pulo Bangkaru.	114285	Female adult.	435	232	203	45	
Do .....	do .....	114286	do .....	441	233	208	46	
Do .....	do .....	114287	do .....	408	216	192	43.4	
Do .....	do .....	114288	do .....	440	230	210	45	
Do .....	do .....	114289	do .....	411	218	193	44	
Do .....	do .....	114290	Male adult.	412	212	200	46	
Do .....	Pulo Tuangku.	114378	Female adult.	457	220	237	50	
Do .....	do .....	114380	do .....	435	222	213	46.4	
Do .....	do .....	114382	do .....	482	242	240	48	
Do .....	do .....	114384	do .....	485	245	240	47	
Do .....	do .....	114379	Male adult.	458	228	230	49	
Do .....	do .....	114381	do .....	487	249	238	48	
Do .....	do .....	114383	do .....	530	270	260	50	
<i>Mus domitor</i> .....	Pulo Mansalar.	114620	Female adult.	400	200	200	46	
Do .....	do .....	<sup>a</sup> 114621	do .....	490	243	247	47	
Do .....	do .....	114622	Female young	384	185	199	42	
Do .....	do .....	114623	Male adult.	485	233	252	48	
Do .....	do .....	114624	do .....	413	207	206	45	
Do .....	do .....	114625	do .....	497	251	246	46	

<sup>a</sup>Type.

<sup>a</sup> Measurements in parentheses are those of the type of *Mus firmus*.

## MUS FREMENS Miller.

1902. *Mus fremens* MILLER, Proc. Acad. Nat. Sci. Philadelphia, 1902, p. 154, March, 1902; Sinkep Island, off east coast of Sumatra.

Twenty-four specimens, from the following localities: Pulo Tuangku, 7 (2 skulls without skins); Pulo Bangkaru, 1; Pulo Mansalar, 7 (1 skull without skin); Tapanuli Bay, 9 (5 skulls without skins). This series shows variation in both size and color, but for the present I prefer to refer it as a whole to *Mus fremens*. None of the skins show any close approach to the bright colors of *Mus vociferans*. For measurements, see table.

Measurements of *Mus fremens*.

Locality.	Number.	Sex.	Total length.	Head and body.	Tail.	Hind foot.	Hind foot without claws.
			mm.	mm.	mm.	mm.	mm.
Pulo Bangkaru.....	114307	Female young....	481	207	274	45	43
Pulo Tuangku.....	114401	Male adult.....	567	245	322	47	45
Do.....	114402	do.....	585	257	328	48	45
Do.....	114403	Male young.....	515	228	287	45	43
Do.....	114404	Male adult.....	578	250	328	48	45.1
Do.....	114405	do.....	572	249	323	50	48
Tapanuli Bay.....	114451	Female adult.....	610	242	368	46	44.4
Do.....	114452	do.....	579	225	351	46	44
Do.....	114453	Male adult.....	611	236	375	48	45
Do.....	114454	do.....	605	240	365	47	45.4
Pulo Mansalar.....	114581	Female adult.....	480	241	a 239	46	44
Do.....	114586	do.....	488	220	263	44.4	42
Do.....	114582	Male young.....	495	210	285	44	41.4
Do.....	114583	Male adult.....	549	250	299	48	45
Do.....	114584	do.....	522	218	304	45	43
Do.....	114585	do.....	520	230	290	45	43

a Tail damaged.

## MUS ASPER Miller.

1900. *Mus asper* MILLER, Proc. Biol. Soc. Washington, XIII, April 21, 1900, p. 145; Trong, Lower Siam.

An adult male (skin and skull) and female (skull only) from Pulo Tuangku, Banjak Islands, and an adult female (in alcohol) from Tapanuli Bay. These specimens so closely resemble *Mus asper* that without further material I am unable to distinguish them. The male from Pulo Tuangku measures: Total length, 249; head and body, 140; tail, 109; hind foot, 29.6 (28). The female from Tapanuli Bay measures: Total length, 210; head and body, 105; tail, 105; hind foot, 27 (26).

## MUS LINGENSIS Miller.

1900. *Mus lingensis* MILLER, Proc. Washington Acad. Sci., II, August 20, 1900, p. 206; Linga Island, off east coast of Sumatra.

Forty specimens, as follows: Pulo Bangkaru, 15 (1 in alcohol, 4 skulls without skins); Pulo Tuanku, 12 (2 in alcohol, 3 skulls without skins); Tapanuli Bay, Sumatra, 13 (1 in alcohol, 7 skulls without skins). For measurements, see table, page 464.

Many of the skins are in fresh, unworn pelage, a stage in which they differ almost as strongly from the bright-colored *Mus surifer* of the Malay Peninsula as was the case with the original specimens taken in midsummer. In fact, the general color of the rats of this group appears to be only slightly affected by abrasion of the fur. In the six specimens from Tapanuli Bay there is no indication of a dark collar. The collar is present in about half the skins from the Banjak Islands, though in none is it developed as in the Pulo Mansalar form.

*Measurements of Mus lingensis.*

Locality.	Number.	Sex.	Total length.	Head and body.	Tail.	Hind foot.	Hind foot without claws.
			<i>mm.</i>	<i>mm.</i>	<i>mm.</i>	<i>mm.</i>	<i>mm.</i>
Pulo Bangkaru.....	114292	Male adult.....	344	191	153	41	39
Do.....	114294	do.....	372	205	167	42	39.4
Do.....	114295	do.....	328	180	148	39	36
Do.....	114296	do.....				40	38
Do.....	114299	do.....	358	200	158	39.4	37.4
Do.....	114300	do.....	<i>b</i> 332	204	<i>b</i> 128	40	38
Do.....	114301	do.....	332	180	152	39	37
Do.....	114293	Female adult.....	345	184	159	38.4	36
Do.....	114297	do.....	<i>b</i> 330	200	<i>b</i> 130	36.4	35.4
Do.....	114298	do.....	380	205	175	41.6	40
Pulo Tuangku.....	114387	Male young.....	316	182	134	38.4	36
Do.....	114389	Male adult.....	330	183	147	39.2	36
Do.....	114392	do.....	342	191	151	40.6	37
Do.....	114388	Female adult.....	361	204	157	39	37
Do.....	114390	do.....	331	177	154	41	37.4
Do.....	114391	do.....	340	192	148	39	36
Do.....	114393	do.....	334	186	148	39	37
Loh Sidoh Bay.....	114101	Male young.....	295	145	150	37	35
Tapanuli Bay.....	114438	do.....	330	173	157	39	37
Do.....	114436	Female adult.....	320	167	153	38	36.2
Do.....	114437	do.....	394	213	181	39	36.4
Do.....	114439	Female young.....	315	162	153	39	37
Do.....	114440	Female adult.....	414	218	196	41.6	40
Linga Island.....	101610	Male adult.....	362	203	159	38	37
Do.....	101612	do.....	400	216	184	43	42
Do.....	<sup>a</sup> 101614	do.....	387	216	171	42	40.4
Do.....	113044	do.....	354	188	166	41	39
Do.....	113048	do.....	389	219	170	43	41
Do.....	113049	do.....	420	237	183	41	39.4
Do.....	113050	do.....	383	201	182	39	36.4
Do.....	101611	Female adult.....	375	210	165	38	36
Do.....	113040	do.....	380	205	175	40	38
Do.....	113042	do.....	<sup>a</sup> 310	220	<sup>a</sup> 90	39.4	37
Do.....	113047	do.....	330	177	153	41	38

<sup>a</sup>Type.

<sup>b</sup>Tail imperfect.

MUS CAPELLIFER, new species.

*Type*.—Adult female (skin and skull). Cat. No. 114590, U.S.N.M. Collected on Pulo Mansalar, off Tapanuli Bay, Sumatra, March 3, 1902, by Dr. W. L. Abbott. Original number, 1587.

*Characters*.—In general similar to *Mus lingensis*, but darker; lower leg entirely tawny, and throat with broad cross-band of same color.

*Fur and general external features*.—The external characters, color excepted, agree so closely with those of *Mus lingensis* as to need no special description. The spines on the back are rather less coarse than in the related species.

*Color.*—Type: Back and sides tawny ochraceous, considerably paler than that of Ridgway, everywhere heavily clouded by the blackish brown of the spines and longer hairs. On middle of back the dark color is greatly in excess, but on sides the tawny-ochraceous slightly predominates. Crown and forehead like back; cheeks clear, dull, tawny-ochraceous. Outer surface of limbs tawny-ochraceous, paler than that of sides, and somewhat dulled by appearance at surface of slaty bases of hairs. The tawny-ochraceous completely encircles heel and wrist, extending up to middle of lower leg and forearm. Underparts dull white, distinctly marked with cream buff. Throat just in front of forelegs crossed by an ochraceous buff band about 25 mm. in width. Feet dull whitish. Ears and tail blackish brown, the latter indistinctly whitish beneath and at tip.

Nine of the skins show no variation worthy of note, but the other three (Nos. 114611, 114612, and 114613) are so peculiar as to suggest their specific distinctness. In these the tawny-ochraceous is absent from median dorsal region, the whole of which is consequently a clear slaty brown from shoulders to base of tail, strongly contrasted with color of sides. Entire ventral surface dull, light, ochraceous-buff, slightly marked with whitish along median line. Otherwise as in the type. As these specimens show no peculiarities other than color, I think they are to be regarded as a dichromatic phase of *Mus catellifer*.

*Skull and teeth.*—The skull and teeth are not distinguishable from those of *Mus lingensis*.

*Measurements.*—External measurements of type: Total length, 348; head and body, 202; tail vertebræ, 146; hind foot, 40 (39). Average of nine specimens from type locality: Total length, 350 (309–398); head and body, 195 (176–221); tail vertebræ, 155 (133–177); hind foot, 41 (40–43); hind foot without claws, 38.9 (37.4–41). For details see table, page 466.

Cranial measurements of type: Greatest length, 46 (47.5);<sup>a</sup> basal length, 39 (40.4); basilar length, 37 (37.5), diastema, 13 (13.4); length of incisive foramen, 7 (7); combined breadth of incisive foramina, 4.4 (4); length of nasals, 17 (19); greatest combined breadth of nasals, 5 (5.4); zygomatic breadth, 20 (20); least interorbital breadth 6.6 (6.8); mandible, 25 (25.4); maxillary tooth row (alveoli), 7 (8); mandibular tooth row (alveoli), 7 (7.2).

*Specimens examined.*—Thirty-two (2 in alcohol; 18 skulls without skins), all from Pulo Mansalar.

<sup>a</sup> Measurements in parentheses are those of the type of *Mus lingensis*.

Measurements of *Mus catellifer*.

Locality.	Number.	Sex.	Total length.	Head and body.	Tail.	Hind foot.	Hind foot without claws.
			mm.	mm.	mm.	mm.	mm.
Pulo Mansalar.....	114588	Female adult.....	<sup>b</sup> 322	220	<sup>a</sup> 102	41	39
Do.....	114589	.....do.....	376	208	168	40	37.4
Do.....	<sup>a</sup> 114590	.....do.....	348	202	146	40	38
Do.....	114593	.....do.....	366	222	144	38	36
Do.....	114596	.....do.....	333	177	156	40	38
Do.....	114612	.....do.....	383	219	164	41	39
Do.....	114591	Male adult.....	338	183	155	43	41
Do.....	114592	Male young.....	297	157	140	40	37
Do.....	114594	Male adult.....	398	221	177	41	38
Do.....	114595	Male young.....	333	186	147	42	39.4
Do.....	114611	.....do.....	328	179	149	42	40
Do.....	114613	.....do.....	309	176	133	40	39

<sup>a</sup>Type.<sup>b</sup>Tail damaged.

## LENOTHRIX, new genus.

Type: *Lenothrix canus*, new species.

*Characters*.—Form as in the larger species of *Mus*; tail longer than head and body. Fur densely woolly, interspersed with long, straight hairs. Feet as in *Mus*, but plantar tubercles unusually large. General form of skull as in *Mus*, but supraorbital ridges greatly developed, somewhat as in *Tylomys*. Teeth essentially as in *Lenomys*,<sup>a</sup> but width of upper molars only about half that of palate, and supplemental reentrant angles on inner side of these teeth less strongly developed.

## LENOTHRIX CANUS, new species.

(Plate XVIII.)

*Type*.—Adult male (skin and skull). Cat. No. 114386. U.S.N.M. Collected on Pulo Tuangku, January 27, 1902, by Dr. W. L. Abbott.

*Characters*.—A slender, bluish gray rat. In external appearance similar to *Lenomys meyeri* as figured by Meyer,<sup>b</sup> but considerably smaller (head and body 236 instead of 290; hind foot 42 instead of 46), and with tail longer than head and body.

*Fur*.—The fur is composed of three elements: (1), a fine, dense, woolly underfur, the hairs of which at middle of back are about 12 mm. in length; (2), slender, straight, terete hairs, the length of which in same region averages about 25 mm., and (3), weak, flattened hairs intermediate in length between the two other kinds and most abundant on sides and underparts. The flattened hairs are very inconspicuous and might readily pass unnoticed. It is the abundant woolly underfur that determines the character of the pelage and gives the animal a very different appearance from *Mus ferreocanus*, which it

<sup>a</sup> As figured by Thomas, Trans. Zool. Soc. London, XIV, pl. xxxvi, fig. 1.<sup>b</sup> Abhandl. u. Berichte des k. Zool. u. Anthrop.-Ethn. Museums zu Dresden, VII, 1899, pl. viii.

rather closely resembles in color. In the type specimen there is an almost naked area about 4 mm. wide and 70 mm. in length extending along median line of belly to posterior portion of chest. It has the appearance of a normal character.

*Color.*—Upper parts and outer surface of limbs ecru-drab, irregularly tinged with broccoli-brown and clouded, particularly along middle of back, by the blackish long hairs. Both under fur and long hairs have a distinctly glossy texture, which causes much variation in the exact shade as the skin is viewed in different lights. Cheeks light broccoli-brown. Whiskers shining black. Underparts and inner surface of limbs cream-buff, the line of demarcation between this color and that of sides fairly well defined. Feet dirty whitish, shaded with ecru-drab, this color extending around heel. Ears blackish. Tail blackish throughout basal fourth, the rest white.

*Tail.*—The tail shows no peculiarities of importance. It is distinctly and uniformly annulated, about 11 rings to the centimeter at middle. The rings are not very clearly divided into scales except toward base. Beyond middle the rings become much more closely crowded, but they retain their distinctness to extreme tip. On basal fourth the hairs which spring from between the rings are too minute to cause any concealment of the annulation, but beyond this region they increase in length and slightly obscure the outlines of the rings. At tip they are about 5 mm. long.

*Ears.*—The ears are of moderate size and normal form. Laid forward they extend about to eye. The surface of the ear is naked, except for a sprinkling of minute blackish hairs.

*Skull.*—The skull is in size and general form not unlike that of a large house rat. The brain case, however, is less deep, the audital bullæ are much smaller, the incisive foramina are shorter, the nasals flare abruptly anteriorly, and the plate of the maxillary which forms outer wall of antorbital foramen is not produced forward beyond level of upper zygomatic root. The most striking differences are found in the interorbital region. In general contour this region is much as in *Mus norvegicus*, but the supraorbital beads are developed into upturned blade-like ledges between which the main surface of the frontal lies at the bottom of a distinct trough. A similar condition is suggested by some skulls of very aged members of the *Mus surifer* group and by those of species of *Tylomys*.

*Teeth.*—Incisors as in *Mus norvegicus*, except that those of the upper jaw are a little less strongly curved. Molars (Plate XVIII, figs. 4 and 5) slightly larger than those of the house rat. *First upper molar:* The anterior ridge contains three distinct cusps, the outermost of which is nearly as large as the innermost and situated distinctly farther forward. As a result, the outer side of the tooth appears longer than the inner—the exact opposite to the condition in *Mus*. Between central and inner

cusps there is a distinct reentrant angle. Another small reentrant angle lies at the posterior base of the outer cusp. The second ridge is practically a repetition of the first, except that the reentrant angle between middle and inner cusps is broader and not as deep, while that at posterior base of outer cusp is better developed. There is also a rudimentary reentrant angle at front of outer cusp, so that the resulting form of the cusp is an imperfect trefoil with a large median lobe, a posterior one of nearly the same size, and a minute anterior segment. In the type the process of attrition has extended far enough to unite the median ridge with the posterior along the inner edge. Third ridge with median cusp larger than in either first or second, the outer cusp rather smaller than that of first or second, and inner cusp obsolete. There is a distinct reentrant angle at posterior base of outer cusp. *Second upper molar*: Anterior ridge represented by a large inner cusp and a minute outer one, both joined in present state of wear to front of main cusp of second ridge. Second like that of first tooth, but with outer cusp smaller and lacking the anterior limb of the trefoil. Third ridge as in anterior tooth. *Third upper molar*: Anterior ridge represented by a large internal cusp, as well developed as that of middle tooth, but quite distinct from second ridge. Second ridge formed by a simple, transverse loop, narrow on the inner side, but expanding externally to a rudimentary median cusp. Third ridge consisting of a single large cusp, probably the median. It is fully as large as the median cusp of the other teeth. *First lower molar*: This tooth consists of three very similar bilobate cross ridges, slightly convex or concave in front, deeply concave behind. The anterior is somewhat concave anteriorly and is preceded by a small median tubercle. A similar but rather smaller tubercle lies between first and second loop on outer side, and a still smaller one between the same loops on inner side. Posterior loop like second, except that there is a small reentrant angle on outer side. It is followed by a median tubercle, rather larger than that at front of tooth. *Second lower molar*: Essentially a duplication of the second and third loops and posterior tubercle of first tooth, but anterior lobe with a rudimentary external tubercle and reentrant angle on outer side of second lobe deeper. *Third lower molar*: This tooth is reduced to an anterior loop about like that of middle tooth, and a broad, crescentic posterior loop, the slightly concave side of which is directed forward.

*Measurements*.—External measurements of type: Total length, 534; head and body, 236; tail, 298; hind foot, 41 (38.6).

Cranial measurements of type: Greatest length, 49.6; basal length, 44.6; basilar length, 42.6; palatal length, 22; least width of palate between anterior molars, 4.8; diastema, 14.6; length of incisive foramen, 6.8; combined breadth of incisive foramina, 3.2; length of nasals, 18; greatest combined breadth of nasals, 6.6; zygomatic breadth, 25



least interorbital breadth, 5.8; breadth of brain case above roots of zygomata, 17; depth of brain case at front of basioecipital, 11.6; frontopalatal depth at posterior extremity of nasals, 11.4; least depth of rostrum immediately behind incisors, 9.6; mandible, 28.6; maxillary tooth row (alveoli), 9; width of front upper molar, 2.6; mandibular tooth row (alveoli), 8; width of front lower molar, 2.

*Specimens examined*.—One, the type.

*Remarks*.—*Lenothrix rarus* is easily recognizable among Malayan rats by its woolly fur, long tail, and bluish gray color, combined with the rather large size. In general appearance it somewhat resembles *Mus ferrocaneus*, but the quality of the fur in the two animals is quite unlike.

#### FAMILY HYSTRICIDÆ.

##### TRICHYS MACROTIS, new species.

*Type*.—Adult female (skin and skull). Cat. No. 114488, U.S.N.M. Collected at Tapanuli Bay, northwestern Sumatra, February 20, 1902, by Dr. W. L. Abbott. Original number, 1555.

*Characters*.—Similar to the Bornean *Trichys fasciculata* (Shaw) but with longer ears; skull with broader, more strongly angled hamulars.

*Ears*.—The ears differ from those of *Trichys fasciculata* in form as well as in size. The anterior border is very moderately convex and the tip is more broadly rounded off than in the Bornean animal. These two characters, in connection with the greater length, give the ear an almost spatulate appearance quite different from the contour of the ear of the related species.

*Color*.—The color so exactly resembles that of *Trichys fasciculata* as to need no description.

*Skull and teeth*.—The skull closely resembles that of *Trichys fasciculata*, except that the hamular processes of the pterygoids are of a distinctly different form. In *T. fasciculata* these processes are slender and uniformly curved throughout, the lower margin slightly thickened and the tip tapering rather abruptly to a point. In *T. macrotis* they are much wider, there is an abrupt angle near middle, the lower edge is not thickened, and the tip is broadened and swollen into a distinct head.

Teeth as in *T. fasciculata*.

*Measurements*.—External measurements of type: Total length, 653; head and body, 428; tail vertebrae, 225; hind foot, 64 (61); ear from meatus, 28. Average of four adults from the type locality: Total length, 614 (590–653); head and body, 420 (410–428); tail vertebrae, 197 (180–225); hind foot, 64 (62–66); hind foot without claws, 60.3 (58–62). For details, see table, page 470.

Cranial measurements of type: Greatest length, 82 (84<sup>a</sup>); basal

<sup>a</sup>Measurements in parentheses are those of a young adult male *Trichys fasciculata* from Mount Salikan, Borneo (No. 83940).

length, 72 (72); basilar length, 68 (67); length of nasals, 27 (25.4); diastema 24 (24); zygomatic breadth, 44 (44.4); least interorbital breadth, 16 (19); mandible, 52.4 (52); maxillary toothrow (alveoli), 13.4 (14.8); mandibular toothrow (alveoli), 14.8 (15).

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

*Remarks.*—Though closely related to the Bornean form, *Trichys macrotis* appears to be readily distinguishable by its large ears and peculiar hamulars.

An embryo with head and body about 40 mm. in length clearly shows that scaly integument, the vestiges of which in the adult have been called attention to by Jentink.<sup>a</sup> The scales are very distinct on the back, sides, thigh, upper arm, and proximal third of tail, much more so, in fact, than in an embryo *Manis javanica* of about the same size. The largest average a little more than 1 mm. in length. Longitudinally there are about 52 rows, each of which contains 24 scales at middle of body. At the posterior border of each scale the incipient spines appear as minute rounded projections, of which the central is usually the best developed. Five of these rudiments to each scale appears to be the usual number, though seven may occasionally be counted. The middle and terminal portions of the tail lack scales, but in a favorable light traces of rings are visible along the second third. Near tip the tail rather abruptly thickens, and its surface becomes somewhat rugose.

*Measurements of Trichys macrotis.*

Locality.	Number.	Sex.	Total length.	Head and body.	Tail vertebræ.	Hind foot.	Hind foot without claws.
			mm.	mm.	mm.	mm.	mm.
Tapanuli Bay.....	114487	Female adult.....	653	425	225	64	61
Do.....	<sup>a</sup> 114488	.....do.....	617	422	195	64	60
Do.....	114491	.....do.....	590	410	180	66	57
Do.....	114489	Male adult.....	600	415	185	62	62
Do.....	114490	.....do.....				62	58

<sup>a</sup> Type.

FAMILY VIVERRIDÆ.

HERPESTES BRACHYURUS Gray.

1837. *Herpestes brachyurus* GRAY, Mag. Nat. Hist., 1, November, 1837, p. 578; "Indian Islands."

A pair of adults, Tapanuli Bay, Sumatra, March 24 and 26, 1902. Measurements: Total length, male, 630, female, 650; head and body, male, 430, female, 435; tail vertebræ, male, 200, female, 215; hind foot, male, 83, female, 82; hind foot without claws, male, 78, female, 78.

<sup>a</sup> Notes from the Leyden Museum, XVI, 1894, p. 209.

## HEMIGALE HARDWICKII Gray.

1830. "*Viverra hardwickii* GRAY, Spic. Zool., II, p. 9."

Adult female, Tapanuli Bay, Sumatra, February 12, 1902. Measurements: Total length, 830; head and body, 520; tail vertebrae, 310; hind foot, 73 (71).

## PARADOXURUS HERMAPHRODITUS (Pallas).

1778. *Viverra hermaphrodita* PALLAS, in Schreber, Säugthiere, III, p. 426; "Barbary."

Six specimens from Simalur Island. For measurements, see table, page 471.

Dr. Abbott writes that the musang of Simalur Island is lighter in weight and much more slender in form than that of the Malay Peninsula. The measurements, however, show no appreciable differences, and I can detect none in the skins or skulls.

*Measurements of Paradoxurus hermaphroditus.*

Locality.	Number.	Sex.	Total length.	Head and body.	Tail vertebrae.	Hind foot.	Hind foot without claws.
			<i>mm.</i>	<i>mm.</i>	<i>mm.</i>	<i>mm.</i>	<i>mm.</i>
Simalur Island .....	114171	Male adult .....	845	465	380	68	65
Do.....	114174	Young male .....	758	388	370	66	63
Do.....	114175	Male adult .....	875	485	390	71	70
Do.....	114172	Female adult.....	883	483	400	66	65
Do.....	114173	.....do .....	865	470	395	71	69
Do.....	114176	.....do .....	885	475	410	70	69

## Family MUSTELIDÆ.

## AONYX CINEREA (Illiger).

1815. *Lutra cinerea* ILLIGER, "Abhandl, Akad. Berlin, 1811, p. 99." Java.

An adult female was taken at Tapanuli Bay, Sumatra, on March 27, 1902. Measurements: Total length, 760; head and body, 470; tail vertebrae, 290; hind foot, 82.

## Family GALEOPITHECIDÆ.

## GALEOPITHECUS VOLANS (Linnæus).

1758 [*Lemur*] *volans* LINNÆUS, Syst. Nat., I, 10th ed., p. 30; Asia.

Two specimens from Pulo Tuangku, Banjak Islands.

*Measurements of Galeopithecus volans.*

Locality.	Number.	Sex.	Total length.	Head and body.	Tail vertebrae.	Hind foot.	Hind foot without claws.
			<i>mm.</i>	<i>mm.</i>	<i>mm.</i>	<i>mm.</i>	<i>mm.</i>
Pulo Tuangku.....	114375	Female, adult ....	620	385	235	61	55
Do.....	114376	Male, adult.....	550	335	215	60	53.6

## Family ERINACEIDÆ.

## GYMNURA GYMNURA (Raffles).

1822. [*Vinerra*] *gymnura* RAFFLES, Trans. Linn. Soc., London, XIII, p. 272; Bencoolen, Sumatra.

One adult male, Tapanuli Bay, Sumatra, March 29, 1902. For measurements see table, page 472.

## Family TUPAIIDÆ.

## TUPAIA FERRUGINEA (Raffles).

1822. *Tupaia ferruginea* RAFFLES, Trans. Linn. Soc. London, XIII, p. 256; Singapore.

Five specimens, two from Loh Sidoh Bay and three (one skull without skin) from Tapanuli Bay. For measurements see table, page 472. Both skins and skulls closely agree with those from the southern extremity of the Malay Peninsula and show no approach toward the *Tupaia phæura*<sup>a</sup> of Sinkep Island.

## TUPAIA TANA Raffles.

1822. *Tupaia tana* RAFFLES, Trans. Linn. Soc. London, XXIII, p. 257; Bencoolen, Sumatra.

A pair of adults, Pulo Tuangku, Banjak Islands, January 29 and 31, 1902. For measurements see table, page 472.

## TUPAIA MALACCANA Anderson.

1879. *Tupaia malaccana* ANDERSON, Anat. and Zool. Researches, p. 134; Malacca.

A male was taken at Tapanuli Bay, Sumatra, March 22, 1902. For measurements see table, page 472.

Measurements of *Gymnura* and *Tupaia*.

Name.	Locality.	Number.	Sex.	Total length.	Head and body.	Tail.	Hind foot.	Hind foot without claws.
<i>Gymnura gymnura</i>	Tapanuli Bay ..	114551	Male, adult...	mm. 632	mm. 377	mm. 255	mm. 53	mm. 50
<i>Tupaia ferruginea</i>	Loh Sidoh Bay ..	114152	Female, adult	365	190	175	45	43
Do .....	do .....	114153	Male, adult...	a 330	190	a 140	47	44
Do .....	Tapanuli Bay ..	114548	Female, adult	365	195	170	45	42
Do .....	do .....	114549	Male, adult...	390	200	190	47	45
<i>Tupaia tana</i>	Pulo Tuangku ..	114412	do .....	375	215	160	46	43
Do .....	do .....	114413	Female, adult	365	205	160	45	42
<i>Tupaia malaccana</i>	Tapanuli Bay ..	114550	Male, adult...	284	132	152	43	41

<sup>a</sup>Tail imperfect.

<sup>a</sup>Miller, Proc. Acad. Nat. Sci. Philadelphia, 1902, p. 157, June 11, 1902.

Family VESPERTILIONIDÆ.

MYOTIS MURICOLA (Gray).

1846. *Vespertilio muricola* GRAY "Catal. Mamm., etc., Nepal and Thibet, p. 4, (ex Hodgson, *nomen nudum*);" Nepal.

Seventeen specimens (in alcohol), from Simalur Island. While it is quite possible that these do not represent true *Myotis muricola*, I am unable to distinguish them in the absence of material for comparison. They closely agree with specimens from Trong, Lower Siam.

Measurements of *Myotis muricola*.

Locality.	Number.	Sex.	Total length.		Tibia.	Foot.	Forearm.	Thumb.	Second digit.	Third digit.	Fourth digit.	Fifth digit.	Ear from meatus.	Ear from crown.
			mm	mm										
Simalur Island.....	114230	Female, adult....	78	36	15	7	35	6.4	29	61	50	46	13	11
Do.....	114231	do.....	73	35	15	8	36	7	30	60	49	45	12	10
Do.....	114232	do.....	75	37	14	7	37	5	32	62	52	47	14	12
Do.....	114235	do.....	73	37	15	7	34	5	30	62	48	45	14	11
Do.....	114237	do.....	75	37	16	8	36	5.4	31	61	50	45	15	11
Do.....	114240	Female, young....	52	23	10	7	27	5	19	35	30	33	10	8.4
Do.....	114241	Female, adult....	75	37	15	7	36	5	31	61	48	43	14	10
Do.....	114244	Female, young....	65	28	14	7	31	6	22	44	37	35	11	9
Do.....	114245	Female, adult....	79	37	15	7.4	34	6	32	65	50	45	15	13
Do.....	114246	do.....	80	37	15	7	36	6	31	62	52	48	13	10
Do.....	114233	Male, adult....	75	35	15	8	35	5	31	60	48	41	13	10
Do.....	114234	do.....	71	31	15	8	34	7	29	59	47	43	11	9
Do.....	114236	do.....	76	35	15	7	34	6	28	60	49	46	14	11
Do.....	114238	Male, young....	53	22	11	7	26	6	17	35	28	26	10	8
Do.....	114239	do.....	65	37	13	7	31	6	25	49	40	38	12	10
Do.....	114242	Male, adult....	75	35	16	7	35	5.6	29	57	45	42	12	10
Do.....	114243	do.....	72	33	15	8	35	6	30	58	46	42	13	10

Family EMBALLONURIDÆ.

EMBALLONURA PENINSULARIS Miller.

1898. *Emballonura peninsularis* MILLER, Proc. Acad. Nat. Sci. Philadelphia, 1898, p. 323, July 25, 1898; Trong, Lower Siam.

Six specimens (in alcohol) from Pulo Babi.

Measurements of *Emballonura peninsularis*.

Locality.	Number.	Sex.	Total length.		Tibia.	Foot.	Forearm.	Thumb.	Second digit.	Third digit.	Fourth digit.	Fifth digit.	Ear from meatus.	Ear from crown.
			mm	mm										
Pulo Babi.....	114274	Female adult....	50	10	17	8	42	8	35	62	42	44	11	10
Do.....	114279	do.....	57	13	16	11	44	8	37	69	49	46	13	10
Do.....	114275	Male adult....	54	13	16	10	44	8	35	65	47	44	12.4	11
Do.....	114276	do.....	53	11	15	10	43	8	33	68	45	44	12	10
Do.....	114277	do.....	57	13	17	9	43	8	37	66	48	45	14	11
Do.....	114278	do.....	53	11	17	9	45	8	35	66	47	46	12	10

## Family NYCTERIDÆ.

## MEGADERMA SPASMA (Linnæus).

1758. [*Vespertilio*] *spasma* LINNÆUS, Syst. Nat., I, 10th ed., p. 32; "Asia."

Nine specimens: Pulo Sumat, off Simalur Island, 3 (2 in alcohol); Pulo Lasia, 4 (2 in alcohol); Pulo Babi, 2 (in alcohol).

*Measurements of Megaderma spasma.*

Locality.	Number.	Sex.	Total length.		Tibia.	Foot.	Forearm.	Thumb.	Second digit.	Third digit.	Fourth digit.	Fifth digit.	Ear from meatus.	Ear from crown.
			mm	mm										
Pulo Sumat .....	α 114227	Female adult.....	75	...	32	18	58	19	50	105	78	83	39	31
Do .....	114228	.....do .....	69	5	33	15	59	19	53	110	79	82	36	30.
Do .....	114229	.....do .....	68	3	30	17	60	17	51	109	81	85	36	30.
Pulo Lasia .....	α 114249	Male adult .....	80	...	32	19	59	19	56	101	81	81	37	30
Do .....	114252	.....do .....	77	2	29	20	58	20	53	108	82	85	37	30
Do .....	α 114250	Female adult.....	85	...	33	19	60	19	55	107	84	86	36	29
Do .....	114251	.....do .....	70	4	34	19	61	19	55	110	84	88	38	31
Pulo Babi.....	114272	Male adult .....	78	2	31	19	59	18	53	108	80	82	36	28
Do .....	114273	Female adult.....	79	...	33	19	.....	20	53	112	85	88	37	30

αSkin.

## Family PTEROPODIDÆ.

## CYNOPTERUS TITTHÆCHEILUS (Temminck).

1827. *Pteropus titthæcheilus* TEMMINCK, Monogr. de Mamm., I, p. 198; Buitenzorg, Java.

1902. *Cynopterus titthæcheilus* STONE and REHN, Proc. Acad. Nat. Sci. Philadelphia, 1902, p. 136, June 4, 1902.

Twenty-four, from the following localities: Pulo Babi, 3 (2 in alcohol); Tapanuli Bay, Sumatra, 21 (19 in alcohol). They closely agree with specimens of true *Cynopterus titthæcheilus* from Java, and are readily distinguishable from the *C. montanoi* of the southern extremity of the Malay Peninsula by their larger general size, and particularly by their large skulls and heavy teeth. As in *C. montanoi* the ears show no indication of a whitish border.

The original description of this species was based on material from Java, Sumatra, and Siam. It therefore included *Cynopterus montanoi*. As Temminck expressly states that most of his specimens were taken at Buitenzorg, Java, it is safe to regard this as the type locality.

Measurements of *Cynopterus litthacheilus*.

Locality.	Number.	Sex.	Total length.	Tail.	Tibia.	Foot.	Forearm.	Thumb.	Second digit.	Third digit.	Fourth digit.	Fifth digit.	Ear from meatus.	Ear from crown.
			mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
Pulo Babi.....	a 114269	Female adult...	103	8	25	15	65	27	46	108	85	85	13	10
Do.....	114271	do.....	93	8	27	15	66	26	44	112	86	86	17	16
Do.....	114270	Male adult.....	95	6	25	15	67	25	42	112	87	86	18	15
Tapanuli Bay.....	a 114466	do.....	113	10	27	18	68	28	46	110	86	89	15	14
Do.....	114486	Male, young.....	87	9	21	16	60	28	43	93	74	74	17	15
Do.....	a 114467	Female adult...	110	8	28	17	66	29	46	107	88	86	16	13.4
Do.....	114468	Female, young.....	86	10	24	15	62	25	41	97	79	78	17	14
Do.....	114469	Female adult...	96	10	24	14	61	28	43	109	83	83	18	16
Do.....	114470	do.....	90	10	23	15	65	26	44	106	81	80	17	15
Do.....	114471	do.....	94	9	24	17	67	26	44	110	85	85	18	16
Do.....	114472	do.....	93	9	24	15	65	27	44	109	83	81	19	17
Do.....	114473	Female, young.....	85	9	23	17	63	22	43	103	78	77	18	15
Do.....	114474	Female adult...	93	8	25	14	66	26	43	110	85	83	18	15
Do.....	114475	do.....	89	9	24	16	65	26	45	110	89	90	20	17
Do.....	114476	do.....	90	10	26	15	68	26	43	110	83	82	18	17
Do.....	114477	do.....	92	10	25	16	66	27	42	107	86	80	18	15
Do.....	114478	do.....	93	10	23	15	64	25	42	103	79	78	16	15
Do.....	114479	do.....	90	9	22	18	66	28	44	109	83	80	19	15
Do.....	114480	do.....	96	10	26	16	67	29	46	107	85	83	17	16
Do.....	114481	do.....	95	10	23	17	66	29	48	111	85	85	18	15
Do.....	114482	Female, young.....	88	7	23	15	63	25	41	100	84	79	18	14
Do.....	114483	Female adult...	100	9	25	14	64	27	41	107	82	81	17.6	15
Do.....	114484	Female, young.....	85	8	26	15	60	27	40	104	78	77	17	14
Do.....	114485	do.....	88	8	24	16	64	26	45	105	83	83	19	16

a Skin.

## Family NYCTICEBIDÆ.

## NYCTICEBUS MALAIANUS (Anderson).

1881. [*Nycticebus tardigradus*] var. *malaiana* ANDERSON, Catal. Mamm. Indian Mus., I, p. 95; Malacca.

1902. *Nycticebus coucang malaianus* STONE and REHN, Proc. Acad. Nat. Sci. Philadelphia, 1902, p. 139, June 4, 1902.

An adult male was taken at Tapanuli Bay on March 20, 1902. Measurements: Total length, 328; head and body, 312; tail vertebrae, 16; hind foot, 65.

This specimen has been examined by Mr. Stone and Mr. Rehn, who write me that they consider it "undoubtedly *malaianus*." Although Anderson mentions no type specimen in his original description of the form, the stuffed adult male and its skull which heads his list of material (p. 96) may be regarded as the type. This was collected at Malacca.

## Family CERCOPITHECIDÆ.

## MACACUS NEMESTRINUS (Linnæus).

1766. [*Simia*] *nemestrina* LINNÆUS, Syst. Nat., I, 12th ed., p. 35; Sumatra.

Two pig-tailed macaques taken at Tapanuli Bay, Sumatra, were the only individuals of the species observed. For measurements, see table, page 477.

## MACACUS "CYNOMOLGUS" Auct.

*Macacus cynomolgus* Auct., not *Simia cynomolgus* LINNÆUS.

Seven specimens of the common crab-eating macaques were obtained, three on Pulo Tuangku, two on Pulo Mansalar, and two at Tapanul Bay, Sumatra. For measurements, see table, page 477.

## MACACUS FUSCUS, new species.

*Type*.—Old male (skin and skull). Cat. no. 114164, U.S.N.M. Collected on Simalur Island, northwestern Sumatra, November 20 1901, by Dr. W. L. Abbott. Original number, 1348.

*Characters*.—Similar to *Macacus umbrosus*<sup>a</sup> of the Nicobar Islands but smaller and with relatively shorter tail.

*Color*.—Type: Upperparts and outer surface of limbs blackish brown with a faint tinge of drab, each hair drab at base and with wood-brown annulation 2 to 4 mm. in width near tip. As the fur is of a soft, silky quality, the exact effect of the two colors varies considerably with reflection of light and with disarrangement of hairs, but the wood-brown is everywhere very distinct though not in excess of the dark underlying brown. Underparts and inner surface of limbs light bluish gray (very nearly Ridgway's No. 8). This color suffuses cheeks and region surrounding ears. Tail like back above, but with the light annulations very indistinct, like belly below and at tip.

*Skull and teeth*.—The skull and teeth resemble those of *Macacus umbrosus* except for their much smaller size.

*Measurements*.—External measurements of type: Total length, 920; head and body, 470; tail vertebrae, 450; hind foot, 125. Average of five males from the type locality: Total length, 939 (905–985); head and body, 478 (460–495); tail vertebrae, 467 (435–490); hind foot, 122 (118–130). For details see table, page 477.

Cranial measurements of type: Greatest length (exclusive of incisors), 122 (134);<sup>b</sup> basal length, 93 (102); basilar length, 87 (96); least palatal length, 49 (57); palatal breadth (between front molars), 21 (25); zygomatic breadth, 83 (90); mastoid breadth, 64 (71); greatest breadth of brain case above roots of zygomatics, 60 (61); least breadth of brain case immediately behind orbits, 38.6 (39); orbital breadth, 61 (67); least distance from orbit to alveolus of inner incisor, 44 (49); greatest depth of brain case (exclusive of sagittal crest), 45 (50); mandibular length, 82 (97); greatest depth of ramus, 19 (19.6); maxillary tooth row (exclusive of incisors), 40 (44.6); mandibular tooth row (exclusive of incisors), 45 (50); crown of middle upper molar, 7.4 by 7 (8.8 by 8.8); crown of middle lower molar, 8 by 6 (8.2 by 7.4).

*Specimens examined*.—Ten, eight from Simalur Island and two from Pulo Lasia.

<sup>a</sup> Miller, Proc. U. S. Nat. Mus., XXIV, May 28, 1902, p. 789.

<sup>b</sup> Measurements in parentheses are those of the type of *Macacus umbrosus*, a young adult male, with unworn teeth.



*Remarks.*—In color and size the specimens from Simalur Island are very constant, presenting no variation worthy of note. In the two from Pulo Lasia the tail is considerably longer, making the proportions essentially the same as in *Macacus umbrosus*. They are readily separable from the Nicobar species, however, by their much smaller skulls.

*Measurements of Macacus.*

Name.	Locality.	Number.	Sex.	Total length.		Tail.	Hind foot.
				mm.	mm.		
<i>Macacus nemestrinus</i> .	Tapanuli Bay ....	114502	Female adult ...	690	480	210	160
Do.....	do.....	114503	do.....	660	490	170	143
<i>Macacus "cynomolgus."</i>	do.....	114505	Male adult .....	922	452	570	127
Do.....	do.....	114506	do.....	973	453	520	130
Do.....	Pulo Mansalar.....	114559	do.....	.....	445	.....	127
Do.....	do.....	114560	do.....	940	440	500	125
Do.....	Pulo Tuangku.....	114408	do.....	955	420	535	125
Do.....	do.....	114409	do.....	953	423	530	125
Do.....	do.....	114410	do.....	905	425	480	117
<i>Macacus fuscus</i>	Pulo Lasia.....	114247	do.....	960	440	520	125
Do.....	do.....	114248	do.....	1,025	470	555	130
Do.....	Simalur Island .....	114162	Female adult .....	915	440	475	115
Do.....	do.....	114165	do.....	830	420	410	110
Do.....	do.....	114166	do.....	830	410	420	110
Do.....	do.....	114163	Male adult .....	905	470	435	118
Do.....	do.....	114164	do.....	985	495	490	128
Do.....	do.....	114167	do.....	940	495	445	125
Do.....	do.....	<sup>a</sup> 114168	do.....	920	470	450	125
Do.....	do.....	114169	do.....	945	460	485	130

<sup>a</sup> Type.

**PRESBYTES<sup>a</sup> SUMATRANUS (Müller and Schlegel).**

1839-1844. *Sennopithecus sumatranus* MÜLLER and SCHLEGEL, Verhandl. over de natuurlijke Geschiedenis der Nederl. overzeesche bezittingen, p. 73; Sumatra.

Four specimens taken at Tapanuli Bay, Sumatra, are essentially identical with those previously collected by Dr. Abbott on the Indragiri River, eastern Sumatra.<sup>b</sup> For measurements see table, page 477.

**PRESBYTES CRISTATUS (Raffles).**

1822. *Simia cristata* RAFFLES, Trans. Linn. Soc. London, XIII, p. 244; Ben-coolen, Sumatra.

One skin from Loh Sidoh Bay and five from Tapanuli Bay, Sumatra. For measurements see table:

*Measurements of Presbytes.*

Name.	Locality.	Number.	Sex.	Total length.		Tail.	Hind foot.
				mm.	mm.		
<i>Presbytes sumatranus</i> .	Tapanuli Bay ....	114507	Male adult .....	1,270	510	760	160
Do.....	do.....	114508	Female adult...	1,230	500	730	170
Do.....	do.....	114509	do.....	1,260	515	745	165
Do.....	do.....	114510	do.....	1,215	455	760	165
<i>Presbytes cristatus</i> ....	Loh Sidoh Bay ....	114160	do.....	1,200	500	700	145
Do.....	Tapanuli Bay ....	114512	Female young...	950	400	550	132
Do.....	do.....	114513	Female adult...	1,190	530	660	150
Do.....	do.....	114515	do.....	1,130	465	665	145
Do.....	do.....	114514	Male adult .....	1,290	540	750	163
Do.....	do.....	114516	do.....	1,295	540	755	163

<sup>a</sup> *Presbytes* Eschscholtz, Kotzebue's Entdeckung's Reise, III, 1821, p. 196, type *P. mitratus* Eschscholtz, antedates *Sennopithecus* F. Cuvier, Des Dents des Mammifères, 1825, pp. 14, 247, the first publication of the more familiar name in Latin form.

<sup>b</sup> See Proc. Acad. Nat. Sci. Philadelphia, 1902, p. 159, June 11, 1902.

## Family SIMIIDÆ.

## HYLOBATES AGILIS F. Cuvier.

1821. *Hylobates agilis* F. CUVIER, Hist. Nat. des Mammifères, III, Pts. 32 and 33, September, 1821; Sumatra.  
 1902. *Hylobates hoolock* MILLER, Proc. Acad. Nat. Sci. Philadelphia, 1902, p. 159, June 11, 1902.

Three specimens from Tapanuli Bay, Sumatra. For measurements see table, page 478. This animal is the same as that from the Indragiri River, eastern Sumatra, which I recently recorded as *Hylobates hoolock*. It is undoubtedly the *H. agilis* of F. Cuvier, some of the light-colored specimens almost exactly matching the figure in the original account of the species.

## SYMPHALANGUS SYNDACTYLUS (Raffles).

1822. *Simia syndactyla* RAFFLES, Trans. Linn. Soc. London, XIII, p. 241; Bencoolen, Sumatra.

Four adults were taken at Tapanuli Bay, where the animal is common.

*Measurements of Hylobates and Symphalangus from Tapanuli Bay.*

Name.	Number.	Sex.	Total length.	Hind foot.
			mm.	mm.
<i>Hylobates agilis</i> .....	114499	Male adult.....	470	12
Do.....	114500	.....do.....	445	12
Do.....	114501	Female adult.....	415	12
<i>Symphalangus syndactylus</i> .....	114494	.....do.....	470	14
Do.....	114497	.....do.....	500	15
Do.....	114495	Male adult.....	510	15
Do.....	114496	.....do.....	525	15

## NOTES ON THE FAUNA OF THE LOCALITIES VISITED.

Lists of the mammals observed at the different collecting stations follow, together with the collector's field notes.

## LOH SIDOH BAY, SUMATRA (November 5 to 8, 1901).

*Sciurus albescens*.—Common in jungles and coconut plantations.

*Mus lingensis*.—Trapped on a low, jungle-covered hill east of the bay.

*Tupaia ferruginea* Raffles.—Found in dense jungle by the seashore.

*Presbytes maurus*.—Shot in dense jungle by the seashore.

“Saw tracks of tiger, *Cervus equinus*, pig, kijang, etc., but did not secure any specimens.”

## SIMALUR ISLAND (November 16, 1901, to January 2, 1902).

*Sus vittatus*.—Pigs are very common. One meets with their track and “diggings” everywhere; but except where sago is being made

they are hard to catch sight of. An adult female (No. 114177) was killed in the forest while feeding on the trunk of a sago palm. Others were killed in clearings and among the mangroves on the shore.

**Mus simalurensis.**—

**Mus surdus.**—No rats were caught in the forest, though many traps were set there. Afterwards the traps were moved to stumps, dead tree trunks, and stony, weedy places in paddy fields with much better results. A few of the larger kind (*Mus simalurensis*) were caught in these situations, and they were common in heavy jungle on Pulo Siumat, 5 miles offshore. The smaller species was common in the paddy fields, and also about houses. Some were found in the stomachs of snake eagles and also in snakes.

**Paradoxurus hermaphroditus.**—Common. Only once seen in the jungle, but natives caught several; said to be very destructive to poultry.

**Myotis muricola.**—Brought in by natives at Sibaboh Bay, where they were caught in hollow trees.

**Megaderma spasma.**—Obtained in some small caves at the seashore on Pulo Siumat.

**Pteropus sp.**—Called by the natives "tupai," the Malay name for squirrel. A "camp" existed on Pulo Asu and two others were said to be on Pulo Siumat. Although frequently seen flying about in the evening, no specimens were secured.

**Macacus fuscus.**—Common. Has the usual habits of *Macacus*. The only monkey on the island.

#### PULO LASIA (January 4 to 7, 1902).

**Mus simalurensis.**—Common in the jungle.

**Megaderma spasma.**—A bunch of four were shot while hanging under a projecting rock in the jungle.

**Macacus fuscus.**—Common. Is not found on the neighboring Pulo Babi.

#### PULO BABI (January 7 to 14, 1902).

**Sus vittatus.**—Although no pigs occur on Pulo Lasia they are abundant on Pulo Babi, but are not easily seen in the dense jungle. Only three were shot. Their "sarongs" or nests were very common in the jungle. These are generally made of the leaves of a small palm and resemble little haycocks. The pig of Babi appears to be different from that of Simalur. It is considerably larger.

**Mus simalurensis.**—A large gray rat was not uncommon, but all the specimens trapped were so cut to pieces by crabs that no skins could be saved. Several skulls, however, were preserved.

**Emballonura peninsularis.**—No notes.

**Cynopterus titthæchæilus.**—Common. Found hanging by day from the midribs of the leaves of an areca palm.

PULO BANGKARU, BANJAK ISLANDS (January 16 to 21, 1902).

No pigs or monkeys were seen, and the natives say that none occur. A number of *Pteropus* were seen, and at least two kinds of smaller bats, but none were obtained. My Malay sailing master said that he saw a red "tupai" on the ground. It was probably the form of *Tupaia tana* afterwards taken on Pulo Tuanku.

*Tragulus brevipes*.—Several seen; only one taken.

*Sciurus pretiosus*.—Common.

*Sciurus bancarus*.—Very common.

*Mus firmus*.—

*Mus fremens*.—

*Mus lingensis*. Rats were very plentiful, but land and hermit crabs abounded to such an extent that trapping was difficult and many of the specimens caught were ruined.

PULO TUANGKU, BANJAK ISLANDS (January 22 to February 5, 1902).

*Tragulus russeus*.—Very common. Am not certain whether there are one or two forms. Three males weighed over 5 pounds each, but none of the females were so large. Now in *Tragulus* the female is considerably larger than the male; but no correspondingly large females were obtained among the thirty or more that I examined. Most of the females were pregnant.

*Sus vittatus*.—A rather small form. Common, but only one female and an immature male obtained.

*Sciurus ubericolor*.—Common.

*Ratufa palliata*.—

*Ratufa femoralis*.—Both very common and very noisy. Often seen together in the same tree. When alive the brown one (*femoralis*) appears smaller than the other.

*Rhinosciurus laticaudatus*.—A female was caught in a rat trap at Ujong Tumbaga.

*Mus firmus*.—

*Mus fremens*.—

*Mus asper*.—

*Mus lingensis*.—All four species of *Mus* were common.

*Lenothrix canus*.—Only one taken.

*Galeopithecus volans*.—Common.

*Macacus "cynomolgus"*.—Common. A small form similar to that of Sumatra.

PULO MANSALAR, AT ENTRANCE TO TAPANULI BAY (March 2 to 11, 1902).

A monkey, apparently identical with the *Presbytes maurus* of the mainland, was observed, but no specimen could be secured. It was shy and not very common. The tracks of pigs were abundant, but

none of the animals themselves were seen. Natives reported *Gallopithecus* common, and also said that no musangs occur.

**Tragulus amœnus.**—Two were brought in by natives.

**Tragulus jugularis.**—Common. About thirty were brought in by natives. Three Nias men with two dogs went to the northwest end of the island, and returned in two days with fourteen napu, so the animals must be very plentiful.

**Sciurus saturatus.**—Common.

**Sciurus mansalaris.**—Very common. Crepuscular, but a few may be seen at all hours.

**Ratufa nigrescens.**—Common, but neither as plentiful nor as noisy as the species of Pulo Tuangku.

**Mus domitor.**—

**Mus fremens.**—

**Mus catellifer.**—All three species of rats were common.

TAPANULI BAY, NORTHWESTERN SUMATRA (February 12 to 28 at Lobo Pandan Bay, and March 16 to 29 at Jaga Jaga).

No elephants are in the immediate vicinity, but they are said to be common only a few miles away. A rhinoceros is said to have come close to the village while I was at Lobo Pandan.

**Rusa.**—A female or young male seen.

**Cervulus.**—Heard at Lobo Pandan. One seen.

**Tragulus kanchil.**—Very common.

**Tragulus napu.**—Several snared and brought in, but all were immature except one fine male. If this is typical *napu*, as it probably is, it is a different animal from any that I have heretofore obtained.

**Sus.**—None seen, but their tracks were everywhere plentiful.

**Sciurus vittatus.**—Common.

**Sciurus tenuis.**—Common.

**Sciurus erebus.**—Generally common, but less so than the last. A good many met with in the mangroves, and particularly in the coconuts at Jaga Jaga village.

**Ratufa palliata.**—Not very common. Heard several times at Lobo Pandan. A pair often seen and fired at unsuccessfully on Gunong Kebong, where a half-grown female was finally shot.

**Mus firmus.**—

**Mus fremens.**—

**Mus lingensis.**—All three rats were common.

**Mus asper.**—Only one taken.

**Trichys macrotis.**—Several caught by Malays on Bukit Sawa.

**Herpestes brachyurus.**—A pair were caught by Malays in a jerat (snare) on Bukit Sawa.

**Paradoxurus.**—No skins. A half-grown female brought to me alive is now (April 6) well and growing fast. While it does not look

like the *P. hermaphroditus* of the peninsula, it closely resembles the form found on Sumalur; so the latter may have been introduced.<sup>a</sup> The Malays often keep musangs as pets.

*Hemigale hardwickii*.—One snared by Malays on Bukit Sawa.

*Aonyx cinerea*.—A female snared on Bukit Sawa. It is apparently adult, though weighing only 5 $\frac{3}{4}$  pounds.

*Gymnura gymnura*.—One caught alive by a Malay on Bukit Sawa.

*Tupaia ferruginea*.—Apparently not common. Three specimens obtained at Lobo Pandan.

*Pteropus* sp.—Often seen flying over Jaga Jaga. Two were shot, but fell into the water and were lost. *Pteropus* usually sinks in water unless very fat.

*Cynocephalus titthæcheilus*.—A bunch of twenty females were found hanging on a cocoanut leaf at Jaga Jaga. All were killed at one shot. A male found hanging alone on another tree about 20 feet away was also shot.

*Nycticebus malaianus*.—One brought in alive. Malay name, "kong-kong." The animal is much used in medicine and magic.

*Presbytes sumatranus*.—Not as common as *P. maurus*, and keeps more strictly to the hills and heavy forests. Local name, "boóro."

*Presbytes maurus*.—Common, especially among the mangroves. Local name, "chinko."

*Macacus nemestrinus*.—Malay name, "broh," but locally called "béróh." Met with a number of times, but only two, both females, shot. These short-tailed *Macacus* are always shy and hard to get. Did not observe them in captivity in Sumatra, although I have seen many in other places trained to climb for cocoanuts. A well-trained broh is said to sell for \$20 to \$25 (Straits dollars) in the Straits Settlements.

*Macacus "cynomolgus"*.—Malay name Krah, from its call. About Tapanuli the local name is Káro. Very common. Apparently a rather small form. Some few males seem to grow to a large size. I shot one very large male, but he tumbled into the river and sank immediately. I do not think that more than one male in a hundred ever reaches this large size—probably 15 or 16 pounds. It is the same with *M. cynomolgus* everywhere.

*Hylobates agilis*.—Common; some are pale brown and some black. A brown female (No. 114501), killed on February 22, had a black husband and a black baby. Gibbons are monogamists.

*Symphalangus syndactylus*.—Common. Their extraordinary cries heard everywhere about Tapanuli Bay, also at Tapat Tuan, 140 miles farther up the coast. A new born young, killed by the same shot

<sup>a</sup>In a letter dated September 26, 1902, Dr. Abbott writes that this musang, now nearly adult, has grown to resemble in all respects the common *P. hermaphroditus* of the Malay Peninsula.

which killed its mother, was naked except on its scalp. A few days after another female was shot. This had a baby about a month old, which is now (April 6) well covered with hair and has cut all its milk incisors. It thrives on condensed milk and bananas and is too affectionate to be an altogether agreeable pet. A later note says that this siamang died of diarrhea on April 14.

**Simia.**—The orang utan exists, but not abundantly, about Tapanuli Bay. Two miles up the Jaga-Jaga River some nibong palms were seen that had been broken off by oranges, and also an old sarong (shelter), but the traces were old. There were said to be more a few miles farther inland, particularly up the Berdiri River. The natives say they always go about in pairs. This is probably true, as all the siamang I met with were in pairs, and all gibbons, as far as I know, are monogamous. Often one meets with two or more pairs on a favorite fruit tree, and, of course, they have young ones with them; but they never go in gangs like *Macacus* and *Pusbytes*, and it is usual for a pair to be alone or with one baby.

#### EXPLANATION OF PLATES.

##### PLATE XVIII.

###### *Lenothrix canis*, Type.

Figs. 1-3, skull (natural size); fig. 4, crowns of lower molars (about  $\times 4$ ); fig. 5, crowns of upper molars (about  $\times 4$ ).

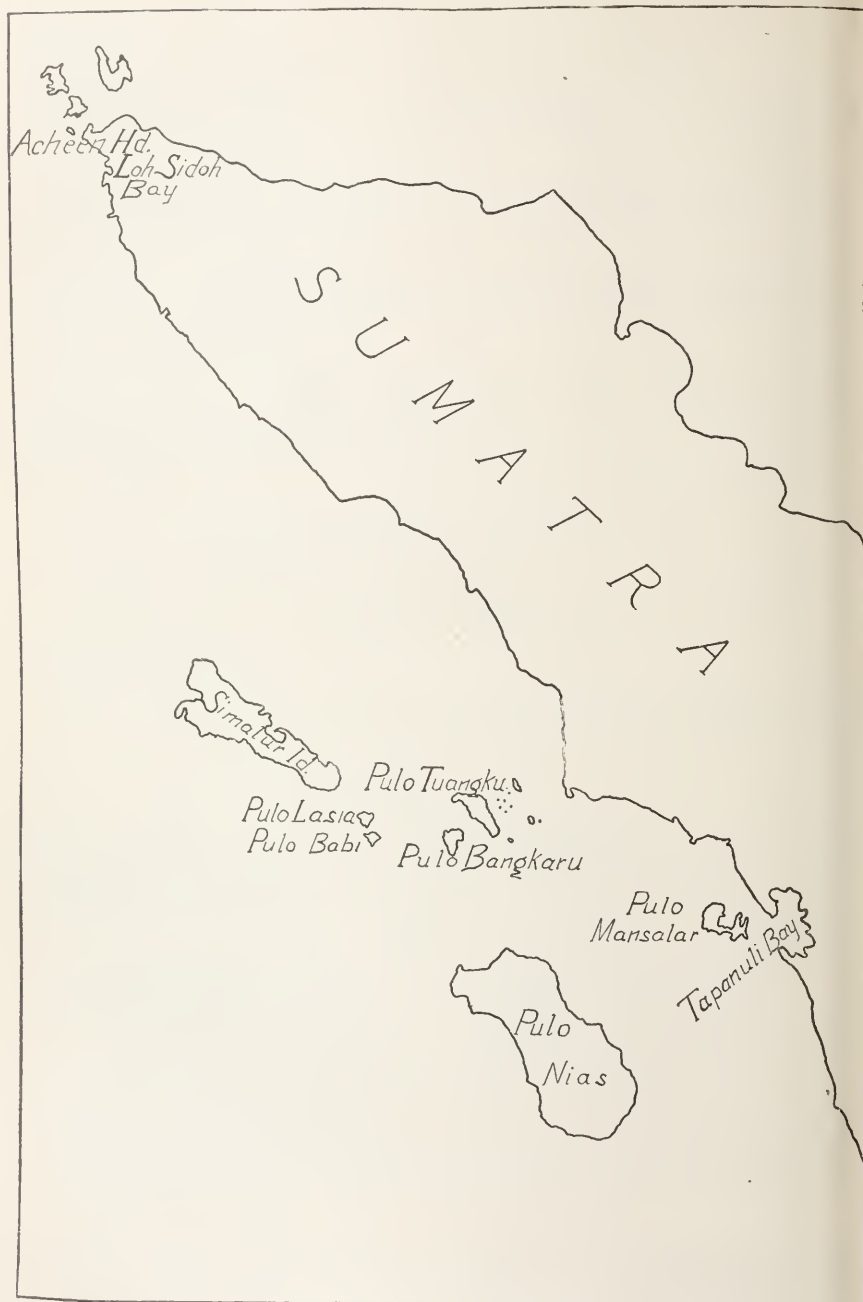
##### PLATE XIX.

###### *Ratufa lenata* *R. palliata*.

Figs. 1-9, posterior termination of nasals and premaxillaries in 9 skulls of *Ratufa lenata*; figs. 10-12, the same in 3 skulls of *R. palliata*; figs. 13-21, anterior termination of maxillaries in 9 skulls of *R. lenata*; figs. 22-24, the same in 3 skulls of *R. palliata* (all about  $\times 1.75$ ).

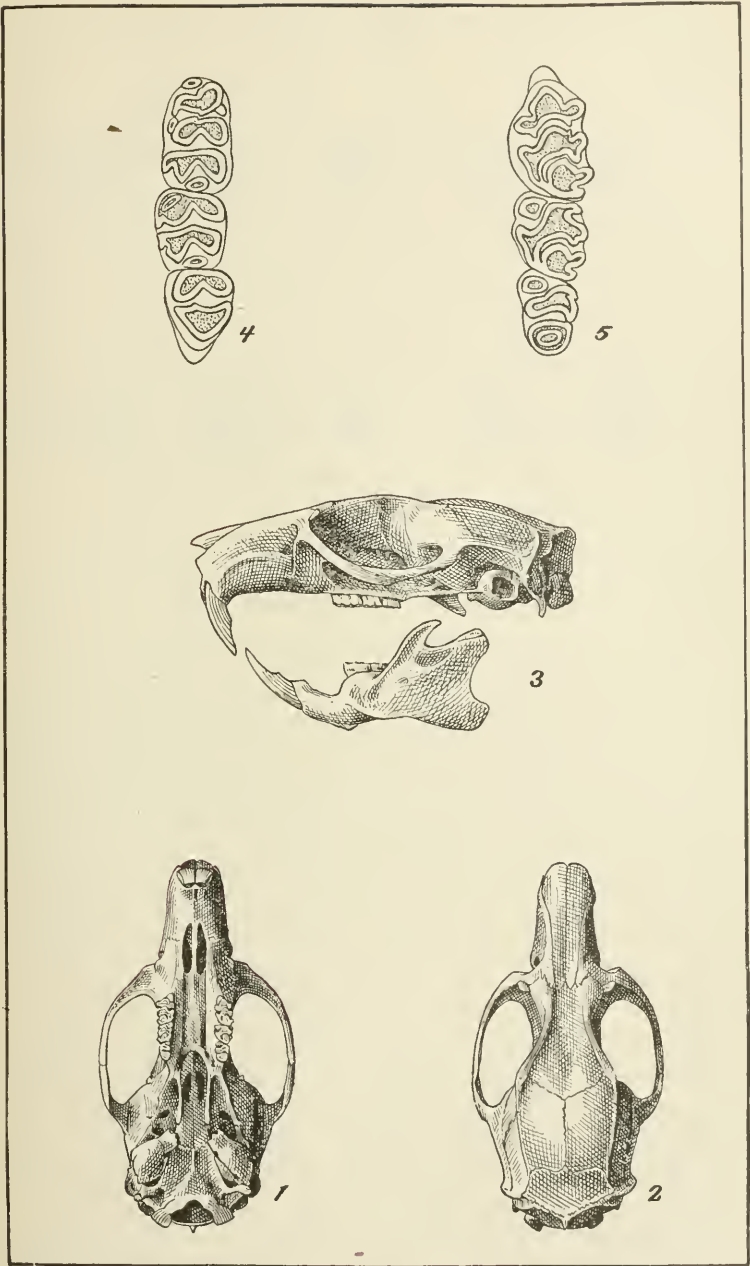
- |                                   |                                    |
|-----------------------------------|------------------------------------|
| Figs. 1 and 13, male, No. 114352. | Figs. 7 and 19, male, No. 114357.  |
| 2 and 14, female, No. 114349.     | 8 and 20, male, No. 114350. Type.  |
| 3 and 15, male, No. 114354.       | 9 and 21, female, No. 114347.      |
| 4 and 16, female, No. 114355.     | 10 and 22, —, No. 114003.          |
| 5 and 17, male, No. 114346.       | 11 and 23, —, No. 114004.          |
| 6 and 18, male, No. 114356.       | 12 and 24, male, No. 113162. Type. |

Nos. 1-9, 13-21, from Pulo Tuanku; Nos. 10-11, 22-23, from Sumatra, exact locality not known; Nos. 12 and 24, from the Indragiri River, eastern Sumatra.



NORTHWESTERN SUMATRA AND ADJACENT ISLANDS.

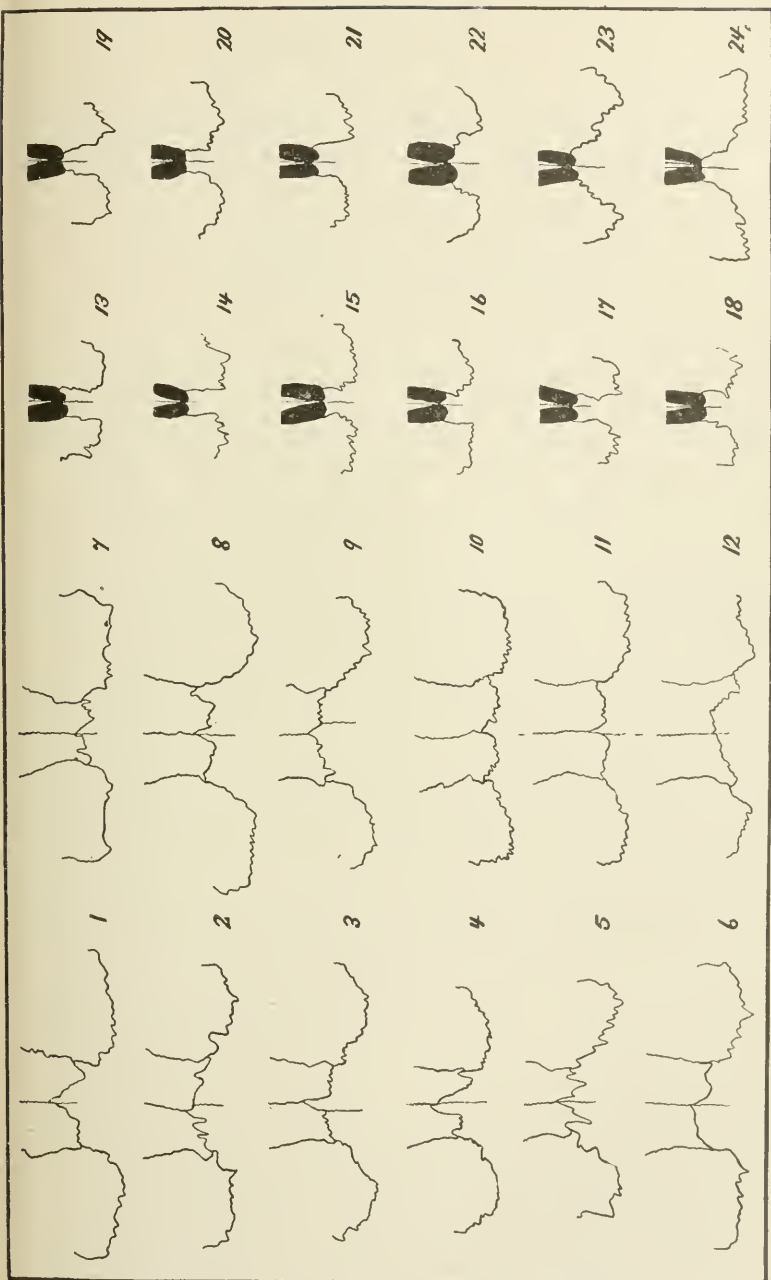




SKULL AND TEETH OF *LENOTHRIX CANUS*, TYPE.

FOR EXPLANATION OF PLATE SEE PAGE 483.





PART OF INTERORBITAL REGION AND PALATE IN RATUFA PALLIETA AND R. LANATA.

FOR EXPLANATION OF PLATE SEE PAGE 483.

