

THE MAMMALS COLLECTED BY DR. W. L. ABBOTT IN  
THE RHIO-LINGA ARCHIPELAGO.

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The Rhio-Linga Archipelago is a series of small islands extending southeastward along the east coast of Sumatra from the southern extremity of the Malay Peninsula. The northernmost of the islands, Karimon, Batam, and Bintang are separated from the mainland by the narrow Malacca Strait on the west and Singapore Strait on the east, the average width of which is only about ten miles. Singapore Strait contains a mass of small islands on the north side, west of Singapore, which narrows the open water at that point to five miles. The easternmost, Karimon, Kundur, and Durei, are equally near the coast of Sumatra. From Karimon, the northeasternmost of the group, to the south shore of Sinkep, the southernmost, is a distance of about 150 miles, while that from Karimon east to Panjang is about 125 miles. Near the middle the Archipelago is partly divided by the Rhio Strait into two main groups, the Rhio<sup>a</sup> Archipelago proper at the north and the Linga Archipelago at the south. The principal islands of the Rhio Archipelago, the main axis of which extends east and west, are: *Karimon*,<sup>b</sup> *Kundur*, *Durei*, *Durian*, *Sugi*, Chombol, Bulang, Batam,<sup>c</sup> Rempang Galong, *Bintang*, and Panjang. Of the Linga Archipelago, the main axis of which is nearly north and south, the more important islands are *Sebang*, *Bakong*, *Linga*, and *Sinkep*. In addition to these, the largest of which, Bintang, Linga, and Sinkep, are from 25 to 35 miles across, the Archipelago contains an almost infinite number of smaller islands and islets (see Map).

The entire group of islands lies in shallow water, mostly within the 20-fathom line, though Malacca and Singapore Straits reach a depth

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<sup>a</sup>The spelling *Rhio* is found on most German, English, and American maps; according to the Dutch authorities it should be *Riouw*.

<sup>b</sup>The names of islands visited by Dr. Abbott are printed in italics.

<sup>c</sup>Visited by Mr. C. B. Kloss.

of about 30 fathoms, while an isolated sounding of 49 fathoms is recorded between Singapore Island and Batam. The average depth of the water between the Archipelago and Sumatra is less than in the straits, that separating the Linga group from the larger island nowhere exceeding 20 fathoms, while that between the Rhio group and the coast scarcely reaches 10 fathoms. The causes which have led to these peculiarities in the conformation of the sea bottom have probably influenced the distribution of the mammals of the Archipelago, but our present knowledge of the fauna of the extreme southern portion of the Malay Peninsula is too imperfect to furnish any satisfactory proof.

The Archipelago has been visited four times by Dr. Abbott, in July, 1899 (Linga<sup>a</sup>), August, and September, 1901 (Linga and Sinkep<sup>b</sup>), August and September, 1902 (Bingtang, Sugi, Sugi Bawa<sup>c</sup>) and May, June, July, and August, 1903 (Karimon, Karimon Anak, Kundur, Ungar, Durian, Little Durian, Jan, Moro Kechil, Sanglar, Bakong, Panaga, Sebang, Penuba, Sinkep<sup>d</sup>). His collections of mammals, numbering about 700 specimens, all of which he has presented to the U. S. National Museum, form the subject of this paper. They are supplemented by a small but interesting lot from Batam, presented by Mr. C. B. Kloss.

So far as I am aware, the mammal fauna of the Rhio-Linga Archipelago was quite unknown previous to Dr. Abbott's explorations. Thus far the number of species taken is 49, but this will undoubtedly be much increased when the important islands of Chombol, Bulang, Rempang, Galong, and Panjang are visited. More than half of these, 28 in all, are, so far as is now known, peculiar to the Archipelago: *Tragulus nigrocinctus*, *T. formosus*, *T. lutescens*, *T. flavicollis*, *T. perflarus*, *T. pretiosus*, *T. pretiellus*, *T. nigricollis*, *T. rubeus*, *T. subrufus*, *Sus rhionis*, *Ratufa notabilis*, *R. conspicua*, *R. carimonensis*, *R. insignis*, *R. condurensis*, *R. confinis*, *Sciurus carimonensis*, *S. condurensis*, *Sciuropterus amœnus*, *Arctogalidia simplex*, *A. fusca*, *Paradoxurus brunneipes*, *Tupaia castanea*, *T. phœura*, *Nannoscirus pulcher*, *Presbytis rhionis*, and *P. cana*. Of the remaining species, 13 (*Manis javanica*,

<sup>a</sup> See Miller, Proc. Washington Acad. Sci., II, pp. 203-246, August 20, 1900.

<sup>b</sup> See Miller, Proc. Acad. Nat. Sci., Philadelphia, 1902, pp. 143-159, June 11, 1902.

<sup>c</sup> No general account of this collection has been published, but the following new species were described in 1903: (a) in paper entitled, Descriptions of Eleven new Malayan Mouse Deer (Proc. Biol. Soc. Washington, XVI, pp. 31-44, March 19, 1903), *Tragulus lutescens* (p. 32), *T. flavicollis* (p. 33), *T. formosus* (p. 34), *T. subrufus* (p. 37), *T. rubeus* (p. 40); (b) in paper entitled, Seventy new Malayan Mammals (Smithsonian Miscell. Coll., XLV, pp. 1-93, November 6, 1903), *Ratufa insignis* (p. 4), *Ratufa conspicua* (p. 5), *Tupaia castanea* (p. 54), *Presbytis rhionis* (p. 64).

<sup>d</sup> On this collection nothing has hitherto been published except the description of *Sus rhionis* and the record of *Sus oi* from Kundur (Proc. U. S. Nat. Mus., XXX, 1906, p. 741).

*Sciurus tenuis*, *Sciurus peninsularis*, *Rhinosciurus laticaudatus*, *Mus* near *rattus*, *Viverra zangalunga*, *Aonyx cinerea*, *Tupaia ferruginea*, *T. malaccana*, *Cynocephalus volans*, *Emballonura peninsularis*, *Pteropus vampyrus*, and *Macaca fascicularis*) occur also in Sumatra and on the Malay Peninsula, 6 (*Sus oi*, *Mus firmus*, *M. lingensis*, *M. fremus*, *Tupaia tana*, and *Presbytis cristata*) are known elsewhere from Sumatra only, and 2 (*Mus concolor*, and *Cynoptyerus montanoi*) from the Malay Peninsula only. Among the 27 peculiar species the affinities of 22 (the 10 *Traguli*, (*Sus rhionis*, *Ratufa notabilis*, *R. conspicua*, *R. carimonensis*, *R. insignis*, *R. condurensis*, *Sciuropterus amannus*, *Arctogalidia simplex*, *A. fusca*, *Paradoxurus brunneipes*, *Tupaia castanea*, and *T. phæura*) are geographically neutral, those of 4 *Sciurus carimonensis*, *S. condurensis*, *Presbytis rhionis*, and *P. cana*) incline distinctly toward Sumatra; while in only a single instance (*Ratufa congnis*) is there any marked likeness to a type apparently characteristic of the Malay Peninsula. From this analysis it seems evident that the relationships of the mammal fauna are more with Sumatra than with the mainland. Of the 49 recognized species 34, it is true, are in this respect neutral or noncommittal, but 11 show noticeable Sumatran affinities, while only 4 are specially related to peninsula forms. It should be remembered, however, that while the mammal fauna of the Archipelago is now fairly well elucidated, that of the neighboring large land areas is still very imperfectly known.

#### SYSTEMATIC LIST OF SPECIES.

##### Family MANIDÆ.

##### MANIS JAVANICA Desmarest.

1902. *Manis javanica* MILLER, Proc. Acad. Nat. Sci. Philadelphia, p. 143, June 11, 1902.

An adult female was dug from a burrow in a hillside on Sinkep Island September 4, 1901 (Cat. No. 113114). Total length, 440 mm.; head and body, 220 mm.; tail, 220; weight, 4.7 kg.; skull (sutures distinct except in occipital region and floor of brain case), upper length (from upper rim of foramen magnum), 82.6 mm.; condylobasal length, 91; basal length, 85.4; palatal length, 57; length of nasals, 34.8; breadth of both nasals together at posterior extremity of premaxillaries, 9.8; lachrymal breadth, 24; breadth of braincase above roots of zygomatic, 33.8; zygomatic breadth, 30.6; mastoid breadth, 34; depth of brain case, 23.4; mandible, 65. The uterus contained a fœtus 92 mm. in length, but with the tail only 25 mm.; scales clearly outlined on head, body, and tail, but very indistinct on legs.

## Family TRAGULIDÆ.

## TRAGULUS NIGROCINCTUS, new species.

*Type*.—Adult male (skin and skull), Cat. No. 122863, U. S. N. M. Collected on Pulo Kundur, Rhio Archipelago, June 21, 1903, by Dr. W. L. Abbott. Original number, 2531.

*Characters*.—Resembling *Tragulus annæ* Matschie, but ear not specially elongated (about 30 mm. instead of 37–38 mm.); neck and back distinctly contrasted in color, and a faint but evident supraorbital stripe always present.

*Color*.—Type: Upper parts raw-sienna, fading to a buff considerably yellower than that of Ridgway on sides and darkening noticeably on outer surface of legs; the hairs everywhere light drab at base and black at tip. The black tips everywhere produce a heavy shading. This is distinctly in excess of the raw-sienna on back, but on sides the lighter color predominates. Neck clear black, contrasting rather noticeably with back. Crown and face very dark brown, faintly grizzled with a dull, light russet which becomes sufficiently concentrated over eye and along edge of naked loreal area to form a slight though evident stripe. Cheeks and haired portion of interramia a grizzle of black and dull russet. Throat clear black, without trace of light markings, except that posteriorly a few annulations slightly paler and more yellow than those on cheeks occur in the region usually occupied by the transverse band. Under parts yellowish buff like that of sides, fading to whitish gray in inguinal and hypogastric regions. On chest and anterior portion of belly the hairs are tipped with black, producing a grizzle as on sides; median line on chest blackish; this bordered anteriorly by an area of bright, clear ochraceous, into which the dark stripe quickly fades. A clear, nearly white, spot 20 mm. long by 10 mm. wide on each side of median line between front legs. Tail an indefinite dull tawny throughout, washed with blackish above. Ears and feet blackish.

*Skull and teeth*.—The skull is slightly larger than that of *Tragulus annæ*, but without making direct comparisons it is impossible to enter into details concerning the form. Teeth apparently as in *T. annæ*.

*Measurements*.—For external measurements see table, page 255. Cranial measurements of type: Greatest length, 210 mm.; upper length, 97.4; condylobasal length, 104; basal length, 97.8; palatal length, 70.8; diastema, 9.6; length of nasals, 29; greatest breadth of both nasals together, 11.6; zygomatic breadth, 45.8; least interorbital breadth, 28; mandible, 89; maxillary toothrow (alveoli), 38.6; maxillary premolars (crowns), 20; mandibular toothrow (alveoli), 44.2; mandibular premolars (crowns), 20.

*Specimens examined*.—Pulo Kundur, 19; Great Karimon, 2.

*Remarks.*—Individual variation in color is not very noticeable in this species. In some specimens the light grayish of the inguinal area is replaced by a clear yellowish buff; while in four, including the two from Great Karimon, the light color is intensified almost to a definite white, this taking place also in the axillary region. In one skin (female, Cat. No. 122851) from Pulo Kundur the black of the upper parts is so reduced that the raw-sienna is much in excess.

**TRAGULUS FORMOSUS** Miller.

1903. *Tragulus formosus* MILLER, Proc. Biol. Soc. Washington, XVI, p. 34, March 19, 1903.

Eleven specimens were trapped by Malays at Telok Pemudong, on the north shore of Bintang, August 11 to 18, 1902. For measurements see table, page 254.

**TRAGULUS LUTESCENS** Miller.

1903. *Tragulus lutescens* MILLER, Proc. Biol. Soc. Washington, XVI, p. 32, March 9, 1903.

Two were snared in the jungle on Pulo Sugi Bawa, September 2, 1902, and five trapped by natives on Pulo Jan, July 5 to 9, 1903. On both islands the animal was abundant. The five additional specimens confirm the characters of the species. All have the dark nape stripe well developed, none showing any tendency to approach *T. flavicollis*. For measurements see table, page 254.

**TRAGULUS FLAVICOLLIS** Miller.

1903. *Tragulus flavicollis* MILLER, Proc. Biol. Soc. Washington, XVI, p. 33, March 19, 1903.

The single known specimen of *Tragulus flavicollis* was trapped by Malays on Pulo Sugi, August 4, 1902. For measurements see table, page 254.

**TRAGULUS PERFLAVUS**, new species.

*Type.*—Adult female (skin and skull), Cat. No. 142125, U. S. N. M. Collected at Semimba Bay, Batam Island, September 21, 1905, by C. Boden Kloss. Original number, 28.

*Characters.*—A member of the *napu* group resembling *Tragulus flavicollis* in the absence of the dark nape stripe, but with general color more strongly yellow and white throat markings noticeably reduced.

*Color.*—General color above a light bright tawny-ochraceous fading to a yellowish ochraceous-buff on sides and median underparts and to a color intermediate between these two on cheeks and sides of neck. Middle area of crown and face darkened by a sprinkling of blackish hairs. Back and sides with the usual clouding of black, but

this nowhere in excess of the ground color. Neck clear and uniform, entirely without darker markings, the hairs noticeably whitish basally. On back the basal portion of the hairs is eeu-drab. Muzzle and loreal stripe blackish. Region bordering upper edge of loreal stripe noticeably paler than general hue of upperparts. Pattern of throat markings abnormal, the white stripes reduced both in length and width. Collar light yellowish ochraceous-buff, its width at middle about 15 mm. Dark stripes in front of collar darker and more brownish, with a few blackish hairs and annulations. Median and transverse white stripes not confluent anteriorly, 5—8 mm. in width, the median becoming indistinct at middle. Between the anterior termination of these stripes and the naked chin area the interramia is crossed by a band of light, dull, orange-buff. This is bordered on each side by the distinct anterior white stripe 55 mm. long by about 10 mm. wide. A white median area on chest and another in hypogastric and inguinal region, the latter continuous with the narrow white stripe extending down inner surface of thighs. Axilla and inner side of forearm grayish.

*Skull and teeth.*—The skull is larger than that of *Tragulus flavicollis*, but perhaps no more so than might be expected in an older individual. In general form it shows no peculiarities except that the rostrum is more produced, as shown by the longer nasals and diastema. The nasals are actually as well as relatively longer than in any skulls examined of female *T. formosus* or *T. lutescens*, the most nearly related species from the northern islands of the archipelago. Teeth large, but apparently in no respect unusual.

*Measurements.*—For external measurements see table, p. 254. Skull of type: Greatest length, 112 mm.; upper length, 102; condylobasal length, 102.8; basal length, 98; palatal length, 72; diastema, 16; length of nasals, 36.8; greatest breadth of both nasals together, 11.6; zygomatic breadth, 47; least interorbital breadth, 27.8; mandible, 87; maxillary toothrow (alveoli), 37; maxillary premolars (crowns), 18; mandibular toothrow (alveoli), 41.4; mandibular premolars (crowns), 18.

*Specimens examined.*—One, the type.

*Remarks.*—With its large size, strongly yellow color, and uniform pale neck, this species needs comparison with *Tragulus flavicollis* only. Though the material representing each animal is unsatisfactory, it appears to point unmistakably to their distinctness. Doctor Abbott writes that a second specimen of the Batum form taken by Mr. Kloss and now in the Singapore Museum exactly resembles the type.

“Several specimens since obtained from Pulo Galang by Kloss are either identical or closely allied to this.” W. L. A.

## TRAGULUS PRETIOSUS Miller.

1900. *Tragulus napu* MILLER, Proc. Washington Acad. Sci., II, p. 227, August 20, 1900. Not of F. Cuvier.

1902. *Tragulus pretiosus* MILLER, Proc. Acad. Nat. Sci. Philadelphia, p. 144, June 11, 1902.

During his first visit to Linga Doctor Abbott procured only one specimen of *Tragulus pretiosus*. In 1901 he took nine more. For measurements see table, page 254.

## TRAGULUS PRETIELLUS, new species.

*Type*.—Adult male (skin and skull), Cat. No. 122994, U.S.N.M. Collected on Pulo Bakong, Rhio Archipelago, July 18, 1903, by Dr. W. L. Abbott. Original number, 2643.

*Characters*.—Like *Tragulus pretiosus*, but noticeably smaller, and with relatively larger teeth.

*Color*.—The color so closely resembles that of *Tragulus pretiosus* that no detailed description is required.

*Measurements*.—For external measurements see table, page 254. Cranial measurements of type (those of the type of *T. pretiosus* in parentheses): Greatest length, 101.4 (108) mm.; upper length, 89.8 (98); condylo-basal length, 96.4 (101.6); basal length, 90.6 (96); palatal length, 66.2 (69.4); diastema, 10 (10.4); length of nasals, 29 (33.6); greatest breadth of both nasals together, 10.2 (11.8); zygomatic breadth, 45 (49); least interorbital breadth, 27 (28.8); mandible, 83 (89); maxillary toothrow (alveoli), 37.4 (36); maxillary premolars (crowns), 19 (18); mandibular toothrow (alveoli), 42 (41.4); mandibular premolars (crowns), 18.4 (19).

*Specimens examined*.—Pulo Bakong, 19; Pulo Sebang, 16.

*Remarks*.—This species is readily distinguishable from its nearest geographical ally, *Tragulus pretiosus*, by its smaller size, as shown in the table of measurements (page 254). From *Tragulus lutescens* of the more northern islands it differs in its much brighter color. The series of thirty-five specimens shows no specially noteworthy variations in color, and I can detect no tangible difference between the skins from the two islands.

## TRAGULUS NIGRICOLLIS Miller.

1902. *Tragulus nigricollis* MILLER, Proc. Acad. Nat. Sci. Philadelphia, p. 145. June 11, 1902.

Five specimens were taken in September, 1901. All were trapped in the jungle by natives. For measurements see table, page 255.

## TRAGULUS RUBEUS Miller.

1903. *Tragulus rubeus* MILLER, Proc. Biol. Soc. Washington, XVI, p. 40, March 19, 1903.

Five specimens were taken during August, 1902. For measurements see table, page 255.

## TRAGULUS SUBRUFUS Miller.

1902. *Tragulus javanicus* MILLER, Proc. Acad. Nat. Sci. Philadelphia, p. 143, June 11, 1902. Not *Cervus javanicus* OSBECK.

1903. *Tragulus subrufus* MILLER, Proc. Biol. Soc. Washington, XVI, p. 39, March 19, 1903.

Common on both Linga and Sinkep, and probably confined to these islands. Fourteen were taken on the former and five on the latter, all during August and September, 1901. For measurements see table, page 255.

*Measurements of Tragulus from the Rhio-Linga Archipelago.*

Name.	Locality.	Number.	Sex.	Total length.	Head and body.	Tail.	Hind foot.	Hind foot without hoofs.
				<i>mm.</i>	<i>mm.</i>	<i>mm.</i>	<i>mm.</i>	<i>mm.</i>
<i>Tragulus formosus</i> ....	Pulo Bintang.....	115508	Male adult....	620	540	80	142	129
Do.....	do.....	α 115511	do.....	600	530	70	137	124
Do.....	do.....	115517	do.....	633	548	85	141	127
Do.....	do.....	115518	do.....	605	530	75	142	129
Do.....	do.....	115510	Female adult...	650	570	80	143	129
Do.....	do.....	115514	do.....	620	535	85	142	129
Do.....	do.....	115516	do.....	693	593	100	145	131
Do.....	do.....	115509	Female immature.	585	495	90	130	118
Do.....	do.....	115512	do.....	487	412	75	123	110
Do.....	do.....	115513	do.....	558	478	80	135	122
Do.....	do.....	115515	do.....	590	500	90	131	118
<i>Tragulus lutescens</i> ....	Pulo Sugi Bawa.....	115506	Female adult...	600	510	90	131	117
Do.....	do.....	α 115507	Male adult....	563	488	75	131	117
Do.....	Pulo Jan.....	122968	Female adult...	592	505	87	129	115
Do.....	do.....	122971	do.....	620	510	80	133	120
Do.....	do.....	122969	Male adult....	575	503	72	130	118
Do.....	do.....	122970	do.....	585	510	75	128	116
Do.....	do.....	122972	do.....	578	503	75	130	118
<i>Tragulus flavicollis</i> ...	Pulo Sugi.....	α 115505	Female immature.	600	520	80	132	117
<i>Tragulus perflarns</i> ....	Pulo Batam.....	α 142125	Female adult...	620	535	85	135	122
<i>Tragulus prctiosus</i> ....	Linga.....	α 113031	Male adult....	625	545	80	135	120
Do.....	do.....	113025	Female adult...	628	548	80	138	124
Do.....	do.....	113026	do.....	675	565	90	140	125
Do.....	do.....	113029	do.....	670	585	85	140	128
Do.....	do.....	113030	do.....	670	580	90	141	127
Do.....	do.....	113032	do.....	650	555	95	145	130
Do.....	do.....	113033	do.....	590	510	80	138	124
<i>Tragulus prctiellus</i> ...	Pulo Bakong.....	122987	do.....	605	515	99	122	108
Do.....	do.....	122995	do.....	610	515	95	126	113
Do.....	do.....	123000	do.....	585	500	85	120	106
Do.....	do.....	123005	do.....	575	500	75	123	107
Do.....	do.....	122988	Male adult....	533	473	60	119	105
Do.....	do.....	122990	do.....	575	500	75	124	111
Do.....	do.....	α 122994	do.....	580	505	75	122	110
Do.....	do.....	122996	do.....	565	500	65	126	112
Do.....	Pulo Sebang.....	123043	do.....	580	505	75	134	118
Do.....	do.....	123048	do.....	615	535	80	135	119
Do.....	do.....	123051	do.....	580	513	67	129	115
Do.....	do.....	123053	do.....	610	525	85	138	123
Do.....	do.....	123044	Female adult...	600	525	75	136	123
Do.....	do.....	123046	do.....	615	530	85	124	111
Do.....	do.....	123047	do.....	605	525	80	130	116
Do.....	do.....	123049	do.....	560	485	75	123	109

α Type.



Measurements of *Tragulus* from the Rhio-Linga Archipelago—Continued.

Name.	Locality.	Number.	Sex.	Total length.	Head and body.	Tail.	Hind foot.	Hind foot without hoofs.
				mm.	mm.	mm.	mm.	mm.
<i>Tragulus nigrocinctus</i> .	Pulo Kundur.....	122850	Male adult.....	575	490	85	137	122
Do.....	do.....	122855	do.....	580	490	90	132	118
Do.....	do.....	122856	do.....	585	500	85	140	124
Do.....	do.....	122857	do.....	615	520	95	140	125
Do.....	do.....	122860	do.....	625	525	100	142	128
Do.....	do.....	122861	do.....	570	490	80	132	118
Do.....	do.....	122862	do.....	598	518	80	136	120
Do.....	do.....	<sup>a</sup> 122863	do.....	578	493	85	136	121
Do.....	do.....	122864	do.....	595	510	85	133	120
Do.....	do.....	122867	do.....	570	490	80	132	118
Do.....	do.....	122851	Female adult.....	537	.....	.....	137	120
Do.....	do.....	122853	do.....	645	560	85	143	128
Do.....	do.....	122858	do.....	635	550	85	140	128
Do.....	do.....	122859	do.....	625	535	90	140	123
Do.....	do.....	122865	do.....	598	513	85	140	126
Do.....	do.....	122866	do.....	615	535	80	138	123
Do.....	Great Karimon.....	122789	do.....	590	510	80	132	118
Do.....	do.....	122791	Male adult.....	590	510	80	130	118
<i>Tragulus nigricollis</i>	Sinkep.....	113121	do.....	620	510	80	138	123
Do.....	do.....	113122	do.....	647	570	77	148	133
Do.....	do.....	113124	do.....	655	570	85	143	130
Do.....	do.....	113120	Female adult.....	645	560	85	143	128
Do.....	do.....	113123	do.....	670	590	80	147	133
<i>Tragulus rubeus</i> .....	Pulo Bintang.....	115519	Male adult.....	540	465	75	119	106
Do.....	do.....	115521	do.....	612	547	65	118	105
Do.....	do.....	<sup>a</sup> 115522	Female adult.....	543	478	65	125	113
Do.....	do.....	115520	Female immature.	460	390	70	116	108
<i>Tragulus subrufus</i> .....	Sinkep.....	113117	Female adult.....	470	.....	.....	124	115
Do.....	do.....	<sup>a</sup> 113119	do.....	540	470	70	125	113
Do.....	do.....	113116	Male adult.....	528	450	78	118	108
Do.....	Linga.....	113017	do.....	500	450	50	119	105
Do.....	do.....	113020	do.....	505	445	60	118	105
Do.....	do.....	113022	do.....	490	410	50	111	100
Do.....	do.....	113014	Female adult.....	500	450	50	118	105
Do.....	do.....	113015	do.....	497	442	55	118	108
Do.....	do.....	113016	do.....	465	400	65	113	102
Do.....	do.....	113018	do.....	535	465	70	117	104
Do.....	do.....	113021	do.....	535	470	65	118	106
Do.....	do.....	113024	do.....	510	440	70	120	109

<sup>a</sup>Type.

## Family SUIDÆ.

## SUS OI Miller.

1902. *Sus oi* MILLER, Proc. Biol. Soc. Washington, XV, p. 51, March 5, 1902 (Indragiri River, eastern Sumatra).

A young male and a nearly adult female were "speared by Orang Mantong, in sago kebun at night," on Pulo Kundur, June 21, 1903. While these are the only specimens that have been received from the archipelago it is probable that the animal occurs on other islands that are sufficiently forested. Under date of April 21 and May 14, 1904, Doctor Abbott writes that seven of these pigs were recently killed on Pulo Batam, opposite Singapore, by a watchmaker named Maw. More recently (October 26, 1905) he writes that the animal is evidently common on Batam, and that he has examined a mounted specimen of an

adult male taken on the island by a Mr. Romenij, of Singapore.<sup>a</sup> The occurrence of this animal on Batam was recorded by Mr. R. Lydekker in *The Field*, August 13, 1904,<sup>b</sup> but apparently under the misunderstanding that this locality is part of the Malay Peninsula, an error repeated in a recent number of *Nature*.<sup>c</sup> The mistake is unfortunate, as no member of the *Sus barbatus* group is at present known from any part of the mainland, and the evidence that we now have, particularly Doctor Abbott's information that the Singapore hunters have never found *Sus oi* elsewhere than on Batam,<sup>d</sup> tends to indicate that no such pig occurs north of Singapore Strait. The essential part of Mr. Lydekker's note is as follows:

I have received from Dr. H. M. Ridley, superintendent of the Botanical Gardens at Singapore, two photographs of a wild boar recently shot by Mr. T. C. Romenieg in Pulan Battam, ten miles south of Singapore, which appear to indicate a species new to the Malay Peninsula. These photographs clearly show that the pig in question belongs to the long-nosed group represented typically by *Sus verrucosus* of Java, and *Sus barbatus* of Borneo. The animal is, however, identified by Mr. Ridley with the Sumatran representative of *Sus barbatus*, which an American naturalist, Mr. G. S. Miller, has recently described as a distinct species, under the name of *Sus oi*, from an abbreviation of the native term "nang-oi" . . . . As Doctor Volz remarks [*Zool. Jahrb., Abth. Syst.*, XX, p. 535, July 14, 1904], the discovery of the so-called *Sus oi* in Sumatra rendered the range of *Sus barbatus* coextensive with that of the orangutan. Now that *S. barbatus* is known to occur in the Malay Peninsula, one can not help wondering whether there is any possibility of the orang turning up in that area.

#### SUS RHIONIS Miller.

1906. *Sus rhionis* MILLER, Proc. U. S. National Museum, XXX, 1906, p. 749.

While only 12 specimens were procured (9 on Pulo Ungar, 2 on Pulo Sugi Bawa, and 1 on Great Karimon) the Rhio form of the *Sus vittatus* group is abundant throughout the archipelago. A single immature female (No. 113034, August 25, 1901) from Linga I am unable to identify satisfactorily as it is too young for the characters of the skull to be definitely shown.

<sup>a</sup> While visiting the U. S. National Museum in June, 1904, Doctor Abbott said:

"Up to the present time about twenty-five to thirty of this species have been taken on Batam, mostly by Mr. Romenij; some by Mr. Maw.

"Batam is largely open ground; pineapple plantations, etc., with small patches of jungle, and is therefore easily driven with men and dogs. It is the only island in the Rhio Archipelago which could be shot over in this way. Some very large pigs inhabit Pulo Bintang, which are doubtless *Sus oi*. The mounted specimen in the Singapore Museum was shot by Mr. Romenij, but it is not any of those whose photographs were seen by Lydekker."

<sup>b</sup> *The Field*, CIV, p. 327.

<sup>c</sup> *Nature*, LXXIII, p. 35, November 9, 1905.

<sup>d</sup> See Miller, Proc. U. S. Nat. Mus., XXX, 1906, p. 741

## Family SCIURIDÆ.

## RATUFA NOTABILIS Miller.

1902. *Ratufa notabilis* MILLER, Proc. Acad. Nat. Sci. Philadelphia, 1902, p. 150, June 11, 1902.

The original two specimens of *Ratufa notabilis* are all that have yet been taken. They were shot on a hillside covered with secondary jungle at Mentuda Bay, west coast of Linga Island, August 24, 1901. For measurements see table, page 260.

## RATUFA CONSPICUA Miller.

1903. *Ratufa conspicua* MILLER, Smithsonian Miscell. Coll., XLV, p. 5, November 6, 1903.

Seven were taken by Doctor Abbott at Telok Pemudong, on the north side of Bintang, in August, 1902. The animals were common, but not easy to catch sight of. For measurements see table, page 260.

## RATUFA CARIMONENSIS, new species.

*Type*.—Adult female (skin and skull). Cat. No. 122813, U.S.N.M. Collected on Great Karimon Island, Rhio-Linga Archipelago, June 2, 1903, by Dr. W. L. Abbott. Original number, 2465.

*Characters*.—Similar to *Ratufa conspicua*, but with more white on face and on under side of tail.

*Color*.—The color so closely resembles that of *Ratufa conspicua* as to need no general description. Entire face so thickly sprinkled with whitish cream-buff that it appears to be an almost uniform dirty white as far back as a line joining middle of eyes. Under surface of tail with a clear whitish median area about 35 mm. in width extending from base to pencil.

*Skull and teeth*.—The skull and teeth resemble those of *Ratufa conspicua*, but are apparently somewhat larger. The difference is by no means constant.

*Measurements*.—For measurements see table, page 260.

*Specimens examined*.—Three, all from Great Karimon.

*Remarks*.—In the strong suffusion of white on the face, and in the broad whitish median stripe on the tail, this squirrel closely resembles *Ratufa notabilis* of Linga. Its size is, however, distinctly less, agreeing more closely with that of *R. conspicua*.

## RATUFA INSIGNIS Miller.

1903. *Ratufa insignis* MILLER, Smithsonian Miscell. Coll., XLV, p. 4, November 6, 1903. (Pulo Sugi.)

Four specimens, Pulo Sugi, August, 1902. For measurements see table, page 260.

## RATUFA CONDURENSIS new species.

*Type*.—Adult male (skin and skull), Cat. No. 122879, U.S.N.M. Collected on Pulo Kundur, Rhio-Linga Archipelago, June 25, 1903, by Dr. W. L. Abbott. Original number, 2552.

*Characters*.—Like *Ratufa insignis*, but underparts more washed with yellowish brown, feet heavily grizzled with tawny and black, and hairs of upper surface of tail noticeably pale through their basal half.

*Color*.—The general color is similar to that of *Ratufa insignis*, but the entire underparts are strongly suffused with buff-yellow. This deepens to orange-buff on throat and fades rather abruptly to a light cream-buff in hypogastric region and on inner surface of thighs. The evident though ill-defined line separating color of sides from that of underparts is very nearly the tawny of Ridgway. Feet grizzled with tawny and blackish, the ends of the toes darker. Entire face in front of ears lightly grizzled by minute whitish annulations on most of the hairs. The grizzle tends to become a whitish wash in front of eyes. Tail as in *Ratufa insignis*, but basal half of the hairs of upper surface cream-buff, whitening proximally, and showing through noticeably at surface even when the hairs are not disarranged.

*Skull and teeth*.—The skull and teeth do not differ appreciably from those of *Ratufa insignis*.

*Measurements*.—For measurements see table, page 260.

*Remarks*.—This squirrel is a member of a group of closely-related forms which are, so far as now known, confined to the Rhio-Linga Archipelago. As a group they may be once recognized by the uniform dark umber-brown upper parts and tail (most of the hairs of the back and sides showing minute inconspicuous annulations near tip), sharply contrasted whitish cheeks, muzzle, and underparts, and usually whitish feet. The pale thigh patch is present but confluent with the light color of inner side of leg. Among themselves the five species now known differ as follows:

## KEY TO SPECIES.

Entire face conspicuously suffused with white.

Hind foot about 82 (73); greatest length of skull about 68 . . . *Ratufa notabilis*

Hind foot about 75 (65); greatest length of skull about 64. . .

*Ratufa carimonensis*

Entire face brown, rather inconspicuously grizzled with white.

Brown of sides sharply contrasted with cream-buff of underparts without intervening tawny line . . . . . *Ratufa conspicua*

Brown of sides separated from cream-buff or orange-buff of underparts by a noticeable tawny line.

Feet clear whitish; hairs of upper surface of tail not conspicuously pale on basal half . . . . . *Ratufa insignis*

Feet heavily grizzled; hairs of upper surface of tail conspicuously pale on basal half . . . . . *Ratufa condurensis*

## RATUFA CONFINIS, new species.

1902. *Ratufa affinis* MILLER, Proc. Acad. Nat. Sci. Philadelphia, p. 149, June 11, 1902. Not *Sciurus affinis* RAFFLES.

*Type*.—Adult female (skin and skull), Cat. No. 113134, U.S.N.M. Collected on Sinkep Island, Rhio-Linga Archipelago, September 3, 1901, by Dr. W. L. Abbott. Original number, 1265.

*Characters*.—Similar to *Ratufa affinis* but slightly larger; skull with larger and more elongated audital bullæ.

*Color*.—The color so exactly resembles that of *Ratufa affinis* as to need no detailed description.

*Skull and teeth*.—In general the skull and teeth resemble those of *Ratufa affinis*. The size of the skull, however, is slightly greater, and the difference appears to be constant. In seven adults of the Sinkep animal the greatest length of the skull averages 66 mm., with extremes of 64.6 and 68, while in eight adults of *Ratufa affinis* the average is 63.3, the extremes 63 and 64. The audital bullæ are relatively larger than in *Ratufa affinis*, and with the same constancy. In the specimens just mentioned their greatest diameter is: *confinis*, 16.4 (15.8 to 17); *affinis*, 14.5 (14 to 15). The teeth of the two animals do not differ appreciably.

*Measurements*.—For external measurements see table, page 260.

Cranial measurements of type: Greatest length, 68 (64)<sup>a</sup> mm.; basal length, 57 (54); basilar length, 52.4 (49); length of nasals along median suture, 21 (20); breadth of both nasals together anteriorly, 11.8 (12); breadth of both nasals together posteriorly, 8 (10); diastema, 14.8 (14.4); least interorbital breadth, 20 (22); zygomatic breadth, 40 (40.4); mandible, 42 (40); maxillary molar series (alveoli), 13 (12.6); mandibular molar series (alveoli), 13.8 (14).

*Specimens examined*.—Twelve; all from Sinkep Island.

*Remarks*.—Since I recorded this animal in 1902, Doctor Abbott has obtained a series of *Ratufa affinis* in Johore and Pahang. This additional material shows that the Sinkep form is distinct.

<sup>a</sup> Measurements in parentheses are those of an adult female *Ratufa affinis* from Rumpin River, Pahang (No. 115388).

Measurements of *Ratufa* from the Rhio-Linga Archipelago.

Name.	Locality.	Number.	Sex.	Total length.	Head and body.	Tail.	Hind foot.	Hind foot without claws.
<i>Ratufa notabilis</i> .....	Linga.....	113065	Female...	780	335	445	80	72
Do.....	do.....	113064	Male.....	780	345	435	82	73
<i>Ratufa conspicua</i> .....	Pulo Bintang.....	115525	Female...	710	330	380	75	68
Do.....	do.....	115526	do.....	730	340	380	70	62
Do.....	do.....	115527	do.....	620	280	340	70	63
Do.....	do.....	115523	Male.....	693	328	365	70	64
Do.....	do.....	115524	do.....	690	305	385	74	67
Do.....	do.....	115528	do.....	705	330	375	77	72
Do.....	do.....	115529	do.....	743	338	405	76	70
<i>Ratufa carimonensis</i> .....	Great Karimon.....	122813	Female.....	683	345	338	74	66
Do.....	do.....	122811	Male.....	710	325	385	75	68
Do.....	do.....	122812	do.....	705	320	385	74	67
<i>Ratufa insignis</i> .....	Pulo Sugi.....	115530	Female.....	725	325	400	75	69
Do.....	do.....	115532	do.....	730	355	385	70	64
Do.....	do.....	115531	Male.....	780	360	420	76	70
Do.....	do.....	115533	do.....	785	365	420	76	70
<i>Ratufa condurensis</i> .....	Pulo Kundur.....	122878	Female.....	675	315	360	72	66
Do.....	do.....	122881	do.....	730	355	385	73	65
Do.....	do.....	122882	do.....	625	345	280	69	63
Do.....	do.....	122879	Male.....	725	340	385	71	64
Do.....	do.....	122880	do.....	720	335	385	74	68
<i>Ratufa confinis</i> .....	Sinkep.....	113132	Female.....	740	345	395	77	72
Do.....	do.....	113134	do.....	770	345	425	72	65
Do.....	do.....	113138	do.....	705	335	370	75	69
Do.....	do.....	113139	do.....	750	340	410	74	65
Do.....	do.....	113140	do.....	770	345	425	75	66
Do.....	do.....	113141	do.....	780	345	435	74	67
Do.....	do.....	113136	Male.....	678	303	375	67	62
Do.....	do.....	113137	do.....	735	325	410	71	64
Do.....	do.....	113142	do.....	625	265	360	65	59

## SCIURUS CONDURENSIS, new species.

*Type*.—Adult female (skin and skull). Cat. No. 122876, U.S.N.M. Collected on Pulo Kundur, Rhio-Linga Archipelago, June 13, 1903, by Dr. W. L. Abbott. Original number, 2486.

*Characters*.—A member of the *prevostii* group, closely resembling *Sciurus melanops*<sup>a</sup> of the neighboring east coast of Sumatra, but with shoulder white, scarcely tinged with reddish brown.

*Color*.—Upperparts and entire tail shining black. Underparts, feet, and inner surface of legs orange-rufous, blackening on chin and about mammae. Outer surface of upperarm a paler shade of orange-rufous. Cheeks and sides of neck black, faintly grizzled by minute whitish annulations on most of the hairs. A whitish patch 15 mm. in diameter at base of whiskers, and another 5 mm. in diameter about 10 mm. below posterior canthus of eye. Ears clear black throughout. The whitish cream-buff lateral stripe is of the usual character. It covers outer side of hind leg and extends forward to front of shoulder where it is abruptly outlined against the black neck. On shoulder it is very faintly tinged with reddish brown.

*Skull and teeth*.—The skull and teeth are similar to those of *Sciurus melanops*.

<sup>a</sup>Miller, Proc. Acad. Nat. Sci. Philadelphia, 1902, p. 151, June 11, 1902. Indragiri River, Sumatra.

*Measurements.*—For measurements see table, page 262.

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

*Remarks.*—The differences in color between this squirrel and *Sciurus melanops* though slight are very constant. The Sumatran animal is now represented in the U. S. National Museum by ten specimens, three from the Indragiri River and seven from the Kateman. In all of these without exception the shoulder is distinctly red, concolor with outer surface of upper arm, and the white stripe ends abruptly at its narrowest region, just behind shoulder. In the eight *S. carimonensis*, on the other hand, the white extends across shoulder to base of neck, with merely a faint, indefinite wash of red near juncture of arm.

SCIURUS CARIMONENSIS, new species.

*Type.*—Adult female (skin and skull), Cat. No. 122800, U.S.N.M. Collected on Great Karimon Island, Rhio-Linga Archipelago, May 24, 1903, by Dr. W. L. Abbott. Original number, 2423.

*Characters.*—A member of the *prevostii* group similar to *Sciurus melanops* but smaller, shoulder less washed with red, and side of neck below and behind ear grizzled gray in noticeable contrast with surrounding parts.

*Color.*—The color is in general exactly like that of *Sciurus condurensis*. Shoulder mostly white, but strongly washed with orange-rufous, the red becoming along border of dark neck area as clear and bright as that of upper arm. Face slightly more grizzled than in *Sciurus melanops* and *S. condurensis*, but the usual whitish spots of normal size and character. On side of neck below and behind ear the white becomes the predominant element in the grizzle, producing a distinct, though not sharply defined light area.

*Skull and teeth.*—Except that they are smaller the skull and teeth do not differ appreciably from those of *Sciurus melanops* and *S. condurensis*.

*Measurements.*—For external measurements see table, page 262.

Cranial measurements of type: Greatest length, 56 (57)<sup>a</sup> mm.; basal length, 49 (51); basilar length, 46 (48); palatal length, 24.6 (26); diastema, 13 (14); length of nasals, 17 (18.8); interorbital breadth, 23.4 (23); zygomatic breadth, 35 (34); mandible, 36.6 (38); maxillary tooth row (alveoli), 11 (11); mandibular tooth row (alveoli), 10.4 (11.4).

*Specimens examined.*—Fifteen (one in alcohol), all from Great Karimon.

*Remarks.*—The characters of this form are quite as constant as those of *Sciurus condurensis*. The color of the shoulder is almost exactly intermediate between that in the two closely related species, but the slightly smaller size, and the gray sides of the neck are sufficiently diagnostic. These two insular species together with the Sumatran

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

*Sciurus melanops*, *S. rafflesi*, and *S. harrisoni*,<sup>a</sup> form a section of the *prerostii* group characterized by the dark-grayish or blackish cheeks with conspicuous white patch on muzzle at base of whiskers and smaller white spot below eye at base of cheek bristles. From each other they are distinguishable as follows:

## KEY TO SPECIES.

Many hairs of the tail with whitish subterminal ring 3-4 mm. in width. *S. harrisoni*  
Tail not grizzled except occasionally at extreme base below.

Shoulder concolor with outer surface of upper arm:

Hind foot about 56 (53); shoulder chestnut ..... *S. rafflesi*

Hind foot about 60 (56); shoulder orange-ochraceous ..... *S. melanops*

Shoulder much lighter than outer surface of upper arm; more white than black in grizzle on sides of neck; shoulder distinctly washed with reddish ..... *S. carimionensis*

More black than white in grizzle on sides of neck; shoulder scarcely washed with reddish ..... *S. condurensis*

Measurements of *Sciurus carimionensis* and *S. condurensis* from the Rho-Linga Archipelago.

Name.	Locality.	Number.	Sex.	Total length.	Head and body.	Tail.	Hind foot.	Hind foot with-out claws.
<i>Sciurus carimionensis</i> .	Great Karimon...	122796	Female adult...	mm. 485	mm. 245	mm. 240	mm. 50	mm. 45
Do.....	do.....	122797	do.....	482	247	235	52	47
Do.....	do.....	122798	do.....	502	253	249	51	45
Do.....	do.....	a122800	do.....	485	245	240	49	42
Do.....	do.....	122803	do.....	478	248	230	51	44
Do.....	do.....	122806	do.....	485	265	220	51	45
Do.....	do.....	122793	Male adult...	490	245	245	50	45
Do.....	do.....	122794	do.....	474	248	225	49	42
Do.....	do.....	122795	do.....	480	240	240	50	44
Do.....	do.....	122799	do.....	486	246	240	50	45
Do.....	do.....	122801	do.....	487	252	235	51	46
Do.....	do.....	122804	do.....	488	248	240	51	46
Do.....	do.....	122805	do.....	495	255	235	48	44
Do.....	do.....	122807	do.....	460	240	220	49	42
<i>Sciurus condurensis</i> .	Pulo Kundur.....	122870	Female adult...	520	270	250	49	44
Do.....	do.....	122872	do.....	500	260	240	52	46
Do.....	do.....	122873	do.....	530	265	265	51	47
Do.....	do.....	122874	Female immature.	458	223	235	51	47
Do.....	do.....	122875	Female adult...	520	270	250	53	48
Do.....	do.....	a122876	do.....	510	267	243	52	48
Do.....	do.....	122877	do.....	510	267	243	50	45
Do.....	do.....	122871	Male adult.....	495	260	235	51	46

<sup>a</sup>Type.

## SCIURUS TENUIS Raffles.

1900. *Sciurus tenuis* MILLER, Proc. Washington Acad. Sci., II, p. 221, August 20, 1900.

The specimen that Doctor Abbott procured on his first visit to Linga is the only one that he has taken in the archipelago.

<sup>a</sup>Stone and Rehn, Proc. Acad. Nat. Sci. Philadelphia, 1902, p. 132, June 4, 1902. (Goenong Segi, Lampong District.) I am indebted to Mr. Witmer Stone and the authorities of the Academy of Natural Sciences of Philadelphia for the opportunity to examine the specimen on which this name was based. I have also examined the type of *Sciurus rafflesi* in the British Museum.



## SCIURUS PENINSULARIS Miller.

1900. *Sciurus notatus* MILLER, Proc. Washington Acad. Sci., 11, p. 221, August 20, 1900. (Linga). Not *Sciurus notatus* Boddaert.
1902. *Sciurus vittatus* MILLER, Proc. Acad. Nat. Sci. Philadelphia, 1902, p. 151, June 11, 1902. (Part, specimens from Linga and Sinkep.) Not *Sciurus vittatus* RAFFLES.
1903. *Sciurus peninsularis* MILLER, Smithsonian Miscell. Coll., XLV, p. 10, November 6, 1903. (Pahang, type locality, and Singapore.)

The fifty squirrels of the *vittatus* group taken in the archipelago appear to be referable to *Sciurus peninsularis*. They are from the following islands: Sinkep (8), Penuba (8), Linga (5), Sebang (4), Sanglar (7), Bintang (4), Batam (2), Sugi (9), and Little Karimon (3). While the series differ slightly among themselves, I can find no tangible characters on which to separate the forms occurring on the various islands. In general the specimens from the southern localities tend to be paler than those from farther north. They all agree with *Sciurus peninsularis* and differ from *S. vittatus* in the color of the cheeks and underparts. In none is there a trace of clear red in the tail. For measurements see table, page 264.

## RHINOSCIURUS LATICAUDATUS (Müller and Schlegel.)

1902. *Rhinosciurus laticaudatus* MILLER, Proc. Acad. Nat. Sci. Philadelphia, 1902, p. 154. June 11, 1902. (Linga.)

A very old male, snared by natives, was procured on Linga Island August 28, 1901. I have not been able to compare it with the Bornean animal. Its measurements are: Total length, 278 mm.; head and body, 213; tail vertebrae, 65; hind foot, 41 (38.5); skull, greatest length, 56; basal length, 49; basilar length, 46.4; nasals, 20.4; greatest breadth of both nasals together, 5.8; diastema, 16.4; zygomatic breadth, 28; least interorbital breadth, 13.8; mandible, 35; maxillary tooth row (alveoli), 11.8; mandibular tooth row (alveoli), 11.

Measurements of *Sciurus peninsularis* from the Rhio-Linga Archipelago.

Name.	Locality.	Number.	Sex.	Total length.	Head and body.	Tail.	Hind foot.	Hind foot, with-out claws.
<i>Sciurus peninsularis</i>				mm.	mm.	mm.	mm.	mm.
Do.	Sinkep	113126	Female adult	390	210	180	45	40
Do.	do	113127	do	400	205	195	45	41
Do.	do	113129	do	417	212	195	46	42
Do.	do	123101	do	410	215	195	43	39
Do.	do	123102	do	410	215	195	42	37
Do.	do	113128	Male adult	395	215	180	45	42
Do.	do	113130	do	360	190	170	39	35
Do.	do	123100	do	388	210	177	42	37
Do.	Pulo Penuba	123075	Female adult	387	210	177	44	40
Do.	do	123076	do	383	208	175	42	37
Do.	do	123078	do	376	200	176	44	38
Do.	do	123079	do	383	210	$\alpha$ 173	45	41
Do.	do	123072	Male adult	355	200	155	44	40
Do.	do	123073	do	325	215	$\alpha$ 110	44	41
Do.	do	123074	do	380	200	180	42	38
Do.	do	123077	do	370	205	165	44	41
Do.	Linga	101604	Female adult	420	210	210	42	37
Do.	do	101606	Female immature.	380	$b$ 190	190	41	37
Do.	do	101607	Female adult	370	$b$ 195	175	39	35
Do.	do	113062	do	345	200	145	44	40
Do.	do	113063	Male adult	373	208	165	44	40
Do.	Pulo Sebang	123054	Female adult	404	218	185	45	41
Do.	do	123057	do	380	205	175	43	39
Do.	do	123055	Male adult	375	200	175	43	39
Do.	do	123056	do	405	215	190	46	43
Do.	Pulo Sanglar	122977	Female adult	395	210	185	45	41
Do.	do	122973	Male adult	390	212	178	44	41
Do.	do	122974	do	385	205	180	44	41
Do.	do	122975	do	370	200	170	45	41
Do.	do	122976	do	380	210	170	46	43
Do.	do	122978	do	378	210	168	44	41
Do.	do	122979	do	368	200	168	44	40
Do.	Pulo Batam	142149	do	380	210	170	48	43.8
Do.	do	142150	do	375	203	172	44	40
Do.	Pulo Bintang	115536	Female adult	405	220	185	47	43
Do.	do	115537	do	415	215	200	45	41
Do.	do	115534	Male adult	355	215	140	47	44
Do.	do	115535	do	413	220	193	47	44
Do.	Great Karimon	122809	Female adult	365	198	167	43	39
Do.	do	122810	do	378	203	175	43	39
Do.	do	122808	Male adult	372	202	170	42	39
Do.	Pulo Sugi	115540	Female adult	394	210	184	45	41
Do.	do	115541	do	380	207	173	45	41
Do.	do	115544	do	375	207	168	41	40
Do.	do	115545	do	368	194	174	45	42
Do.	do	115546	Female immature.	360	190	170	43	40
Do.	do	115538	Male adult	370	205	165	43	40
Do.	do	115539	do	360	200	160	43	40
Do.	do	115532	do	405	220	185	46	43
Do.	do	115543	do	393	218	175	45	41

 $\alpha$  Tail imperfect. $b$  From skin.

## SCIUROPTERUS AMÆNUS, new species.

*Type*.—Adult male (skin and skull), Cat. No. 122883, U.S.N.M. Collected on Pulo Kundur, Rhio-Linga Archipelago, June 12, 1903.

*Characters*.—Like *Sciuropterus aurantiacus* (Wagner), but skull noticeably larger and nasal bones much more abruptly widened anteriorly.

*Color*.—Upper parts and outer surface of legs a reddish brown, varying according to light from ochraceous to dull ochraceous-rufous, the slate-black under color appearing irregularly at surface, particularly on sides of body and on flying membrane. Cheeks and lips yel-

lowish ochraceous-buff. Under parts buffy white, somewhat clouded by the slate-gray bases of the hairs. Chest, scrotum, and under surface of membranes washed with ochraceous buff. Extreme edge of membranes cream-buff, becoming whitish posteriorly. Tail a yellowish ochraceous-buff at base and along edges; elsewhere heavily clouded with a dark Prout's brown. Feet scantily clothed with very short hairs, these yellowish on front feet, the terminal phalanges of the fingers brown, mixed brown and yellowish on hind feet, the terminal phalanges of the toes white.

*Skull and teeth.*—As compared with a skull of *Sciuropterus aurantiacus* from Banka, the type locality, figured by Jentink,<sup>a</sup> that of *S. amoenus* is readily distinguishable by its larger size, broader rostrum, and by the peculiar abrupt widening of the nasal bones anteriorly, which causes the side of the rostrum to be distinctly concave immediately behind the region of their greatest width. As in *S. aurantiacus*, the mastoid bullæ are considerably inflated, projecting backward sufficiently to be in line with upper rim of foramen magnum. Teeth as in *Sciuropterus aurantiacus*.

*Measurements.*—Total length, 308 mm.; head and body, 165; tail vertebræ, 143; hind foot, 31 (28.6); skull, greatest length, 37.8; condylo-basal length, 35.4; basilar length, 29.6; palatal length, 19; diastema, 7.8; length of nasal, 9; greatest breadth of both nasals together, 6.4; least breadth of both nasals together, 2.8; zygomatic breadth, 23; inter-orbital constriction, 8; breadth of braincase above roots of zygomata, 17.6; mastoid breadth, 19; mandible, 22.8; maxillary toothrow (alveoli), 7.6; mandibular toothrow (alveoli), 7.

*Specimens examined.*—One, the type.

*Remarks.*—Doctor Jentink has kindly compared a photograph of the skull of this animal with the specimen *Sciuropterus aurantiacus*, in the Leyden Museum. He writes me that his published figure is exactly natural size and that it perfectly represents the original;<sup>b</sup> furthermore, that he agrees with me regarding the Pulo Kundur squirrel as distinct.

#### NANNOSCIURUS PULCHER Miller.

1902. *Nannosciurus pulcher* MILLER, Proc. Acad. Nat. Sci. Philadelphia, 1902, p. 153, June 11, 1902.

1906. *Nannosciurus pulcher* LYON, Proc. Biol. Soc. Washington, XIX, p. 53, May 1, 1906.

Doctor Abbott shot the type of this species on a small tree trunk in heavy forest at Sakana Bay, northwest corner of Sinkep Island, September 4, 1901. He did not meet with the animal again until August, 1903, when he found it common in a patch of jungle near the

<sup>a</sup> Notes from the Leyden Museum, XII, 1890, pl. VII, figs. 11 and 12.

<sup>b</sup> The excellence and accuracy of the plate I have myself verified in the case of the three type specimens figured on it. Unfortunately, when examining the squirrels in the Leyden Museum, I neglected to take notes on the skull of *S. aurantiacus*.

shore a few miles farther east on the same island. "I heard a number" he writes, "but only saw the two I shot. The voice is a very high-pitched thin little whistle, kept up several minutes at a time like the 'scolding' of bigger squirrels."

### Family MURIDÆ.

#### MUS FIRMUS Miller.

1902. *Mus firmus* MILLER, Proc. Acad. Nat. Sci. Philadelphia, p. 155, June 11, 1902. (Linga.)

Great Karimon (5), Sugi (5), Sugi Bawa (3), Moro Besar (2), Bakong (4), Sebang (2), Linga (5).

This is a common rat throughout the Archipelago, though not as abundant as the members of the *rattus* and *surifer* groups. For measurements see table, page 268.

#### MUS LINGENSIS Miller.

1900. *Mus lingensis* MILLER, Proc. Washington Acad. Sci., II, p. 206, August 20, 1900. (Linga.)

1902. *Mus lingensis* MILLER, Proc. Acad. Nat. Sci. Philadelphia, p. 154, June 11, 1902. (Linga and Sinkep.)

Great Karimon (21), Sugi (2), Sugi Bawa (4), Batam (4), Bintang (6), Moro Besar (1), Moro Kechil (7); Bakong (22), Sebang (8), Linga (17), Penuba (6), Sinkep (33).

The local form of the *Mus surifer* group appears to be the most abundant and generally distributed member of its genus. Considerable variation is shown by the 127 specimens collected by Doctor Abbott; but taken as a whole the series from the Archipelago is noticeably less brightly colored than that from the Malay Peninsula. For measurements see table, page 267.

#### MUS near RATTUS.

Great Karimon (1), Sugi (2), Sugi Bawa (6), Batam (2), Kundur (1), Moro Kechil (11), Bakong (4).

Members of the *Mus rattus* group are very generally distributed throughout the Archipelago. The twelve skins collected by Doctor Abbott are all of the *alexandrinus* type of coloring, but the series are not sufficiently extensive to show whether more than one local form is represented. In the six skins from Sugi Bawa the belly is uniformly light buff, conspicuously paler than the dull yellowish-brown underparts of the two from Pulo Sugi. The four from Bakong are a peculiar slaty brown below. Two of the skins from Batam (male No. 142128 and male No. 142129) show no special peculiarities; underparts pale cream-buff. The third (male No. 142132) has much the same coloring as those from Sugi. The tail is, however, more finely annulated

than in any member of the group that I have seen, having about 16 rings to the centimeter near base. Both tail and ears of this specimen are imperfect. For measurements see table, page 267.

#### MUS FREMENS Miller.

1902. *Mus fremens* MILLER, Proc. Acad. Nat. Sci. Philadelphia, p. 154, June 11, 1902.

A specimen was taken on Linga August 29, 1901, and another, the type, on Sinkep a week later. These are the only records from any of the islands of the Archipelago, though the animal occurs on the mainland of Sumatra as well as on certain islands off the west coast.<sup>a</sup>

#### MUS CONCOLOR Blyth.

Two specimens (adult female, No. 142126, and immature female, No. 142127) were taken at Semimba Bay, Batam, on September 20, 1905, by Mr. Kloss. For measurements see table, page 268.

#### Measurements of *Mus* from the Rhio-Linga Archipelago.

Name.	Locality.	Number.	Sex.	Total length.	Head and body.	Tail vertebrae.	Hind foot.	Hind foot without claws.
				mm.	mm.	mm.	mm.	mm.
<i>Mus lingensis</i> . . .	Pulo Batam . . . . .	142136	Male adult . . . . .	359	191	168	37	35
Do . . . . .	do . . . . .	142138	do . . . . .	338	179	159	36	33
Do . . . . .	do . . . . .	142135	Female adult . . . . .	352	187	165	39	36.4
Do . . . . .	do . . . . .	142137	do . . . . .	311	166	145	37	34.6
Do . . . . .	Pulo Bintang . . . . .	115574	do . . . . .	397	223	174	40	38
Do . . . . .	do . . . . .	115575	do . . . . .	402	225	177	40	38
Do . . . . .	do . . . . .	115576	do . . . . .	371	212	159	39.6	37
Do . . . . .	Pulo Moro Kechil . . . . .	122954	Male adult . . . . .	393	204	189	38	36
Do . . . . .	do . . . . .	122964	do . . . . .	277	205	172	38	35.6
Do . . . . .	do . . . . .	122965	do . . . . .	375	200	175	35.4	34
Do . . . . .	do . . . . .	122966	do . . . . .	359	189	170	38	36.4
Do . . . . .	Pulo Bakong . . . . .	123027	do . . . . .	378	215	163	42	39
Do . . . . .	do . . . . .	123031	do . . . . .	361	210	154	43	41
Do . . . . .	do . . . . .	123012	Female adult . . . . .	345	200	145	38	35.4
Do . . . . .	do . . . . .	123019	do . . . . .	340	199	141	37.8	36
Do . . . . .	do . . . . .	123024	do . . . . .	323	188	135	38	36
Do . . . . .	Pulo Sebang . . . . .	123058	do . . . . .	377	215	162	38	35.6
Do . . . . .	do . . . . .	123066	do . . . . .	268	208	160	37.4	36
Do . . . . .	Linga . . . . .	<sup>a</sup> 101614	Male adult . . . . .	387	216	171	42	40.4
Do . . . . .	do . . . . .	113044	do . . . . .	354	188	166	39.6	38
Do . . . . .	do . . . . .	113048	do . . . . .	389	219	170	42	40
Do . . . . .	do . . . . .	113049	do . . . . .	420	237	183	39.6	37.6
Do . . . . .	do . . . . .	113050	do . . . . .	383	201	182		
Do . . . . .	do . . . . .	113040	Female adult . . . . .	380	205	175	37.6	35.4
Do . . . . .	Pula Penuba . . . . .	123084	Male adult . . . . .	367	197	170	39	37
Do . . . . .	Sinkep . . . . .	113095	do . . . . .	365	199	166		
Do . . . . .	do . . . . .	113090	Female adult . . . . .	385	209	176	38.4	36
Do . . . . .	do . . . . .	113092	do . . . . .	384	213	171	41	39
Do . . . . .	do . . . . .	113093	do . . . . .		182	163	41	39
Do . . . . .	do . . . . .	113094	do . . . . .		204	176	40	39
<i>Mus near rutilus</i> . . . . .	Pulo Sugi . . . . .	115552	Male adult . . . . .	201	186	37	35	
Do . . . . .	Pulo Sugi Bawa . . . . .	115551	Female adult . . . . .	171	164	34	32	
Do . . . . .	do . . . . .	115553	do . . . . .		182	172	37	34.8
Do . . . . .	do . . . . .	115556	do . . . . .		187	182	36.6	34.4
Do . . . . .	Pulo Kundur . . . . .	122884	do . . . . .		197	192	37.4	36
Do . . . . .	Pulo Bakong . . . . .	123020	Male adult . . . . .		170	155	34.6	33
Do . . . . .	do . . . . .	123034	do . . . . .		165	167	33	31.4
Do . . . . .	Pulo Batam . . . . .	142128	do . . . . .	385	193	192	35	32.4
Do . . . . .	do . . . . .	142129	do . . . . .	375	180	195	34	31.6
Do . . . . .	do . . . . .	142132	do . . . . .		150		33	31.0
<i>Mus fremens</i> . . . . .	Linga . . . . .	113046	Female adult . . . . .		234		46	44
Do . . . . .	Sinkep . . . . .	<sup>a</sup> 113087	Male adult . . . . .	558	234	324	47	41.6

<sup>a</sup> Type.

<sup>a</sup> See Miller, Proc. U. S. Nat. Mus., XXVI, p. 463, February 3, 1903.

Measurements of *Mus* from the Rhio-Linga Archipelago—Continued.

Name.	Locality.	Number.	Sex.	Total length.	Head and body.	Tail vertebrae.	Hind foot.	Hind foot without claws.
				mm.	mm.	mm.	mm.	mm.
<i>Mus concolor</i> . . . . .	Pulo Batam . . . . .	142126	Female adult . . . . .	262	123	139	22	20
Do . . . . .	do . . . . .	142127	Female, immature.	224	109	115	22	20
<i>Mus firmus</i> . . . . .	Great Karimon . . . . .	122820	Male adult . . . . .	505	250	255	50	47
Do . . . . .	do . . . . .	122838	do . . . . .	520	256	264	49	45
Do . . . . .	do . . . . .	122839	do . . . . .	471	234	237	47	43
Do . . . . .	do . . . . .	122821	Female adult . . . . .	492	247	245	45	42
Do . . . . .	do . . . . .	122822	do . . . . .	504	247	257	45	42
Do . . . . .	Pulo Sugi . . . . .	115591	Male adult . . . . .	472	225	247	49	45
Do . . . . .	do . . . . .	115594	do . . . . .	450	218	232	50	46
Do . . . . .	do . . . . .	115596	do . . . . .	492	245	247	49	46
Do . . . . .	do . . . . .	115592	Female adult . . . . .	462	232	230	47	44
Do . . . . .	do . . . . .	115595	do . . . . .	520	264	256	50	46
Do . . . . .	Pulo Sugi Bawa . . . . .	115590	Male adult . . . . .	518	246	272	47	44
Do . . . . .	do . . . . .	115589	Female adult . . . . .	487	230	257	47	44
Do . . . . .	do . . . . .	115588	do . . . . .	487	230	257	47	44
Do . . . . .	Pulo Sebang . . . . .	123065	Male adult . . . . .	517	250	267	50	47
Do . . . . .	do . . . . .	123021	do . . . . .	452	226	226	47	44
Do . . . . .	do . . . . .	123032	do . . . . .	450	230	220	47	44
Do . . . . .	Linga . . . . .	113035	do . . . . .	538	269	269	52	49
Do . . . . .	do . . . . .	113036	Female adult . . . . .	488	231	254	48	44
Do . . . . .	do . . . . .	<sup>a</sup> 113038	do . . . . .	500	245	255	50	48.6
Do . . . . .	do . . . . .	113039	do . . . . .	490	230	260	48	44
<i>Mus limgensis</i> . . . . .	Great Karimon . . . . .	122826	Male adult . . . . .	361	207	154	41.4	39.4
Do . . . . .	do . . . . .	122828	do . . . . .	359	201	158	40.4	38
Do . . . . .	do . . . . .	122825	Female adult . . . . .	356	202	154	39	36
Do . . . . .	Pulo Sugi . . . . .	115569	Male adult . . . . .	426	231	192	43	41
Do . . . . .	do . . . . .	115572	do . . . . .	406	229	177	44	41
Do . . . . .	Pulo Sugi Bawa . . . . .	115566	do . . . . .	378	207	171	40.4	38
Do . . . . .	do . . . . .	115568	do . . . . .	359	191	168	39	36.6
Do . . . . .	do . . . . .	115571	do . . . . .	373	205	168	39	37
Do . . . . .	do . . . . .	115570	Female adult . . . . .	360	200	160	38.6	36
Do . . . . .	Pulo Bintang . . . . .	115573	Male adult . . . . .	398	219	179	43	40.4

<sup>a</sup>Type.

## Family VIVERRIDÆ.

## VIVERRA TANGALUNGA Gray.

1902. *Viverra tangalunga* MILLER, Proc. Acad. Nat. Sci. Philadelphia, p. 156, June 11, 1902. (Linga.)

An adult female was trapped by Malays on Linga Island, August 27, 1901, and three others were taken on Bintang in 1902. These are the only specimens that Doctor Abbott has secured in the Archipelago. For measurements see table, page 271.

## ARCTOGALIDIA SIMPLEX Miller.

1902. *Arctogalidia simplex* MILLER, Proc. Acad. Nat. Sci. Philadelphia, p. 156, June 11, 1902. (Linga.)

Three specimens are now known: The type, an adult male, taken August 30, 1901, on Linga, an immature male taken September 2, 1901, on Sinkep, and an adult female shot in a cocoanut plantation on the same island, August 7, 1903. The skins show no variations worthy of note. An adult female, of this or a closely related form, was taken on Batam, September 16, 1905, by Mr. Kloss. For measurements see table, page 271.

## ARCTOGALIDIA FUSCA, new species.

*Type*.—Adult male (skin and skull), Cat. No. 122920, United States National Museum. Collected on Pulo Kundur, Rhio Archipelago, June 22, 1903, by Dr. W. L. Abbott. Original number, 2540.

*Characters*.—Size about as in *Arctogalidia simplex*, but color darker, and all three dorsal stripes well developed.

*Color*.—Type: General color above a rather dark smoke-gray or drab-gray, irregularly lightened by the narrow buffy gray subterminal annulations and silvery gloss of the hairs. On crown, ears, feet, and distal two-thirds of tail the color deepens to nearly black. Dorsal stripes blackish, the central clear and sharply defined, the laterals less distinct, though evident. Sides of neck washed with light ochraceous-buff. Underparts broccoli-brown washed with pale buffy, this color running out faintly on basal third of tail. Forehead with the usual whitish stripe.

*Skull and teeth*.—The skull and teeth do not differ appreciably from those of *Arctogalidia simplex*.

*Measurements*.—For external measurements see table, page 271. Skull of type: Greatest length, 98 mm.; upper length, 90; condylobasilar length, 93.8; basilar length, 89.4; palatilar length, 51.2; breadth of palate between anterior molars, 15; zygomatic breadth, 62; constriction in front of postorbital processes, 18; constriction behind postorbital processes, 17; breadth of braincase above roots of zygomata, 34.4; mandible, 73.4; maxillary toothrow (exclusive of incisors), 35; mandibular toothrow (exclusive of incisors), 37.

*Specimens examined*.—Four, all from Pulo Kundur. The skull of an adult female from Pulo Bintang (No. 115600, August 18, 1902) may represent the same species.

*Remarks*.—The Kundur *Arctogalidia* is fully as dark as the black-eared animals of Borneo and the Malay Peninsula, but is readily distinguishable by its smaller size. From the small members of the genus it differs in its dark color and well-developed dorsal stripes.

## PARADOXURUS BRUNNEIPES, new species.

*Type*.—Adult male (skin and skull), Cat. No. 122886, United States National Museum. Collected on Pulo Kundur, Rhio Archipelago, June 24, 1903, by Dr. W. L. Abbott. Original number, 2549.

*Characters*.—In general like *Paradoxurus hermaphroditus* of the Malay Peninsula, but ground color of upper parts more yellowish, and feet dull brown instead of nearly black; skull with audital bullæ noticeably reduced in size.

*Color*.—Type: Ground color throughout ochraceous-buff, dull and pale on back, brighter on under parts and base of tail, grayer on neck. Crown, ears, and area below and behind eyes dark hair brown; face

and cheeks dull, buffy gray; feet broccoli-brown, scarcely darker than legs; tail dull blackish on terminal half, except for a white ring 30 mm. wide, 80 mm. from tip; on basal half the black gradually gives place to the ochraceous-buff; dorsal markings normal, the clear black longitudinal stripes extending onto base of tail, where, however, they become broken up into spots. Beyond the lateral stripe a second band is indicated by a row of spots, and beyond this the sides are irregularly spotted, especially at shoulder and in front of thigh.

*Skull and teeth.*—Although similar in its structural details to that of *Paradoxurus hermaphroditus*, the skull is larger, the rostrum and palate are broader, the audital bullæ are distinctly smaller and less inflated. Teeth as in the related species, but larger throughout.

*Measurements.*—For external measurements see table, page 271. Skull of type: Greatest length, 114 (112)<sup>a</sup> mm.; upper length, 102.8 (98.6); condylobasilar length, 109 (109); basilar length, 102.6 (104); palatilar length, 49.6 (50); breadth of palate between anterior molars, 23 (21); breadth of rostrum through roots of canines, 23 (21); zygomatic breadth, 65.4 (65); constriction in front of postorbital processes 19.4 (18.8); constriction behind postorbital processes, 9.4 (12); breadth of braincase above roots of zygomata, 32 (34); mandible, 84 (83); maxillary toothrow (exclusive of incisors), 42.4 (41); mandibular toothrow (exclusive of incisors), 48 (46.4).

*Specimens examined.*—Three, all from Pulo Kundur.

*Remarks.*—This species is readily distinguishable from *Paradoxurus hermaphroditus* by its brown feet, a character to which I find no approach in a series of about fifty specimens. The cranial characters may be of less importance, though the skull of the type can not be matched among numerous skulls of *P. hermaphroditus* collected by Doctor Abbott. The three skins show no variations worthy of special note.

### Family MUSTELIDÆ.

#### AONYX CINEREA (Illiger).

Two clawless otters have been taken in the Archipelago, an adult female shot among the mangroves on Great Karimon, May 28, 1903, and a young male (no. 123068) caught by natives off Pulo Sebang, July 31, 1903. Their measurements are, respectively: Head and body, 468 mm.; tail, 270; hind foot, 89; and head and body, 330; tail, 180; hind foot, 70.

<sup>a</sup>Measurements in parenthesis are those of an older male *P. hermaphroditus* from the Rumpin River, Pahang (no. 115487), the largest in an extensive series from the mainland.



Measurements of *Viverra*, *Arctogalidia*, and *Paradoxurus* from the Rhio-Linga Archipelago.

Name.	Locality.	Number.	Sex.	Total length.	Head and body.	Tail ver- bra.	Hind foot.	Hind foot with- out claws
				mm.	mm.	mm.	mm.	mm.
<i>Viverra tangalunga</i> .....	Linga .....	113067	Female adult...	990	655	360	100	97
Do .....	Bintang .....	115597	Male adult .....	850	675	315	101	96
Do .....	do .....	115598	Male immature.	983	580	270	.....	90
Do .....	do .....	115599	Female adult .....	1,050	658	325	.....	95
<i>Arctogalidia simplex</i> .....	Linga .....	<sup>a</sup> 113069	Male adult .....	880	515	535	83	80
Do .....	Sinkep .....	113144	do .....	1,035	405	475	77	80
Do .....	do .....	123103	Female adult...	950	480	555	80	85
Do .....	Batam .....	142153	do .....	970	502	.....	.....	.....
<i>Arctogalidia fusca</i> .....	Kundur .....	<sup>a</sup> 122920	Male adult .....	.....	485	485	89	83
Do .....	do .....	122917	do .....	.....	515	.....	86	82
Do .....	do .....	122918	do .....	1,094	514	580	90	86
Do .....	do .....	122919	do .....	1,045	490	555	91	86
<i>Paradoxurus brunneipes</i> .....	do .....	<sup>a</sup> 122886	do .....	1,004	554	450	91	87
Do .....	do .....	122885	Female adult...	925	525	400	85	80
Do .....	do .....	122887	do .....	920	500	420	82	78

<sup>a</sup>Type.

## Family TUPAIDÆ.

## TUPAIA CASTANEA Miller.

1903. *Tupaia castanea* MILLER, Smithsonian Miscell. Coll., XLV, p. 54, November, 6, 1903.

The two original specimens of this species, collected on Pulo Bintang, August 9 and 11, 1902, are all that have thus far been taken. Both were shot in heavy forest. For measurements see table, page 272.

## TUPAIA TANA Raffles.

1822. *Tupaia tana* RAFFLES, Trans. Linn. Soc., London, XIII, p. 257. (Sumatra).

1900. *Tupaia tana* MILLER, Proc. Washington Acad. Sci., II, p. 229, August 20, 1900. (Linga.)

An adult male taken on Linga Island, July 16, 1899, is the only specimen known from the Archipelago. For measurements see table, page 272.

## TUPAIA PHÆURA Miller.

1902. *Tupaia phæura* MILLER, Proc. Acad. Nat. Sci., Philadelphia, p. 157, June 11, 1902.

Three were taken on Sinkep Island in 1901. The animal has not been met with elsewhere. For measurements see table, page 272.

## TUPAIA FERRUGINEA Raffles.

Two adult females (Nos. 142151 and 142152) were taken by Mr. Kloss at Semimba Bay, Batam, September 15 and 16, 1905. They are slightly larger than two collected by Doctor Abbott on Singapore Island (Nos. 111977 and 111979) in October, 1900, a difference especially noticeable in the molar teeth, but I can detect no appreciable peculiari-

ties in color except that the tail is slightly more gray. The material is not sufficient to show whether it is necessary to recognize the two forms by name. For measurements see table, page 272.

**TUPAIA MALACCANA** Anderson.

1879. *Tupaia malaccana* ANDERSON, Anat. and Zool. Researches, Yunnan, p. 134, (Malacca.)

1900. *Tupaia malaccana* MILLER, Proc. Washington Acad. Sci., II, p. 230, August 20, 1900. (Linga.)

1902. *Tupaia malaccana* MILLER, Proc. Acad. Nat. Sci., Philadelphia, p. 157, June 11, 1902. (Linga and Sinkep.)

During his first visit to Linga Island Doctor Abbot obtained two adult males and an adult female of the Malacca treeshrew. A fourth specimen was taken on the same island in 1901. Two were procured on Sinkep in 1901 and four in 1903. On these two islands it is therefore apparently the commonest member of the genus. The skins show no specially noteworthy variations in color. For measurements see table, page 272.

*Measurements of Tupaia from the Rhio-Linga Archipelago.*

Name.	Locality.	Number.	Sex.	Total length.	Head and body.	Tail vertebræ.	Hind foot.	Hind foot without claws.
<i>Tupaia castanea</i> .....	Pulo Bintang.	115607	Male adult .....	mm. 360	mm. 210	mm. 150	mm. 46	mm. 44
Do .....	do .....	<sup>a</sup> 115608	Female adult...	345	200	145	44	42
<i>Tupaia tana</i> .....	Linga .....	101597	Male adult .....	324	191	133	42	38
<i>Tupaia phœura</i> .....	Sinkep .....	<sup>a</sup> 113148	do .....	335	195	140	46	43.6
Do .....	do .....	113147	Female adult...	325	195	140	43	40
Do .....	do .....	113149	do .....	335	195	140	44	41
<i>Tupaia ferruginea</i> .....	Batam .....	143151	do .....	360	200	160	43	40
Do .....	do .....	143152	do .....	334	180	154	41	38.6
<i>Tupaia malaccana</i> .....	Linga .....	101598	Male adult .....	298	133	165	.....	.....
Do .....	do .....	101600	do .....	305	140	165	34	32
Do .....	do .....	113068	do .....	297	141	156	36	33.6
Do .....	do .....	101599	Female adult...	305	140	165	35	33
Do .....	Sinkep .....	113145	do .....	313	133	180	35	33
Do .....	do .....	113146	do .....	290	130	160	35.6	33
Do .....	do .....	123101	do .....	277	127	150	35	33
Do .....	do .....	123106	do .....	290	130	160	36	34
Do .....	do .....	123107	Female, immature	270	120	150	34.6	32.6
Do .....	do .....	123105	Male adult .....	305	140	165	34	32

<sup>a</sup>Type.

Family COLUGIDÆ.<sup>a</sup>

**CYNOCEPHALUS** <sup>b</sup> **VOLANS** Linnæus.

Great Karimon (1), Bintang (6), Kundur (3), Bakong (1), Sebang (1), Penuba (3).

<sup>a</sup> See Miller, Proc. Biol. Soc. Washington, XIX, p. 41, February 26, 1906.

<sup>b</sup> 1768. *Cynocephalus* BODDAERT, Dierhundig, Mengelwerk, II, p. 8, Type, *C. volans* from Ternate.

1780. *Galeopithecus* PALLAS, "Acta Acad. Sci. Imp. Petrop., IV, p. 208."

The flying lemur is common and generally distributed throughout the Archipelago. Among the fifteen specimens collected by Doctor Abbott there is some variation in size, though the series from the different islands are not extensive enough to show whether more than one local form is represented. For measurements see table, page 273.

*Measurements of Cynocephalus from the Rhio-Linga Archipelago.*

Name.	Locality.	Number.	Sex.	Total length.	Head and body.	Tail vertebrae.	Hind foot.	Hind foot without claws.	Front foot.	Front foot without claws.
<i>Cynocephalus rotans</i> ..	Pulo Bintang...	115605	Female adult.	mm. 720	mm. 125	mm. 295	mm. 78	mm. 67	mm. 85	mm. 78
Do .....	Great Karimon.	122841	.....do.....	633	403	230	69	62	79	71
Do .....	Pulo Kundur...	122888	.....do.....	657	407	250	72	65	84	77
Do .....	.....do.....	122890	.....do.....	657	407	250	74	68	83	76
Do .....	Pulo Sebang...	123069	Male adult .....	.....	374	192+	66	58	74	68
Do .....	Pulo Bakong...	123035	.....do.....	560	345	215	65	57	69	62
Do .....	Pulo Penuba...	123086	Female adult.	588	368	220	69	62	76	69
Do .....	.....do.....	123087	.....do.....	665	365	240	69	63	72	65
Do .....	.....do.....	123088	.....do.....	615	375	240	69	62	73	67

Family EMBALLONURIDÆ.

EMBALLONURA PENINSULARIS Miller.

This is the only insectivorous bat that has been collected in the Archipelago. Twenty were found roosting beneath a fallen tree in the forest at Pasir Panjang, Bintang, August 6, 1902, five were shot beneath an overhanging rock on Karimon Anak, June 3, 1903, and three were shot in caves on the shore of Pulo Sanglar on July 10, 1903. For measurements see table, p. 273.

*Measurements of Emballonura from the Rhio-Linga Archipelago.*

Locality.	Number.	Sex.	Total length.		Tibia.	Foot.	Forearm.	Thumb.	Second digit.	Third digit.	Fourth digit.	Fifth digit.	Ear from meatus.	Ear from crown.
			mm.	mm.										
Pulo Bintang ...	115644	Male adult .....	54	13	15	7	42	7	33	67	48	43	12	11
Do .....	115645	.....do.....	52	12	14.6	7	41	7.2	34	67	48	44	12.6	11
Do .....	115648	.....do.....	55	11	17	6.8	43.6	6.8	37	70	51	47	13.6	12
Do .....	115649	.....do.....	53	12	15.6	6.6	41.6	6.4	31.4	67	47	42	13	11
Do .....	115650	.....do.....	57	13	16	6.8	43	7.4	36	70	51	48	12.4	10.4
Do .....	115652	.....do.....	55	13	14.6	7	41	7	33	67	47	41	13	12
Do .....	115655	.....do.....	54	10.6	13.6	8	42	6.6	34	68	47	43	13	11.4
Do .....	115658	.....do.....	56	11	16	7.6	42.8	7.6	35	72	49	46	13	12
Do .....	115660	.....do.....	56	12	15	6.4	43	6.6	34	68	47	43	13	11.4
Do .....	115661	.....do.....	57	12	15	6.2	41	7	34.6	68	48	44	13.4	12
Karimon Anak ..	122843	.....do.....	52.4	11	16	7.2	42	7	36	65	48	43	10.4	9.4
Do .....	122844	Female adult...	51	10	15	6.4	41	7	33	65	43	40	11	10
Do .....	122846	.....do.....	51	10	15	6.2	40	6.8	32	64	42	39	10.2	9
Pulo Sanglar...	122984	.....do.....	54	11	15	7	42.4	7	34	64	43	42	11	10
Do .....	122985	Male adult .....	55	12	15.4	7	42	7	34	65	44	40	12	10.8
Do .....	122986	.....do.....	54	14	16.4	6.4	43	7.2	35	67	44	43	12	10

## Family PTEROPIDÆ.

## CYNOPTERUS MONTANOI Robin.

1881. *Cynopterus montanoi* ROBIN, Bull. Soc. Philomath. Paris, 7th ser., V, p. 90 (Malacca).

1901. *Cynopterus montanoi* MILLER, Proc. Washington Acad. Sci., III, p. 137, March 26, 1901.

Bats of this genus are evidently common throughout the Archipelago. They all appear to be referable to *Cynopterus montanoi*.

*Measurements of Cynopterus from the Rhio-Linga Archipelago.*

Locality.	Number.	Sex.	Total length.	Tail.	Tibia.	Foot.	Forearm.	Thumb.	Second digit.	Third digit.	Fourth digit.	Fifth digit.	Ear from meatus.	Ear from crown.
			mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
Pulo Sugi.....	115615	Female adult...	100	10	23	12	62.4	23	41	105	85	84	18	15
Do.....	115616	do.....	105	13	24	13	62	27	43	105	84	80	17	15
Do.....	115617	do.....	102	12	23	12	60	25	42	103	83	81	17.4	15.6
Do.....	115623	do.....	100	9	25	13	62	24	42	108	86	85	18	16
Do.....	115626	do.....	102	12	23	12	61	23	42	108	87	85	17	15
Do.....	115628	do.....	102	11	23	13.6	62	22	40	110	88	85	20	17
Do.....	115629	do.....	102	10	26	13	65	25	46	115	95	91	20	17
Do.....	115632	do.....	105	11	24	13	64	24	45	108	86	85	19	17
Do.....	115633	do.....	100	8	25	14	65	23	42	108	87	84	17.6	15.6
Do.....	115634	do.....	105	9	25	14	62	23	41	104	85	83	18	16.6
Do.....	115635	do.....	100	8	22	16	65	23	43	110	91	88	18	17
Do.....	115636	do.....	101	7	26	15	63	24	43	104	86	83	17	15
Do.....	115637	do.....	99	10	25	15	62	24	40	107	85	83	18	16
Do.....	115638	do.....	97	9.4	25.1	13	62	24	41	108	85	82	18	16
Do.....	115639	do.....	160	9	25	14	65	26	45	113	92	90	19	16
Do.....	115640	do.....	96	9	23	13	61	23	41	102	81	80	17	15
Do.....	115641	do.....	106	10	25	13	61.6	24	41	115	91	89	19	17
Do.....	115642	do.....	102	8.2	24	13	63	25	40	107	85	84	18	15.6
Do.....	120714	do.....	105	9	25	13	64	25	45	109	86	85	17	15
Do.....	115627	do.....	78	8	19	12.4	52.4	20	36	85	65	63	16.6	13
Pulo Kundur.....	122899	Male adult.....	88	10	24	13	62	25	42	99	72	78	17	15
Do.....	122901	Female adult.....	93	10	24	14	63	22	42	111	82	81	16	15
Do.....	122905	do.....	90	8	24	14	60	24	43	109	82	80	16	15
Do.....	122906	do.....	96	8	25	13	66	26	41	103	88	87	18	16.4
Pulo Sanglar.....	122981	Male adult.....	95	10	25	12	64	25	43	107	79	81	17	14.2
Do.....	122982	Female adult.....	98	8	24	13	62	23	43	102	81	81	17	14
Do.....	122983	do.....	103	8	24	13	62	23	40	101	79	80	16	14
Pulo Penuba.....	123090	Male adult.....	108	10	26	13	62	25	42	102	78	78	17	16
Do.....	123092	Female adult.....	98	94	25	14	64	26	44	99	83	81	17.4	14.4
Do.....	123095	do.....	100	9	26	13.4	67	26	44	107	85	83	19	17
Do.....	123097	do.....	103	10	25	12	63	25	41	103	79	78	15	14

## PTEROPUS VAMPYRUS (Linnæus).

1900. *Pteropus vampyrus* MILLER, Proc. Washington Acad. Sci., II, p. 237, August 20, 1900. (Linga.)

Eight specimens taken on Linga Island are the only ones procured by Doctor Abbott in the Archipelago.

Measurements of *Pteropus vampyrus* from Linga Island.

Num-ber.	Sex.	Head and body.	Foot.	Foot without claws.	Forearm.	Thumb.	Second finger.	Third finger.	Fourth finger.	Fifth finger.
		mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
101590	Male adult.....	310	61	55	200	77	155	370	295	263
101592	Male immature.....	270	60	52	165	75	127	308	247	217
101594	Male adult.....	305	62	53	192	81	143	342	277	242
101589	Female adult.....	279	58	50	193	80	144	342	270	250
101591	Female immature.....	260	58	50	167	78	130	305	250	220
101593	Female adult.....	305	63	58	197	85	155	350	287	268
101596	.....do.....	290	67	60	190	80	148	340	280	245

## Family CERCOPITHECIDÆ.

## MACACA FASCICULARIS (Raffles).

Apparently common and generally distributed throughout the Archipelago. For measurements see table, page 276.

## PRESBYTIS CRISTATA (Raffles).

1900. *Sennopithecus maurus* MILLER, Proc. Washington Acad. Sci., II, p. 239, August 20, 1900. (Linga.)

Common throughout the Archipelago. The two skins from Pulo Sugi are rather darker than the others, as the silvery tips to the hairs are less conspicuous, but otherwise the series shows no special peculiarities. For measurements see table, page 276.

## PRESBYTIS RHIONIS Miller.

1903. *Presbytis rhionis* MILLER, Smithsonian Miscell. Coll., XLV, p. 64, November 6, 1903.

Common on Pulo Bintang, but thus far not known from any other locality. For measurements see table, page 276.

## PRESBYTIS CANA, new species.

*Type*.—Adult male (skin and skull), Cat. No. 122915, United States National Museum. Collected on Pulo Kundur, Rhio Archipelago, June 28, 1903, by Dr. W. L. Abbott. Original number, 2558.

*Characters*.—Similar to *Presbytis rhionis*, but larger and with conspicuously gray head.

*Color*.—The general color so closely resembles that of *Presbytis rhionis* as to require no detailed description. On the crown and forehead, however, the hairs are light gray from base nearly to tip, producing a distinct pale crown patch by which the animal is easily recognizable.

*Skull and teeth*.—The skull and teeth do not differ appreciably from those of *Presbytis rhionis*.

*Measurements.*—For external measurements see table, page 276. Skull of type: Greatest length, 89 (88)<sup>a</sup> mm.; condylobasilar length, 66 (64.6); basilar length, 58 (57); palatal length, 30 (28); palatal breadth between front molars, 19 (19); zygomatic breadth, 73 (68.8); mastoid breadth, 60.6 (60); breadth of brain case, 52.4 (50.4); postorbital constriction, 47.2 (44.8); interorbital constriction, 8 (6.8); least distance from orbit to alveolus of inner incisor, 19 (19.8); greatest depth of brain case, 42 (44); mandible, 65.2 (62); maxillary tooth row, exclusive of incisors, 28.4 (28); mandibular tooth row, exclusive of incisors, 32.4 (33.8).

*Specimens examined.*—Six from Pulo Kundur and two from near the mouth of the Kateman River, eastern Sumatra.

*Remarks.*—The six skins from Pulo Kundur show no important variations. All have the gray head markings well developed and the thigh patches large and conspicuous. In one female (No. 122911) the back is lighter than usual and the legs are browner, probably the result of bleaching. In the two from the Kateman River the thigh patches are somewhat reduced.

*Measurements of monkeys from the Rhio-Linga Archipelago.*

Name.	Locality.	Number.	Sex.	Total length.	Head and body.	Tail vertebrae.	Foot.
				mm.	mm.	mm.	mm.
<i>Macaca fascicularis</i> .....	Great Karimon.....	122849	Male adult.....	920	420	500	.....
Do.....	Pulo Bintang.....	115676	.....do.....	1,010	485	525	122
Do.....	.....do.....	115677	.....do.....	928	445	483	128
Do.....	Pulo Sugi.....	115675	Female adult.....	942	420	522	112
Do.....	Linga.....	111602	Male immature.....	905	425	480	140
Do.....	.....do.....	111603	.....do.....	1,020	470	550	130
<i>Presbytis cristata</i> .....	Pulo Bintang.....	115670	Male adult.....	1,130	475	655	147
Do.....	.....do.....	115671	.....do.....	1,225	550	675	142
Do.....	.....do.....	115672	Female adult.....	1,155	495	660	145
Do.....	Pulo Sugi.....	115673	.....do.....	1,157	502	655	142
Do.....	.....do.....	115674	.....do.....	1,247	530	717	150
Do.....	Pulo Bakong.....	123036	.....do.....	1,250	510	740	155
Do.....	.....do.....	123037	.....do.....	1,285	475	710	150
Do.....	Pulo Sebang.....	123070	Female immature.....	1,140	540	600	130
Do.....	Linga.....	101601	Female adult.....	1,275	535	740	145
Do.....	.....do.....	113071	.....do.....	1,255	515	740	145
Do.....	.....do.....	113070	Male adult.....	1,260	563	697	160
<i>Presbytis rhionis</i> .....	Pulo Bintang.....	115664	Male immature.....	1,045	425	620	148
Do.....	.....do.....	115666	Male adult.....	1,213	550	663	150
Do.....	.....do.....	<sup>a</sup> 115665	Female adult.....	1,173	468	705	150
Do.....	.....do.....	115667	.....do.....	1,135	470	665	158
Do.....	.....do.....	115668	.....do.....	1,090	460	630	148
Do.....	.....do.....	115669	Female immature.....	965	360	605	135
<i>Presbytis cana</i> .....	Pulo Kundur.....	122912	Male adult.....	1,110	470	640	155
Do.....	.....do.....	<sup>a</sup> 122915	.....do.....	1,130	480	650	155
Do.....	.....do.....	122911	Female adult.....	1,170	455	715	152
Do.....	.....do.....	122913	.....do.....	1,185	470	715	157
Do.....	.....do.....	122914	.....do.....	1,153	493	660	154
Do.....	.....do.....	122916	.....do.....	1,225	485	740	158

<sup>a</sup>Type.

<sup>a</sup>Measurements in parentheses are those of an adult male *Presbytis rhionis* (No. 115666).

## GEOGRAPHICAL LISTS OF SPECIES.

In the following lists the species are arranged according to islands. The descriptions of the localities and the field observations are mostly from Doctor Abbott's letters, labels, and notebooks. For the spelling of the geographic names I have in most cases adopted that used by the collector; the variants are from Findlay's Indian Archipelago and China Sea Directory, Middel's Gids door Nederlandsch Oost-Indië, and from the standard maps.

GREAT KARIMON (*Karimon*).

The northwesternmost island of the Rbio Archipelago. It lies in the Strait of Malacca, 11 miles southwest of Tanjong Bulus, the south point of Asia. Its length is 10 miles and its area about 30 geographical square miles. The northern part of the island is hilly, the surface rising to 1,450 feet at Gumong Santan. Most of the low land has been cleared and is now grown up to lalang and scrub jungle. On the hills the original timber is mostly small, though there is some heavy forest at the north. Even here most of the best trees have been cut by the Chinese timber towkays from Singapore.

*Tragulus nigrocinctus*.—*Traguli* were scarce and hard to get. Those taken were snared by natives at Kampong Pernal and at Mensuda Bay.

*Sus rhionis*.—One was shot among the mangroves at Mensuda Bay.

*Ratufa carimonensis*.—Shot at Mensuda Bay.

*Sciurus carimonensis*.—Taken at Kampong Punkah on the east coast, and at Mensuda Bay, northeast corner of the island. These squirrels were very common in the plantations of fruit and cocoa.

*Mus firmus*.—

*Mus lingensis*.—

*Mus* near *rattus*.—The three rats are not specially mentioned in Doctor Abbott's notes.

*Aonyx cinerea*.—One shot among the mangroves at Mensuda Bay.

*Cynocephalus volans*.—No notes.

*Cynopterus montanoi*.—One shot while hanging on a palm leaf in dense jungle.

*Macaca fascicularis*.—Taken at Kampong Punkah. No notes.

LITTLE KARIMON (*Karimon Anak*).

Karimon Anak lies northwest of Karimon, separated from the larger island by a strait about one-half mile wide. It contains about  $\frac{1}{4}$  square miles, and is hilly; the surface mostly covered with heavy jungle.

*Sciurus peninsularis*.—No notes.

*Emballonura peninsularis*.—Shot beneath an overhanging rock in the forest.

Pigs, monkeys, and *Tragulus* exist, but none were obtained. A *Ratufa* is also said to occur.

KUNDUR (*Konduur*).

Pulo Kundur is not quite  $16\frac{1}{2}$  miles long—I do not remember the exact size—and contains about 90 square miles. It is about 6 miles from the nearest point on the coast of Sumatra, and about the same distance south of Karimon; between it and the latter there are, however, numerous small islets. Some islands to the north and separated by narrow channels from Kundur are given on the *older* charts as part of Kundur itself. Though much of its surface is low and swampy, especially along the coast, the interior is somewhat elevated, three of the hills rising to a height of 400 to 500 feet. Much of the interior has been cleared for the cultivation of gambier and pepper, and is now mostly covered with lalang and low scrub jungle. There are many sago plantations. The coast and lower portions of the island are still heavily forested. There is a total population of about 1,000—Chinese, Malays, and some Orang Utan and Orang Mantong; these last non-Mussulman wild tribes like the Jakuns.

*Tragulus nigrocinctus*.—Common. All the specimens taken were snared by natives. No small *Tragulus* occurs.

*Sus oi*.—

*Sus rhionis*.—Pigs swarmed in the sago plantations at night when I could not shoot, so I employed the wild men to get them. The Orang Mantong spear pigs in the following way: They make a screen of branches 10 or 15 feet long and 3 feet high near the stumps of newly felled sago palms which they know the pigs will visit at night. When they hear the animals at work they are able to come within striking distance behind the screens, as the pigs are very fond of sago and are easily approached while eating it. *Sus oi* was much less plentiful than the smaller animal. In addition to the female and young taken the men wounded a fine adult male, but their spears broke and the pig escaped.

*Ratufa condurensis*.—Shot in heavy forest, where they were quite numerous.

*Sciurus condurensis*.—No notes.

*Sciuropterus amoenus*.—No notes.

*Arctogalidia fusca*.—Those taken were shot in the tops of coconut palms.

*Paradoxurus brunneipes*.—No notes.

*Cynocephalus volans*.—No notes.

*Cynocephalus montanoi*.—A dense bunch of about 20 hung to a coconut leaf in Kampong Batu. Of these 17 were killed at one shot.

*Presbytis cana*.—Common, but less so than *Macaca fascicularis*. One pair taken were mates. The female was shot first and the male came back and showed great anxiety, though all the rest of the drove fled in terror.



In addition to the mammals obtained in Kundur a large musang, probably *Viverra zangalunga*, was said to exist, also a *Manis*. The Orang Mantong said that the binturong (*Arctitis*) occurs. A *Funambulus* was once or twice seen, and I think I saw a *Nannosciurus*. *Macaca fascicularis* was very abundant.

UNGAR.

Pulo Ungar lies along the southeast coast of Kundur, separated from it by a strait a quarter of a mile wide and 6 or 7 fathoms deep. Most of the surface is swampy, and great quantities of sago are grown. The central part of the island is slightly elevated, and is covered with alang-alang (long grass) and scrubby jungle. Wild pigs, especially *Sus rhionis*, are very plentiful. *Sus oi* is less common. Birds are numerous, but mammals are much fewer in species than on Kundur. Musangs (*Arctogalidia* or *Paradoxurus*) and *Tragulus* are said to exist. *Macaca fascicularis* is very numerous, and many are trapped and sent to Singapore for sale. There are no squirrels. Dugongs are said to be common, but none were seen.

*Sus rhionis*.—The pigs speared by natives were the only mammals procured on the island.

DURIAN (*Moro Besar, Durian Besar, Jora*).

This island lies on the east side of Durian Straits, a passage 5 to 8 miles wide, separating Karimon and Kundur from the more easterly island of the Rhio group. It contains 8 square miles, and is very hilly, its highest point 1,031 feet. Until recently it was covered with forest, but within a few years most of this has been cut off by Chinese to prepare the land for pepper and gambier cultivation. Some heavy forest remains on the hilltops, and there are patches of it in other places. Most of the surface, however, is now covered with scrubby jungle and alang-alang. Moro Besar is 1½ miles from Sugi Bawa, with the islands of Manda and Jan in the strait. It is 4 miles from Pulo Sugi and 19 from the nearest point of Sumatra.

*Mus firmus*.—

*Mus lingensis*.—No notes on either of the rats obtained.

I failed to get a large *Tragulus* which is said to exist. It was certainly very scarce, as the people could catch none, though they made plenty of traps and I offered \$2 apiece to stimulate their energies. *Sus rhionis* and *Macaca fascicularis* are both common. There are no squirrels.

JAN (*Djan*).

An islet in the strait between Moro Besar and Sugi Bawa, separated from the latter by only a narrow strait. This was not visited, but specimens of *Tragulus lutescens* were brought from it by natives while I was at Moro Besar.

MORO KECHIL (*Durian Kechil, Little Durian*).

July 6-9, 1903.

Moro Kechil is separated from Moro Besar by a strait one-fourth-mile wide containing 2 islets. Tidal currents run swiftly through the passage. The island is rocky and hilly, its highest point 571 feet. Surface covered with heavy forest of fine timber.

*Mus lingensis*.—No notes.

*Mus* near *rattus*.—No notes.

Rats of two species were the only mammals collected on Moro Kechil. As on Moro Besar, a large *Tragulus*, a pig (*Sus rhionis*), and a monkey (*Macaca fascicularis*) occur, though no specimens were procured. No squirrels exist. The Malays said there was one tiger on the island, but this must have been a Rimau hantu (ghost tiger), as the island is small (2,000 acres) and there is no place such an animal could have come from. They never visit Kundur. Besides, no tracks could be found, and the only available food would have been wild pigs. Moro Kechil is uninhabited and is still covered with fine timber. It appears to be a ghost island, and the Malays are afraid to stay there. Every place swarms with spirits in Malayana, and if these happen to be bad, the locality is left unoccupied. It would quite delight a spiritualist.

SANGLAR (*False Durian*).<sup>a</sup>

July 10-11, 1903.

Pulo Sanglar contains about 2,000 acres and is hilly, the highest point 651 feet. Most of the surface has now been cleared by the Chinese, who have many pepper and gambier kebuns. This island lies about 3 miles south of Moro Besar.

*Sciurus peninsularis*.—Common; in very poor pelage.

*Emballonura peninsularis*.—Shot in caves on the shore.

*Cynopterus montanoi*.—Shot in cocoa palm.

There are no monkeys or *Tragulus*. Tengeling (*Manis*) are said to exist. Did not try trapping for rats. Pigs are common. The inhabitants, in addition to Chinese, are Orang Mantong and Orang Tambus.

SUGI BAWA (*Moro*).

August 31-September 2, 1902.

This island lies on the west side of Durian (Moro) Strait, directly north of Moro Besar, separated by a strait about a mile wide. It is  $5\frac{1}{2}$  miles long and about one-fourth as broad, containing 4,000 to 5,000 acres. The surface is hilly, the highest point about 500 feet. It is thinly inhabited and there are many old clearings, but a good deal of heavy forest still remains.

*Tragulus lutescens*.—Snared in jungle. Apparently common.

<sup>a</sup> Not shown on the map (facing page 247) where it should be placed; about the size of Jan. 2-3 mm. southeast of the southeast corner of Durian.

*Sus rhionis*.—No notes.

*Mus firmus*.—

*Mus* near *rattus*.—

*Mus lingensis*.—The three species of *Mus* were trapped in heavy jungle, where they were very abundant.

No musangs (*Viverridæ*) were seen, and the natives say that none occurs.

SUGI (*Sojee*).

August 22–29, 1902.

Pulo Sugi, on east side of Durian (Moro) Strait, is about 10 miles long and contains about 30 square miles. Scarcely any original forest remains, it having been cleared sometime since by Chinese to grow gambier. The surface is now mostly covered with scrub and blukar (secondary jungle), and there are wide areas of coarse bracken and lalang. Most of the island is hilly, rising to above 1,000 feet in Gunung Bekaka. A tract of heavy jungle lay about 2 miles W. S. W. of Nyor Kampong, and a hill with some original forest back (east) of Kampong Sisok furnished excellent collecting ground.

*Tragulus flavicollis*.—The napu was not common. Many traps and snares were seen, but the natives succeeded in getting only one specimen, though they were offered a dollar apiece for them.

*Ratufa insignis*.—Shot on a forest-covered hill. A number seen and heard.

*Sciurus peninsularis*.—Very common among the cocoanuts.

*Mus firmus*.—No notes.

*Mus lingensis*.—No notes.

*Mus* near *rattus*.—No notes.

*Cynocephalus montanoi*.—A large bunch hanging beneath a coconut leaf in village. Thirty-one killed at one shot; many of these young. Only one adult male in the lot.

*Macacus fascicularis*.—Common. Shot in patch of heavy forest.

*Presbytis cristata*.—Shot on forest-covered hill.

Pig tracks were plentiful, and Kubong (*Cynocephalus*) were said to exist. The natives said that there were no musangs on the island.

BATAM (*Bataui*).

September 15–27, 1905.

Batam is the second largest of the *northern* islands of the Rhio Archipelago. It is the fourth in size of the whole group. It lies 10 miles southeast of Singapore, and is about 15 miles long by about 12 miles wide. Doctor Abbott has not visited it, but Mr. C. B. Kloss spent a week there in September, 1905. Part of his collection of mammals, numbering 30 specimens, has been presented to the U. S. National Museum. It contains the following species:

*Tragulus perflavus*.

*Sciurus peninsularis.*

*Mus lingensis.* \*

*Mus* near *rattus*.

*Mus concolor.*

*Arctogalidia simplex?*

*Tupaia ferruginea.*

Mr. Kloss writes that the monkeys of the island are *Presbytis cristata* and *Macaca fascicularis*, and also that a *Ratufa* occurs. He saw one *Sus oi*, but was unable to obtain it. This animal is, however, well known to be common on the island.

BINTANG.

August 5-20, 1902.

Pulo Bintang is the northeast island of the Rhio-Linga Archipelago. It is the largest of the group, containing about 325 square miles. It is 11 miles distant from the southeast point of the Malay Peninsula, and is separated from Batam by Rhio Strait. As Pulo Sau lies in this strait, the actual width of unbroken water is only about 2 miles. As the tide sets strongly through the strait, unassisted migration of wild mammals must be very rare. Originally covered with heavy forest, most of the land has been cleared for the cultivation of gambier, been exhausted, and is now covered with scrub and secondary jungle and broad patches of lalong grass.

*Tragulus formosus.*—Trapped by Malays at Telok Pemudong, on north shore of the island.

*Tragulus rubrus.*—Trapped at Telok Pemudong.

*Ratufa conspicua.*—Pretty common, but very hard to catch sight of.

*Sciurus peninsularis.*—Common. Shot among rocks on shore and also in heavy forest.

*Mus lingensis.*—Trapped in heavy jungle on rocky promontory by the shore.

*Viverra zangalunga.*—Trapped at Pasir Panjang. One bought from natives at Rhio was said to have been taken at the same locality.

*Arctogalidia* sp.—One shot and two others seen. The one taken was with another in a big kaju ara tree. They were making most remarkable cries like cats rutting, as these probably were.

*Tupaia castanea.*—A female contained 2 embryos.

*Cynocephalus volans.*—No notes.

*Emballomura peninsularis.*—Roosting beneath a fallen tree in the forest at Pasir Panjang. Twelve specimens were obtained with 3 shots from auxiliary barrel. There were probably 100 individuals in the colony. Five others were shot while roosting beneath a slanting rock in the forest.

*Macaca fascicularis.*—No notes.

*Presbytis cristata*.—The voice of *P. cristata* is a series of rather musical grunts, well represented by the Malay name Chingkau.

*Presbytis rhionis*.—Common. Malay name, Ka-Ka, from the cry, which is exactly similar to that of *P. femoralis* and *P. natunensis*.

The inhabitants of Bintang said there were 2 or 3 other musangs; one very big, probably *Viverra megaspila*, was rare; there was another, smaller; then the *tangalunga*, of which 2 were taken, and finally, the binturong, which they said was not common. Otter of 2 kinds were plentiful, and many tracks were seen. There were no wild-cats, except one lone tiger.

BAKONG (*Sechava*).

July 15-22, 1903.

Pulo Bakong is a narrow island about 14 miles long and not much more than a mile wide. It lies north of Linga, from which it is separated by Dasi (or Dangsi) Strait, half a mile wide. Eastward lies a confused labyrinth of islands and islets. The tidal currents set strongly through the channels, which are 6 to 10 fathoms deep. The shores have fringing reefs, and there are many isolated coral patches. Bakong still contains some heavy timber, but most of it has been cut for the Singapore market. There are some tracts of lalang marking the sites of former cultivation. The hills rise to 200 or 300 feet.

*Tragulus pretiellus*.—All the *Traguli* obtained were trapped by natives and brought in alive. They were evidently very plentiful, as I had at last to refuse to buy any more and refused a good many. Some may have been caught on the islets off the shore of the main island. All the females were either pregnant or had recently had young. This, and the fact that some had been kept 24 hours without food before killing accounts for the variation in weight of the females.

*Mus firmus*.—No notes.

*Mus lingensis*.—No notes.

*Cynocephalus volans*.—No notes.

*Presbytis cristata*.—No notes.

Monkeys and pigs are common. Otter are said to be numerous. There are no squirrels or *Tupaia*.

PANAGA (*not shown on map*).

This is a small island off Bakong. It was not visited, but a *Tragulus* was brought from it on July 17, 1903.

SEBANG.

July 26-31, 1903.

Sebang is about 19 miles long by  $1\frac{1}{2}$  to 3 miles wide. It lies parallel to and about 6 miles east of Bakong. From Linga it is separated by a strait  $4\frac{1}{2}$  miles wide and 10 to 15 fathoms deep. The hills rise gen-

erally to a height of 200 to 400 feet. There was formerly considerable cultivation of gambier by the Chinese, but it is now given up, and there are many tracts covered with lalang and small scrub. There is still a good deal of heavy forest, but many of the best trees have been cut out and the remaining jungle is much mangled.

*Tragulus pretiellus*.—No notes.

*Sciurus peninsularis*.—

*Mus firmus*.—

*Mus lingensis*.—No notes on the rats or squirrel.

*Aonyx cinereus*.—Caught by natives while swimming in the strait. Tracks were common among the mangroves.

*Cynocephalus volans*.—No notes.

*Presbytis cristata*.—No notes.

Besides the mammals obtained, *Macaca fascicularis* was common, and some pigs were seen. Musangs were said to occur, but were rare. A wildeat said to exist; described as "blang," which means piebald, or dark and light in patches. The human inhabitants are Orang Laut and a few Chinese.

LINGA (*Lingga, Lingin*).

July 7-25, 1899, August 23-30, 1901.

Linga Island, lying about midway between Banka and Singapore Strait, is about 33 miles in extent, W. N. W. and E. S. E. From the nearest point, Point Baru (Datu), on the coast of Sumatra, the distance is about 35 miles. Upon its southwestern part is a remarkable mountain, the peak of which, rising to an elevation of 3,920 feet, is split in two, forming a sort of double peak, "rising like spires from the summit of the mountain," but more generally thought to resemble asses' ears, visible many miles in all directions. Viewed from the sea, this mountain presents a most beautiful and imposing appearance, which is sure to arrest the attention even of the most careless observer. Other hills rise to a height of from 600 to 750 feet. Heavy forests still are found on the island, and there is also the usual cultivation. (Account mostly from Findlay.)

*Tragulus pretiosus*.—

*Tragulus subrufus*.—Both species were abundant and were brought in by the natives in quantities, owing to the high price offered—\$1 (2 shillings) for napu and 50 cents for kanchil. The natives spoke of a larger species that was not obtained.

*Sus rhionis?*—Pigs were not uncommon, but the only specimen taken was a young female shot in a sago plantation at Mentuda Bay, on the west side of the island.

*Ratufa notabilis*.—Shot on a hillside covered with secondary jungle and some large trees. Breeding.

*Sciurus tenuis*.—No notes.

*Sciurus peninsularis*.—No notes.

*Rhinosciurus laticaudatus*.—Brought in by Malays, who secured it in a jerot or snare.

*Mus firmus*.—Trapped on the rocky promontory covered with forest, forming the north side of Mentuda Bay.

*Mus lingensis*.—No notes.

*Mus fremens*.—No notes.

*Viverra tangalunga*.—An adult female trapped by Malays, August 27, 1901. Uterus contained three embryos.

*Arctogalidia simplex*.—Shot in a "fig" tree in sago plantation. Said to be frequent in the cocoanut plantations.

*Tupaia tana*.—No notes.

*Tupaia malaccana*.—No notes.

*Tupaia phæura*.—No notes.

*Pteropus vampyrus*.—No notes.

*Macaca fascicularis*.—Two males were taken on July 23, 1899.

*Presbytis cristata*.—Shot from drove of 20 or 30 in sago plantation.

PENUBA (*Punoeba*, *Penoeba*).

August 2-6, 1903.

Pulo Penuba lies between Linga and Sinkep, from each of which it is separated by a strait about a mile wide. It is about 6 miles long and contains some 8,000 acres. The highest hill is about 950 feet. Considerable heavy timber remains, but the greater part of the island is covered with lalang and scrub. There are large plantations of cocoanuts.

*Sciurus peninsularis*.—Trapped in heavy forest near center of island.

*Mus lingensis*.—Trapped in heavy forest near center of island.

*Cynocephalus volans*.—Common among the cocoanuts.

*Cynopterus montanoi*.—No notes.

In addition to the mammals obtained, monkeys were plentiful, and tracks of pig and otter were numerous. Natives said that both large and small *Traguli*, tenggeling (*Manis*), and a large squirrel (*Ratufa*) occur.

SINKEP (*Singkep*, *Singkap*).

September 1-9, 1901, August 7-9, 1903.

This island with the smaller ones close to its shores covers a space of 200 to 240 square miles. Sinkep is of very irregular shape and of considerable elevation, having on its eastern side a range of hills, with a peak 1,440 feet high near the center of the range (Findlay). There appears to be nothing worthy of special note with regard to the vegetation of the island.

*Manis javanica*.—An adult female was dug from a burrow on a hillside by natives.

*Tragulid nigricollis*.—Only five were brought in by the natives. A few were seen in the jungle, but could not be shot.

*Tragulid subrufus*.—More numerous than the last.

*Ratufa conjinis*.—Shot on a low hill by the seashore west of Sakana Bay. The hill is covered with heavy forest, with large trees, and the squirrels appeared plentiful.

*Sciurus peninsularis*.—Shot on the same hill with the *Ratufa*; plentiful.

*Nannosciurus pulcher*.—One taken at Sakana Bay in 1901 (no notes). At another locality they were found numerous in 1903. The voice is a very high-pitched, thin little whistle, kept up several minutes at a time, like the scolding of larger squirrels.

*Mus lingensis*.—

*Mus fremiens*.—Both species of rats were trapped in heavy forest.

*Arctogalidia simplex*.—Shot in cocoanut plantation.

*Tupaia phæura*.—Trapped in heavy forest.

*Tupaia malaccana*.—This animal has a low, soft, birdlike whistle, and is much more arboreal than other *Tupaia*s.