

MAMMALS COLLECTED IN EASTERN SUMATRA BY DR.  
W. L. ABBOTT DURING 1903, 1906, AND 1907, WITH  
DESCRIPTIONS OF NEW SPECIES AND SUBSPECIES.

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INTRODUCTION.

During the last eight years Dr. W. L. Abbott has visited various localities along the eastern coast of Sumatra for the purpose of making collections of natural history and of ethnology, all of which he has presented to the United States National Museum. Mammals and birds have constituted by far the greater part of the zoological collections. The following paper is a systematic account of the mammals that he has obtained in the general region of eastern Sumatra. Thirteen new species and three new subspecies are described in it.

Doctor Abbott's first visit to eastern Sumatra was in August and September, 1901. At that time he ascended the Indragiri River (see map, page 623) for a short distance and made collections of mammals from along its banks. This collection, together with material gathered during the same year from the near-by islands of the Rhio-Linga Archipelago, was described in 1902 by Mr. Gerrit S. Miller, Jr.<sup>a</sup> It is not treated of in the following pages except in an incidental manner.

The next visit of Doctor Abbott to eastern Sumatra was in August and September, 1903, when he made a small collection from along the banks of the Kateman River, a stream not far from the Indragiri which had been visited two years before. He again made a trip to the east coast of Sumatra during the period from November 15, 1905, to February 12, 1906, to Aru Bay (see map, page 621). From there he proceeded down the coast for about 250 miles to the strait, known as Salat Rupert, between Pulo Rupert and the mainland of Sumatra.

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<sup>a</sup> Mammals collected by Dr. W. L. Abbott in the region of the Indragiri River, Sumatra, Proc. Acad. Nat. Sci. Philadelphia, March, 1902, issued June 11, 1902, pp. 143-159.

(See map, page 623.) From February 24 until April 3, 1906, he collected on Pulo Rupert, on the mainland opposite, on the small island of Payong in Salat Rupert and on the large islands of Bengkalis and Padang. (See map, page 623.) During the autumn of the same year Doctor Abbott visited that part of Sumatra again for a period of nearly five months, October, 1906, to February, 1907. He made collections from along the banks of the Siak and the Little Siak rivers, from the islands of Merbau, Tebing Tinggi, Rangsam, and Penjalei, as well as from the mainland of Sumatra opposite them. (See map, page 623.) The mammals of these several collections are described in detail below. Several preliminary notices of some of the specimens have already been printed, but the collections as a whole are treated of here for the first time. Reference to the earlier papers will be found in the synonymies of the species to which they refer.

In 1889 Dr. F. A. Jentink,<sup>a</sup> director of the Leyden Museum, published a short paper on a collection of mammals made in eastern Sumatra by Dr. B. Hagen. In 1905 Mr. Gustav Schneider<sup>b</sup> published a detailed account of his travels in eastern Sumatra and the mammals which he collected there. The names applied by these authors to the various species of mammals in eastern Sumatra are given under the synonymies of the species listed below.

#### DESCRIPTIONS OF LOCALITIES.

The following account of the localities visited by Doctor Abbott are taken almost entirely from his letters and field notes, and a study of the maps of the region.<sup>c</sup>

*Aru Bay*.—(Map, page 621.) This is a small indentation on the east coast of Sumatra at about longitude  $98^{\circ} 15' E.$  and latitude  $4^{\circ} 10' N.$  One fresh water river, the Besitan, flows into it. In addition to that several tidal creeks empty into it. The shores of the bay and the rivers generally are fringed with mangroves. A short distance back from the rivers the country is rolling. A rather large island, Pulo Sembilan, is at the entrance to the bay.

The shooting ground was the peninsula between the lower Besitan River and the smaller Sungei Tongkam. This was covered to a great extent with heavy forest, through which many paths and roads had been made by the Chinese

<sup>a</sup> On a collection of mammals from East-Sumatra. Notes Leyden Museum, XI, pp. 17-30, January, 1889.

<sup>b</sup> Ergebnisse zoologischer Forschungsreisen in Sumatra. Erster Teil. Säugetiere (Mammalia). Gesammelt und bearbeitet von Gustav Schneider in Basel. Zool. Jahrb. Syst., XXIII, pp. 1-172, pls. i-iii, sketch maps 1 and 2.

<sup>c</sup> Especially, Atlas van Nederlandsch Oost-Indië, bij het topographisch bureau te Batavia samengesteld in de jaren 1897-1904. (Omgewerkte uitgave van den atlas van J. W. Stenfoort en J. J. Ten Siethoff.) Bij de topographisch inrichting te 's Gravenhage gereproduceerd in de jaren 1898-1907, onder leiding van den Directeur C. A. Eckstein uitgegeven van het Departement van Koloniën.

woodcutters. These, however, had only taken the best trees of three or four species and the rest of the jungle was undisturbed.

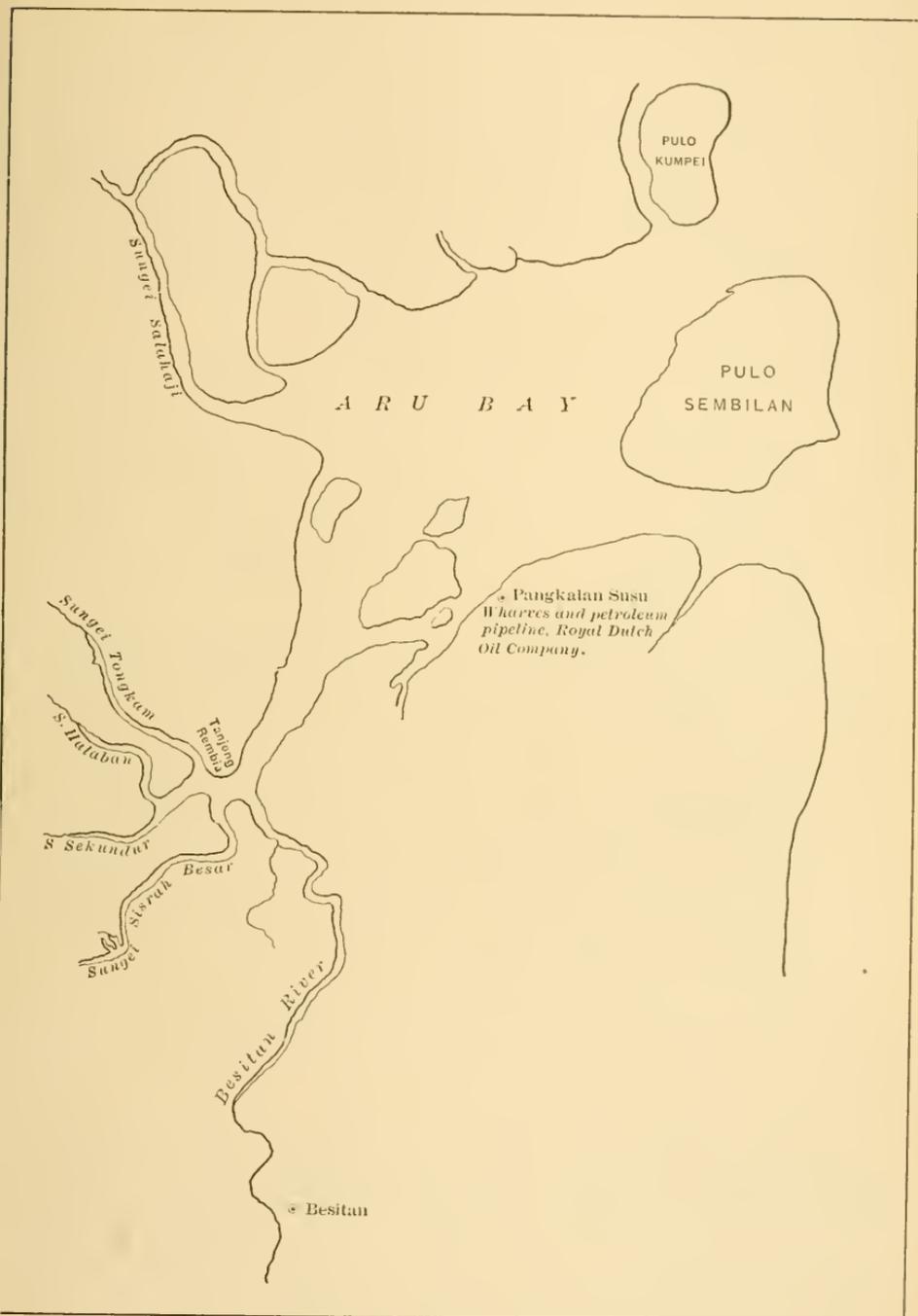


FIG. 1.—MAP OF ARU AND VICINITY.

There were many old clearings and tracts of lalang [long coarse grass] and scrub jungle, besides some new clearings and pepper gardens. I remained at this anchorage opposite Tanjong Rembia from November 17 to December 8, 1905.

The Tongkam River joins the Besitan at Tanjong Kramet. [Tanjong Rembia on map.] The schooner anchored about 4 miles up the Tongkam, which is a tidal creek lined with mangroves. The principal collecting ground was the left bank of the Tongkam. There were a few kebuns and old clearings, but the country was mostly forest, intersected in all directions by the roads of the Chinese woodcutters. There was plenty of heavy original forest. The surrounding country is mostly rolling hills and ridges about 80 to 120 feet high. I remained at the anchorage in the Sungei Tongkam from December 8, 1905, to January 8, 1906. I also shot over the country about the headwaters of the Tongkam, which is covered with heavy forest extending from the Tamiang River [belonging to a watershed just to the north, not included or shown on the map, page 621]. Saw many fresh tracks of rhinoceros here. But a Malay who had a gun was continually after them, until, before I left, I could find no more fresh tracks. About a dozen Malays had made a clearing at the head of canoe navigation on the Tongkam.

I was anchored in the Sungei Halaban from January 11 to 28, 1906, about 4 miles up. The shooting ground was usually the peninsula between the Halaban and the Tongkam, which was rolling country mostly covered with heavy forest. There were many roads made by the Chinese woodcutters.

February 1 to 9, 1906, was spent in the upper part of the Besitan River, about 14 miles up from the kwala [mouth of river]. The country was hilly and covered with magnificent unbroken forest. Animal life was not plentiful. There were no habitations beyond about two hours above Besitan Station.—W. L. Abbott.

*Salat Rupert.*—This is the narrow strait between Pulo Rupert and the mainland of Sumatra. Its average width is about 3 miles and its depth at the upper part is about 5 fathoms and at the lower part decreases to 3 fathoms.<sup>a</sup>

The mainland of Sumatra along Salat Rupert is low and swampy during the rains. The shore is mostly covered with secondary scrub and jungle, but back a short distance the country is all heavy forest. Tigers are abundant and elephants are said to be found at the time of rains. I saw many of their trails. The country is completely tracked up with pigs, tigers, *Rusa*, and many other animals, but the denseness of the jungle prevents one from catching sight of the larger game.—W. L. Abbott.

*Pulo Payong.*—See map, page 623.

Is an island about 4 miles long, in the Salat Rupert. It is low and swampy and largely covered with "Nibong" palms.—W. L. Abbott.

*Pulo Rupert.*—See map, page 623.

Pulo Rupert is the largest of the islands in the straits of Malacca, lying near the east coast of Sumatra, from which it separated by the Salat Rupert, 2 to 3 miles wide and 10 to 15 fathoms deep. The whole island is low and flat, and swampy in the rainy season. The surface is nearly all covered with virgin forest. Some clearings exist along the coast and on the Salat Morong which separates it from Pulo Medang. Including Pulo Medang, this island forms a circle 26 geographic miles in diameter. The inhabitants number 2,000 or 3,000.

<sup>a</sup> Directory Indian Archipelago and Coast of China by Alexander George Findlay. London, 1889, p. 53.

and consist largely of a primitive tribe called Orang Akit. They are much mixed with the Malays, however. There are a few Chinese.

In addition to the mammals obtained, *Sus oi* and *Rusa* are common. A few bears are said to exist. *Ratufa* is said to exist, but I never saw or heard them. *Gymnura* and a wild cat also occur. Dugongs are said not to be rare

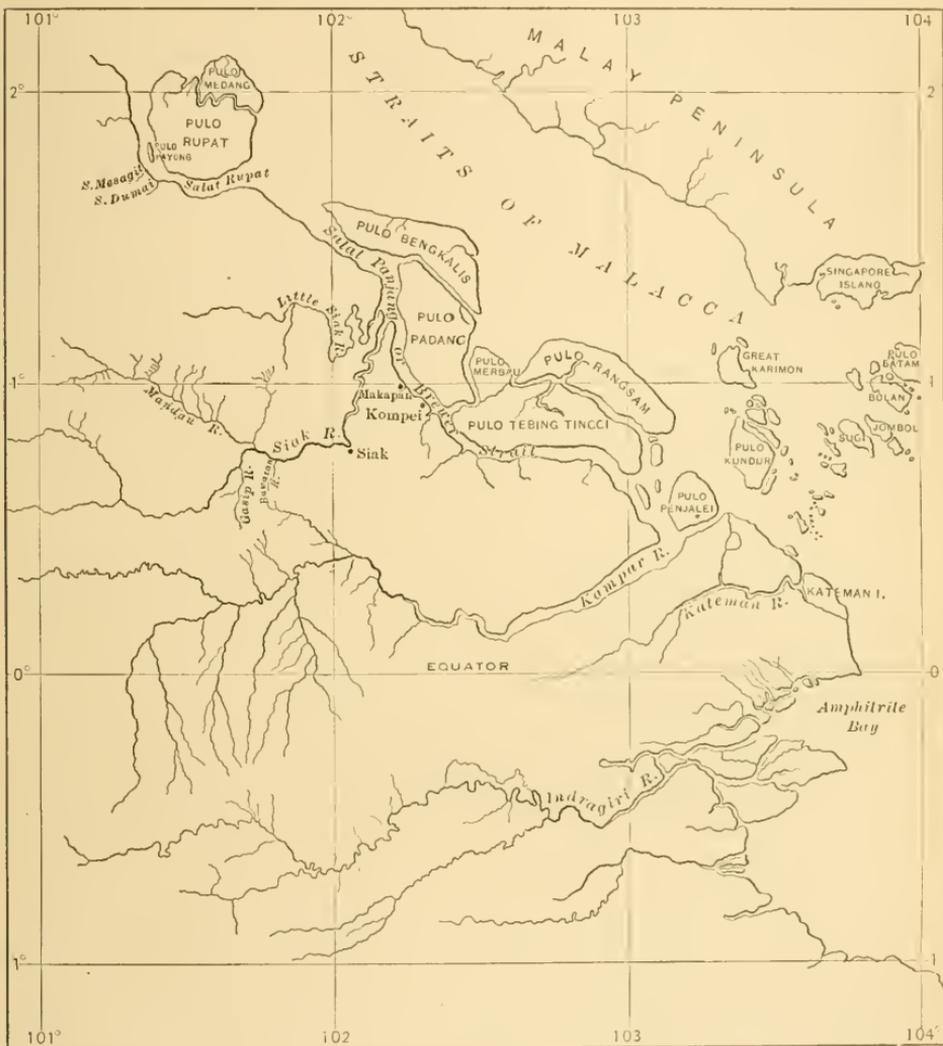


FIG. 2.—MAP OF PORTION OF EAST COAST OF SUMATRA.

in the Salat Rupert. Tigers never occur in Rupert, nor do elephants or rhinoceroses cross the strait, although they are all common upon the mainland.—W. L. Abbott.

*Pulo Bengkalis*.—See map above.

This island is 39 geographical miles long and contains about 400 square miles. The whole surface is low and flat, and swampy during the rains. Along the coast are many clearings and sago kebuns, but most of the surface is covered with heavy forest. It is separated from the mainland by the Salat Panjang, about 3 miles wide [and 5 to 15 fathoms deep].—W. L. Abbott.

*Pulo Padang*.—See map, page 623.

This island is separated from the mainland of Sumatra by a continuation of the Salat Panjang. It is separated from Pulo Bengkalis by the Salat Padang, about 1 mile in width and 5 or 6 fathoms deep. At its lower end it is separated from Pulos Merbau and Tebing Tinggi by narrow channels.

It has about the same area as Pulo Bengkalis; its surface is low and flat and mostly covered with forest.—W. L. Abbott.

The mammals of these islands, Rupal, Bengkalis, and Padang, are remarkably few in number of species, considering their extent and their proximity to the coast of Sumatra. These islands are very low, only a few feet above high water, and nearly everywhere swampy after heavy rains. There are no hills anywhere and they are all doubtless of recent alluvial formation. No typhoons or heavy gales ever occur, so that the tiger and rhinoceros have never been carried across the narrow straits, as has happened in many of the islands of the Mergui Archipelago. When some of the great cyclones have occurred at the head of the Bay of Bengal, Sangar Island and much of the Sundarbans have been completely flooded, and tigers, deer, and other mammals swept out to sea in hundreds and drowned. The only heavy gales, except squalls, that occur in the Straits of Malacca are the "Sumatras," which blow for a short time with almost hurricane violence. They last only a short time, at most four or five hours, and are unaccompanied by much depression of barometer and consequent rise of sea level. The rain pours in torrents, but the short duration and comparatively local character prevent much flooding.

The large rivers which rise in the western range of mountains and flow nearly across Sumatra, to empty on this coast, the Indragiri, Siak, and Kampar, all rise enormously in the rains, particularly in the uplands. They must carry down more or less animal life on such occasions. But when the rivers reach the vast alluvial flat bordering the east coast the level of the water scarcely changes during the highest floods. There are no embankments, and the increase of fresh water simply spreads out over the forest-covered country whose surface is just a few inches above ordinary high-tide level. The fresh water merely displaces the previously salt or brackish water. The whole east coast of Sumatra is simply a huge sponge. This coast district then acts as a sort of strainer which catches any or most of the animals brought down by the floods from the highlands.

Curiously enough the bear exists in all three of the islands of Rupal, Bengkalis, and Padang. This is a common inhabitant of the swampy east coast, but is not often found in islands. It occurs in Banka, however, and in some of the Mergui Archipelago near the coast. The absence of tigers is curious, especially as its particular food pigs and *Rusa* are very common, and tigers swim very well indeed. In this connection it is to be noted that tigers were absent from Singapore Island at the time of its settlement in 1819, but became abundant ten or fifteen years later when the human population increased. At the present time they seem to swim across the Johor Strait at will. Leopards are not found in the islands. There is a wild cat common in all three islands, probably a form of *Felis bengalensis*. The natives complain much of its depredations on their poultry. Muntjacs are absent. They like dry ground and low hills and the islands are unsuited to them. They rarely occur on islands, only on Nias and on Pulo Bintang, where they have probably been introduced. Monkeys, *Macaca fascicularis* and *Presbytis cristata*, occur on all three islands, [*Presbytis percurea*] on Pulo Rupal only. *Sus oi* and *Sus vittatus* both occur on Rupal, the latter very common. On Bengkalis and Padang, *Sus oi* was common

and the natives told me that the "Babi bakan," *Sus vittatus*, was very rare. It is common everywhere on the mainland.

On the small island of Pulo Payong, in the middle of Salat Rupert, the small pig, *Sus vittatus*, was very abundant, but *Sus oi* does not occur. The tracks of tiger are said to occur occasionally on Payong, but the natives said they were not real tigers, but "Rimau kwáka" (were tigers).

*Manis* occurs on Bengkalis. No squirrel is found on Bengkalis, but *Sciurus vittatus* is plentiful across the narrow salat in Pulo Padang. No *Ratufa* occurs on any of the islands.

The conclusion derived from the distribution of the mammalian fauna of these islands and of the Rhio-Lunga Archipelago is that the present period is one of extension of land areas, either from elevation of land areas or more probably from alluvial deposit. The islands with hills have a much larger fauna. At some past period the islands in all this region extended to the mainland and received their fauna. Then followed a period of depression, when everything was sunk below sea level, except the tops of the hills. These islands were small, too much so, for the larger mammals to continue to exist. The squirrels, *Manis*, *Tragulus*, etc., remained on the small islands in safety. Then followed the present condition of things, elevation and alluvial deposition, enlarging the islands and extending the coast of Sumatra eastward and receiving additions to its fauna by swimming and introduction by man. According to this theory, the islands of Rupert, Bengkalis, Padang [Merbau, Tebing Tinggi, Rengsam, and Penjalei] are of entirely recent formation and the present fauna has entered only comparatively recently.—W. L. Abbott.

Doctor Abbott's views as to the formation of these islands and the manner in which they received their fauna are entirely in accord with my own as based on study of his collections and of the elevations of the land and depths of the sea. His explanation of the manner in which animals may be carried from the highlands of Sumatra to the lowlands of the east coast may possibly explain some puzzling points noted beyond under *Tragulus* (page 630), *Mus* (page 645), and *Ratufa* (page 636).

*Pulo Tebing Tinggi*.—Also called Pulo Rantow.

*Pulo Merbau*.—A small island.

*Pulo Rengsam (or Rangsang)*.—Also called Medang, but not to be confused with Pulo Medang off Pulo Rupert.

The location and relative sizes of these islands may be seen on the map, page 623. They are all low alluvial islands, similar in general characteristics to the islands of Rupert, Bengkalis, and Padang, described above.

*Pulo Penjalei (also called Mendol)*.—This is a small alluvial island at the mouth of the Kampar River.

*Kateman River*.—See map, page 623.

The Kateman has a course of 25 or 30 miles through the low alluvial land of eastern Sumatra. The whole country is more or less swampy. No place is more than 2 feet above high water. There are many sago plantations along its banks. During the past five or ten years [this was written in the summer of 1903] much timber near the river banks has been cut by the Chinese for the Singapore market, but the lumbering operations never extend more than a

mile from the river banks. The timber tongkans (juuks) ascend the Kateman for about 18 or 20 miles. Besides the animals obtained, I saw pigs and a black leopard. Tigers also exist, but no elephants or rhinoceroses.—W. L. Abbott.

#### SYSTEMATIC LIST OF SPECIES.

##### SUS VITTATUS Müller and Schlegel.

- 1839-1844. *Sus vittatus* MÜLLER and SCHLEGEL, Verhandl. Naturh. Geschied. Nederl. Bezitt. Zool., p. 172, pls xxx, xxxii.  
 1889. *Sus vittatus*, JENTINK, Notes Leyden Museum, XI, p. 25.  
 1905. *Sus vittatus*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 127.  
 1906. *Sus vittatus*, MILLER, Proc. U. S. Nat. Mus., XXX, p. 746, June 13, 1906.

Three specimens from Aru Bay, one from Pulo Rupert, two from Pulo Payong in Salat Rupert, two from the Siak region, and two from Pulo Penjalei, at the mouth of the Kampar River. Those from Pulos Payong and Penjalei are very small, but it is doubtful if this is more than individual variation.

For measurements of the adults, see table, page 627.

##### SUS OI Miller.

1902. *Sus oi* MILLER, Proc. Biol. Soc. Washington, XV, p. 51, March 5, 1902.  
 1905. *Sus barbatus*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 128.  
 1906. *Sus oi*, MILLER, Proc. U. S. Nat. Mus., XXX, p. 741, June 13, 1906.

During his latest trip into eastern Sumatra, Doctor Abbott secured eight additional specimens of this large pig from the mainland or the adjoining islands. These specimens, together with material recently collected by him in western Borneo,<sup>a</sup> indicate that the members of the *Sus barbatus* group of pigs are somewhat more variable than was at first supposed. The characters pointed out by Mr. Miller, however, appear as a rule to hold good. The most reliable character for distinguishing between *Sus oi* and *Sus barbatus* is the size and shape of the last lower molars. This tooth averages longer in the Bornean pigs and in the majority of the specimens shows three distinct cross ridges and a terminal heel, while in the Sumatran *Sus oi* most specimens have this tooth shorter, with only two cross ridges and a terminal heel, or sometimes what appears like three cross ridges and no heel. As for actual size of the skulls, the largest in the U. S. National Museum comes from Borneo (Cat. No. 142351, upper length 487 mm.). It does not, however, reach the extreme length (505 mm.) given by Mr. Miller<sup>b</sup> for *Sus oi*. All the pigs of this group recently taken by Doctor Abbott on Sumatra or the adjacent islands are distinctly smaller than is the type of *Sus oi*.

For measurements see table, page 627.

<sup>a</sup> Lyon, Proc. U. S. Nat. Mus., XXXIII, p. 551, December 24, 1907. Part of the specimens only.

<sup>b</sup> Proc. U. S. Nat. Mus., XXX, 1906, p. 741.

External and cranial measurements of pigs from eastern Sumatra.

Dimensions.	Cat. No. 113159, adult male, Indragiri River, Sumatra. Type of <i>Sus</i> <i>o</i> .	Cat. No. 14304, nearly adult male, Kampar River, Sumatra, <i>Sus o</i> .	Cat. No. 14312, old male, Pulo Tebing Tinggi, <i>Sus o</i> .	Cat. No. 14308, adult male, Pulo Tebing Tinggi, <i>Sus o</i> .	Cat. No. 14310, adult male, Pulo Tebing Tinggi, <i>Sus o</i> .	Cat. No. 14309, adult female, Pulo Tebing Tinggi, <i>Sus o</i> .	Cat. No. 14311, adult female, Pulo Tebing Tinggi, <i>Sus o</i> .	Cat. No. 14354, old male, Pulo Kangsam, <i>Sus o</i> .	Cat. No. 14355, old female, Pulo Kangsam, <i>Sus o</i> .	Cat. No. 14302, adult male, Sungai Mandau, <i>Sus villosus</i> .	Cat. No. 14303, adult male, Siak River, <i>Sus villosus</i> .	Cat. No. 14365, adult male, Pulo Penjajet, <i>Sus villosus</i> .	Cat. No. 14366, adult female, Pulo Penjajet, <i>Sus villosus</i> .	Cat. No. 14343, adult female, Pulo Payong, <i>Sus villosus</i> .	Cat. No. 14350, nearly adult male, Aru Bay, <i>Sus villosus</i> .	Cat. No. 14351, nearly adult male, Aru Bay, <i>Sus villosus</i> .
Head and body <i>a</i> .....mm.	1,575	1,360	1,150	1,440	1,440	1,440	1,440	1,340	1,410	1,325	1,235	1,105	1,027	1,290	1,290	1,290
Tail <i>a</i> .....mm.	295	245	290	230	230	230	230	240	270	260	240	240	240	260	260	260
Hind foot <i>a</i> .....mm.	310	310	310	310	310	310	310	303	303	290	278	261	237	290	290	290
Height at shoulder <i>a</i> .....mm.	850	715	780	960	960	960	960	690	690	690	640	650	650	640	640	640
Weight in pounds <i>a</i> .....lbs.	250	122	204	190	190	190	190	122	122	200	168	117	78	61	61	61
Weight in kilos.....kilos	113	56	93	86	86	86	86	56	56	91	76	53	36	28	28	28
Upper length of skull.....mm.	480	423	463	412	412	412	412	398	398	352	332	319	266	253	253	253
Basal length.....mm.	410	372	406	368	368	368	368	381	381	309	287	282	242	227	227	227
Basilar length.....mm.	390	354	388	350	350	350	350	327	327	294	271	262	224	223	223	223
Palatal length.....mm.	330	323	335	272	267	267	267	306	306	229	206	207	173	163	163	163
Width of palate at <i>pm</i> .....mm.	50	40	55	50	50	50	50	42	42	37	36	36	34	32	32	32
Width of palate, including <i>m</i> <sub>3</sub> .....mm.	72.6	69	68	64	64	64	64	70	70	65	62	62	58	54	54	54
Least width of palate at front of <i>m</i> <sub>3</sub> .....mm.	28.4	28	27	25	25	25	25	23	23	24	22	22	21	21	21	21
Zygomatic breadth.....mm.	162	142	160	141	141	141	141	135	135	152	141	130	112	112	112	112
Least interorbital breadth.....mm.	74	67	70	70	70	70	70	72	72	76.5	66	67	57	52	52	52
Parietal constriction.....mm.	11	23	5	26	26	26	26	10	10	40	29	35	33	27	27	27
Nasal breadth at posterior extremity of premaxillary.....mm.	38	30	42	41	41	41	41	33	33	38	28	28	24	24	24	24
Length of nasals.....mm.	240	225	246	215	215	215	215	200	200	165	156	157	131	124	124	124
Occipital depth to bastion.....mm.	140	120	132	119	119	119	119	128	128	115	103	98	81	75	75	75
Mandible.....mm.	360	319	352	331	331	331	331	337	337	300	274	252	213	206	206	206
Maxillary toothrow.....mm.	129.4	124	122	121	121	121	121	126	126	113	106	103	96	93	93	93
Second upper molar.....mm.	23 x 19.4	24 x 20	21 x 17	23 x 18	21 x 17	20 x 15	22 x 17.5	21 x 20	23 x 18	19 x 16	19 x 16	17 x 16	17 x 16	17 x 16	20 x 19	21 x 18
Third upper molar.....mm.	31 x 21	33 x 21	34 x 19	33 x 21	32 x 20	29 x 18	32 x 18.5	35 x 20	33 x 20	33 x 20	30 x 20	31 x 19	26 x 18	25 x 16	25 x 20	32 x 20
Mandibular toothrow.....mm.	122	118	116	111	111	107	112	121	121	110	100	97	93	88	88	88
Second lower molar.....mm.	22 x 16	23 x 15	20 x 13	22 x 14	19 x 15.5	19 x 15.5	21.5 x 14.5	21 x 15	21 x 15	20 x 15	20x14.5	18 x 15	18 x 15	16 x 12	19 x 15	21 x 15
Third lower molar.....mm.	33.8 x 18.4	35 x 17	37 x 16	38 x 17	33 x 16	33 x 16	35 x 17	38 x 18	39 x 17	34 x 18	30 x 16	32 x 15	28 x 15	25 x 13	33 x 17.5	33 x 17.5
Number of cross ridges plus heel on <i>m</i> <sub>3</sub> .....	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

b "Gutted."

a Collector's measurements.

## TRAGULUS NAPU (F. Cuvier).

1822. *Moschus napu* F. CUVIER, Hist. Nat. Mamm., IV, pl. xxxix.  
 1889. *Tragulus napu*, JENTINK, Notes Leyden Museum, XI, p. 25.  
 1902. *Tragulus napu*, STONE and REHN, Proc. Acad. Nat. Sci. Philadelphia, March, 1902, pp. 127-131, issued June 4, 1902.  
 1905. *Tragulus napu*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 133.

Seven specimens from the vicinity of Aru Bay and five from the Siak region farther down the coast.

For measurements of the adults see table, page 631.

## TRAGULUS KANCHIL (Raffles).

1822. *Moschus kanchil* RAFFLES, Trans. Linn. Soc. London, XIII, p. 262.  
 1889. *Tragulus kanchil*, JENTINK, Notes Leyden Museum, XI, p. 25.  
 1902. *Tragulus kanchil*, STONE and REHN, Proc. Acad. Nat. Sci. Philadelphia, March, 1902, p. 128, issued June 4, 1902.  
 1905. *Tragulus kanchil*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 133.

Twelve specimens from the vicinity of Aru Bay. This series is in all respects similar to the series of *Tragulus* collected by Doctor Abbott at Tapanuli Bay, on the west coast of Sumatra.<sup>a</sup> The Traguli of this group from the Siak region in eastern Sumatra are very variable but present certain average differences, and may be recognized as a distinct race described below.

For measurements of the adults see table, page 631.

## TRAGULUS KANCHIL LONGIPES, new subspecies.

*Type*.—Skin and skull of adult male, Cat. No. 144141, U.S.N.M., collected on the Little Siak River, eastern Sumatra, November 3, 1906, by Dr. W. L. Abbott. Original number 4853.

*Diagnostic characters*.—Similar in all respects to typical *Tragulus kanchil* except that the hind foot is distinctly longer.

*Color*.—The color of typical examples of *Tragulus kanchil longipes* is exactly like that of *T. kanchil kanchil*, so that no detailed description is necessary. Certain of the specimens, however, two from Makapan, one from Kompei, and one from Sungei Mandau, are distinctly lighter or more "yellow" in color than is the type and the rest of the series, being practically identical in coloration with the animal described below as *Tragulus fulvicollis*.

*Skull and teeth*.—I have been able to detect no differences between the skulls and teeth of Aru and Tapanuli Bay examples of *Tragulus* and specimens from the Siak region.

*Measurements*.—See table, page 632, and diagram, page 629. An examination of this table and diagram shows that the Siak *Tragulus* is essentially similar in size and weight to specimens from Aru Bay with the exception of the hind foot. In Aru Bay examples this

<sup>a</sup> Miller, Proc. U. S. Nat. Mus., XXVI, p. 442, and table, p. 446.

measurement ranges between 114 and 128 mm., while in those from the Siak region it is between 131 and 145 mm.

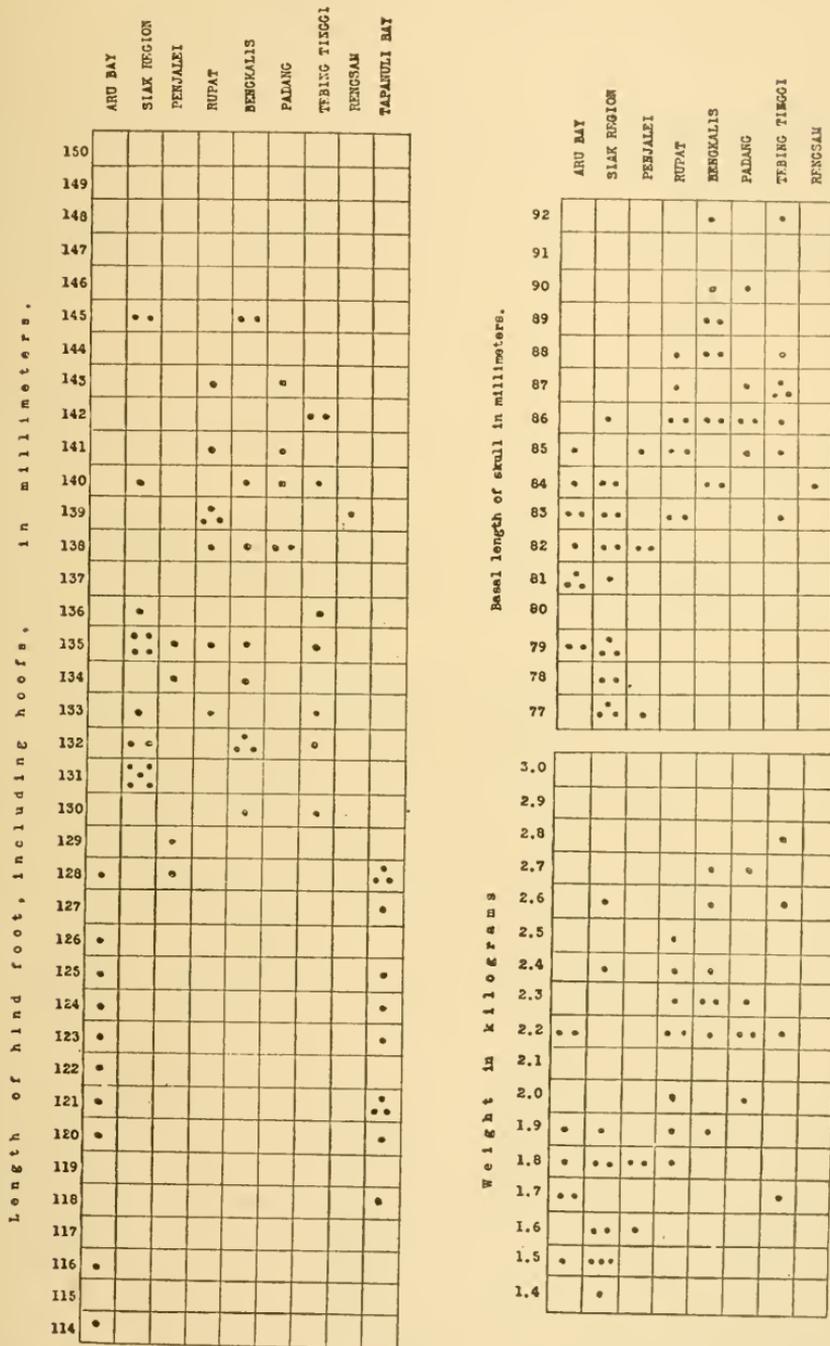


FIG. 3.—DIAGRAMMATIC VIEW OF THE LENGTHS OF HIND FOOT, BASAL LENGTHS OF SKULL, AND OF THE WEIGHTS OF TRAGULUS FROM EASTERN SUMATRA. THE DOTS REPRESENT SPECIMENS. SPECIMENS FROM ARU BAY AND TAPANULI BAY ARE TRAGULUS KANCHIL KANCHIL; THOSE FROM THE SIAK REGION AND PULO PENJALEI, TRAGULUS KANCHIL LONGIPES; THOSE FROM ALL THE OTHER ISLANDS, PELOS, RUPAT, BENGKALIS, PADANG, TEBING TINGGI, AND RENGSAM, TRAGULUS FULVICOLLIS.

*Specimens examined.*—Nine from the Little Siak River, four from Kompei, two from Sungei Mandau, two from Makapan, and four from Pulo Penjalei.

*Remarks.*—The *Traguli* of the *kanchil* group from the Siak region in eastern Sumatra are quite variable. Most of them are like typical *kanchil* except with larger feet, others of them, one from Kompei, one from Sungei Mandau, and especially the two from Makapan, are almost identical in point of color and size with the *Tragulus* from the neighboring islands of Rupal, Padang, Bengkalis, Tebing Tinggi, and Rangsam. The *Tragulus* from Pulo Penjalei, an island at the mouth of the Kateman River, is singularly enough clearly referable to *T. kanchil longipes* both in point of size and coloration.

TRAGULUS FULVICOLLIS, new species.

*Type.*—Skin and skull of adult female, Cat. No. 143519, U.S.N.M., collected on Pulo Bengkalis off east coast of Sumatra, March 27, 1906, by Dr. W. L. Abbott. Original number 4765.

*Diagnostic characters.*—A large member of the *Tragulus kanchil* group, somewhat like *Tragulus rarus* Miller,<sup>a</sup> from the Malay Peninsula, but much larger and more richly colored especially about the neck and forelegs; differs from *T. kanchil* in its larger size and lighter color.

*Color.*—Type: Upper parts and sides of body a mixture of light and dull orange-buff and black, the black slightly in excess along the middle line of the back, both colors equally prominent along the sides but the black gradually disappearing as the belly is reached so that next to the white of the underparts no black is mixed in with the dull orange-buff. Sides and top of neck tawny-ochraceous with no admixture of black except for a narrow (15 mm. wide), ill-defined nape stripe which gradually blends in with the colors of the middle line of the back. The tawny-ochraceous of the neck gradually blends in with the dull orange-buff of the body. Top of head a mixture of black and tawny-ochraceous, the former color in excess. Sides of head similar to sides of neck but duller. Underparts generally white. Throat pattern normal, the collar and median line of belly (5 mm. wide anteriorly, 30 mm. posteriorly) a light ochraceous or dull orange-buff, the  $\Lambda$  in front of collar similar in color but faintly lined with black. Inner sides of legs white; outer sides tawny-ochraceous, bright and clear on the forelegs, duller and with a slight admixture of black on the hind legs. Tail above dull tawny slightly admixed with black, below and at the tip white.

Variation in the series: The series as a whole does not show much variation in respect to color. Some of the specimens run slightly lighter than the type. The extent of the black on the top of head

<sup>a</sup> Proc. Biol. Soc. Washington, XV, August 6, 1902, p. 173.

and neck is variable. In some specimens, especially those from Pulo Rupert, it is quite conspicuous. None of the series show a decided approach in color to typical *Tragulus kanchil longipes* of the adjacent mainland, although several of the mainland form strongly approach the insular race.

*Skull and teeth.*—These show no special peculiarities, but average larger than those of *Tragulus* from the mainland.

*Measurements.*—See table, page 632, and diagram, page 629. The latter show that *Tragulus fulvicollis* is a heavier animal and has a larger skull than either *T. kanchil kanchil* or *T. kanchil longipes*. In length of hind foot it averages only slightly more than does *T. kanchil longipes*.

*Specimens examined.*—Fourteen from Pulo Bengkalis, six from Pulo Padang, ten from Pulo Rupert, nine from Pulo Tebing Tinggi, and two from Pulo Rangsam.

*Remarks.*—Typical specimens of *Tragulus fulvicollis*, compared with typical *T. kanchil*, appear very distinct, but its relations with the latter must be quite close and are easily traced back to typical *kanchil*, by way of the abnormal specimens of *T. kanchil longipes*, and then through normal specimens to *T. kanchil kanchil*. It would seem that *T. kanchil* in the lowlands of eastern Sumatra is in a state of active evolution and on the outlying alluvial islands has become *T. fulvicollis*, while on the mainland and on Pulo Penjalei it retains nearly all of the *kanchil* characters with the exception of larger hind feet. Certain examples on the mainland, however, show its tendency to become *T. fulvicollis*.

*Measurements of adult Tragulus from eastern Sumatra.*

Name.	Locality.	Number.	Sex.	Head and body. <sup>a</sup>	Tail. <sup>a</sup>	Hind foot with hoofs.	Weight. <sup>a</sup>	Basal length of skull.	Zygomatic width.	Maxillary tooth row—alveoli.	Mandibular tooth row—alveoli.
				mm.	mm.	mm.	kilos	mm.	mm.	mm.	mm.
<i>T. napu</i> .....	Aru Bay.....	143481	Male.....	583	92	147	4	105.3	52.3	42.8	47.2
Do.....	do.....	143483	do.....	505	90	146	3.6	100.1	51.1	40.7	46.3
Do.....	do.....	49871	do.....	.....	.....	.....	.....	103.2	50.5	42.7	48
Do.....	do.....	143484	Female.....	600	90	153	5.2	105	50.9	42.2	48.8
Do.....	do.....	143486	do.....	565	95	145	4.1	100.6	51.3	39.1	44.3
Do.....	Sungei Mandau.....	144132	Male.....	554	83	152	4.1	97.5	51.6	36.1	41
Do.....	do.....	144133	do.....	590	100	156	4.2	101.5	51.3	35.4	41.3
Do.....	Siak River.....	144136	do.....	550	90	154	4.1	97.7	52.2	38.2	43.9
Do.....	do.....	144135	Female.....	590	110	145	4.2	104	53	39.4	45.1
Do.....	do.....	144139	do.....	550	100	150	4.2	97	51.4	36.5	41.2
<i>T. kanchil</i> .....	Aru Bay.....	143488	Male.....	442	75	123	1.7	78.7	42.7	31.4	34.9
Do.....	do.....	143489	do.....	456	70	126	1.5	81	44.3	31.7	35.2
Do.....	do.....	143492	do.....	445	65	116	1.7	78.6	43.4	30.5	35
Do.....	do.....	143497	do.....	460	70	122	.....	81.3	43.2	33.4	36.6
Do.....	do.....	143493	Female.....	470	80	125	1.8	81.5	44.7	32.8	37.7
Do.....	do.....	143494	do.....	450	70	120	.....	81.3	.....	30.9	35.8
Do.....	do.....	143495	do.....	455	75	114	1.9	83.3	44.5	34.4	37.7
Do.....	do.....	143496	do.....	490	85	128	2.2	84	44.7	32.4	37.3
Do.....	do.....	143498	do.....	457	70	121	.....	82.9	43.1	32.9	36.1
Do.....	do.....	143499	do.....	470	80	124	2.2	84.7	42.7	31.6	34.4

<sup>a</sup> Collector's measurements.

Measurements of adult *Tragulus* from eastern Sumatra—Continued.

Name.	Locality.	Number.	Sex.	Head and body. <sup>a</sup>	Tail. <sup>a</sup>	Hind foot with hoofs.	Weight. <sup>a</sup>	Basal length of skull.	Zygomatic width.	Maxillary tooth row—alveoli.	Mandibular tooth row—alveoli.
				mm.	mm.	mm.	kilos	mm.	mm.	mm.	mm.
<i>T. kanchil longipes</i> .	Little Siak River.	144140	Male	440	70	131	1.5	77.7	42.9	31.5	34.2
Do.	do.	144141	do.	460	75	135	1.6	82.8	41.7	33.3	37
Do.	do.	144144	do.	455	88	131	1.6	78	40.3	30.7	33.8
Do.	do.	144146	do.	430	70	131	1.5	78.7	42.3	31	34
Do.	do.	144147	do.	435	75	132	1.5	77	41	33.5	36.4
Do.	do.	144143	Female	470	70	135	1.9	81.5	43.7	31.6	34.5
Do.	do.	144148	do.	475	85	136	1.8	81.3	40.5	30.4	33.6
Do.	Kompei	144153	Male	440	77	131	.....	79.4	40	32.2	36.4
Do.	do.	144155	do.	437	70	135	1.4	77.4	41.5	31.5	36.6
Do.	do.	144157	do.	442	73	132	.....	77.1	41.6	34.5	38.6
Do.	do.	144156	Female	460	75	133	1.8	79.4	42.8	31.8	36.3
Do.	do.	144158	do.	467	80	135	.....	83.7	42.8	30.4	35
Do.	Sungei Mandau	144150	Male	460	80	145	.....	82.4	40.5	32.3	35.4
Do.	do.	144149	Female	447	80	131	.....	83	42.1	30	34.3
Do.	Makapan	144154	do.	505	99	140	2.6	84	43	31.5	35.4
Do.	do.	144151	do.	500	99	145	2.4	85.6	40	34.5	38
Do.	Pulo Penjaki	144367	Male	437	75	127	1.6	76.6	41.1	30.3	34
Do.	do.	144368	do.	450	80	134	1.8	81.5	40.6	33.3	37
Do.	do.	144370	do.	462	75	128	.....	85.3	43.3	31.9	35.4
Do.	do.	144369	Female	465	75	135	1.8	81.7	42	33.4	37.4
<i>T. fulvicolis</i>	Pulo Rupa	143500	Male	464	78	139	1.9	85.5	42.7	32.7	37.7
Do.	do.	143501	do.	468	85	133	2.2	85.3	41.7	32.8	36.1
Do.	do.	143502	do.	470	85	138	2	83	44.4	32.5	35.5
Do.	do.	143504	do.	475	80	141	1.8	85.2	43	32.8	36.7
Do.	do.	143506	Female	477	85	139	2.2	86.9	45.6	32	37.2
Do.	do.	143507	do.	487	90	139	2.3	85.9	42.7	34	37
Do.	do.	143508	do.	504	100	143	2.5	87.9	45.1	32.7	35.9
Do.	do.	143509	do.	480	85	135	2.4	83	43.3	34.2	37.6
Do.	Pulo Bengkalis	143514	Male	505	75	145	.....	89.7	43.1	34.1	38
Do.	do.	143515	do.	485	65	134	2.2	87.8	43.8	31.5	36.5
Do.	do.	143516	do.	500	80	138	.....	89.5	43.4	32.7	36.5
Do.	do.	143517	do.	475	80	130	.....	86	43.1	31.8	37.4
Do.	do.	143529	do.	562	85	132	1.9	83.5	40.7	35.4	39.5
Do.	do.	143511	Female	490	80	132	2.3	86.7	44.8	34.3	37.7
Do.	do.	143512	do.	514	100	140	2.7	92.3	45.1	35.4	37.8
Do.	do.	143519	do.	500	85	145	2.3	88.9	42.8	34.3	38.5
Do.	do.	143520	do.	490	75	135	2.6	87.6	44.8	32.5	37.1
Do.	do.	143522	do.	497	75	132	2.4	83.8	42.8	33	38.2
Do.	Pulo Padang	143523	Male	490	80	138	2.2	87.2	44.4	35.2	39.1
Do.	do.	143524	do.	485	70	138	2.2	86.4	41.1	32.1	35.4
Do.	do.	143525	do.	490	80	141	2	85	42.8	36	40
Do.	do.	143526	do.	500	80	143	2.3	90.2	43.7	34.6	38.4
Do.	do.	143528	Female	500	78	140	2.7	85.5	44.4	33.7	38.4
Do.	Pulo Tebing Tinggi	144313	Male	448	80	135	1.7	85.7	44	33	36.3
Do.	do.	144315	do.	465	80	140	2.2	82	42.5	34.9	38.5
Do.	do.	144318	do.	495	80	142	.....	85.7	44.6	34.4	38.4
Do.	do.	144320	do.	480	70	132	.....	85.9	43.4	34.8	38.5
Do.	do.	144321	do.	470	65	130	.....	85	44.2	33.8	36.8
Do.	do.	144316	Female	485	85	136	2.8	86.6	44.6	32	36.2
Do.	do.	144317	do.	515	.....	142	.....	92	47.5	32.6	35.5
Do.	do.	144319	do.	490	70	133	.....	84.4	43.2	34.5	39
Do.	Pulo Rangsam	144356	Male	500	80	138	2.6	88.7	46.4	35.2	38
Do.	do.	144357	do.	.....	.....	.....	.....	83.6	43.5	33.3	37.4

<sup>a</sup> Collector's measurements.<sup>b</sup> Type.

## MUNTICACUS MOSCHATUS\* (Blainville).

1816. *C[ervus] moschatus* BLAINVILLE, Bull. Soc. Phil., p. 77. (Type-locality: Sumatra.)1889. *Cervulus muntjac*, JENTINK, Notes Leyden Museum, XI, p. 25.1905. *Cervulus muntjac*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 134.1906. *Muntiacus moschatus*, LYON, Proc. U. S. Nat. Mus., XXXI, pp. 582-584, December 16, 1906.

Skin and skull of an immature male (last molars just beginning to come through alveoli) from Aru Bay, Cat. No. 143538, U.S.N.M.

Length of head and body, 1,040 mm.; tail, 180; hindfoot, 303; weight 58 pounds (26 kilos); basal length of skull, 178; zygomatic width, 86; length of antler, in a straight line, from the angle which it makes posteriorly with the skull, 128. The antlers are without burr or brow tine. The proximal two-thirds of them are comparatively smooth, the distal third is deeply rugose with longitudinal furrows.

Two frontlets with their attached antlers, also without brow tines, were obtained from the natives on Pulo Rangsam. These antlers have been much scraped and smoothed down.

RUSA EQUINA (Cuvier).

1822. *Cervus axis*, RAFFLES (not Erxleben). Trans. Linn. Soc., London, XII, p. 263.

1825. *Cervus equinus* CUVIER, Recherches Ossements Fossiles, 3d. ed., IV, p. 45, pl. v, figs. 30, 37, and 38. (Type-locality: Sumatra.)

1889. *Rusa equina*, JENTINK, Notes Leyden Museum, IX, p. 25.

1905. *Rusa equinus*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 134.

Skin and skull of a young female. Cat. No. 143539, U.S.N.M., from Pulo Bengkalis. The second and third permanent molars have not begun to appear.

The frontlets and attached antlers of ten adult males were secured from the natives, two from along the Siak River, one from Kompei, and seven from Pulo Rangsam.

Measurements of antlers of Sambar deer from Sumatra.

Locality.	Number.	Circumference of antler above burr.		Circumference of antler above brow tine.		Length of antler along convexity of curve.		Burr to tip of browtine, along convexity.		Tip of apical tine to its angle with main trunk of antler.	
		mm. <sup>a</sup>	mm. <sup>a</sup>	mm. <sup>a</sup>	mm. <sup>a</sup>	mm. <sup>a</sup>	mm. <sup>a</sup>				
Siak River.....	144299	140	140	101	106	b463	b421	242	b220	69	68
Do.....	144300	166	164	106	102	460	465	217	230	98	97
Kompei.....	144301	132	135	105	100	440	457	247	252	104	71
Pulo Rangsam.....	144342	160	142	107	106	391	415	197	248	92	91
Do.....	144343	149	151	116	115	445	462	188	218	98	54
Do.....	144344	162	162	110	114	512	507	134	142	65	55
Do.....	144345	133	135	106	100	440	438	210	140	162	171
Do.....	144346	134	134	101	100	411	417	184	175	76	80
Do.....	144347	123	129	92	88	453	427	176	180	76	88
Do.....	144348	128	122	97	94	397	400	150	140	44	68

<sup>a</sup> The first number refers to the left antler, the second, to the right.

<sup>b</sup> Tips slightly broken.

SCIUROPTERUS HAGENI Jentink.

1889. *Sciuropterus hageni* JENTINK, Notes Leyden Museum, XI, p. 26.

1905. *Sciuropterus hageni*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 106.

Two specimens from Aru Bay, which is not very distant from the type-locality, Deli.

For measurements see table, page 634.

## PETAURISTA BATUANA Miller.

1889. *Pteromys nitidus*, JENTINK, Notes Leyden Museum, XI, p. 26.  
 1903. *Petaurista batuana* MILLER, Smithsonian Miscell. Coll., XLV, p. 27, November 6, 1903.  
 1905. *Pteromys nitidus*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 104.  
 1908. *Petaurista nitida marchio* THOMAS, Ann. Mag. Nat. Hist., Sth ser., I, March, 1908, p. 251.

Ten specimens, skins and skulls, from various places on the east coast of Sumatra. For a list of localities and measurements see table below. I can find no essential differences between the series from Sumatra and that from the Batu Islands off the west coast of Sumatra. The extremes of total length of skull in Sumatran examples are: 65 to 68.4 mm., in the Batu series 65.8 to 69.4; the extremes of the maxillary tooth row are, respectively, 14.6 to 16 and 15.5 to 16.8. The teeth in the Batu specimens thus appear a little larger than they do in Sumatran examples and as a whole look heavier. This may probably be accounted for by wear, as in nearly all the Batu skulls the crowns of teeth are worn to a flat surface, while the teeth in most of the Sumatran skulls have the primary cusps unworn. As the cusps become worn down the teeth assume a somewhat heavier appearance.

## PETAURISTA NITIDULA Thomas.

1900. *Petaurista nitidula* THOMAS, Novitates Zoologicae, VII, p. 592, December 8, 1900.

Four skins and skulls from Pulo Rupert. They are distinctly smaller than the related flying-squirrel from Sumatra and so closely

*Measurements of flying squirrels from Sumatra.*

Name.	Locality.	Number.	Sex and age.	Head and body. <sup>a</sup>	Tail vertebrae. <sup>a</sup>	Hind foot with claws. <sup>a</sup>	Greatest length of skull.	Zygomatic width.	Maxillary tooth-row.
				mm.	mm.	mm.	mm.	mm.	mm.
<i>Sciuropterus hageni</i>	Aru Bay	143344	Male, adult	270	248	49	.....	.....	.....
Do	do	143345	Female, nearly adult.	254	240	48	51.1	31.3	.....
<i>Petaurista nitidula</i> .	Pulo Rupert	143339	Male, adult	405	460	77	63.9	43	15.3
Do	do	143340	Female, adult	380	440	75	62.6	44.3	15.2
Do	do	143341	do	400	405	75	64.3	42.8	15
Do	do	143342	do	395	425	77	65	45.4	14.5
<i>Petaurista batuana</i> .	Aru Bay	143338	Male, adult	430	470	85	68.4	46.4	16
Do	30 miles up Little Siak River.	144211	do	385	435	81	65	44.8	15
Do	Siak River near mouth,	144212	Female, adult	415	465	82	66.2	45	15.8
Do	do	144213	do	420	465	82	67.3	44.6	15.8
Do	Sungei Mandau	144214	Male, adult	405	500	84	67.2	46.3	15.3
Do	Kompei	144215	do	392	483	80	65	43.5	15
Do	Sungei Makapan	144307	do	405	470	84	67.5	45.3	15.5
Do	Kateman River	123135	Female, adult	406	520	80	67.5	44	15
Do	do	123136	Male, immature	385	480	.....	62	41.6	14.6
Do	do	123137	Male, adult	430	470	81	66.8	.....	15.4

<sup>a</sup> Collector's measurement.

resemble topotypes of *Petaurista nitidula* that no constant differences can be found to distinguish them. The greatest length of the skull in the Rupert specimens ranges from 62.5 to 65 mm.; in a series of seven specimens from the Natunas the extremes are 61.6 to 65.3 mm. Ten specimens from the mainland of Sumatra show a range of greatest length of skull from 65 to 68.4 mm.

For measurements of the Rupert specimens see table, page 634.

#### RATUFA PALLIATA Miller.

1889. *Sciurus bicolor*, JENTINK, Notes Leyden Museum, XI, p. 27.  
 1902. *Ratufa palliata* MILLER, Proc. Acad. Nat. Sci. Philadelphia, March, 1902, p. 147, issued June 11, 1902.  
 1905. *Ratufa bicolor* and *Ratufa palliata*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 108.  
 1907. *Ratufa palliata*, LYON, Proc. U. S. Nat. Mus., XXXII, p. 440, May 23, 1907.

Nine specimens from Aru Bay and two from Salat Rupert. No Ratufas of this group were taken on Pulo Rupert or other islands, and the only specimen taken by Doctor Abbott farther down the coast on the east side of Sumatra is the type-specimen, Cat. No. 113162, from the Indragiri River.

For measurements see table, page 636.

#### RATUFA ARUSINUS Lyon.

1905. *Ratufa auriventer*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 108.  
 1907. *Ratufa arusinus* LYON, Proc. U. S. Nat. Mus., XXXII, p. 442, May 23, 1907.

Thirteen specimens, skins and skulls from the vicinity of Aru Bay. This is a very well-marked form, and no specimens from Sumatra are in the National Museum which show evidences of intergrading with it, though doubtless future collections will show it to be a subspecies of *Ratufa hypoleuca* from the west coast of Sumatra.

For measurements see table, page 636.

#### RATUFA HYPOLEUCA CATEMANA (Lyon).

1905. *Ratufa affinis*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 108.  
 1907. *Ratufa catemana* LYON, Proc. U. S. Nat. Mus., XXXII, p. 443, May 23, 1907.

Doctor Abbott's latest collections from eastern Sumatra in the region of the Siak River show that this form of *Ratufa* is more variable than was at first supposed. As shown in the original description,<sup>a</sup> specimens from the Indragiri River had a tendency to be whitish on the underparts instead of tawny as in the type and other specimens from the Kateman River. (See table, page 636.) Five of the indi-

<sup>a</sup> Proc. U. S. Nat. Mus., XXXII, p. 443.

viduals recently collected from farther up the coast (Siak River, see map, page 623) have the underparts white or whitish, and continuation of the light underparts extends down the inner side of the hind leg as a narrow line to the heel, about the same as it does in the west coast series of *R. hypoleuca*. This series of east coast *Ratufas* averages smaller, in both external and cranial measurements, than the series of west coast specimens. Some of the specimens, especially Cat. No. 144167, from Makapan are very close to typical *R. hypoleuca* in both size and coloration, so that *R. catemana* must be considered as a subspecies of *R. hypoleuca*. None of the specimens show any approach to *Ratufa arusinus*.

For measurements see table below.

*Measurements of Giant Squirrels from eastern Sumatra.*

Name.	Locality.	Number.	Sex and age.	Head and body. <sup>a</sup>		Hind foot with claws. <sup>b</sup>	Greatest length of skull.	Zygomatic breadth.	Interorbital constriction.
				Tail. <sup>a</sup>	Tail. <sup>a</sup>				
<i>R. palliata</i> ...	Aru Bay.....	143359	Male, adult.....	mm. 568	mm. 472	mm. 88	mm. 71.9	mm. 44.6	mm. 29.1
Do.....	do.....	143360	do.....	350	452	83	69.7	41.7	27
Do.....	do.....	143361	do.....	360	440	84	69.6	45	28.8
Do.....	do.....	143362	do.....	370	400	81	69.3	41.9	26.8
Do.....	do.....	143363	do.....	.....	50	85	69.3	43.1	28.9
Do.....	do.....	143364	Female, adult.....	390	455	90	72.4	44	27.3
Do.....	do.....	143365	do.....	375	480	86	73.7	44	28.4
Do.....	do.....	143366	do.....	370	455	85	70.6	45	28.9
Do.....	do.....	143367	do.....	355	400	84	71.2	44.3	28.2
Do.....	Salat Rupert.....	143368	Male, adult.....	300	433	83	70.2	44.7	27.9
Do.....	do.....	143369	Female, adult.....	365	435	86	70.5	45.8	29.3
<i>R. arusinus</i> ...	Aru Bay.....	143346	Male, young adult.....	345	405	81	63.7	37.8	24
Do.....	do.....	143347	Male, adult.....	335	420	82	64	38.7	25.9
Do.....	do.....	143348	Female, adult.....	355	400	81	66.6	42.5	27
Do.....	do.....	143349	Male, adult.....	350	400	81.5	64.2	40.4	25.8
Do.....	do.....	143350	do.....	355	365	84	64	38.9	23.7
Do.....	do.....	143351	do.....	354	405	81.5	65.9	40.8	25.7
Do.....	do.....	143352	do.....	350	400	80	66	40	25.7
Do.....	do.....	143353	do.....	350	440	82	67	41.1	26.8
Do.....	do.....	143354	Female, adult.....	310	390	82	67	40	25.8
Do.....	do.....	143355	Female, young adult.....	310	405	83	62.7	37.7	23.7
Do.....	do.....	143356	Female, adult.....	340	450	84	65.8	39.3	25
Do.....	do.....	143357	do.....	340	465	83.5	66.1	39.9	26.5
Do.....	do.....	143358	do.....	350	445	83.5	65.1	41.8	26.8
<i>R. catemana</i> ...	Little Siak River.....	144159	Male, adult.....	315	350	74	60	36.4	23.4
Do.....	do.....	144160	do.....	317	383	78	61.7	.....	25.7
Do.....	do.....	144161	do.....	325	410	80	63.4	39	26.2
Do.....	do.....	144162	do.....	325	410	80	63.2	36.5	25.8
Do.....	do.....	144163	Female, adult.....	342	238	80	63	40	25.4
Do.....	Sungei Mandau.....	144164	do.....	320	410	78	64	39.4	26.7
Do.....	Makapan.....	144165	Male, adult.....	315	360	80	61.5	.....	25
Do.....	do.....	144166	Female, adult.....	322	380	89	62	38.2	24.8
Do.....	do.....	144167	Male, adult.....	318	400	80	64	37.7	24.8
Do.....	Kompei.....	144168	Female, adult.....	315	385	75	59.5	38.5	24.3
Do.....	do.....	144169	Male, adult.....	320	370	78	61	38	24.2
Do.....	do.....	144170	do.....	330	390	78	62.5	38	25.3
Do.....	Kateman River.....	123123	do.....	310	390	77	61	37.4	24.6
Do.....	do.....	123124	do.....	320	385	74	61.9	38.5	24.6
Do.....	do.....	123125	Male, immature.....	275	380	73	57.7	35.8	23.8
Do.....	do.....	123126	Female, adult.....	310	375	75	60.5	38.3	24.4
Do.....	do.....	123127	do.....	325	380	75	62.3	39.3	25.6

<sup>a</sup> Collector's measurements.

<sup>b</sup> Measured by writer after relaxing feet in water for forty-eight hours.

<sup>c</sup> Type.

<sup>d</sup> Underparts white or whitish and inner side of hind leg marked with a narrow extension of the white of the underparts to the heel.

<sup>e</sup> Imperfect.

## SCIURUS MELANOPS Miller.

1899. *Sciurus prevoatii*, JENTINK, Notes Leyden Museum, XI, p. 27.

1902. *Sciurus melanops* MILLER, Proc. Acad. Nat. Sci. Philadelphia, March 1902, p. 151, issued June 11, 1902.

1905. *Sciurus melanops*. SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 109.

Twenty-four specimens of this species were collected at various localities in eastern Sumatra. For measurements and list of localities see table, page 639. *Sciurus melanops* was described from specimens collected along the Indragiri River, Sumatra. Since publishing the original description Mr. Miller has had the opportunity of comparing specimens of *S. melanops* with the cotypes of *S. rafflesi* Vigors and Horsfield in the British Museum and made the following notes on the two forms:

At first sight the two appear to be identical, but *rafflesi* (cotype No. 84.63.8. Sumatra Raffles) differs from *melanops* in considerably smaller size and apparently in a less blackish cheek. The skin is not in perfect condition, having been mounted and exposed to light. Cheeks very nearly as in Cat. No. 113153, U. S. National Museum (Paratype of *S. melanops*), but more distinctly grizzled. Whitish spots on cheek and muzzle exactly as in Cat. No. 113153. Red of underparts essentially as Cat. No. 113153, but distinctly browner and darker, especially along median region, outer surface of leg, and on shoulder. In latter region the palest red is about the same as the darkest at side of wrist in *melanops*. Skull conspicuously smaller and more slender than in *melanops*; ramus of mandible more slender; teeth slightly larger than in *melanops*, therefore relatively much larger. Measurements of the skull of cotype of *S. rafflesi*: Greatest length, 55 mm. (58.3); <sup>a</sup> basal length, 48.6 (50.4); basilar length, 45.6 (47.4); palatal length, 24.8 (28.1); diastema, 13.6 (14.4); zygomatic breadth, 31 (34.3); mastoid breadth, 24 (26); breadth of braincase, 24 (25.4); inter-orbital constriction, 23 (22.8); maxillary tooth row, 11.4 (11.2); mandibular tooth row, 11.4 (10.9).

## SCIURUS MELANOPS PENIALIUS, new subspecies.

*Type*.—Skin and skull of adult female, Cat. No. 144364 U.S.N.M., collected on Pulo Penjalei, at the mouth of the Kampar River, eastern Sumatra, February 5, 1907, by Dr. W. L. Abbott. Original number 5040.

*Diagnostic characters*.—A member of the *Sciurus prevoatii* group of squirrels, very similar to *Sciurus melanops* Miller (see above), differing only in the possession of a distinctly darker shoulder, ferruginous instead of ochraceous.

*Color, etc.*.—In all external and cranial characters this subspecies so closely resembles *Sciurus melanops* Miller, aside from its darker shoulders, that no detailed description is necessary.

*Measurements*.—See table, page 639.

<sup>a</sup> Measurements in parentheses, those of the type of *Sciurus melanops* Miller.

*Specimens examined.*—Six skins with skulls and one skull without skin.

*Remarks.*—Although the Penjalei *prevostii* squirrel differs from *Sciurus melanops* of the mainland in apparently but a single character, the darker shoulders, yet this character is easily seen and perfectly constant. Doctor Abbott recognized them as distinct in the field, remarking "there is a new *Sciurus melanops* with rufous shoulders from Pulo Penjalei." None of the six skins show any tendency toward the light shoulders of *S. melanops*, and only one out of the large series of *S. melanops* approaches the dark shoulders of the insular subspecies. This specimen is an adult female, Cat. No. 123109, from Kateman Island. It is the only intermediate specimen between the two forms so far as known.

#### SCIURUS PICEUS Peters.

1866. *Sciurus piccus* PETERS, Proc. Zool. Soc. London, p. 429.

1903. *Sciurus erebus* MILLER, Proc. U. S. Nat. Mus., XXVI, p. 456, February 3, 1903.

1905. *Sciurus piccus*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 109.

Twelve specimens of this squirrel were taken at Aru Bay. They do not differ from the series of skins collected by Doctor Abbott at Tap-anuli Bay to which M. Miller applied the name *Sciurus erebus*. While studying material in the Berlin Museum in 1904 Mr. Miller made the following notes on *Sciurus piccus* Peters:

*Type.*—Male, in good condition. The locality given on the label and in the original description is Tenasserim, but this is doubtless an error. It was received from Professor Stempel of Rostock together with *Presbytis potenziani*, also supposed to be from Tenasserim but now known to occur on the islands off the west coast of Sumatra. The squirrel is undoubtedly from Sumatra also, as it agrees in every way with *S. erebus*. No further history of the specimens can be found in the Museum records. There is no indication of a pale lateral stripe (present in two *S. pluto*). Measurements, head and body, 280; tail vertebrae, 230; hind foot, with and without claws, 62, 59. Skull inside. The collection contains a second specimen without locality and a third from Sumatra.

#### SCIURUS NYX, new species.

*Type.*—Adult female, skin and skull, Cat. No. 143392, U.S.N.M., collected on Pulo Rupert, off east coast of Sumatra, March 10, 1906, by Dr. W. L. Abbott. Original number 4691.

*Diagnostic characters.*—A member of the *Sciurus prevostii* group, most like *Sciurus piccus* Peters, but smaller, and with color of the underparts extending on the upper surfaces of the feet.

*Color.*—Upperparts, sides, tail, and outer sides of thighs, black; underparts and upper surfaces of feet including adjoining portions of legs, deep ferruginous. At the base of whiskers the black is finely

grizzled with buffy. The region about the shoulder, the outer surface of the upper arm and outer surface of thigh are very faintly grizzled with a buffy or ochraceous buffy color. Ordinarily this grizzling is scarcely noticeable, but evident, though slight in amount when the specimens are placed in certain lights. A still fainter grizzling may be brought out with proper lighting along the side just above the ferruginous underparts.

*Skull and teeth.*—These are distinctly larger and heavier than they are in *Sciurus piceus*, but do not differ in essential respects from skulls of *S. melanops*.

*Measurements.*—See table, page 640.

*Specimens examined.*—Fourteen, all from Pulo Rupert.

*Remarks.*—*Sciurus nyr* appears to be a very well marked member of the *Sciurus prevostii* group of squirrels. Although most like *Sciurus piceus* with regard to general appearances, its large size, red feet, and faint grizzling about the shoulders, thighs, and sides (lacking in *S. piceus*), indicate that it has developed from *S. melanops*, rather than from *S. piceus*. Another fact giving strength to this view is that *S. melanops* is found on the mainland opposite Pulo Rupert, while, so far, *S. piceus* is not known from there.

*Measurements of squirrels of the Sciurus prevostii group from eastern Sumatra.*

Name.	Locality.	Number.	Sex and age.	Head and body, <sup>a</sup>	Tail vertebrae, <sup>a</sup>	Hind foot with claws, <sup>a</sup>	Greatest length of skull.	Interorbital constriction.	Zygonomatic width.
				mm.	mm.	mm.	mm.	mm.	mm.
<i>S. melanops</i> . . .	Little Siak, at mouth. . .	144175	Female, adult . . .	280	275	67	61.1	24	37
Do. . . . .	do. . . . .	144176	do. . . . .	263	280	65	59.7	24.5	36.4
Do. . . . .	do. . . . .	144177	Male, adult . . .	265	285	67	60.8	23.9	35.2
Do. . . . .	do. . . . .	144178	do. . . . .	275	220	67	60	22.4	34.6
Do. . . . .	do. . . . .	144179	do. . . . .	283	245	67	60.3	23	35.8
Do. . . . .	Little Siak River . . .	144180	Female, adult . . .	263	275	64	59.2	22.2	35
Do. . . . .	do. . . . .	144181	Male, adult . . .	260	250	63	58.6	24.1	35.5
Do. . . . .	do. . . . .	144182	Female, adult . . .	275	250	67	58.6	23.8	35.7
Do. . . . .	do. . . . .	144183	do. . . . .	270	275	64	59	23.5	35.5
Do. . . . .	Makapan. . . . .	144184	do. . . . .	257	280	66	58.9	23.8	37
Do. . . . .	do. . . . .	144185	Male, adult . . .	265	270	66	58.7	23.5	33.8
Do. . . . .	do. . . . .	144186	Female, nearly adult.	288	270	64	57.7	23	35.7
Do. . . . .	Kompei . . . . .	144187	Male, adult . . .	270	255	65	59.4	23.8	35.7
Do. . . . .	do. . . . .	144188	Female, adult . . .	268	275	68	59.3	25	36.5
Do. . . . .	Kateman Island. . .	123109	do. . . . .	265	263	57	57	23.7	34.6
Do. . . . .	do. . . . .	123110	do. . . . .	260	275	58	58	23.7	34.7
Do. . . . .	Kateman River . . .	123112	do. . . . .	270	265	57	61.4	25	36.5
Do. . . . .	do. . . . .	123113	Male, adult . . .	255	278	57	56.5	22.5	33
Do. . . . .	do. . . . .	123115	do. . . . .	253	267	57	58.3	24.3	35.3
Do. . . . .	do. . . . .	123118	do. . . . .	275	290	60	59.5	24	35.6
Do. . . . .	do. . . . .	123122	do. . . . .	260	275	57	57.9	24	35
Do. . . . .	Salat Rupert. . . . .	143396	do. . . . .	265	280	69	61	24.2	35.8
Do. . . . .	do. . . . .	143397	Female, adult . . .	255	270	67	58.7	22.7	35.5
Do. . . . .	do. . . . .	143398	Male, adult . . .	267	280	68	58	23.9	36.7
<i>S. melanops penialius</i> .	Pulo Penjai. . . . .	144358	Female, adult . . .	280	275	65	58.5	23.4	34.7
Do. . . . .	do. . . . .	144359	do. . . . .	280	260	65	60	24	36
Do. . . . .	do. . . . .	144360	do. . . . .	245	245	66	59.7	24	36.6
Do. . . . .	do. . . . .	144361	Male, adult . . .	280	200	68	59.7	22.8	35.2
Do. . . . .	do. . . . .	144362	Female, adult . . .	277	275	66	58.7	22.8	35.2
Do. . . . .	do. . . . .	144363	Male, adult . . .	270	270	67	57.7	22.8	35.7
Do. . . . .	do. . . . .	144364	Female, adult . . .	270	278	67	57.9	23.5	36.2

<sup>a</sup> Collector's measurements.

<sup>b</sup> Type.

Measurements of squirrels of the *Sciurus prevostii* group from eastern Sumatra—Cont'd.

Name.	Locality.	Number.	Sex and age.	Head and body. <sup>a</sup>	Tail vertebrae. <sup>a</sup>	Hind foot with claws. <sup>a</sup>	Greatest length of skull.	Interorbital constriction.	Zygomatic width.
				mm.	mm.	mm.	mm.	mm.	mm.
<i>Sciurus nyr</i>	Pulo Rupert	143382	Male, adult	277	265	69	58.2	23.4	35.6
Do.	do.	143383	do.	270	265	67	59.5	23.3	36.3
Do.	do.	143384	do.	265	265	64	60	23.8	36
Do.	do.	143385	do.	275	250	66	59.8	24.2	36
Do.	do.	143386	do.	270	258	64	58.2	24	31.1
Do.	do.	143387	do.	280	240	65	57.8	24	36.1
Do.	do.	143388	do.	261	235	64	57.2	24.6	36
Do.	do.	143389	do.	270	260	66	59.6	24.3	37.1
Do.	do.	143390	do.	264	261	66	59.5	24	36.1
Do.	do.	143391	Female, adult	275	260	66	61	24.8	36.5
Do.	do.	143392	do.	280	250	67	59.7	23.8	36.5
Do.	do.	143393	do.	275	260	65	59	24	36.8
Do.	do.	143394	do.	270	255	65	59.4	25	36.4
Do.	do.	143395	do.	28	255	64	59.7	25	38.8
<i>Sciurus piceus</i>	Aru Bay	143370	Male, adult	245	223	61	56.3	22.5	34
Do.	do.	143371	do.	250	220	59	55.4	22.3	34.4
Do.	do.	143372	do.	255	235	53	56.6	21.4	34.8
Do.	do.	143373	Male, immature	235	185	50	52.8	21.3	33.8
Do.	do.	143374	Male, adult	250	230	58	55.9	22.2	34.2
Do.	do.	143375	do.	247	238	62	56.8	22.6	34.2
Do.	do.	143376	Female, adult	243	227	59	55.3	23.7	34.2
Do.	do.	143377	do.	240	220	60	54.4	22.6	34.7
Do.	do.	143378	do.	235	215	60	52.7	21.9	33.9
Do.	do.	143379	do.	246	220	60	54.5	22.7	34.7
Do.	do.	143380	do.	255	225	61	56.2	22.8	34.7
Do.	do.	143381	do.	255	230	60	56.1	21.8	34.4

<sup>a</sup> Collector's measurements.<sup>b</sup> Type.

## SCIURUS VITTATUS VITTATUS (Raffles).

1822. *Sciurus vittatus* RAFFLES, Trans. Linn. Soc. London, XIII, p. 259.1889. *Sciurus badjing*. JENTINK, Notes Leyden Museum, XI, p. 27.1905. *Sciurus vittatus*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 110.1906. *Sciurus vittatus vittatus*, LYON, Smithsonian Miscell. Coll., XLVIII, p. 278, February 4, 1907.

Nine specimens from the mainland of Sumatra. For localities and measurements see table below. Examples from higher up the coast, as those opposite Pulo Rupert, average slightly darker than those taken farther down, the Indragiri-Kateman specimens. The insular race described below can not be considered a highly differentiated form. The fact, however, that the thirty-two squirrels of this group from the lowlands and adjacent islands of eastern Sumatra can be arranged in two fairly well-marked series according to intensity of color, one from the mainland the other from the islands, shows the necessity of recognizing another race of this highly variable group of squirrels.

## SCIURUS VITTATUS RUPATIUS, new subspecies.

*Type*.—Adult female, skin and skull, Cat. No. 143406, U.S.N.M., collected on Pulo Rupert, east coast of Sumatra, March 17, 1906, by Dr. W. L. Abbott. Original number 4733.

*Diagnostic characters.*—Closely related to *Sciurus vittatus vittatus* (comparison with specimens from the lowlands, east coast of Sumatra) but slightly darker, especially on the underparts, black side stripe slightly more conspicuous.

*Color.*—Type: Upperparts and outer surfaces of legs and upper surfaces of feet a fine grizzle of light tawny-olive and black; upper surface of tail similar but the grizzle coarser; under surface of tail a coarse grizzle of ochraceous and black, the latter color quite conspicuous at the tip; underparts and inner sides of legs generally a bright hazel, or a color between ferruginous and hazel; light side stripe (about 80 by 5 mm.) cream-buff; dark side stripe (85 by 10 mm.) black. Variations in the series: The series of specimens from Pulo Rupert and Padang are on the whole quite uniform, some of the specimens have the underparts slightly lighter than they are in the type. Only one specimen shows any marked deviation, Cat. No. 143414, U.S.N.M., Pulo Padang, in having the underparts ochraceous. It is even brighter beneath than are the skins from Salat Rupert.

*Skull and teeth.*—Apparently there are no constant cranial and dental characters by which *Sciurus vittatus rupatius* can be distinguished from related forms.

*Measurements.*—See table, page 642.

*Specimens examined.*—Five from Pulo Rupert and ten from Pulo Padang, one from Tebing Tinggi, and two from Pulo Merbau.

*Remarks.*—While *Sciurus vittatus rupatius* is not a sharply defined form, the majority of the specimens average enough darker to constitute another race. In general dark color, especially in the underparts, this squirrel is somewhat like *Sciurus saturatus* Miller, from Pulo Mansalar, off the opposite coast of Sumatra, but the light rings in the hairs of the upperparts in the latter squirrel are tawny ochraceous instead of light tawny olive.

#### SCIURUS VITTATUS ALBESCENS (Bonhote).

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

1907. *Sciurus vittatus albescens*, LYON, Smithsonian Miscell. Coll., XLVIII, p. 281, February 4, 1907.

Two specimens taken at Aru Bay do not differ from certain of the skins collected by Doctor Abbott at Loh Sidoh Bay. The latter are practically topotypes of *S. albescens*. The majority of the Loh Sidoh Bay skins have many white hairs on the underparts, but two of them have comparatively few such hairs, in this respect resembling the two skins from Aru Bay.

For measurements see table, page 642.

Measurements of squirrels of the *Sciurus vittatus* group from eastern Sumatra.

Name.	Locality.	Number.	Sex.						
				Head and body. <sup>a</sup>	Tail vertebrae. <sup>a</sup>	Hind foot with claws. <sup>a</sup>	Greatest length of skull.	Interorbital constriction.	Zygomatic breadth.
<i>S. v. albescens</i>	Aru Bay	143400	Female, adult	200	<sup>b</sup> 115	48	48	17.8	28.5
Do.	do.	143401	do.	205	200	50	48.9	18	30
<i>S. v. rufatus</i>	Pulo Rupert	143402	Male, adult	210	190	54	51.7	18.5	29.9
Do.	do.	143403	do.	237	190	37	54.9	20.5	32
Do.	do.	143404	do.	225	185	55	54.6	18.7	31.7
Do.	do.	143405	Female, adult	230	180	54	53.7	19.8	30.7
Do.	do.	143406	do.	235	210	55	52.4		31.4
Do.	Pulo Padang	143410	Male, young	200	196	54	50	17	28.8
Do.	do.	143411	Male, adult	220	<sup>b</sup> 131	56	53.6	18.9	31
Do.	do.	143412	do.	214	163	56	53	18	30.3
Do.	do.	143413	Female, adult	235	195	54	53.7	19	
Do.	do.	143414	do.	230	200	54	53.3	18.8	31.5
Do.	do.	143415	do.	220	190	54	52.3	18	30.7
Do.	do.	143416	do.	213	200	54	52.3	19	30.4
Do.	do.	143417	do.	212	190	54	51	17.3	29.7
Do.	do.	143418	do.	220	180	55	51.5	18	30.5
Do.	do.	143419	do.	218	<sup>b</sup> 152	54	53.3	19.5	30.9
Do.	Pulo Tebing Tinggi	144326	do.	225	197	55	53.6	18	31.5
Do.	Pulo Merbau	144333	Male, adult	215	210	54	52.9	18.2	31.7
Do.	do.	144334	Female, adult	215	180	53	52.3	17.8	31
<i>S. v. vittatus</i>	Salat Rupert	143407	do.	203	210	54	51.9	18.8	
Do.	do.	143408	do.	210	210	53	52	18	29.6
Do.	do.	143409	do.	215	190	53	52	18	30.2
Do.	Kateman River	123111	Male, adult	208	156	51	50	16	28.7
Do.	do.	123117	do.	205	205	52	50	17.2	27.1
Do.	Little Siak River, at month.	144189	Female, adult	212	200	55	49.9	16.7	30
Do.	Little Siak River	144190	do.	216	182	54	50.1	16.6	29
Do.	Sungei Mandau	144191	Male, adult	212	190	52	49	17.4	29
Do.	do.	144192	do.	215	210	51	50.4	18	28.8

<sup>a</sup> Collector's measurements.<sup>b</sup> Tail apparently defective.<sup>c</sup> Type.

## SCIURUS TENUIS Horsfield.

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

1889. *Sciurus tenuis*, JENTINK, Notes Leyden Museum, XI, p. 27.

1905. *Sciurus tenuis*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 110.

Twenty-two adult specimens from various localities along the east coast of Sumatra. They show no differences from specimens from other parts of Sumatra or from the island of Singapore, the type locality of the species. For table of measurements and list of localities see table, page 643.

## SCIURUS LOWII Thomas.

1892. *Sciurus lowii* THOMAS, Ann. Mag. Nat. Hist., 6th ser., IX, p. 253. (Type-locality, Borneo.)

A small squirrel, not fully adult, Cat. No. 123116, U.S.N.M., from the Kateman River, may be referred to *Sciurus lowii* Thomas. It differs from specimens of *Sciurus tenuis* collected at the same locality in having a general color effect of dark mummy brown instead of tawny olive. The hairs of the edges of the ears are blackish, and the underparts are creamy white, in marked contrast to the gray under-

parts of *Sciurus tenuis*. These small gray squirrels fall into two groups so far as the clear white of the underparts is concerned. The following species have the hairs of the underparts white or cream-white throughout: *Sciurus lowii* (Borneo, Sumatra), *lingungensis* (Pulo Lingung, Natuna Islands), *piniiensis* (Pulo Pinie, Batu Islands), and *bala* (Tana Bala, Batu Islands). In the other series of species the hairs of the underparts have gray or slaty bases and whitish tips. They are: *Sciurus tenuis* (Malay Peninsula, Sumatra), *tenuis surdus* (Malay Peninsula), *parvus* (Borneo), *mansalaris* (Pulo Mansalar, west of Sumatra), *bancaricus* (Bankaru, Banjak Islands), *pumilus* (Pagi Islands), and *procerus* (Borneo).

Measurements, head and body, 114 mm.; tail, defective; hind foot, 77; greatest length of skull, 31.8; zygomatic breadth, 18.5; interorbital constriction, 10.4.

*Measurements of Sciurus tenuis from eastern Sumatra.*

Name.	Locality.	Number.	Sex.	Head and body, <sup>a</sup>	Tail vertebrae, <sup>a</sup>	Hind foot with claws, <sup>b</sup>	Greatest length of skull.	Zygomatic breadth.	Interorbital constriction.
				mm.	mm.	mm.	mm.	mm.	mm.
<i>S. tenuis</i> .....	Aru Bay .....	143420	Male .....	142	113	36	37.3	22.3	.....
Do. ....	do. ....	143421	do. ....	135	100	35	.....	22	12.5
Do. ....	do. ....	143423	Female .....	143	112	34	36.8	.....	12.4
Do. ....	do. ....	143424	do. ....	135	105	33.5	36	21.5	11.8
Do. ....	do. ....	143425	do. ....	137	90	33	.....	.....	12.8
Do. ....	do. ....	143426	do. ....	140	111	35	37.3	21.7	12.8
Do. ....	do. ....	143427	do. ....	140	111	33	.....	22.4	12.8
Do. ....	Besitan River .....	143422	Male .....	140	120	35.5	37	21.3	12.5
Do. ....	do. ....	143428	Female .....	137	83	34	36.4	22.5	13.5
Do. ....	Salat Rupert .....	143429	Male .....	135	110	33.5	36	22	13.3
Do. ....	Siak River .....	144195	do. ....	138	109	35	36	20.4	12
Do. ....	do. ....	144198	do. ....	140	100	35	35.4	21.7	12.5
Do. ....	Sungei Mandau .....	144196	Female .....	130	105	36	37.9	22	12.4
Do. ....	do. ....	144197	do. ....	135	105	34	35.7	21.9	12
Do. ....	Kompei .....	144200	Male .....	138	107	37	36.5	21.2	12.2
Do. ....	Little Siak River .....	144193	Female .....	140	100	36	.....	.....	.....
Do. ....	Little Siak River, at mouth.	144201	do. ....	145	90	35	34.9	21.3	12
Do. ....	do. ....	144202	do. ....	128	97	34	34	20	11.5
Do. ....	Little Siak River .....	144202	Male .....	125	115	35	34	20.5	11.6
Do. ....	Kateman River .....	123119	do. ....	130	110	36	36.3	21.5	11.8
Do. ....	do. ....	123120	Female .....	150	110	34	.....	.....	12
Do. ....	do. ....	123121	Male .....	148	.....	34	38.2	22	13

<sup>a</sup> Collector's measurements.

<sup>b</sup> Measured by writer after soaking feet twenty-four hours in water.

SCIURUS HIPPUROSUS Lyon.

1905. *Sciurus hippurus*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 109.

1907. *Sciurus hippurosus* LYON, Smithsonian Miscell. Coll., L, Pt. 1, p. 26, April 8, 1907.

One specimen from the Besitan River, Cat. No. 143399, U.S.N.M., adult male; head and body, 260 mm.; tail, 250; hind foot with claws, 62; greatest length of skull, 57.8; zygomatic width, 34.

## MUS "RATTUS."

1905. *Mus neglectus*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 111.

Four rats from the Siak region are referable to this group. They are very little if at all different from *Mus neglectus* Jentink, so far as may be judged by descriptions and measurements. For list of localities and measurements see table, page 649.

## MUS EPHIPIUM Jentink.

1880. *Mus ephippium* JENTINK, Notes Leyden Museum, II, p. 15.

1905. *Mus ephippium*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 111.

A small rat, an old male, from the Siak River, may be referred to *Mus ephippium* provisionally. It does not agree entirely with the original description or measurements, but without an actual comparison of specimens it does not seem advisable to recognize another small species of rat from Sumatra.

For measurements see table, page 649.

## MUS ASPER Miller.

1900. *Mus asper* MILLER, Proc. Biol. Soc. Washington, XIII, April 21, 1900, p. 145. (Type-locality, Trong, Lower Siam.)

Fifteen small spiny rats collected by Doctor Abbott in eastern Sumatra may be referred to *Mus asper* Miller. They are all small brightly colored rats with rusty bellies, and closely resemble the original series of *Mus asper* from Trong as well as the other bright colored rats from the Malay Peninsula referable to the same species. For list of localities and measurements see table, page 648. The single skin from Aru Bay is considerably darker than the other specimens, and has very rusty underparts.

## MUS MANDUS, new species.

*Type*.—Skin and skull of adult male, Cat. No. 144225, U.S.N.M., collected at Sungei Mandau (tributary to the Siak River), eastern Sumatra, November 23, 1906, by Dr. W. L. Abbott. Original number 4898.

*Diagnostic characters*.—A large member of the *Mus asper* group, differing from typical *asper* in its larger size, darker upperparts, and gray underparts.

*Color*.—Type: Upper parts of head and body, a mixture of ochraceous-buff and brownish black, the latter color much in excess; sides of head, neck, and body, a mixture of the same two colors but in about equal proportions. Underparts gray, about like Ridgway's No. 10 gray. Hands and feet whitish; outside of legs similar to sides of body; inner side of the same color as underparts of body. Tail, bicolor, dark brownish above, whitish beneath.

*Skull.*—The skull of *Mus mandus* does not differ from that of *Mus asper*, except in its distinctly larger size.

*Measurements.*—For external and cranial measurements of the type and series see table, page 648.

*Specimens examined.*—Six from Pulo Rupert, six from Pulo Padang, three from the Kateman River, four from the confluence of the Sungei Mandau with the Siak River, and one from the confluence of the Gasip and Siak rivers.

*Remarks.*—The rats of the *Mus asper* group in eastern Sumatra fall into two well marked groups, a small bright colored form with rusty bellies differing in no essentials from *Mus asper* of the Malay Peninsula and the species just described, larger, duller, darker, and with clear gray bellies. The mouth of the Gasip River is the only locality where both forms appear to have been taken together. Elsewhere in eastern Sumatra only one form has been taken at a given locality. The relations of the two forms are not at all clear, but the material thus far collected show them to be quite distinct, and no intermediate specimens are met with. It is not improbable that both forms may belong to the same species which is branching out in two different directions in eastern Sumatra, and at various localities one form or another is becoming dominant. Rats of this group on the Malay Peninsula are quite variable both as to size and as to intensity of color of the upperparts and rustiness or grayness of the underparts. These variations are most pronounced in specimens from the east coast of the Peninsula, but they are by no means so pronounced or constant as they are in the Sumatran examples, and many intermediate conditions are met with, which is not the case with the rats from Sumatra.

#### MUS LINGENSIS Miller.

1900. *Mus lingensis* MILLER, Proc. Washington Acad. Sciences, II, p. 206, August 20, 1900. (Type-locality, Linga Island.)

1903. *Mus lingensis* MILLER, Proc. U. S. Nat. Mus., XXVI, p. 463, February 3, 1903. (Specimens from Tapanuli Bay, western Sumatra.)

Twelve specimens from Aru Bay, eight skins with skulls and four odd skulls.

For measurements see table, page 648.

#### MUS FIRMUS Miller.

1902. *Mus firmus* MILLER, Proc. Acad. Nat. Sci. Philadelphia, March, 1902, p. 155, issued June 11, 1902. (Type-locality, Linga Island.)

1903. *Mus firmus* MILLER, Proc. U. S. Nat. Mus., XXVI, p. 461, February 3, 1903. (Specimens from Tapanuli Bay, Sumatra.)

One specimen, an adult male, from the Siak River

For measurements see table, page 649.

## MUS BULLATUS, new species.

*Type*.—Adult male, skin and skull, Cat. No. 143447, U.S.N.M., collected on Pulo Rupert, off east coast of Sumatra, March 16, 1906, by Dr. W. L. Abbott. Original number 4723.

*Diagnostic characters*.—Similar to *Mus firmus* Miller<sup>a</sup> from Linga Island, but lighter in color and with audital bullæ about twice as large.

*Color*.—Upper parts and sides a grizzle of blackish brown and buff, the former color in excess on the back and the latter along the sides. Under parts cream color, darkened to a bright yellow buff toward the sides where it contrasts rather sharply with the blackish brown and buff grizzle.

*Fur, etc.*—In general the fur is like that of *Mus firmus*, but coarser and many weak grooved bristles are scattered through it. In *M. firmus* these bristles are scarcely more than grooved hairs. In the middle portion of the tail there are nine scales to the centimeter.

*Skull and teeth*.—The skull of *Mus bullatus* resembles that of *Mus firmus*, but it is slightly smaller, and the audital bullæ are nearly twice as large. The teeth of *Mus bullatus* are somewhat smaller than those of *M. firmus*.

*Measurements*.—See table, page 649.

*Specimens examined*.—Two skins with skulls from Pulo Rupert, two skins with skulls and two odd skulls from Pulo Padang, and three skins with skulls from the Kateman River.

*Remarks*.—*Mus bullatus* is at once distinguished from *Mus firmus* by its large audital bullæ, and by its generally somewhat smaller size. I can detect no differences between specimens from Pulos Rupert and Padang. The three Kateman River specimens give slightly smaller external measurements than those from the islands.

*Mus bullatus* needs to be compared with *Mus mülleri* Jentink<sup>b</sup> from Batang Singalang, Padang Highlands, western Sumatra. I have seen no specimens of this rat, but Mr. Gerit S. Miller, jr., made full notes of the type and another specimen in the Leyden Museum. His remarks are here published.

*Mus mülleri* Jentink. *Type*: Mounted specimen (immature, sex ?), in fair condition. All teeth fully in place except *m*<sub>3</sub>, which, however, is almost up but absolutely unworn. Skull with back part broken away to frontals. Mandible perfect. Fur soft, but rather plentifully sprinkled with long coarse hairs on the back. These hairs are not in the least bristly, but with a hand lens most of them can be seen to be grooved. They are nowhere conspicuous but are a little more numerous on rump than elsewhere. Crown, nape, and back about hair-brown, the underfur gray No. 6, and the long hairs not far from raw umber, the result in certain lights closely approaching isabella color. Sides of body and outer surface of legs a dull yellowish brown, between wood-brown and ochra-

<sup>a</sup> Proc. Acad. Nat. Sci. Philadelphia, March, 1902, p. 155, issued June 11, 1902.

<sup>b</sup> Notes Leyden Museum, II, 1880, p. 16.

ceous-buff, the fur longer than that on the back and apparently belonging to a different pelage. Underparts and inner sides of legs a dirty pale buff, perhaps intermediate between cream-buff and broccoli-brown, lightening to cream-color on the throat, the hairs everywhere except in this cream-colored area slaty gray below middle. Face and cheeks an indefinite buffy gray. Feet a dull broccoli-brown. Ears with a grayish pubescence on both surfaces. Tail with rather indistinct rings, of which there are eleven to the centimeter at the middle. At first sight it appears naked, but from the edge of each scale there grow two to three stiff hairs as long as the width of  $1\frac{1}{2}$  rings. Color of tail dark brown above, faintly lighter below. Head and body 185 mm., tail 235, hind foot with and without claws 44.6 and 41.

With the type is an adult female (*b*) also marked *mülleri* from Padang, apparently a typical *Mus firmus*. It seems hardly probable that the two animals are the same. *Mülleri* differs in relatively longer tail and narrower less distinct caudal annulations. The color is much the same in a general way, allowance being made for age, but the whitish area on the throat of *mülleri* seems to be a distinguishing character. The skulls show one apparently very important character that can hardly be due to age—in *mülleri* the interpterygoid space extends forward distinctly beyond edge of last molar, while quite the contrary is true in *firmus* [and also in *bullatus*]. The anterior portion of the rostrum appears to be less heavily built than that of *firmus*, but this may readily be the result of the difference in age. Incisive foramina alike. Mandible differs from that of *firmus*, smaller in size, less prominent protuberance over root of incisor, and wider angular process less distinctly drawn inward. Lateral grooves of palate less well developed in the small skull.

Cranial measurements of the type of *Mus mülleri*: Back of frontal to front of nasal, 33.4 [34.6]<sup>a</sup>; nasal, 17 [19]; diastema, 12 [15]; interorbital constriction, 7 [7]; depth of rostrum behind incisors, 8 [9]; width of both nasals together anteriorly, 5 [6]; mandible, 27 [29]; maxillary toothrow, 10 [8.5]; mandibular toothrow, 10 [8]; width of both upper incisors together, opposite henselion, 3.4 [4.2] [5.4 in *firmus*]. Molars apparently the same in the two, allowing for age, the rows the same length, but width greater in the younger specimen. Pattern not obviously different.

The above description and measurements show that *Mus bullatus* is evidently closely related to *M. mülleri*. Unfortunately nothing is known regarding the bullæ of the latter as that portion of the skull is missing. The chief points of difference between *M. mülleri* and *M. bullatus* are the shorter toothrow of the latter, the absence of a whitish throat patch, and of gray bases of the hairs of the underparts. The annulations of the tail in *Mus bullatus* does not differ in appearance from that in *Mus firmus*.

#### MUS FREMENS Miller.

1902. *Mus fremens* MILLER, Proc. Acad. Nat. Sci. Philadelphia, March, 1902, p. 154, issued June 11, 1902. (Type-locality, Singkep Island.)

1903. *Mus fremens*, MILLER, Proc. U. S. Nat. Mus., XXVI, p. 463, February 3, 1903. (Specimens from Tapanuli Bay, western Sumatra.)

1905. *Mus fremens*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 110.

Four skins and skulls and one odd skull, all from Aru Bay.  
For measurements see table, page 649.

<sup>a</sup> Measurements in brackets are those of the type of *Mus bullatus*.

Measurements of *Mus mandus* and *Mus usper* from eastern Sumatra.

Name.	Locality.	Number.	Sex and age.	Head and body. <sup>a</sup>	Tail vertebra. <sup>a</sup>	Hind foot with claws. <sup>a</sup>	Greatest length of skull.	Zygomatic breadth.	Maxillary tooth row (alveoli).
				<i>m.m.</i>	<i>m.m.</i>	<i>m.m.</i>	<i>m.m.</i>	<i>m.m.</i>	<i>m.m.</i>
<i>Mus mandus</i> . . . . .	Pulo Rupert . . . . .	143468	Male, old . . . . .	151	115	33	36.4	16.3	6.1
Do. . . . .	do. . . . .	143469	Male, adult . . . . .	145	126	35	34.6	16	6.1
Do. . . . .	do. . . . .	143470	do. . . . .	138	112	33	34	15.5	5.8
Do. . . . .	do. . . . .	143471	do. . . . .	140	119	34	34.3	15.3	5.7
Do. . . . .	do. . . . .	143472	Female, old . . . . .	168	131	37	37	16.6	6.2
Do. . . . .	do. . . . .	143473	Female, adult . . . . .	139	114	33	35.6	15.1	6.1
Do. . . . .	Pulo Padang . . . . .	143474	Male, old . . . . .	147	112	32	35.8	16.4	5.8
Do. . . . .	do. . . . .	143475	Male, adult . . . . .	121	109	32	34.6	16	6.1
Do. . . . .	do. . . . .	143476	do. . . . .	131	103	33	34.6	14.3	5.8
Do. . . . .	do. . . . .	143477	Male, old . . . . .	154	120	34	36.9	16.3	6.2
Do. . . . .	do. . . . .	143478	Male, adult . . . . .	143	112	33	33.7	15	5.9
Do. . . . .	do. . . . .	143479	Male, immature . . . . .	143	112	33	30.3	13.7	5.5
Do. . . . .	Kateman River . . . . .	123128	Female, adult . . . . .	150	111	32	35	15.5	6
Do. . . . .	do. . . . .	b123132	Male, adult . . . . .	152	126	33	36.6	16	5.8
Do. . . . .	do. . . . .	b123133	Male, old . . . . .	155	130	33	38	16.8	6.3
Do. . . . .	Siak River near mouth of Gasip River . . . . .	b144230	do. . . . .	160	130	33	37.8	16.8	6
Do. . . . .	Sungei Mandau . . . . .	144224	Female, adult . . . . .	154	119	34	36.9	17	6.3
Do. . . . .	do. . . . .	c144225	Male, adult . . . . .	167	130	35	38	16.4	5.8
Do. . . . .	do. . . . .	144226	do. . . . .	159	128	35	36.9	16.4	6.1
Do. . . . .	do. . . . .	144227	do. . . . .	160	128	35	37.2	16.5	6.2
<i>Mus usper</i> . . . . .	Aru Bay . . . . .	143467	Female, adult . . . . .	116	101	30	31.3	14.2	5.5
Do. . . . .	Siak River near mouth of Gasip River . . . . .	144234	Male, adult . . . . .	140	103	28	33.8	15.5	5.2
Do. . . . .	do. . . . .	144235	Male, old . . . . .	135	122	29	35	15.5	5.6
Do. . . . .	do. . . . .	144236	do. . . . .	133	104	26	33.3	15	4.8
Do. . . . .	Siak River near mouth of Buwatan River . . . . .	b144237	do. . . . .	135	107	28	32.6	14.6	5.3
Do. . . . .	do. . . . .	b144238	do. . . . .	130	104	29	33.2	14.6	5.6
Do. . . . .	do. . . . .	144239	Male adult . . . . .	135	113	29	33.2	14.6	5.3
Do. . . . .	do. . . . .	d144240	do. . . . .	142	100	27	33.2	14.6	5.3
Do. . . . .	do. . . . .	e144241	Female, adult . . . . .	130	95	26	33.2	14.6	5.3
Do. . . . .	do. . . . .	f144242	Male, adult . . . . .	140	110	32	33.2	14.6	5.3
Do. . . . .	Little Siak, 30 miles up . . . . .	144244	Female, adult . . . . .	140	103	28	32.9	14.5	5
Do. . . . .	Little Siak River . . . . .	b144245	Male, adult . . . . .	127	105	27	31.4	14.5	5
Do. . . . .	do. . . . .	144246	do. . . . .	130	107	28	32.4	14.6	5
Do. . . . .	do. . . . .	144247	do. . . . .	139	99	28	32.9	14.3	6.2
Do. . . . .	Little Siak River, 6 miles up . . . . .	b144248	do. . . . .	126	85	25	31.5	15	5.4

<sup>a</sup> Measurements by collector in the flesh.<sup>b</sup> Skull only, no skin.<sup>c</sup> Type.<sup>d</sup> Alcoholic.Measurements of *Mus lingensis* from eastern Sumatra.

Name.	Locality.	Number.	Sex and age.	Head and body. <sup>a</sup>	Tail. <sup>a</sup>	Hind foot with claws. <sup>a</sup>	Greatest length of skull.	Zygomatic breadth.	Maxillary tooth row (alveoli).
				<i>m.m.</i>	<i>m.m.</i>	<i>m.m.</i>	<i>m.m.</i>	<i>m.m.</i>	<i>m.m.</i>
<i>M. lingensis</i> . . . . .	Aru Bay . . . . .	143455	Male, adult . . . . .	190	177	47	43.4	19.9	7.3
Do. . . . .	do. . . . .	143456	Male, old . . . . .	216	196	46	46.1	19.9	7
Do. . . . .	do. . . . .	143457	Male, adult . . . . .	200	205	42	44.6	19.7	6.7
Do. . . . .	do. . . . .	143458	do. . . . .	188	196	42	43.7	19	6.6
Do. . . . .	do. . . . .	143459	Male, old . . . . .	203	188	41	45.5	20	6.2
Do. . . . .	do. . . . .	143460	Male, adult . . . . .	202	193	43	44	18.5	6.4
Do. . . . .	do. . . . .	143462	Female, adult . . . . .	199	200	40	45	19.6	7.3
Do. . . . .	do. . . . .	143463	do. . . . .	194	181	42	43.8	19.6	7.2
Do. . . . .	do. . . . .	b143461	Male, old . . . . .	200	211	47	46.2	20.4	6.8
Do. . . . .	do. . . . .	b143464	Female, immature . . . . .	159	156	39	37.7	17	6.4
Do. . . . .	do. . . . .	b143465	Female, adult . . . . .	190	171	39	43.5	19.8	7
Do. . . . .	do. . . . .	b143466	Female, old . . . . .	190	171	39	46.2	20	6.9

<sup>a</sup> Collector's measurements.<sup>b</sup> Skull only.

Measurements of rats from eastern Sumatra.

Name.	Locality.	Number.	Sex and age.	Head and body. <sup>a</sup>	Tail. <sup>a</sup>	Hind foot with claws. <sup>a</sup>	Greatest length of skull.	Zygomatic breadth.	Maxillary tooth row (alveoli).
<i>M. fremens</i> . . .	Aru Bay . . . . .	143442	Female, adult . . . . .	mm.	mm.	mm.	mm.	mm.	mm.
Do. . . . .	do. . . . .	143443	do. . . . .	207	310	46	50	22	9.5
Do. . . . .	do. . . . .	b143444	do. . . . .	205	310	46	50.9	21.9	10
Do. . . . .	do. . . . .	143445	do. . . . .	210	310	45	49	22.4	9.5
Do. . . . .	do. . . . .	143445	do. . . . .	206	313	47	48	22.4	9.8
Do. . . . .	do. . . . .	143446	do. . . . .	227	345	48	52.3	23.4	9.9
<i>M. bullatus</i> . . .	Pulo Rupa. . . . .	c143447	Male, adult . . . . .	234	265	48	50.6	25	8.5
Do. . . . .	do. . . . .	143448	Female, adult . . . . .	225	245	46	51.2	23.9	9.2
Do. . . . .	Pulo Padang . . . . .	143449	Female, young adult . . . . .	226	233	42	48	23	8
Do. . . . .	do. . . . .	143452	Male adult . . . . .	234	221	45	49.4	24.3	8.6
Do. . . . .	do. . . . .	b143451	Adult . . . . .	203	228	42	48	23.7	8.2
Do. . . . .	do. . . . .	b143450	Immature . . . . .	201	228	42	46.7	23	8
Do. . . . .	Kateman River . . . . .	123129	Male, adult . . . . .	212	232	43	50.5	23.2	9
Do. . . . .	do. . . . .	123130	do. . . . .	201	228	42	46.7	23	8
Do. . . . .	do. . . . .	123131	Female, adult . . . . .	203	230	42	48	23	7.7
<i>M. firmus</i> . . .	Siak River . . . . .	144223	Male, adult . . . . .	250	278	50	55.3	26.4	10
<i>M. ephippium</i> . .	do. . . . .	144233	Male, old . . . . .	126	135	26	31.7	15	5.1
<i>M. "rattus"</i> . . .	Sungei Mandau . . . . .	144228	Female, adult . . . . .	165	166	33	41.5	20	6.5
Do. . . . .	do. . . . .	144229	Male, old . . . . .	188	171	37	42.8	21.2	6.8
Do. . . . .	Siak River . . . . .	144231	Female, old . . . . .	175	183	35	42.3	19.7	6.4
Do. . . . .	do. . . . .	144232	Female, adult . . . . .	172	183	35	41	18.6	6.1

<sup>a</sup> Collector's measurements.

<sup>b</sup> Skull only.

<sup>c</sup> Type.

ACANTHION LONGICAUDUM (Marsden.)

- 1810. *Hystrix longicauda* MARSDEN, History of Sumatra, 3d ed., p. 118.
- 1811, name only without description, and pl. xiii n. l. with legend: "The Landak, *Hystrix longicauda*, Published by W. Marsden 1810."
- 1889. *Acanthion mülleri*. JENTINK, Notes Leyden Museum, XI, p. 28.
- 1905. *Hystrix longicauda*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 113.
- 1907. *Acanthion longicaudum*, LYON, Proc. U. S. Nat. Mus., XXXII, p. 580, June 29, 1907.

Skin and skull of a half grown individual, from Aru Bay.

For measurements see table, page 650.

THECURUS SUMATRÆ Lyon.

- 1907. *Thecurus sumatra* LYON, Proc. U. S. Nat. Mus., XXXII, p. 583, June 29, 1907.

Twelve specimens from the vicinity of Aru Bay and four from the Siak region.

For list of specimens and measurements see table, page 650.

TRICHYS MACROTIS Miller.

- 1903. *Trichys macrotis* MILLER, Proc. U. S. Nat. Mus., XXVI, p. 469, February 3, 1903.
- 1905. *Trichys fasciculata*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 114.
- 1907. *Trichys macrotis*, LYON, Proc. U. S. Nat. Mus., XXXII, p. 591, June 29, 1907.

Two specimens from Aru Bay and three from the Siak region. They are identical in every way with specimens from Tapanuli Bay, the type-locality. Two of the specimens lack tails entirely.

For measurements see table, page 650.

## Measurements of porcupines from eastern Sumatra.

Name.	Locality.	Number.	Sex and age.	Measurements.				
				Head and body. <sup>a</sup>	Tail vertebra. <sup>a</sup>	Hind foot with claws.	Greatest length of skull.	Zygomatic width.
				mm.	mm.	mm.	mm.	mm.
<i>Acanthion longicaudum</i> .	Aru Bay.	143431	Male, young <sup>b</sup> .	515	95	72	103	55
<i>Thacurus sumatras</i>	do.	c143432	Male, old.	540	100	70	108	56
Do.	do.	143433	do.	495	90	70	102.3	56.1
Do.	do.	143434	do.	540	110	71	105.8	56
Do.	do.	143435	Female, old.	455	90	68	99.5	49.1
Do.	do.	143438	do.	525	90	73	102.3	53.2
Do.	do.	143439	do.	500	430	70	98.6	55
Do.	do.	49870	Male, old.	€480	€110	€70	97.6	53
Do.	do.	143454	Male, adult.	490	90	...	98.7	52.5
Do.	do.	143430	do.	550	110	75	108.6	53.2
Do.	do.	143436	Female, adult.	495	100	73	102.6	50.6
Do.	do.	143437	Female, young.	450	95	62	93.7	47.8
Do.	do.	145704	Male, young.	410	60	57	...	...
Do.	Sungei Mandau.	144219	Female, old.	420	100	65	96.3	49.8
Do.	do.	144220	Male, old.	485	90	70	95	50.8
Do.	do.	♂144221	Female, old.	...	...	...	99	51
Do.	do.	144222	Female, adult.	472	90	73	98	51.5
<i>Trichys macrotis</i> .	Aru Bay.	143441	do.	415	200	60	78	42.8
Do.	do.	143440	Female, immature.	420	220	65	79.7	44.2
Do.	Siak River.	144216	Male, adult.	400	190	66	84	44
Do.	do.	144217	Female, young, adult.	430	(h)	65	83	43
Do.	Sungei Mandau.	144218	Male, adult.	385	(h)	63	84.5	44.5

<sup>a</sup> Collector's measurements.<sup>b</sup> Second upper molars just coming through alveoli.<sup>c</sup> Type.<sup>d</sup> Tail injured.<sup>e</sup> Estimated from skeleton.<sup>f</sup> Alcoholic.<sup>g</sup> Skull only.<sup>h</sup> Tail wanting

## HERPESTES BRACHYURUS Gray.

1837. *Herpestes brachyurus* GRAY, Mag. Nat. Hist., I, p. 578. Type-locality, "Indian Islands."1889. *Herpestes brachyurus*, JENTINK, Notes Leyden Museum, XI, p. 23.1905. *Herpestes brachyurus*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 98.

Thirteen specimens of *Herpestes brachyurus* were collected by Doctor Abbott in eastern Sumatra—seven from the Little Siak River, three from Sungei Mandau, and three from the vicinity of Arn Bay. For measurements see table below.

Measurements of *Herpestes brachyurus* from Sumatra.

Locality.	Catalogue number.	Sex and age.	Head and body. <sup>a</sup>		Hind foot. <sup>a</sup>	Weight.		Basal length of skull.	Zygomatic width.	Maxillary tooth-row (alveoli).
			Head.	Tail.		lbs.	kgs.			
			mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
Little Siak River.	144100	Male, adult.	470	210	94	4	1.8	90	55	34.5
Do.	144099	do.	450	210	86	3½	1.6	82.6	55	32.8
Do.	144095	do.	480	196	93	4	1.8	86.5	54	34
Do.	144098	do.	433	222	93	3	1.4	83.3	50.8	32.6
Do.	144096	do.	460	193	88	4	1.8	84	55.6	33.7
Do.	144097	Male, young adult.	460	220	94	4	1.8	84.5	53	34.3
Do.	144101	Male, nearly adult.	430	220	94	3½	1.6	81.5	51.3	33.7
Sungei Mandau.	144102	Male, adult.	445	240	93	...	...	85.6	55	32
Do.	144104	Female, nearly adult.	...	...	...	...	...	84.3	51	33
Do.	144103	do.	435	200	85	3	1.4	82.5	48.7	31.4
Aru Bay.	143615	Male, adult.	453	200	92	3½	1.7	88.7	54.3	35.2
Do.	143616	Female, nearly adult.	440	220	90	...	...	83.3	48.2	33.6
Do.	143617	Female, young.	368	172	82	...	...	76.4	43.7	31.7

<sup>a</sup> Measurements by collector in the flesh.

## CYNOGALE BENNETTII Gray.

1837. *Cynogale bennettii* GRAY, Mag. Nat. Hist., I, p. 579.

1889. *Cynogale bennettii*, JENTINK, Notes Leyden Museum, XI, p. 24.

1905. *Cynogale bennettii*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 97.

Two specimens of this rare and interesting animal were secured, an adult female from Aru Bay and an immature male from the Siak River. The uterus of the female contained two fetuses. The two specimens, Cat. Nos. 143621 and 144122, U.S.N.M., adult female and young male, measure respectively, head and body, 617, 520 mm.; tail, 180, 185; hind foot, 106, 103; weight,  $7\frac{3}{4}$  pounds (3.5 kilos),  $4\frac{3}{4}$  pounds (2.2 kilos); greatest length of skull, 123, 110; basal length, 114.8, 102.8; zygomatic width, 60.8, 53.3; interorbital constriction, 10.2, 15; maxillary toothrow (alveoli), 49, 47.

"Female caught by a Malay in a fish trap."—W. L. Abbott.

## ARCTICTIS BINTURONG (Raffles).

1822. *Viverra? binturong* RAFFLES, Trans. Linn. Soc., London, XIII, p. 253.

1905. *Arctictis binturong*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 97.

Six skins and skulls. For localities and measurements see table, page 652.

Three of the specimens are in the black phase and three in the grizzled phase. I can not agree with Schneider <sup>a</sup> or Blanford <sup>b</sup> that the grizzled or gray phase is entirely characteristic of the young. One specimen of the present series, Cat. No. 143619, U.S.N.M., from Pulo Payong, is an old male, and is much grizzled everywhere except the tail, which is almost entirely black. Its ears are conspicuously tufted. Cat. No. 144118, U.S.N.M., a young male from the Siak River, is as black as any specimen in the collection.

The skulls appear quite as variable as the skins in respect to size and to inflation of the frontal bones. The skull of adult male, Cat. No. 143618, U.S.N.M., from Aru Bay, has a total length of 145 mm., while a much older specimen of the same sex, Cat. No. 143619, from Pulo Payong, has a total length of only 130.5 mm. In Cat. No. 144117, a young adult female from Sungei Mandau, has the frontal bones very much inflated in a perfectly symmetrical manner. An examination of their interior structure does not reveal anything that may be considered pathologic similar to the evidently abnormal swellings in the skulls of many specimens of the American genus *Mephitis*. (See Plate LII, figs. 2 to 4.) Cat. No. 143618, U.S.N.M., from Aru Bay, has a normal or typical skull with respect to the frontal bones. (See Plate LII, fig. 1.) Cat. No. 143619, U.S.N.M., from Pulo Payong, is intermediate between these two extremes as regards frontal inflation.

<sup>a</sup> Zool. Jahrb. Syst., XXIII, 1905, p. 97.

<sup>b</sup> Fauna of British India, Mammals, 1888, p. 118.

External and cranial measurements of *Arctictis binturong* from Sumatra.

Locality.	Number.	Sex.	Age.	Head and body. <sup>a</sup>		Hind foot. <sup>a</sup>	Weight. <sup>a</sup>	Weight.	Basal length of skull.	Constriction in front of postorbital processes.	Swelling of frontal bones behind postorbital processes.	Maxillary tooth row.
				mm.	mm.							
Aru Bay.....	143618	Male.....	Adult.....	740	690	143	25½	11.5	132.5	31	35.8	42.5
Sungei Mandau..	144117	Female..	Young adult.	760	680	141	23	10.4	133.5	34.4	46.8	42.8
Siak River.....	144118	Male.....	Immature <sup>b</sup> .	600	570	125	8	3.6	108.5	28.2	41.4	40
Pulo Payong, in Salat Rupert.	143619	.....do.....	Old.....	670	630	127	20	9	121.4	29	40	40.5
Pulo Tebing Tinggi.	144322	.....do.....	Immature <sup>c</sup> .	550	530	119	7	3.2	99	24	34	30
Do.....	144323	Female..	.....do. <sup>c</sup> .....	610	550	117	11	5	107	22	35	33

<sup>a</sup> Measurements in the flesh by collector.

<sup>b</sup> Last upper maxillary tooth and permanent canine just coming through their alveoli.

<sup>c</sup> Last upper maxillary teeth and permanent canine not yet appearing.

## ARCTOGALIDIA TINGIA, new species.

*Type*.—Skin and skull of adult male, Cat. No. 144324, U.S.N.M., collected on Pulo Tebing Tinggi, east coast of Sumatra, January 20, 1907, by Dr. W. L. Abbott. Original number, 4992.

*Diagnostic characters*.—A medium-sized member of the genus resembling in color *Arctogalidia fusca* Miller,<sup>a</sup> from Pulo Kundur, and in shape of skull *A. simplex* Miller,<sup>b</sup> from Pulo Linga and Pulo Singkep.

*Color*.—Type (in an old and worn pelage): The upper parts have the general effect of a dark broccoli brown or a Prout's brown, the latter most conspicuous posteriorly. Top of head, feet, and terminal two-thirds of tail, dull blackish brown; basal third of tail similar to upper parts. Under parts indefinitely brownish, lightened on the throat and chest by the dirty cream-colored subapical band of the hairs. The median dorsal stripe fairly well indicated, the lateral stripes faintly so. Paratype (Cat. No. 144336, Pulo Merbau): General effect of upper parts, basal third of tail, and outer surface of legs a dark smoke-gray; top of head blackish, slightly grizzled; feet and terminal two-thirds of tail brownish black; under parts generally a very light smoke-gray. Median dorsal stripe fairly well indicated, lateral stripes faintly so.

*Skull and teeth*.—The skull and teeth of *Arctogalidia tingia* are not essentially different from those of *A. simplex*. From its geographical neighbor, *A. fusca* on Pulo Kundur, it differs in the possession of a narrow postorbital constriction, like that seen in *A. simplex*. From the still more closely situated *A. sumatrana* it differs

<sup>a</sup> Proc. U. S. Nat. Mus., XXXI, p. 269, September 11, 1906.

<sup>b</sup> Proc. Acad. Nat. Sci. Philadelphia, 1902, p. 156, June 11, 1902.

in its distinctly smaller size and greater distance between lateral plates of the palate bones.

*Measurements.*—Type, Cat. No. 144324, U.S.N.M., adult male, Pulo Tebing Tinggi, and paratype, Cat. No. 1444336, U.S.N.M., adult female, Pulo Merbau, respectively: Head and body, 465, 450 mm.; tail, 490, 460; hindfoot, 85, 80; weight in pounds, 4, 3 $\frac{3}{4}$ ; in kilograms, 1.8, 1.7; greatest length of skull, 98, 96; basal length, 92, 87; basilar length, 91, 86; palatal length, 52, 51; zygomatic breadth, 56, 51.5; interorbital constriction, 19.3, 17; postorbital constriction, 13.3, 15; width of brain case above roots of zygomata, 32, 32.7; maxillary toothrow (alveoli), 35, 33.4.

*Specimens examined.*—The above two.

ARCTOGALIDIA SUMATRANA, new species.

1889. *Arctogale stigmatica*, JENTINK, Notes Leyden Museum, XI, p. 23.

*Type.*—Skin and skull of adult male, Cat. No. 144120, U.S.N.M., collected at Makapan, eastern Sumatra, February 19, 1907, by Dr. W. L. Abbott. Original number 5054.

*Diagnostic characters.*—A large member of the *Arctogalidia stigmatica* group, closely resembling *A. stigmatica* from Borneo as to color, but cranially more nearly related to *A. major* Miller,<sup>a</sup> from the Malay Peninsula.

*Color.*—Type: General effect of upper parts varies between smoke-gray and mouse-gray, produced by a mixture, almost a grizzling of the dark terminal, the light subterminal, and the dark basal portions of the hairs. Top and sides of head much darker, blackish, slightly grizzled with cream-buff. Ears, feet, and all of tail except terminal fifth, blackish. Legs and terminal fifth of tail similar to upper parts but darker. Median dorsal stripe only faintly indicated and lateral stripes still less evident. The under parts have the general effect of a very light smoke-gray. Paratype (Cat. No. 144121, U.S.N.M.): This differs from the type in being somewhat lighter colored throughout and in having the three dorsal stripes well marked.

*Skull and teeth.*—The skull and teeth of *Arctogalidia sumatrana* closely resemble those of the Bornean *A. stigmatica* and the peninsular *A. major*, but its teeth are smaller. In form the skull exactly resembles that of *A. major*. Both *major* and *sumatrana* differ from *stigmatica* in having distinctly wider postorbital regions and broader rostrums. *A. sumatrana* differs from *A. major* in having the lateral plates of the palate bones very closely approximated, distance between their outer surfaces, 8.5 mm., while in *A. major* it is 12.3 mm. (In *A. stigmatica* this distance is 10 mm.)

<sup>a</sup> Proc. Biol. Soc. Washington, XIX, p. 25, February 26, 1906.

*Measurements.*—Type. Cat. No. 144120, U.S.N.M., adult male, Makapan, and paratype, Cat. No. 144121, U.S.N.M., adult female, Siak River, respectively. Head and body, 526, 550 mm.; tail, 590, 605; hindfoot, 103, 93; weight in pounds, 8 $\frac{1}{4}$ , 4 $\frac{1}{4}$ ; in kilograms, 3.7, 1.9; greatest length of skull, 112.9, 101.2; basal length, 104.7, 95.3; basilar length, 102, 93; palatal length, 61, 55.3; zygomatic breadth, 68, 57.5; interorbital constriction, 21, 17.4; postorbital constriction, 17.3, 19.6; width of braincase above roots of zygomata, 36.2, 34; maxillary tooththrow, 39, 35.7; mandibular tooththrow, 42.4, 36.8.

*Specimens examined.*—The above two.

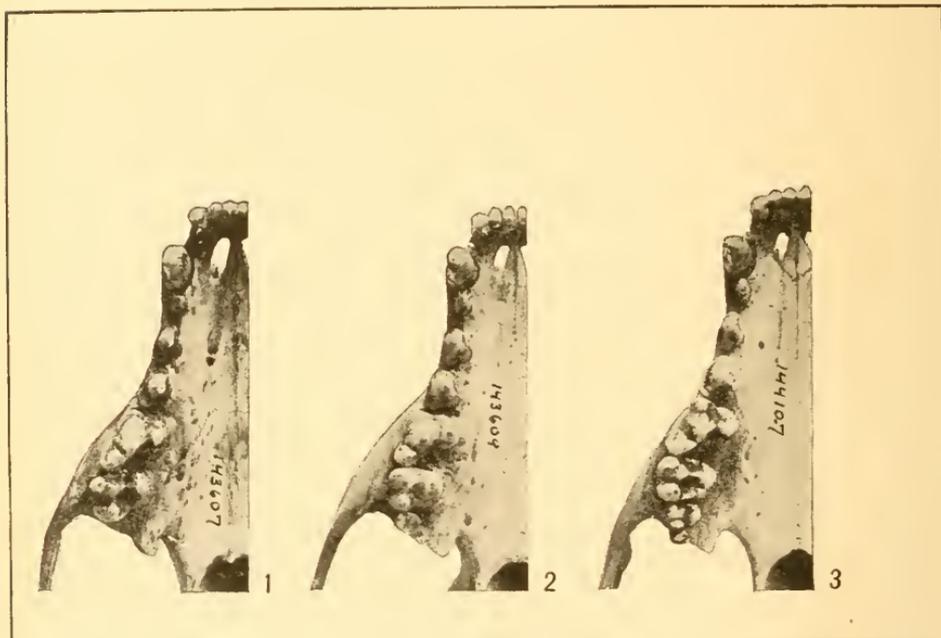


FIG. 4.—UPPER TOOTHROWS OF PARADOXURUS HERMAPHRODITUS  $\times 1$ . 1. CAT. No. 143607, ADULT FEMALE, ARU BAY, LAST UPPER MOLAR WANTING. 2. CAT. No. 143609, ADULT FEMALE, ARU BAY, NORMAL NUMBER OF TEETH PRESENT. 3. CAT. No. 144107, ADULT FEMALE, SIAK RIVER, A SUPERNUMERARY TOOTH PRESENT AT END OF TOOTHROW.

PARADOXURUS HERMAPHRODITUS (Pallas.)

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

1889. *Paradoxurus musanga*, JENTINK, Notes Leyden Museum, XI, p. 22.

1905. *Paradoxurus hermaphrodita*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 36.

Of this species Doctor Abbott secured three males and seven females from the vicinity of Aru Bay and one male and two females from the Siak region. The species is evidently as variable on Sumatra as it is on the Malay Peninsula and elsewhere. One peculiar variation is seen in the number of upper cheek teeth. (Fig. 4. Nos. 1, 2, 3.) Six, molars and premolars combined, is the usual number, and it is not

departed from in a large series from the Malay Peninsula. The last small upper molar is lacking in three of the skulls from Sumatra, but two of them are not fully adult and it looks as if a small tooth might have erupted in later life. Cat. No. 144107, U.S.N.M. from the Siak River, is the only one among numerous skulls examined that shows supernumerary teeth. Corresponding variations in the number of teeth do not occur in the lower jaw. The series of skins shows several variations in color or markings. Nearly all of the specimens have three well defined dorsal stripes. Several of them have another pair of stripes lateral to these, indicated by a row of spots placed more or less closely together. Two of the series are practically devoid of any laterally placed spots. The general ground color varies from an effect of light grayish brown like a light broccoli brown to a light tawny olive.

For measurements see table, page 656.

PARADOXURUS PADANGUS, new species.

*Type*.—Skin and skull of adult male, Cat. No. 143614, U.S.N.M., collected on Pulo Padang, east coast of Sumatra, April 1, 1906, by Dr. W. L. Abbott. Original number 4791.

*Diagnostic characters*.—A member of the *Paradoxurus hermaphroditus* group, most like *P. brunneipes* Miller,<sup>a</sup> from Pulo Kundur, differing from it chiefly in having bullæ of the size found in *P. hermaphroditus*, that is, much larger.

*Color*.—General body color very light grayish broccoli brown, with a slight buffy cast on lower back and thighs. On the underparts the grayish broccoli brown is much lighter than it is above. The back is marked by three seal brown or bistre stripes, well defined, though clearly made up of coalescing spots. On either side of these stripes is another ill-defined stripe, made up of spots coalescing only here and there. On the sides of the body and on the thighs are a few irregularly scattered spots. The tail is dull brownish throughout, similar in color to the spots on the back, except at the base, where it is colored and spotted as is the lower back, and at the extreme tip, which is soiled white or light buffy in color. The feet and lower legs are an indefinite light brownish.

*Skull and teeth*.—The skull is larger, heavier, and more angular than *Paradoxurus* skulls of similar age from Sumatra or the Malay Peninsula. The sagittal crest is remarkably well developed, more so than it is in any other *Paradoxurus* skull in the U. S. National Museum. The skull of the type is not that of an aged adult, as judged by the relatively small amount of wear of the molar teeth and

<sup>a</sup> Proc. U. S. Nat. Mus., XXXI, p. 269, September 11, 1906.

by the distinctness of the occipito-sphenoid suture. The teeth are larger and heavier than they are in any specimens of *Paradoxurus hermaphroditus* from Sumatra or the Malay Peninsula; they are even slightly larger than they are in *P. brunneipes*. The audital bullæ are of the size found in *P. hermaphroditus*, and consequently much larger than they are in *P. brunneipes*. See Plate LIII.

*Measurements.*—External measurements of the type taken in the flesh by the collector: Head and body, 556 mm.; tail, 442; hindfoot, 92; weight,  $7\frac{3}{4}$  pounds (3.5 kilograms). Cranial measurements of the type: Greatest length, 116.7; basal length, 107.8; basilar length, 104; palatal length, 53.3; zygomatic width, 63.8; mastoid breadth, 38.7; interorbital constriction, 11; maxillary toothrow (alveoli), 41.8; mandibular toothrow (alveoli), 48.

*Specimens examined.*—The type and an immature male from Pulo Rupert.

*Remarks.*—The general coloration of *Paradoxurus padangus* is not essentially different from that of *P. brunneipes*. In addition to its being generally lighter in color than the majority of specimens of *P. hermaphroditus*, its light brown feet serve to distinguish it from that species. The skull and teeth of *P. padangus* average a trifle larger and heavier than they do in *P. brunneipes*, but the marked difference in size between the audital bullæ is the main distinguishing cranial character. The immature male from Pulo Rupert, Cat. No. 143613, U.S.N.M., may be referred to *P. padangus*. In color it is generally darker and brighter; its teeth are large and massive.

*External and cranial measurements of Paradoxurus.*

Name.	Locality.	Number.	Sex and age.	Head and body. <sup>a</sup>		Hind foot with claws. <sup>a</sup>	Weight. <sup>a</sup>	Weight.	Basal length of skull.	Maxillary tooth row (alveoli).
				mm.	mm.					
<i>P. hermaphroditus</i> .	Aru Bay.....	143604	Male, adult.....	545	455	87	5	2.27	101.2	39.2
Do.....	do.....	143605	do.....	535	465	87	5 $\frac{1}{2}$	2.38	101.7	40
Do.....	do.....	143606	Male, nearly adult	490	455	88	4 $\frac{1}{2}$	1.93	91.0	b 34
Do.....	Little Siak River.	144106	Male, adult.....	595	520	90	6	2.72	103.5	37.7
Do.....	Aru Bay.....	143607	Female, adult.....	545	455	87	5	2.27	96.7	c 35.7
Do.....	do.....	143608	Female, old.....	535	475	88	.....	.....	102.2	40
Do.....	do.....	143609	Female, adult.....	490	430	83	.....	.....	92.5	36
Do.....	do.....	143610	Female, nearly adult.	500	470	88	3 $\frac{1}{4}$	1.70	94.2	b 36.6
Do.....	do.....	143611	Female, adult.....	505	435	85	4	1.81	92.8	37.4
Do.....	do.....	d 49868	do.....	.....	.....	.....	.....	.....	92.5	37.6
Do.....	Little Siak River.	144105	Female, old.....	560	475	90	5	2.27	103	37.8
Do.....	Siak River.....	144107	Female, adult.....	555	490	94	6 $\frac{1}{2}$	2.95	98.2	e 38.8
<i>P. padangus</i> ...	Pulo Rupert.....	143613	Male, immature...	493	430	90	4 $\frac{1}{2}$	1.81	96.6	b 38.9
Do.....	Pulo Padang.....	143614	Male, adult.....	556	442	92	7 $\frac{3}{4}$	3.56	107.8	41.8

<sup>a</sup> Measurements in the flesh by collector.

<sup>b</sup> Last upper molar not in place.

<sup>c</sup> Last upper molar absent, apparently never had been present.

<sup>d</sup> Skeleton, no skin.

<sup>e</sup> Has a supernumerary upper molar.

<sup>f</sup> Type.

## HEMIGALUS HARDWICKII (Gray).

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

1889. *Hemigalca derbyana*, JENTINK, Notes Leyden Museum, XI, p. 23.

1905. *Hemigale hardwickei*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 95.

Six adult specimens from the Siak region and an immature male from the Kateman River. For list of specimens and measurements, see table below.

*Measurements of Hemigalus hardwickii from eastern Sumatra.*

Locality.	Number.	Sex and age.	Head and body. <sup>a</sup>		Hind foot.	Weight. <sup>a</sup>		Basal length of skull.	Zygomatic width.	Maxillary tooth-row (alveoli).
			mm.	mm.		lbs.	kilos.			
Kateman River.....	123134	Male, young <i>b</i> .....	500	357	77	---	---	86	44	36
Little Siak River.....	144125	Female, adult.....	575	380	90	4	1.8	95	49	43
Do.....	144126	Male, adult.....	573	365	92	4	1.8	98	46	41
Do.....	144127	Female, adult.....	552	335	82	4	1.8	94	45	40
Sungei Mandau.....	144129	Male, adult.....	547	309	87	4	2.0	97	51	41
Siak River.....	144130	Male, young adult.....	548	359	90	4	2.2	97	48	42.5
Kompei.....	144131	Male, young <i>b</i> .....	515	345	88	3	1.7	87	44	36

<sup>a</sup> Collector's measurements.

<sup>b</sup> Last upper molars not through alveoli.

## LINSANG LINSANG (Hardwicke).

1822. *Viverra linsang* HARDWICKE, Trans. Linn. Soc. London, XIII, p. 236, pl. XXIV. (Type-locality, Java.)

1905. *Linsanga gracilis*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 95.

Two specimens, both adult males, one from the Siak River the other from Sungei Mandau.

*Measurements.*—Cat. Nos. 144108 and 144109, U.S.N.M. Head and body, 405, 405 mm; tail, 355, 335; hind foot, 69, 75; weight, 1½ pounds (680 grams), —; greatest length of skull, 73.7, 73.3; zygomatic width, 36.5, 34.7; maxillary toothrow (alveoli), 26.7, 25.5.

## VIVERRA TANGALUNGA Gray.

1832. *Viverra tangalunga* GRAY, Proc. Zool. Soc. London, p. 63.

1905. *Viverra tangalunga*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 94.

Eight specimens. For list of localities and measurements see table below.

*External and cranial measurements of Viverra tangalunga.*

Locality.	Number.	Sex and age.	Head and body. <sup>a</sup>		Hind foot. <sup>a</sup>	Weight. <sup>a</sup>		Basal length.	Zygomatic width.	Maxillary tooth-row (alveoli).
			mm.	mm.		lbs.	kilos.			
Pulo Rupa.....	143625	Female, immature..	630	235	103	6	2.7	101	51.8	43.2
Siak River near mouth of Gasp. Do.....	144115	Female, adult.....	660	330	106	10	4.5	111.8	62.6	45.3
Do.....	144116	Male, adult.....	680	305	110	8	3.6	111.5	61	45.8
Little Siak River, 6 miles up. Do.....	144110	.....do.....	660	320	111	7½	3.4	108.4	60	46.8
Do.....	144111	.....do.....	680	305	110	8	3.6	111	58.8	45.7
Do.....	144112	.....do.....	615	315	108	7	3.2	109	55	45.4
Sungei Mandau.....	144113	Female, adult.....	705	340	109	9	4.1	109	57.8	45
Do.....	144114	.....do.....	655	315	110	5½	2.5	108.7	57.5	45.4

<sup>a</sup> Collector's measurements in the flesh.

## FELIS SUMATRANA Horsfield.

1824. *Felis sumatrana* HORSFIELD, Zoological Researches in Java, description, and plate of entire animal. Pages and plates not numbered.  
1889. *Felis minuta*, JENTINK, Notes Leyden Museum, XI, p. 22.  
1905. *Felis sumatrana*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 103.

One specimen, an adult male from Aru Bay, Cat. No. 143624, U.S.N.M. It is generally grayer in color than are young examples of tiger cats collected by Doctor Abbott in Borneo and the Malay Peninsula. Horsfield's plate shows an animal distinctly gray, grayer than his plate of *Felis javanica*. The bony orbits of this specimen are complete behind, resembling those of *Ailurim planiceps*.

For external and cranial measurements see table, page 659.

## FELIS TINGIA, new species.

*Type*.—Adult female, skin and skull. Cat. No. 144325, U.S.N.M., collected on Pulo Tebing Tinggi, east coast of Sumatra, by Dr. W. L. Abbott, January 24, 1907. Original number 5022.

*Diagnostic characters*.—Similar to *Felis sumatrana*, but smaller and distinctly brighter in color, and with relatively larger teeth.

*Color*.—Ground color of head, upper surface, and sides of body and tail something between Ridgway's hazel and chestnut. It is spotted and striped in the usual manner of cats of the *Felis bengalensis* group, these markings being black or brownish black. The ground color of the underparts is whitish, with the usual blackish spots. Under surface of the tail is a mixture of buffy and whitish. The color is everywhere brighter, that is, more reddish than it is in the specimen of *Felis sumatrana* from Aru Bay.

*Skull and teeth*.—The skull of *Felis tingia* is generally similar to that of *F. sumatrana*, but is smaller throughout. (See table of measurements, page 659.) The interpterygoid space, however, is relatively wider. The orbits lack about 3 mm. of being complete behind. The last mandibular tooth in the skull of *F. tingia* has the same size as the corresponding tooth in *F. sumatrana*, but the other mandibular teeth are distinctly smaller, except the incisors, which are about the same size in the two species. With the exception of the canines (which may be due to the difference in sex between the two skulls examined) and the small premolars, the upper jaw teeth of *F. tingia* are fully as large as they are in the large skull of *F. sumatrana*. The small premolars were once present in the skull of *F. tingia*, but were evidently shed at an early age.

*Measurements*.—See table, page 659.

*Specimens examined*.—One, the type.

*Remarks*.—It is not without much hesitation that I have ventured to describe a new species in the already much named *Felis bengalensis*

group of cats. The Aru Bay and the Tebing Tinggi specimens are so different, however, that it is impossible to consider them as belonging to the same species. Although the two examples are of opposite sexes, the difference in color and in the relative size of the teeth are too great to be accounted for on that ground entirely.

*External and cranial measurements of tiger cats.*

Dimensions.	<i>Felis sumatranæ</i> , adult male, Cat. No. 143624, U. S. N. M., Aru Bay, Sumatra.	<i>Felis tingia</i> , type, adult female, Cat. No. 144325, U. S. N. M., Pulo Tebing Tinggi.
Head and body <sup>a</sup> .....	625 mm.	485 mm.
Tail <sup>a</sup> .....	145	185
Hind foot <sup>a</sup> .....	114	108
Weight <sup>a</sup> .....	5½ lbs. 2.6 kilos.	4½ lbs. 2 kilos.
Greatest length of skull.....	93.5 mm.	83.2 mm.
Basal length.....	78.7	72
Basilar length.....	76.8	70
Palatal length.....	35.4	32.9
Zygomatic width.....	64	56.2
Postorbital constriction.....	22.2	26.6
Width of brain case above zygomata.....	40.3	37
Greatest length of bulla.....	21.8	18.7
Greatest width of bulla.....	12.3	12.2
Alveolar length of last three maxillary teeth.....	15.8	16
Alveolar length of last three mandibular teeth.....	19.6	17.6

<sup>a</sup> Collector's measurements taken in the flesh.

**AILURIN PLANICEPS (Vigors and Horsfield).**

1828. *Felis planiceps* VIGORS and HORSFIELD, Zool. Journ., III, p. 450, pl.

XII. (Type-locality, Sumatra.)

1855. [*Felis*] (*Ailurin*) [*planiceps*], GERVAIS, Hist. Nat. Mamm., II, p. 87.

1889. *Felis planiceps*, JENTINK, Notes Leyden Museum, XI, p. 22.

1905. *Felis planiceps*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 103.

Of this interesting and rather rare cat Doctor Abbott secured an adult female (skin and skull, Cat. No. 144119, U.S.N.M.) from along the Little Siak River. The large size of the functional first premolar is well shown by a text figure in Gervais' account (place cited) and even in the plate of the entire animal published by Vigors and Horsfield (place cited). For the present, at least, I consider the great development of this tooth with its two distinct roots as the main character of the genus of which *Felis planiceps* is the type. The general form of the skull does not differ from *Felis* proper more markedly than many other so-called members of the composite genus *Felis*.

Collector's measurements: Head and body, 490 mm.; tail, 169; hind foot, 104. Cranial measurements by writer: Greatest length, 96.5; basal length, 86; palatal length, 35.8; zygomatic width, 56.4; breadth of brain case above roots of zygomata, 37.5.

## MUSTELA HENRICII Westerman.

- 1848-54. *Mustela (Martes) henricii* WESTERMAN, Bijdr. Dierk., I, p. 13, and unnumbered plate.  
 1887. *Mustela henricii*, JENTINK, Cat. Osteol. Mus. Hist. Nat. Pays-Bas, IX, p. 112. Type-locality given as Padang, Sumatra.  
 1901. *Mustela flavigula henricii*, BONHOTE, Ann. Mag. Nat. Hist., 7th ser., VII, p. 346.

Two adult males, Cat. No. 144133, U.S.N.M., from Kampong Makapan and Cat. No. 144124, U.S.N.M., from Kompei. The two specimens measure, respectively: Head and body, 445, 448 mm; tail, 370, 340; hind foot, 99, 100; weight, 3 pounds (1.4 kilograms), 4 pounds (1.8 kilograms); basal length of skull, —, 80 mm.; maxillary tooth-row, 26.7, 28.

## HELARCTOS MALAYANUS (Raffles).

1822. *Ursus malayanus* RAFFLES, Trans. Linn. Soc. London, XIII, p. 254.  
 1905. *Helarctos malayanus*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 90.  
 1907. *Helarctos malayanus*, LYON, Proc. U. S. Nat. Mus., XXXIII, p. 562, December 24, 1907.

Two skins and skulls, an adult male and female, from along the Kateman River, Cat. Nos. 123138 and 123139, U.S.N.M., respectively. Collector's measurements in flesh: Head and body, 1,190, 1,125 mm.; tail, 40, 30; height at shoulder. —, 490; height at rump, —, 500; weight, 138 pounds (63 kilograms), 105 pounds (48 kilograms). For cranial measurements see table below.

*Cranial measurements of Sumatran sun bears.*

Dimensions.	Cat. No. 123138, adult male.	Cat. No. 123139, adult female.
	<i>mm.</i>	<i>mm.</i>
Basal length.....	215	200
Basilar length.....	210	197
Condylar-basal length.....	234	218
Palatal length.....	117	113
Greatest length.....	256	231
Zygomatic width.....	208	183
Mastoid width.....	156	159
Width of brain case above zygomata.....	104	104
Width at postorbital processes.....	87.5	81
Least interorbital width.....	69	62
Least width of palate between last upper molars.....	41	36
Posterior edge of last upper molar (alveolus) to palation.....	36	27
Posterior edge of last upper molar (alveolus) to tip of pterygoid.....	66	62
Alveolar length of last three upper cheek teeth combined.....	44	49
Antero-posterior diameter of canine at alveolus.....	25	23

## TUPAIA FERRUGINEA Raffles.

1822. *Tupaia ferruginea* RAFFLES, Trans. Linn. Soc., London, XIII, p. 256.  
 1889. *Tupaja ferruginea*, JENTINK, Notes Leyden Museum, XI, p. 28.  
 1905. *Tupaia ferruginea*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 86.

Ten specimens from the vicinity of Aru Bay. They show no appreciable differences from examples obtained on the west coast of Sumatra or from Singapore (type-locality) and the Malay Peninsula,

but are very different from the *Tupaia*s collected along the Siak River and described below as new. The hairs of the tail are conspicuously annulated, and there is no approach to the "whitish or cream yellow" tail of *Tupaia ferruginea demissa* Thomas from Tanjong Bringin, only a few miles to the southeast.

For measurements see table, page 662.

TUPAIA SIACA, new species.

1905. *Tupaia castanea*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 87.

*Type*.—Skin and skull of adult female, Cat. No. 144205, U.S.N.M., collected along the Little Siak River, eastern Sumatra, November 4, 1906, by Dr. W. L. Abbott. Original number 4856.

*Diagnostic characters*.—A member of the *Tupaia ferruginea* group, very similar to *Tupaia castanea* Miller<sup>a</sup> from Pulo Bintang, differing mainly in having a duller colored tail, lighter colored head, and an indistinct dark area on the lower back.

*Color*.—The color of *Tupaia siaca* is so much like that of *T. castanea* that no detailed description is necessary. It is throughout a shade lighter except on the lower back, where there is an indistinct dark area. The color of the back extends forward on the head to well between the ears in *Tupaia siaca*, and to well between the eyes in *Tupaia castanea*. The tail of *T. castanea* is brighter in color than that of *T. siaca* and the hairs less annulated with black. The light annulations are orange-rufous in *T. castanea* and tawny-ochraceous in *T. siaca*. Compared with its geographic neighbor *T. ferruginea*, *T. siaca* is everywhere "redder" or more chestnut throughout, most conspicuously seen in the coloration of the tails and of the underparts.

*Skull and teeth*.—I can find no trustworthy characters to distinguish between the skulls of *Tupaia siaca*, *T. ferruginea*, and *T. castanea*. Those of the latter appear to have slightly broader palates and those of *T. ferruginea* appear a trifle shorter than in the Siak Tree-shrew, but these differences are so slight that they might be caused by individual variations.

*Measurements*.—See table, page 662.

*Specimens examined*.—Three adults and four young, skins and skulls.

*Remarks*.—Although *Tupaia siaca* is very similar to *T. castanea*, yet from a distributional point of view it seems best to regard it as distinct. No doubt future collections will show that it grades in with *T. ferruginea* on Sumatra.

<sup>a</sup> Smithsonian Miscell. Coll., XLV, November 6, 1903, p. 54.

## External and cranial measurements of adult Sumatran tree-shrews.

Name.	Locality.	Number.	Sex.	Head and body.	Tail vertebrae.	Hind foot with claws.	Greatest length of skull.	Zygomatic breadth.	Interorbital constriction.
				mm.	mm.	mm.	mm.	mm.	mm.
<i>T. ferruginea</i> ....	Aru Bay.....	143328	Male....	200	155	47	(a)	.....	.....
Do.....	do.....	143329	.....do	197	178	50	50.7	26	14.7
Do.....	do.....	143330	.....do	200	170	50	.....	.....	14.5
Do.....	do.....	143332	.....do	200	162	47	49.7	.....	13.7
Do.....	do.....	143333	.....do	190	165	46	50.3	25.5	14.6
Do.....	do.....	143334	Female.	185	175	45	49.7	24.3	14.6
Do.....	do.....	143335	.....do	(b)	.....	.....	51.8	25.1	15
<i>T. siaca</i> .....	Little Siak River.....	144209	Male....	198	165	49	52	26.2	15.7
Do.....	do.....	144204	.....do	210	156	51	51.4	26.4	15.2
Do.....	do.....	c144205	Female.	205	175	51	52.8	26.1	15.8

a Aleoholic.

b Skull only.

c Type.

## CROCIDURA LEPIDURA, new species.

*Type*.—Skin and skull of adult female, Cat. No. 123140, U.S.N.M., from the Kateman River, eastern Sumatra, collected by Dr. W. L. Abbott, September 1, 1903. Original number 2772.

*Diagnostic characters*.—A member of the subgenus *Crocidura* with a long scantily haired tail. Head and body, 105 mm.; tail, 71; hind foot, 18 mm., without claws; 19.5 including claws.

*Color of type*.—The upperparts much like a dark seal-brown of Ridgway; the underparts closely resembling a very dark drab; the bases of the hairs above and below slate-gray. Tail brownish black above and lighter beneath; it is scantily clothed for its entire length with very short hairs, so that the scales are plainly visible. On the basal half of the tail are a few scattered long hairs. Upper surfaces of feet and hands brownish.

*Skull*.—The skull of the type, and only specimen, is much broken, consisting practically of the rostrum and mandible only.

*Measurements*.—Head and body, 105 mm.; tail, 71 (collector's measurements made in the flesh; the same two measurements on the dried skin are 93 and 68 mm., respectively): hind foot (measured from the dried skin), 18 mm. without the claws and 19.5 including claws. Length of entire upper toothrow, from front of the most anterior tooth to back of last molar, 11.5; greatest distance between outer edges of upper toothrow, 7.5; length of entire lower toothrow, from point of the most anterior tooth to back of last molar, 10.6.

*Specimens examined*.—One, the type.

*Remarks*.—*Crocidura lepidura* differs so conspicuously in size from any of the five previously known Hairy-tailed Shrews from Sumatra that its specific distinctness can not be doubted. A table of measurements of the various species is given below. Except for larger size and darker color *C. lepidura* appears to be closely related to *Crocidura fuliginosa* as described by Blanford.<sup>a</sup>

<sup>a</sup> Blanford, Fauna Brit, India, Mamm., p. 242.

Measurements of specimens of *Crocidura* from Sumatra.

Name and locality.	Head and body.	Tail.	Hind-foot.
	mm.	mm.	mm.
<i>Crocidura lepidura</i> , Kateman River, Sumatra.....	105	71	19
<i>Crocidura fuliginosa</i> , <sup>a</sup> Assam, Tenasserim.....	74	63	14
<i>Crocidura neglecta</i> , <sup>b</sup> "Sumatra".....	81	36	12
<i>Crocidura paradozura</i> , <sup>c</sup> Mount Singalan, 2,000 m., Sumatra.....	66	105	16
<i>Crocidura beccarii</i> , <sup>c</sup> Mount Singalan, 2,000 m., Sumatra.....	66	53	13
<i>Crocidura brunnea</i> , <sup>b</sup> "Sumatra".....	75	47	15
<i>Crocidura weberi</i> , <sup>d</sup> Singkarah, Sumatra.....	80	56	12

<sup>a</sup> Blanford, Fauna Brit. India. Mamm., p. 242.

<sup>b</sup> Jentink, Notes Leyden Museum, X, 1888, p. 167.

<sup>c</sup> Dobson, Ann. Mus. Civ. Stor. Nat. Genova, 2d ser., IV, 1886, pp. 566-567.

<sup>d</sup> Jentink, Weber, Zool. Ergebn. Reis. Niederland, Ost-Indie, 1890, I, p. 124.

GYMNURA GYMNURA (Raffles).

1822. *Viverra gymnura* RAFFLES, Trans. Linn. Soc. London, XIII, p. 272.

1827. *Gymnura rafflesii* HORSEFIELD and VIGORS, Zool. Journ., III, p. 248, pl. VIII.

1889. *Gymnura rafflesii*, JENTINK, Notes Leyden Museum, XI, p. 29.

1905. *Gymnura gymnura*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 89.

Four skins and skulls from the mainland of Sumatra and three from Tebing Tinggi. All of them are of the usual color and none of the seven skins show any tendency to albinism.

External and cranial measurements of *Gymnura*.

Locality.	Catalogue No.	Sex and age.	Head and body. <sup>a</sup>	Tail. <sup>a</sup>	Hind foot. <sup>a</sup>	Basal length of skull.	P a l a t a l length.	Zygomatic width.	Upper tooth row, a 11 teeth.
			mm.	mm.	mm.	mm.	mm.	mm.	mm.
Little Siak River, 6 miles up.....	144172	Male, old.....	372	253	70	77	50	38.5	46
Do.....	144173	.....do.....	365	250	64	73	48	38	43.2
Do.....	144171	Female, adult.....	402	263	69	78	51	41	45.7
Sungei Mandau.....	144174	Female, old.....	371	250	68	76	48	40	44
Pulo Tebing Tinggi.....	144329	Female adult.....	382	280	69	76.5	49	38.5	45
Do.....	144330	.....do.....	370	260	69	75	49	36.5	45
Do.....	144331	.....do.....	390	240	68	73.5	47.2	37.5	44.5

<sup>a</sup> Measurements by collector in the flesh.

GALEOPTERUS TEMMINCKII (Waterhouse).

1838. *G. [alcopthecus] temminckii* WATERHOUSE, Proc. Zool. Soc. London, p. 119.

1889. *Galeopthecus volans*, JENTINK, Notes Leyden Museum, XI, p. 22.

1905. *Galeopthecus volans*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 82.

1906. *Cynocephalus volans*, MILLER, Proc. Biol. Soc. Washington, XIX, p. 41, February 21, 1906.

1908. *G. [alcopterus] temminckii*, THOMAS, Ann. Mag. Nat. Hist., 8th ser., I, p. 254.

Three specimens from Pulo Rupert, two adult females and the young of one of them. They agree in all essential respects with specimens of so-called *Galeopterus temminckii* from the Malay Peninsula and various Malayan Islands. The adult females, Cat. Nos. 143325 and 143327, U.S.N.M., measure, respectively: Head and body, 480, 410 mm.; tail, 280, 270; hindfoot, 75, 78; greatest length of skull, 73.8, 76.1; zygomatic width, 46.5, 47; interorbital constriction, 19.2, 20.4.

## CYNOPTERUS BREVICAUDATUS (I. Geoffroy).

1828. *Pachysoma brevicaudatum* I. GEOFFROY, Dict. Classique d'Hist. Nat., XIV, p. 705. (Type-locality, Sumatra.)

1889. *Cynopterus marginatus*, JENTINK, Notes Leyden Museum, XI, p. 30.

1905. *Cynopterus titharcheilus*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 75.

Forty-five specimens of *Cynopterus* from eastern Sumatra may be referred provisionally to *C. brevicaudatus*. They are all medium-sized members of the genus, and have a white border around the ear. They are distinctly smaller than Javan examples of *C. titharcheilus* in the U. S. National Museum. It is not at all probable that they are identical with the continental *C. marginatus*. Two specimens from Aru Bay and two from Salat Rupat are slightly smaller than are specimens from farther down the coast and the adjacent islands. (See table of measurements.) Without a greater number of examples it seems inadvisable to recognize them as a distinct race.

For measurements see table below.

*Measurements of Cynopterus brevicaudatus from eastern Sumatra.*

Catalogue No.	Locality.	Sex and age.	Head and body.		Forearm.	Tibia.	Foot	Ear from crown.	Greatest length of skull.	Maxillary tooth row, including canine.
			mm.	mm.						
143314 <sup>a</sup>	Salat Rupat	Male, adult	90	7	55	24	15	.....	27	8.4
143315	do.	do.	92	9	57	21	14	14	26.8	9
143316	Aru Bay	do.	93	10	58	22	13	14	26.7	8.7
143317	do.	Female, adult	92	10	58	22	12	15	26.7	8.4
144250 <sup>a</sup>	Sungei Mandau	do.	95	.....	58	23	15	18	28.1	9.3
144259 <sup>a</sup>	do.	Male, adult	96	7	62	25	16	.....	27.6	8.6
144251	do.	Female, adult	102	9	65	25	14	16	.....	.....
144252	do.	do.	100	8	64	24	14	14	.....	.....
144253	do.	do.	95	10	62	25	16	17	29	9.4
144254	do.	do.	100	10	66	25	15	17	.....	9.4
144255	do.	Male, adult	95	8	64	25	14	14	29.5	9.2
144256	do.	Female, adult	100	11	65	25	14	13	.....	.....
144257	do.	do.	105	8	68	26	15	15	.....	.....
144258	do.	do.	160	8	67	26	15	15	29.3	9.3
144260	do.	do.	100	10	66	25	16	14	.....	.....
144262	do.	do.	110	8	68	25	15	14	.....	.....
144263	do.	do.	105	10	67	26	14	13	.....	.....
144280	Little Siak River	do.	105	8	67	25	14	15	29.4	9.2
144283	do.	do.	110	11	65	24	15	13	.....	.....
144285	do.	Male, adult	95	8	65	25	14	16	30	9.4
144286	do.	Female, adult	95	8	63	23	15	17	27.9	9
144288	do.	Male, adult	100	10	62	23	15	14	.....	.....
144299 <sup>a</sup>	do.	do.	98	.....	64	24	16	18	28.5	9
144289	Makapan	do.	.....	.....	64	24	15	.....	28.9	9.6
144338	Pulo Merbau	Female, adult	98	8	68	25	14	16	.....	.....
144339	do.	do.	100	10	65	24	15	16	.....	.....
144340	do.	do.	100	10	62	25	15	17	.....	9.7
144341	do.	do.	100	9	64	23	16	16	29	9.4
143302	Pulo Bengkalis	Male, adult	100	9	63	24	15	17	29.9	9.2
143303	do.	do.	103	7	65	24	15	15	.....	.....
143304	do.	do.	104	10	60	24	16	16	28.3	9
143305	do.	Female, adult	106	9	62	25	14	14	29	9.2
143306	do.	do.	110	8	65	27	15	14	.....	.....
143307	do.	do.	105	7	63	24	14	14	.....	.....
143308	do.	do.	100	10	66	24	15	16	28.4	9
143310	do.	do.	110	8	66	26	14	16	.....	.....
143311	do.	do.	112	10	65	25	15	17	.....	.....
143312	do.	do.	.....	9	66	25	14	16	.....	.....
143300 <sup>a</sup>	do.	Male, adult	94	9	.....	25	15	.....	.....	8.7
143301 <sup>a</sup>	do.	Female, adult	100	8	65	26	15	.....	29.3	.....

<sup>a</sup> Skin and skull, measurements of head and body, tail, and ear made by collector.

## NIADIAS MINOR, new species.

*Type*.—Nearly adult male in alcohol, Cat. No. 144264, U.S.N.M., collected at the confluence of the Gasip and Siak rivers, eastern Sumatra, December 14, 1906, by Dr. W. L. Abbott. Original number 4951.

*Diagnostic characters*.—Similar in all respects to *Niadias princeps* (Miller),<sup>a</sup> except in size, being distinctly smaller throughout. Forearm 72 mm., instead of 84.4.

*Color*.—The color of *Niadias minor* is apparently not essentially different from that of *N. princeps*. It is rather lighter throughout and less yellowish on the underparts, perhaps due to its preservation in alcohol and the fact that the hair is rather scant above owing to sloughing. The fingers, the elbows, and the distal two-thirds of the forearms are whitish in color. The antebrachium near its attachment to the body, the wing membrane between the forearm and the fifth finger, and the tips of the wing are also whitish. Some of this may be due to sloughing of the dark epidermis, but as this whitening is symmetrical on both sides of the body it is probably natural.

*Skull and teeth*.—The skull and teeth of *Niadias minor* are similar in every way to those of *N. princeps*, except in size. See measurements below. The Sumatran bat lacks the saggital crest found in the bat from the Nias Islands. It is not fully adult, however.

*Measurements*.—Type: Head and body, 100 (143);<sup>b</sup> tail, 8 (10); tibia, 26 (30); foot, 17 (20.5); forearm, 72 (84.4); thumb, 27 (35.9); second finger, 48 (61.4); third finger, 108 (143); fourth finger, 89 (112); fifth finger, 77 (110); skull, greatest length, 32.3 (38.2); condylo-basal length, 30 (36.4); basilar length, 26.4 (32.6); palatal length, 16.6 (20.2); zygomatic breadth, 21 (25.4); breadth of brain case, 14.4 (15.6); interorbital constriction, 6.5 (6.7); postorbital constriction, 7.5 (5.8); mandible, 25 (28.8); depth of mandible at anterior molar, 3.4 (3.6); maxillary toothrow, including canine (alveoli), 11.2 (12.2); mandibular toothrow, excluding incisors (alveoli), 12.2 (13.8).

*Specimens examined*.—One the type.

*Remarks*.—It is unfortunate that the single available specimen of *Niadias minor* is not fully adult. From an examination of its finger joints its immaturity is scarcely noticeable. The skull, however, shows unmistakable signs of immaturity, but they are hardly sufficient to account for the great difference in size between *N. minor* and *N. princeps*. The teeth of *N. minor* are fully developed. Tooth by tooth they are distinctly smaller than they are in *N. princeps*, espe-

<sup>a</sup> Proc. Biol. Soc. Washington, XIX, p. 61, May 1, 1906; also p. 83, June 4, 1906.

<sup>b</sup> The figures in parentheses are those of the type of *Niadias princeps*.

cially noticeable in the mandibular teeth. The generic characters: "larger cheek-teeth broader and more squarish in outline crown of  $pm_4$  and  $m_1$  with distinct terete cusp slightly in front of middle of crushing surface" are shown as distinctly as they are in the type species, but of course on a slightly smaller scale.

PTEROPUS VAMPYRUS (Linnæus).

1758, *Vesperilio vampyrus* LINNÆUS, Syst. Nat., 10th ed., p. 31.

1889, *Pteropus edulis*, JENTINK, Notes Leyden Museum, XI, p. 29.

1905, *Pteropus celano*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 75.

One specimen, skin and skull, Cat. No. 143299, U.S.N.M., from Pulo Payong, Salat Rupert. Collector's measurements: Head and body, 315 mm.; foot, 69; expanse wings, 1,515. Measurements by writer: Forearm, 200; thumb, 77; second digit, 145; third digit, 390; fourth digit, 295; fifth digit, 264; tibia, 103; greatest length of skull, 79; zygomatic breadth, 44, maxillary toothrow, 31.

EMBALLONURA PENINSULARIS Miller.

1889, *Emballonura semicaudata*, JENTINK, Notes Leyden Museum, XI, p. 30.

1898, *Emballonura peninsularis* MILLER, Proc. Acad. Nat. Sci. Philadelphia, 1898, p. 323, issued July 25, 1898.

Five specimens from Aru Bay and one from Pulo Padang, all preserved in alcohol.

For measurements see table, page 668.

MEGADERMA SPASMA TRIFOLIUM (Geoffroy).

1810, *Megaderma trifolium* GEOFFROY, Ann. Mus. d'Hist. Nat., Paris, XV, p. 193.

1905, *Megaderma spasma*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 79.

1907, *Megaderma spasma trifolium*, ANDERSON and WROUGHTON, Ann. Mag. Nat. Hist., 7th ser., XIX, p. 132, February, 1907.

One specimen, a desiccated body, from Pulo Merbau, Cat. No. 144355.

Measurements: Forearm, 56 mm.; tibia, 32; greatest length of skull, 25.5; breadth of braincase, 11; zygomatic breadth, 15.5; maxillary tooth row, 10.3; mandibular tooth row, 11.5.

RHINOLOPHUS TRIFOLIATUS Temminck.

1835-1841, *Rhinolophus trifoliatatus* TEMMINCK, Monogr. Mamm., II, p. 27, pl. xxxi. (Type-locality, Java.)

1905, *Rhinolophus trifoliatatus*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 77.

One specimen, an adult female, preserved in alcohol, from Pulo Rupert.

For measurements see table, page 668.

## MYOTIS CARIMATÆ Miller.

1906. *Myotis carimata* MILLER, Proc. U. S. Nat. Mus., XXXI, p. 62, July 23, 1906.

Nine bats of this species were collected at Sungei Makapan.  
For measurements see table, page 668.

## MYOTIS MURICOLA (Gray).

1841. *Vespertilio muricola* HODGSON, Journ. Asiatic Soc. Bengal, X, p. 908.  
(*Nomen nudum*.)  
1846. *Vespertilio muricola* GRAY, Cat. Specimens and Drawings, Mammals and Birds of Nepal and Thibet presented by B. H. Hodgson to Brit. Mus., p. 4.  
1905. *Myotis muricola*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 80.

Ten specimens from the Little Siak River.  
For measurements of the adults see table, page 668.

## PIPISTRELLUS IMBRICATUS Horsfield.

1824. *Vespertilio imbricatus* HORSFIELD, Zoological Researches in Java, pages not numbered.  
1878. *Vesperugo imbricatus*, DOBSON, Monogr. Chiropt. Brit. Mus., p. 217.  
1905. *Pipistrellus imbricatus*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 79.

One specimen from the Little Siak River may be referred to this species. The close approximation in size between this and the preceding species is remarkable.

For measurements see table, page 668.

## Measurements of Insectivorous Bats from eastern Sumatra.

Name.	Locality.	Catalogue number.	Sex.	Ear from crown.	Tail.	Fore-arm.	Thumb.	Second finger.	Third finger.	Fourth finger.	Fifth finger.	Tibia.	Foot.
				mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
<i>Emballonura peninsularis</i>	Aru Bay	143319	Male	10.5	12	42	6	34	59	45	42	16	7.5
Do.	do.	143320	do.	10	11	43	6	34	60	44	41	15	7.3
Do.	do.	143321	do.	9.7	12	42.8	7	34	59	43	39	16	6.5
Do.	do.	143318	Female	9.5	12	41	6.5	35	63	46	43	17	7.5
Do.	do.	143324	do.	10.3	13	43	7	35	64	45	43	17	7.5
Do.	do.	143325	do.	10	14	43	7	36	65	50	50	17	11.5
<i>Myotis carinatus</i>	Pulo Padang	144290	Male	11.5	38	38.2	6.5	38	67	56	51	17	11
Do.	Makapan	144291	do.	12.5	38	38.5	7.5	36	66	54	51	17	10.5
Do.	do.	144292	do.	13	34	37	7	35	67	53	49	18	12
Do.	do.	144293	do.	12	35	37	7	34	65	54	51	17.5	12.5
Do.	do.	144294	do.	12	35	38.7	6.5	35	68	57	54	17.7	11
Do.	do.	144295	Female	14	36	38.7	6.5	38	70	59	55	18.2	11.5
Do.	do.	144296	do.	12.5	34	40	7	38	70	59	52	17.5	11.5
Do.	do.	144297	do.	12.2	35	38.5	8	38	71	56	46	15	9
Do.	do.	144270	do.	9	33	34	5	32	58	49	46	15	9
<i>Myotis muricola</i>	Little Siak River	144271	Male	9.5	31	33	5	30	50	45	43	15	7
Do.	do.	144272	do.	10	29	33.5	5.2	29	46	46	43	15	7
Do.	do.	144276	do.	10	31	34	5.5	30	57	47	44	15	7.5
Do.	do.	144271	Female	10.5	32	34.5	5.2	32	57	48	45	15.5	7.5
Do.	do.	144275	do.	10	34	35	5	33	56	48	46	14	7
Do.	do.	144271	do.	11	33.5	32.5	6	30	51	48	44	13	8
Do.	do.	144278	do.	11	30	35	6	29	57	46	43	15	7.5
Do.	do.	144279	do.	11	30	35	5	30	55	47	40	13.2	7.5
<i>Pipistrellus imbricatus</i>	do.	144265	Male	9.5	28	33	5	30	55	47	40	13.2	7.5
<i>Rhinolophus trifoliatas</i>	*Pulo Rupert	143323	Female	24	31	51	6	39	79	67	68	25	14

## PHONISCUS ATROX Miller.

1905. *Phoniscus atrox* MILLER, Proc. Biol. Soc. Washington, XVIII, pp. 229-230, December 9, 1905.

Two specimens, preserved in alcohol, found roosting in the abandoned nest of a Broad Bill, in heavy forest on the banks of the Kateman River.

Measurements<sup>a</sup> of the two specimens, Cat. Nos. 123141, U.S.N.M., adult female, type, and No. 123142, U.S.N.M., adult female: Head and body, 43, 46; tail 38, 37; tibia, 14, 15; foot, 7.4, 7.6; forearm, 34, 35; thumb, 7, 6.4; second digit, 33, 31; third digit, 73, 71; fourth digit, 53, 52; fifth digit, 49, 49; ear from meatus, 13, 13.6; ear from crown, 10, 9.6; width of ear, 11, 11.6.

## NYCTICEBUS MALAIANUS (Anderson).

1881. *Nycticebus tardigradus*, var. *malaiana* ANDERSON, Catalogue Mammals Indian Museum, I, p. 95.

1889. *Nycticebus tardigradus* JENTINK, Notes Leyden Museum, XI, p. 21.

1905. *Nycticebus tardigradus hilleri* SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 73.

One specimen from Pulo Tebing Tinggi, an adult female. The skull is considerably smaller than skulls of like age of typical *Nycticebus malaianus*.<sup>b</sup> The bone has an unnatural appearance similar to that seen in skulls of animals kept in zoological parks. It may have been a captive specimen or lived amid otherwise unfavorable conditions. The skin is rather light in color. Four upper incisors are present in the skull. The temporal ridges not strongly developed are separated by a space of 10 mm.

*Measurements*.—Head and body, 285 mm., tail, 10; hind foot, 63; greatest length of skull, 54.5; basal length, 46.4; greatest width, 42.4; width of brain case above zygomata, 30; maxillary tooth row, 19.4; mandible, condyle to front of symphysis, 36.

## MACACA NEMESTRINA (Linnæus).

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

1822. *Simia caprolagus* RAFFLES, Trans. Linn. Soc. London, XIII, p. 243.

1889. *Macacus ncemestrinus* JENTINK, Notes Leyden Museum, XI, p. 21.

1905. *Nemestrinus ncemestrinus* SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 73.

1906. *Macaca ncemestrina* MILLER, Proc. U. S. Nat. Mus., XXIX, 1906, p. 556.

Three specimens from Aru Bay and two from the Siak River, all adult males. Four specimens, three adult males and one adult female, were collected by Doctor Abbott in 1903 along the Kateman River.

<sup>a</sup> From the original description, place cited.

<sup>b</sup> See Proc. U. S. Nat. Mus., XXXI, p. 537, November 9, 1906.

(See Miller, place cited, page 556, and table of measurements, pages 561, 562.)

*Measurements of pig-tailed macaques from Aru Bay and the Siak region.*

	Cat. No. 49874, adult male, Aru Bay, <sup>a</sup>	Cat. No. 143581, adult male, Aru Bay,	Cat. No. 143583, adult male, Aru Bay,	Cat. No. 141093, adult male, Siak River,	Cat. No. 141094, adult male, Siak River,
Head and body in mm. <sup>b</sup>		355	395	390	375
Tail <sup>b</sup>		280	245	285	220
Hindfoot <sup>b</sup>		183	192	182	180
Weight in pounds		26	24	21	24½
Weight in kilograms		11.8	10.9	10.9	11
Condyle-basilar length of skull, in mm	141	119	121	121	118
Basilar length	101	108	112	112	99
Basal length	104.8	113	116	115.5	112
Greatest length	150	155	157	159	157
Palatal length	61	66	65	71	66
Orbit to gnathion	64	63	69	68	66
Front of orbit to posterior point of braincase	38	100	95	100	95
Zygomatic breadth	100	97	97	97	99
Breadth of braincase above roots of zygomata	68.5	67	66	64	70
Depth of braincase from posterior extremity of frontal to lower edge of occipital condyle	60	57	62.6	58	56.5
Maxillary toothrow (alveoli)	47	47.5	48	49	49
Mandible, back of condyle to front of symphysis	106	115	111.5	115	108
Mandibular toothrow (alveoli)	57	58	55	56	55

<sup>a</sup> Skeleton.

<sup>b</sup> Collector's measurements.

MACACA FASCICULARIS (Raffles).

1822, *Simia fascicularis* RAFFLES, Trans. Linn. Soc. London, XIII, 1822, p. 266.

1889, *Cercocebus cynomolgus*, JENTINK, Notes Leyden Museum, XI, p. 21.

1905, *Cynomolgus fascicularis*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 72.

Only two specimens of this usually common monkey were collected by Doctor Abbott in eastern Sumatra: Cat. No. 143583, U.S.N.M., adult male, skull without skin, from Pulo Padang, and Cat. No. 143582, U.S.N.M., adult male, skin and skull, from Pulo Bengkalis. The two specimens measured respectively: Head and body, 412, 445 mm.; tail, 470, 495; hindfoot, 120, 128; weight, 7¾ pounds (3.5 kilos), 9¾ (4.4); basal length of skull, 74.5, 73.4; zygomatic width, 68.5, 75.7; maxillary toothrow (alveoli), 35.5, 32.8.

PRESBYTIS THOMASI (Collett).

1892, *Simnopithecus thomasi*, COLLETT, Proc. Zool. Soc. London, p. 613, pl. XIII.

1905, *Simnopithecus thomasi*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 70.

Of this handsome monkey Doctor Abbott secured nine skins with skulls, two skulls without skins, and one new-born young preserved in alcohol. Of the females, Cat. No. 143555, U.S.N.M., killed January 21, 1906, contained a small fetus (Cat. No. 143556, U.S.N.M., preserved in alcohol), and Cat. No. 143549, U.S.N.M., killed November

22, 1905, contained a large fetus, at term or nearly so. (Cat. No. 143550, U.S.N.M., preserved in alcohol.)

For measurements see table, page 673.

Iris pale gray brown, ischial callosities, palms of hands, and soles of feet black, face slaty black.—W. L. A.

PRESBYTIS PERCURA, new species.

*Type*.—Skin and skull of adult male, Cat. No. 144088, U.S.N.M., collected at Kompei, eastern Sumatra, February 26, 1907, by Dr. W. L. Abbott. Original number 5083.

*Diagnostic characters*.—A member of the *Presbytis sumatrana-chrysomelus* group, differing from typical *sumatrana* in the absence of the conspicuous light area on the under side of the tail.

*Color*.—Type: Upper parts of head and body, outer surfaces of arms and legs, feet and hands, and tail, black or blackish. On the arms and on the upper parts of the thighs there is a very slight amount of grizzling with whitish. The under side of the tail is grizzled with whitish to a greater extent. The bases of the hairs about the forehead are light gray and can be seen without parting them. The belly, inner side of thighs, and a narrow stripe on inner side of leg extending to heel, inner side of arms from axilla to wrist, chin and a narrow line on the chest, whitish. Chest and throat, blackish.

The series of *Presbytis percursa* is very uniform in color, the only variation of any note being the amount of blackish suffusion on the chest, which is more extensive in some individuals than it is in others. Some specimens show no grizzling on the arms.

*Skull and teeth*.—These show no distinguishing characteristics.

*Measurements*.—See table, page 673.

*Specimens examined*.—Eleven from the Siak region, eastern Sumatra. For exact localities, sex, and age, see table, page 673.

*Remarks*.—*Presbytis percursa* is evidently closely related to *P. sumatrana*, but is readily distinguished by the lack of white on the under parts of the tail. No topotypes<sup>a</sup> of *P. sumatrana* are at hand to make an actual comparison, but the original description and figure<sup>b</sup> are so clear as to leave no doubt as to the distinctness of *P. percursa* from *P. sumatrana*.

<sup>a</sup> Schlegel, Mus. Hist. Nat. Pays-Bas, VII, Simiac, 1876, pp. 45 and 46. Locality of specimens in the Leyden Museum is given as Mount Ophir, on the west side of Sumatra, near Padang.

<sup>b</sup> Müller and Schlegel, Verhandl. Natur., Geschied. Nederl. Bezitt. Zool., p. 73, pl. x bis.

## PRESBYTIS CATEMANA, new species.

1902, *Scenopithecus sumatranus*, MILLER, Proc. Acad. Nat. Sci. Philadelphia, p. 159, March, 1902, issued June 11, 1902. (Indragiri River specimens.)

1906, *Presbytis cana* MILLER, Proc. U. S. Nat. Mus., XXXI, p. 275, September 11, 1906. (Kateman River specimens.)

*Type*.—Skin and skull of adult female, Cat. No. 123149, U.S.N.M., collected along the Kateman River, eastern Sumatra, August 23, 1903, by Dr. W. L. Abbott. Original number 2762.

*Diagnostic characters*.—A member of the *Presbytis sumatrana chrysonoides* group, differing from typical *sumatrana* in being generally brown where *sumatrana* is black, in having conspicuous gray spots on the thighs, and less white on the under side of the tail than has *sumatrana*. It is closely related to *P. cana* Miller,<sup>a</sup> but differs in having less conspicuous thigh patches.

*Color*.—Type: Upper parts of body, base of tail above, and outer side of arms, drab; hands and feet and terminal portion of tail, blackish brown, probably nearest a very dark sepia of Ridgway; hairs of head blackish, but with their bases dirty white; entire under parts, including chin, throat, inner side of arms to wrists, and inner side of legs to ankles, whitish. The whitish color becoming gray extends almost completely around the upper part of the thighs, leaving only a narrow drab band on the outer side, making a mark similar to, but less conspicuous, than that on *Presbytis cana* Miller. Under side of tail for basal third a very light broccoli brown. Series: The four specimens of this species are very uniform in color, showing no essential variations. Cat. No. 113175, U.S.N.M., from the Indragiri River has the thigh patches somewhat darker than they are in the other three skins.

*Skull and teeth*.—These show no distinguishing characteristics.

*Measurements*.—See table, page 673.

*Specimens examined*.—Four, two adult females from the Kateman River and two adult males from the Indragiri River.

*Remarks*.—While *Presbytis catemana* is sufficiently distinct from the related forms on Sumatra its resemblance to *P. cana* Miller, from the off-lying Pulo Kundur, is very close, the only essential difference being that the Kundur animal has the light area of the thigh larger and whiter than has the Sumatran form, differences which were pointed out by Mr. Miller in his description of *P. cana*.<sup>a</sup>

<sup>a</sup> Place cited, page 276.

Measurements of monkeys of the genus *Presbytis* from eastern Sumatra.

Name.	Locality.	Catalogue number.	Sex and age.	Head and body. <sup>a</sup>		Hind foot. <sup>a</sup>	Weight. <sup>c</sup>	Weight.	Basal length of skull.	Zygomatic width.	Maxillary tooth-row (alveoli).
				mm.	mm.						
<i>Presbytis thomasi</i>	Aru Bay....	143558	Male, adult....	500	650	170	14	6.4	58	69	27.3
Do.....	do.....	143559	.....do.....	580	675	176	16	7.3	61	69.5	28
Do.....	do.....	143560	.....do.....	510	625	164	13 $\frac{1}{2}$	6.2	63	72	29.5
Do.....	do.....	143561	.....do.....	515	715	178	15	6.8	64.5	73.5	31
Do.....	do.....	143549	Female, adult.	495	655	160	14	6.4	59.7	67	27.5
Do.....	do.....	143551	.....do.....	540	730	182	17 $\frac{1}{2}$	8.1	65.5	72	28
Do.....	do.....	143554	.....do.....	525	745	173	14	6.4	64.4	70	29
Do.....	do.....	143555	.....do.....	505	750	173	14	6.4	64	70.5	29.5
Do.....	do.....	143557	.....do.....	520	710	165	14	6.4	61.5	68	29
Do.....	do.....	b143553	Female, young adult.						56.4	64.5	27.8
Do.....	do.....	b143552	Female, youngc						53.4	61	22.3
<i>Presbytis catemana</i> .	Kateman River.	123148	Female, adult.	480	705	165	12 $\frac{1}{2}$	5.7	61	71	29
Do.....	do.....	d123149	.....do.....	495	725	175	14	6.4	61	68.6	28
Do.....	Indragiri River.	113173	Male, adult....	460	740	175	14	6.4	64	71	31
Do.....	do.....	143175	.....do.....	480	730	165	13	5.9	62	69	28.6
<i>Presbytis percara</i>	Little Siak River.	144081	.....do.....	450	765	182	14 $\frac{1}{2}$	6.7	65	71	29
Do.....	do.....	144082	.....do.....	515	760	181			64	73	30
Do.....	Makapan.....	144083	.....do.....	505	690	185	16	7.3	62.5	73	30
Do.....	Kompel.....	d144088	.....do.....	390	660	177	15 $\frac{1}{2}$	7.1	61	75.5	27
Do.....	Pulo Rupert....	143548	.....do.....	505	755	167			65	71	27.5
Do.....	Salat Rupert....	143546	Male, young adult.	465	735	172	12	5.4	61	67	28.5
Do.....	do.....	143547	Female, adult.	500	785	175	16	7.3	65	73	29.4
Do.....	Makapan.....	144084	.....do.....	500	760	170	15 $\frac{1}{2}$	6.9	63		28.5
Do.....	do.....	144085	.....do.....	510	720	171	15 $\frac{1}{2}$	6.9	62	71.5	29
Do.....	Kompel.....	144086	.....do.....	500	730	170	14 $\frac{1}{2}$	6.6	63.4	72	30.5
Do.....	do.....	144087	.....do.....	500	750	174	15 $\frac{1}{2}$	7.1	62	70	30

<sup>a</sup> Collector's measurements.  
<sup>b</sup> Skull only.

<sup>c</sup> Last molars not through alveoli.  
<sup>d</sup> Type.

HYLOBATES ALBIMANUS (Vigors and Horsfield).

1828. *Simia albimana* VIGORS and HORSFIELD, Zool. Journal, IV, p. 107.

1838. *Hylobates lar*, WATERHOUSE, Cat. Mamm. Mus. Zool. Soc. London, p. 3.

1905. *Hylobates entelloides*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 64.

The existence in Sumatra of a white-handed gibbon has been very generally overlooked by recent writers in spite of Vigors and Horsfield's <sup>a</sup> description of a specimen evidently from that island, and of Waterhouse's <sup>b</sup> very definite mention of a specimen from Sumatra collected by Raffles, in fact the same individual upon which Vigors and Horsfield based their description of *Hylobates albimanus*. Schneider's remark, "new from Sumatra," regarding *Hylobates entelloides*, therefore can not be considered correct. Doctor Abbott secured six adult individuals of the Sumatran Whitehanded Gibbon from the vicinity of Aru Bay. All of them are in the "brown" or "yellow" phase. No specimens are available in the U. S. National

<sup>a</sup> Zool. Journal, IV, p. 107.

<sup>b</sup> Cat. Mamm. Mus. Zool. Soc. London, p. 3.

Museum from the west coast of Sumatra to compare with the present series from Aru Bay, but the latter, for the present at least, may be regarded as undoubted specimens of *Hylobates albimanus*.

As this name has for so long been placed as a synonym of *Hylobates lar* Linnaeus and not without cause (for none of the differential characters are brought out in the original description) I give below a description of the Aru Bay specimens and a comparison between them and a series of Whitehanded Gibbons from the Malay Peninsula.

*Color*.—The general color of the body and the limbs is "brown" in varying shades. Top of head, limbs, and underparts of body very similar to Ridgway's Prout's brown, gradually lightening over the shoulders, rump, and sides to a light Isabella color or wood brown. Upper surfaces of hands and feet dirty cream color. A dirty cream color surrounds the face, most conspicuous back of the cheeks and under the chin. There is some variation in the intensity and in the extent of the "brown" colors. One specimen, Cat. No. 143567, U.S.N.M., male, is very light, almost dull cream color throughout, but the top and sides of head are wood brown, and the arms and legs incline toward that color. Cat. No. 143565, U.S.N.M., also a male, has the "browns" more intense than most of series, thus bringing into stronger contrast the light hands and feet as well as the light colored band about the face.

*Skull*.—In the skulls of *Hylobates albimanus* the bony rim of the orbit is much less conspicuous than it is in *H. lar*. The difference is especially noticeable in the supraorbital region; the space between the inner angles of the supraorbital ridges is shallow in the Sumatran Whitehanded Gibbon, but in the Malaccan species a prominent furrow is found between them. (Plate LIV, figs. 1a, 2a.) The nasal bones show almost a straight line from above downwards in *Hylobates albimanus*, while in *H. lar* they are decidedly concave from above downwards, thus making the profiles of the skulls of this species quite different. (Plate LIV, figs. 1b, 2b.) The ascending portion of the mandible is very unequally developed in the two forms, it being much deeper in *H. lar*, about as deep as it is long, in *H. albimanus* being very shallow and longer than it is deep. (Plate LIV, figs. 1b, 2b.) In *Hylobates lar* the mental foramen lies in a broad shallow fossa on the side of the mandible. This fossa is quite lacking in *H. albimanus*, and the foramen opens on a slightly convex surface.

*Teeth*.—The teeth of *Hylobates albimanus* average smaller than they do in *H. lar*. In the peninsular form the three upper molar teeth are of nearly the same size, the third in some individuals being a trifle smaller. In the Sumatran form the third upper molar is reduced in size and distinctly smaller than the subequal first and second molars.

*Measurements*.—See table, page 675.

## HYLOBATES AGILIS F. Cuvier.

1821. *Hylobates agilis* F. CUVIER, Hist. Nat. Mammifères, III, Pts. 32 and 33, September, 1821. (Type-locality, Sumatra.)

1905. *Hylobates agilis*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 55.

Fourteen specimens, skins and skulls, five from Salat Rupert, all black; four from the Little Siak River, one in the brown phase and three in the black; five from the Kateman River, one in the brown phase and four in the black. None of the four females in this series is brown.

For measurements see table below.

## SYMPHALANGUS SYNDACTYLUS (Raffles).

1822. *Simia syndactyla* RAFFLES, Trans. Linn. Soc. London, XII, p. 241. (Type-locality, Bencoolen, Sumatra.)

1889. *Hylobates syndactylus*, JENTINK, Notes Leyden Museum, XI, p. 19.

1905. *Symphalangus syndactylus*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 50.

Five specimens, skins and skulls, from the vicinity of Aru Bay. For measurements see table below.

## External and cranial measurements of Gibbons.

Name.	Locality.	Catalogue number.	Sex.	Age.	Head and body. <sup>a</sup>		Hind foot. <sup>a</sup>		Weight. <sup>a</sup>		Basal length.	Zygomatic width.	Front of canine to back of m.
					mm.	mm.	lbs.	kilos.	mm.	mm.			
<i>Symphalangus syndactylus</i> .	Aru Bay....	143577	Male....	Old.....	585	158	23 $\frac{1}{2}$	10.5	92.4	81.6	44.8		
Do.....	do.....	143578	do.....	Adult.....	560	155	24 $\frac{1}{2}$	11	91	78	42		
Do.....	do.....	143579	Female..	Old.....	550	160	20 $\frac{1}{2}$	9.3	92.3	83.5	41.9		
Do.....	do.....	143580	do.....	Adult.....	570	167	25	11.3	90.2	81.3	41		
Do.....	do.....	143581	do.....	do.....	525	160	20	9	87.4	75.3	38.9		
<i>Hylobates al-bimanus</i> .	do.....	b 143564	Male....	do.....	480	139	10 $\frac{1}{2}$	4.9	75.6	70.5	31.2		
Do.....	do.....	b 143565	do.....	do.....	470	146	12	5.4	72.3	70.8	30		
Do.....	do.....	b 143566	do.....	do.....	450	143	9 $\frac{1}{2}$	4.3	69.3	66.3	28.5		
Do.....	do.....	b 143567	do.....	do.....	455	136	10 $\frac{1}{2}$	4.9	69.8	69.3	30.8		
Do.....	do.....	b 143569	do.....	do.....	465	140	12 $\frac{1}{2}$	5.6	70.4	65.6	31.9		
Do.....	do.....	b 143570	Female..	do.....	460	133	11 $\frac{1}{4}$	5.3	71.7	63.6	31.3		
<i>Hylobates agilis</i> .	Salat Rupert.	c 143572	Male....	do.....	450	145	11	5	70.5	63.8	31.8		
Do.....	do.....	c 143573	do.....	Old.....	455	145	13	5.9	73.6		31.7		
Do.....	do.....	c 143574	do.....	Adult.....	455	145	14	6.4	73.9	67	34.2		
Do.....	do.....	c 143575	do.....	do.....	455	150	12	5.4	71.2	62	32.5		
Do.....	do.....	c 143576	Female..	Nearly adult	440	145	10	4.5	69.9	57.3	30.9		
Do.....	Little Siak River.	b 144089	Male....	Adult.....	470	140	12	5.4	78.9	67.7	32.9		
Do.....	do.....	c 144091	do.....	do.....	450		12 $\frac{1}{2}$	5.7	72	65.6	32.7		
Do.....	do.....	c 144092	Female..	do.....	475	147	12 $\frac{1}{2}$	5.8	74.8	69.1	30.9		
Do.....	do.....	c 144090	do.....	Immature.	435	143	8 $\frac{1}{2}$	3.9	67.8	60.5	29.3		
Do.....	Kateman River.	c 123151	Male....	Adult.....	455	145	13	5.9	71.8	67.3	34		
Do.....	do.....	c 123152	do.....	do.....	495	155	16 $\frac{1}{2}$	7.4	76.2	70.8	33.7		
Do.....	do.....	c 123153	do.....	do.....					75.8	70	31.6		
Do.....	do.....	c 123154	Female..	do.....	466	145	12 $\frac{1}{2}$	5.7	71.8	65	33.4		
Do.....	do.....	b 123155	Male....	do.....	460		15 $\frac{1}{2}$	7	73.4	72.2	33.6		
		49694											

<sup>a</sup> Collector's measurements.

<sup>b</sup> Brown or yellow phase.

<sup>c</sup> Black phase.

## PONGO ABELII (Clarke).

1826. *Simia abelii* CLARKE. Asiatic Researches, XIV, 1826, p. 489.

1904. *Pongo pygmaeus bicolor*, ROTHSCCHILD, Proc. Zool. Soc. London, 1904, II, p. 439.

1905. *Simia sumatrana delicusis*, SCHNEIDER, Zool. Jahrb. Syst., XXIII, p. 39.

Seventeen specimens, skins, skulls, skeletons, and brains, from the vicinity of Arn Bay. Both sexes and many different ages of each are represented in the series. For list of these specimens and measurements see table, page 678. An examination of this material convinces me that not more than one species is represented among them. Taken as a whole the series of skulls shows a considerable amount of variation. Differences in age and in sex among Orang skulls produce great variations in size and in shape. Even when these factors are eliminated and comparisons are made between skulls of like age and sex, considerable individual variation is found to be present, but there are always certain specimens connecting the extremes. In the general region visited by Doctor Abbott, Selenka,<sup>a</sup> however, recognized two subspecies of the Orang and Doctor Abbott in his field catalogue designated some of his specimens as "large species" and others as "small species." So far as the material I have examined shows these differences may be accounted for by differences in age or in the development of cheek callosities. From an examination of the prepared skins it is no easy matter to determine to the degree of development of the cheek callosities. The appearance of a freshly killed old male is shown in Plates LV and LVI.

The color of the skins of this series varies from a dark chocolate to tawny or even ochraceous. The predominating color ranges from chestnut to cinnamon-rufous. None of the specimens are uniform in color throughout, the sides, chest, and limbs being clothed with darker hair than the top of the head, middle of back, or abdomen. The beard is always light in color, about ochraceous. The skin of the face is blackish as well as that of the hands and feet. The face has a thin sprinkling of short ochraceous hairs.

In adult males the beard is about 100 mm. in length at the point, in females and in immature males it is much shorter, 50 mm. or less. On the sides of the back and around the thighs the hair is very long, reaching a length of 375 mm. in the full grown males. It is usually much less in the females and in immature individuals. On the breast the hair may be thick or scant, reaching a maximum length of about 180 mm. On the top of the head and middle of back the hair is relatively short. The long, coarse, shaggy nature of the hair is well seen in Plate LV.

<sup>a</sup> Sitzb. k. p. Akad. Wissensch., Berlin, 1906, p. 389.

The Orang-utan do not occur so far south as the Siak River, at least near the coast. No one seems to know the southern limit of its range.

The natives mentioned a third sort of Mawas [that is in addition to the "large" and the "small" species] which I did not meet with. They called it *Mawas orang* (literally *man orang*) and said it was nearly naked. It was said to occur back in the mountainous districts and also up the Besitan, where I spent eight days without seeing anything but the two ordinary species.—W. L. Abbott.

Measurements of Orangs from *Aru Bay, Sumatra.*

Sex and age.	Catalogue number.	Crown of head to sole of foot. <sup>a</sup>	Head and body. <sup>a</sup>	Hind foot. <sup>a</sup>	Weight. <sup>a</sup>	Basilar length of skull.	Zygomastic width.	Mastoid width.	Upper tooth row including canine (alveoli).	Length of humerus. <sup>b</sup>	Length of radius. <sup>b</sup>	Length of femur. <sup>b</sup>	Length of tibia. <sup>b</sup>	With nails on great toes.	With nails on great toes.
		mm.	mm.	mm.	lbs.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.		
Male, adult.....	145589	1,360	940	310	190	163	171	144	70.5	374	370	287	245		
Do.,.....	145590	1,400	965	360	160	169	165	149	78	409	380	298	265	+	+
Male, nearly adult <sup>2</sup> .....	145591	1,350	930	318	140	156	153	129	71.7	373	361	304	247	+	+
Do., <sup>2</sup> .....	145592	1,340	890	325	120	158	153	126.5	71.7	367	380	305	252	+	+
Do., <sup>2</sup> .....	145593	1,350	880	325	120	158	153	126.5	68.3	367	343	259	233	+	+
Do., <sup>2</sup> .....	145594	1,350	880	325	120	158	153	126.5	68.3	367	343	259	233	+	+
Do., <sup>2</sup> .....	145595	1,350	880	325	120	158	153	126.5	68.3	367	343	259	233	+	+
Male, young <sup>3</sup> .....	145596	1,045	715	290	75	142	127	124.5	56	336	320	220	187	+	d
Do.,.....	145597	1,045	715	290	75	142	127	124.5	56	336	320	220	187	+	d
Male, very young <sup>4</sup> .....	145598	840	565	217	30	102	99	106	39.5	288	282	180	154	+	c
Do.,.....	145599	840	565	217	30	102	99	106	39.5	288	282	180	154	+	c
Female, old.....	145600	1,180	810	298	74	133	123.5	98.5	36	331	329	254	220	+	+
Do.,.....	145601	1,180	810	298	74	133	123.5	98.5	36	331	329	254	220	+	+
Female, adult.....	145602	1,135	775	285	98	145	137	126.8	64.8	326	333	247	223	+	+
Do.,.....	145603	1,135	775	285	98	145	137	126.8	64.8	326	333	247	223	+	+
Do.,.....	145604	1,135	775	285	98	145	137	126.8	64.8	326	333	247	223	+	+
Female, nearly adult <sup>9</sup> .....	145605	1,139	735	272	80	130	129.5	118	57.5	331	333	262	219	+	+
Do.,.....	145606	1,139	735	272	80	130	129.5	118	57.5	331	333	262	219	+	+
Female, young <sup>10</sup> .....	145607	1,105	715	218	60	120	122	115	49	333	336	253	209	+	+
Do.,.....	145608	1,105	715	218	60	120	122	115	49	333	336	253	209	+	+
Female, very young <sup>5</sup> .....	145609	840	565	217	30	102	99	106	39.5	288	282	180	154	+	+
Do.,.....	145610	840	565	217	30	102	99	106	39.5	288	282	180	154	+	+

<sup>a</sup>Collector's measurements.

<sup>b</sup>Measured by Dr. Alex. Hrdlička, assistant curator of physical anthropology, U. S. National Museum. Doctor Hrdlička is preparing a detailed account of these Orang skeletons.

<sup>c</sup>Right foot only.

<sup>d</sup>Left foot only.

<sup>1</sup>Not so old as Cat. No. 145590, occipito-sphenoid suture not completely closed.

<sup>2</sup>Permanent dentition all in place, but occipito-sphenoid suture open.

<sup>3</sup>Last upper molars through alveoli, but not level with crowns of other teeth.

<sup>4</sup>Last upper molars not through alveoli; upper canines about half erupted.

<sup>5</sup>Milk incisors, canines, and molars still in place; first permanent molar above in place.

<sup>6</sup>Teeth practically in same condition as in Cat. No. 145586, but skull shows a younger animal.

<sup>7</sup>Uterus contained a well-grown fetus.

<sup>8</sup>Not so old as Cat. No. 145597, occipito-sphenoid suture not closed.

<sup>9</sup>Last upper molar not quite level with rest of teeth.

<sup>10</sup>Milk canines still in place, last tooth up, above, is second molar, last upper molars not nearly through alveoli.

## EXPLANATION OF PLATES.

## PLATE LII.

Skulls of *Arctictis biaturong*. About  $\frac{1}{2}$  nat. size.

- Fig. 1. Dorsal view of skull of Cat. No. 143618, U.S.N.M., young male from the Siak River.  
 2. Dorsal view of skull of Cat. No. 144117, U.S.N.M., nearly adult female, from Sungei Mandau, showing abnormal inflation of frontal bones.  
 3. Dorsal view of the same skull with its top removed in order to show sinuses.  
 4. Ventral view of the removed top in order to show sinuses.

## PLATE LIII.

Skull of the type-specimen of *Paradoxurus padangus*, Cat. No. 143614, U.S.N.M., adult male from Pulo Padang. About  $\frac{3}{4}$  nat. size.

- Fig. 1. Ventral view of skull.  
 2. Dorsal view of skull.  
 3. Lateral view of skull, left side.  
 4. Lateral view of mandible, left half.  
 5. Dorsal view of mandible.

## PLATE LIV.

Facial and lateral views of skulls of *Hylobates albimanus* and *lar*. About  $\frac{2}{3}$  nat. size.

- Fig. 1. *Hylobates albimanus*, Cat. No. 143564, U.S.N.M., adult male, Aru Bay.  
 Fig. 2. *Hylobates lar*, Cat. No. 111970, U.S.N.M., Tanjong Badak, Tenasserim, adult male.

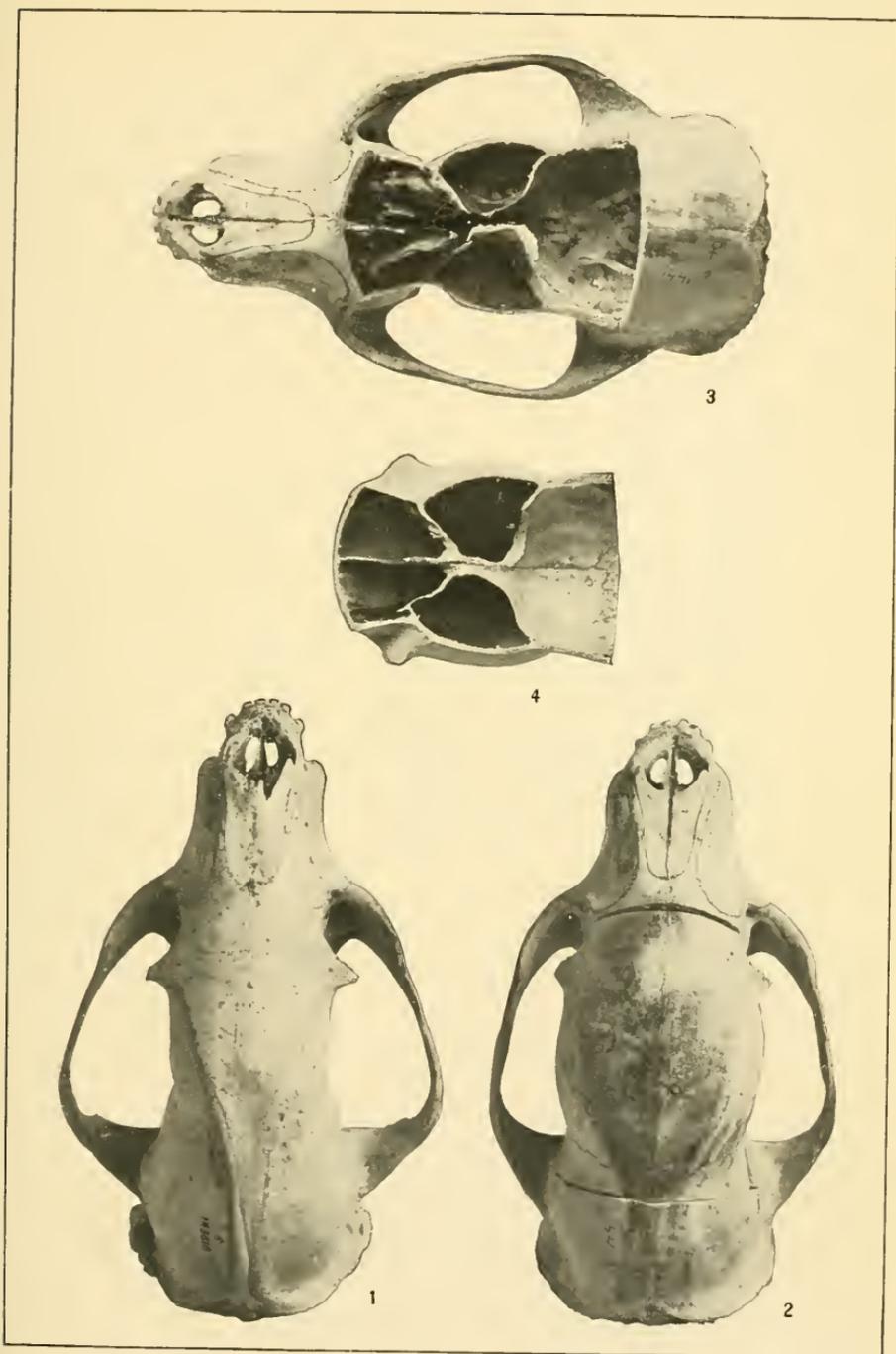
## PLATE LV.

Large male Orang, Aru Bay, Sumatra, photographed by Dr. W. L. Abbott shortly after killing.

## PLATE LVI.

Profile and portrait views of a large male Orang, Aru Bay, Sumatra, photographed by Dr. W. L. Abbott shortly after killing.

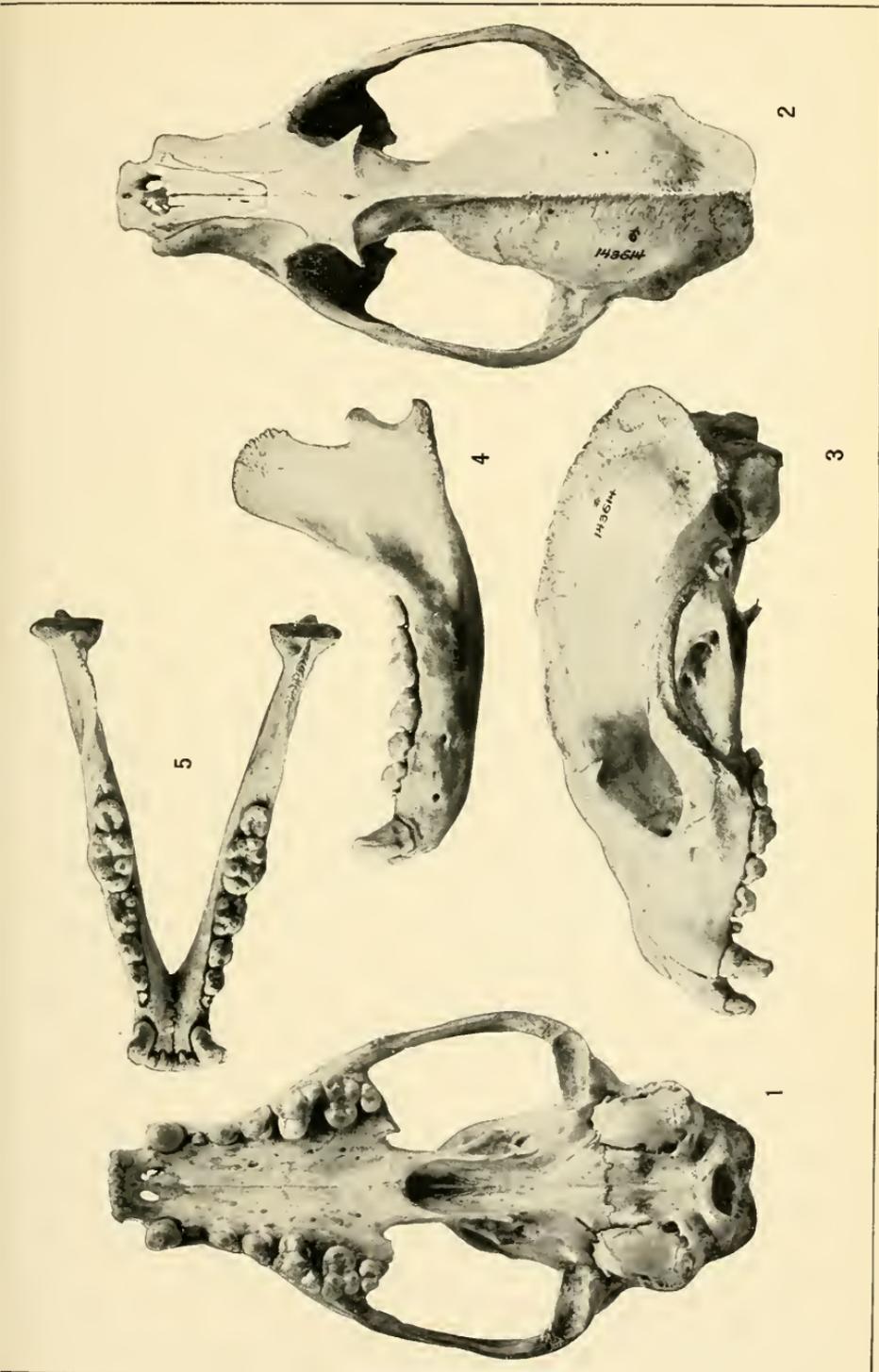




SKULLS OF ARCTICTIS BINTURONG.

FOR EXPLANATION OF PLATE SEE PAGE 679.





SKULL OF TYPE-SPECIMEN OF PARADOXURUS PADANGUS.

FOR EXPLANATION OF PLATE SEE PAGE 679.

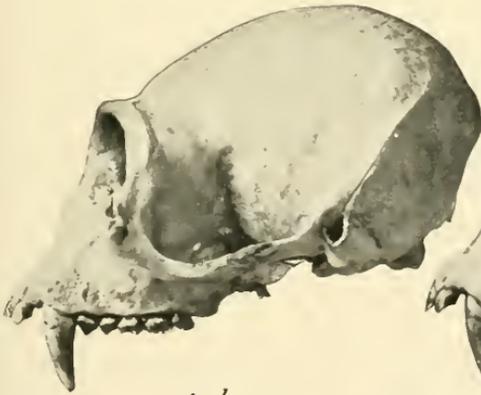




1 a



2 a



1 b



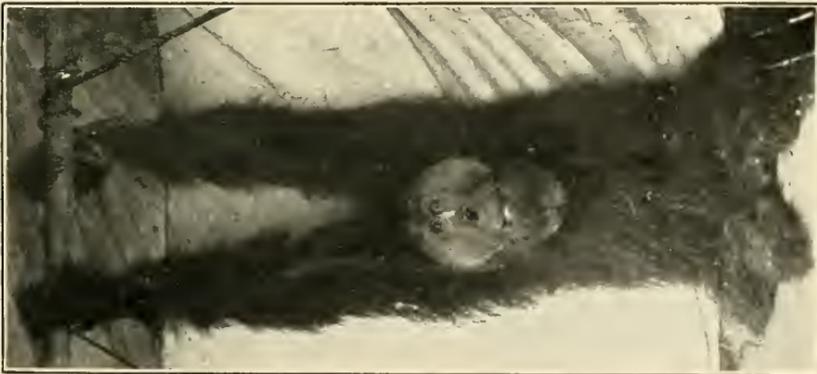
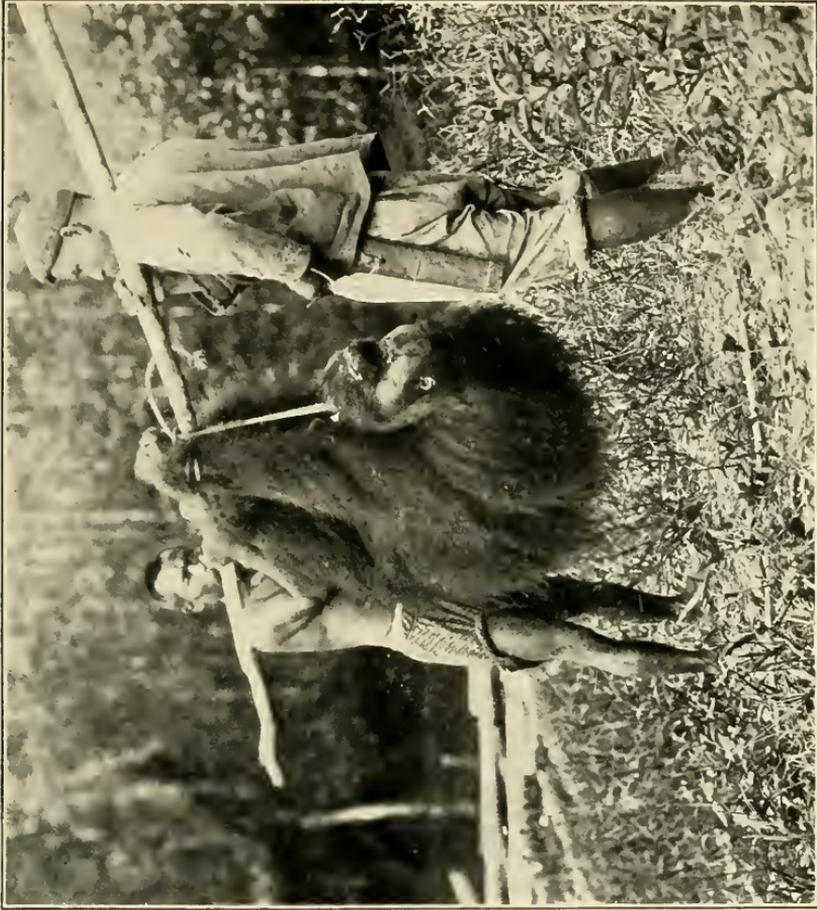
2 b



SKULLS OF HYLOBATES ALBIMANUS AND LAR.

FOR EXPLANATION OF PLATE SEE PAGE 679.





LARGE MALE ORANG, ARU BAY, SUMATRA.

FOR EXPLANATION OF PLATE SEE PAGE 679.





VIEWS OF LARGE MALE ORANG FROM ARU BAY.

FOR EXPLANATION OF PLATE SEE PAGE 679.