MAMMALS COLLECTED IN WESTERN BORNEO BY DR. W. L. ABBOTT.

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INTRODUCTION.

From about the middle of June until the end of September, 1905, Dr. W. L. Abbott occupied himself in exploring western Borneo, where some three hundred specimens of mammals were collected, all of which he presented to the United States National Museum. A few preliminary notices [a] of these have been published, but the collection as a whole is treated of for the first time in the following pages.

After collecting in the vicinity of Pontianak and along the Sungei Sama, Doctor Abbott ascended the Landak River to about Ngabong, making collections along the shores as he returned down that stream. He next ascended the Kapuas River as far as Sanggau, where the Sakaiam River, or Sungei Sakaiam, flows into the Kapuas. From Sanggau Doctor Abbott ascended the Sakaiam for 105 miles, reaching Mrowi, near the Sarawak frontier. As this trip was made in a small boat, no attempt was made to collect animals, his efforts being directed toward securing ethnological objects from the Dyaks. Collections of mammals were, however, made on the trip down the Kapuas from Sanggau.

The maps published on the region of western Borneo show that the lower courses of the Landak and Kapuas rivers pass through an area of lowland swamps, as would be inferred from the tortuous courses of the rivers and their numerous mouths. The upper courses of the

[a] Pigmy Squirrels of the *Nannosciurus melanotis* group, Proc. Biol. Soc. Washington, XIX, pp. 51–56, May 1, 1906.

Notes on the Slow Lemurs, Proc. U. S. Nat. Mus., XXXI, pp. 527–538, pl. XIII, November 9, 1906.

Mammals of Banka, Mendanau, and Billiton, islands between Sumatra and Borneo, Proc. U. S. Nat. Mus., XXXI, pp. 575–612, December 18, 1906. Mention of *Rusa brookei*, *Muntiacus pleiharicus*, *Nannosciurus borneanus*, and *Cynopterus brachyotis*.

Notes on some squirrels of the *Sciurus hippurus* group, with descriptions of two new species, Smithsonian Misc. Coll., L, Pt. 1, pp. 24–29, April 8, 1907.

rivers traverse a country characterized by low hills. See map, frontispiece, where most of the points visited by Doctor Abbott are shown.

Doctor Abbott's remarks on the places visited by him follow:

The Sungei Sama is one of the two branches of the Ambawang which flows into the Landak River, 2 miles above Pontianak. This river is inhabited by Dyaks, who have been accustomed to shoot for naturalists at Pontianak, and that is the reason for my comparative success during my short stay. I stayed at the Kampong of the Mankoh (headman), 18 miles from Pontianak. The district is all swampy, and the big jungle is cleared immediately along the river for a half mile back. There are many sago plantations. Beyond a half mile from the river bank is heavy forest. The headwaters of the Sama are on some hills, and here is where the two Orangs were shot. The Dyaks live in the regular long houses (Rumeh Panjong) of the Dyaks, but are otherwise much Malayified.

The country along the Landak River for the lower 50 miles of its course is swampy and still mostly heavy forest. The last kampong (village) is about 14 miles from Pontianak, and from here to Batu Ampar the banks are mostly heavy forest. Above this point the banks become higher and the country largely covered with scrub jungle and lalang, and is inhabited by a considerable population of Dyaks. A good many Malays inhabit the district about Ngabong and along the river.

About Sanggau the country is mostly rolling, with low hills. Not much heavy forest is left, mostly scrub jungle and lalang with small patches of heavier forest. The Sakaiam River flows into the Kapuas at this point, coming down from the borders of Sarawak. There is a considerable population of Malays along the bank and many Dyaks in the district. I went up the Sakaiam as far as Mrowi, about 105 miles. Scarcely any heavy forest is left near the river; all scrub and lalang. A good deal of heavy forest remains along its affluent, the Kumbaiang River. Along its upper course, but not upon its banks, are many hills which are still forest clad, especially near the Sarawak border. I was told much rimba (virgin forest) exists along the Jangko, the first branch of the Sakaiam above Sanggau.

What I saw of Borneo up the Kapuas was a poor place for collecting. Down the river in the swampy forests there were some animals, the inhabitants being Malays or Dyaks who did not eat monkeys. But every Dyak has a gun in Borneo, and up river everything having fur, fin, or feather is devoured. Sarawak being a native State, the natives are allowed firearms, and as a consequence guns and ammunition drift across the frontier all over Dutch Borneo. The Dutch authorities complain very much about it. In Sumatra one may occasionally see an old gun, but ammunition is almost unobtainable.

SYSTEMATIC LIST OF SPECIES.

The mammals collected by Doctor Abbott represent thirty-eight species or subspecies, five of which were previously unknown to science, two of them being here described for the first time. A systematic list of all the species collected, accompanied by tables giving the precise localities and measurements of the individual specimens, with Doctor Abbott's field observations, follows:

MANIS JAVANICA Desmarest.

1822. *Manis javanica* Desmarest, Mammalogie, Pt. 2, p. 377.

Two specimens from Pontianak, a young and an adult male. The skull of the adult appears to be the oldest *Manis* skull in the United States National Museum. The zygomatic arch is complete and bony

on each side, and is formed by the backward extension of the maxilla meeting the forward extension of the squamosal. The skull is shorter and heavier, especially about the rostrum, than somewhat younger skulls from the Malay Peninsula. The scales of the adult are large and heavy, with the markings conspicuous. Many of the scales are scarred and broken.

Measurements of the adult male, Cat. No. 142460, U.S.N.M.; head and body (to anus), 500 mm.; tail (from anus), 510; greatest length of skull, 104.3 mm.; zygomatic width, 39. The weight was 16½ pounds [7.48 kilos].

TRAGULUS HOSEI (Bonhote).

1903. *Tragulus kanchil hosei* Bonhote, Ann. Mag. Nat. Hist., 7th ser., XI, p. 239. March 1903 (received at library of U. S. National Museum, March 16, 1903).

1903. *Tragulus virgicollis* Miller, Proc. Biol. Soc. Washington, XVI, p. 37. March 19, 1903.

Skin and skull of an adult female, from the Kapuas River below Tyan. In point of color and markings this specimen is indistinguishable from *Tragulus kanchil* of Sumatra, differing from that species only in the greater length of the hind foot and somewhat greater size of the skull. In most respects, it resembles the type of *T. virgicollis* (= *T. hosei*), but differs from it conspicuously in the absence of the narrow, well-defined nape stripe. With but one skin from the Kapuas River, it does not seem advisable, for the present at least, to recognize two distinct races of the *kanchil* group on Borneo. (For measurements, see table herewith.)

External and cranial measurements of Tragulus from western Borneo.

Name.	Locality.	Number.	Sex.	Age.	Head and body.[a]	Tail vertebræ.[a]	Hind foot.	Weight.[a]	Greatest length of skull.	Condylo-basal length.	Basal length.	Palatal length.	Interorbital constriction.	Zygomatic breadth.	Mandible, condyle to front of symphysis.	Maxillary tooth-row (alveoli).	Mandibular toothrow (alveoli).
					mm.	*mm.*	*mm.*	*kilos.*	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*
T. borneanus	Opposite Pulo Jambu, Kapuas River.	b 43772	Male	Adult					110	103.5	97.3	71.5	26.2	48.3	86.4	36.7	43.3
Do	Opposite Pulo Saparo, Kapuas River.	142345	do	do					104.2	96.9	90.2	65.5	29.9	48.7	81.4	36.6	41.4
Do	Ten miles below Tyan, Kapuas River.	142346	Female	do	545	85	138	4.536	108.2	101.0	94.0	68.5	25.5	49.6	85.0	37.3	42.8
T. hosei	Below Tyan, Kapuas River	142348	do	do	482		135	2.155	95.3	88.2	81.9	57.5	27.8	43.3	72.4	34.0	39.0

[a] Collector's measurements.

[b] Skeleton.

TRAGULUS BORNEANUS Miller.

1902. *Tragulus borneanus* MILLER, Proc. Biol. Soc. Washington, XV, p. 174, August 6, 1902.

Two skins with skulls and one skeleton from the Kapuas River. The skins are practically indistinguishable in coloration from specimens of *Tragulus napu* from Sumatra. The Bornean animals are somewhat smaller. (For measurements, see page 549.)

RUSA BROOKEI (Hose).

1893. *Cervus brookei* HOSE, Ann. Mag. Nat. Hist., 6th ser., XII, p. 206.

1906. *Rusa brookei*, LYON, Proc. U. S. Nat. Mus., XXXI, p. 585, December 18, 1906.

Two specimens from along the Kapuas River, the antlers of an adult male, Cat. No. 142356, U.S.N.M., and the skull of a nearly adult male, Cat. 142357, U.S.N.M.

Measurements of these specimens respectively: Length of antler along convexity of curve, 462, 325; burr to tip of frontal tine along convexity, 160, 136; circumference of antler above frontal tine, 132, 84; tip of apical tine to its angle with main trunk of antler, 50, 33. The basal length of the skull of Cat. No. 142357, U.S.N.M., is 332 mm., maxillary toothrow (alveoli) 105 mm.

MUNTIACUS PLEIHARICUS (Kohlbrugge).

1896. *Cervulus pleiharicus* KOHLBRUGGE, Natuurkundig Tijdschrift Nederlandsch-Indië, LV, 1896, p. 192, plate facing p. 260.

1906. *Muntiacus pleiharicus*, LYON, Proc. U. S. Nat. Mus., XXXI, p. 583, December 18, 1906.

Represented by the frontlet and antlers of an adult male from the Sakaiam River, Cat. No. 142358, U.S.N.M.

Measurements: Burr to tip of antler along convex curve, left 112 mm., right 97; tip of frontal tine to angle with main trunk of antler, left 26, right 27; distance between the angles of the pedicles with skull, 56; distance from angle of pedicle with skull to posterior edge of burr, left 83, right 83.

SUS BARBATUS Müller.

1839. *Sus barbatus* MÜLLER, Tijdschrift voor Natuurlijke Geschied. en Physiologie, V, p. 149.

1906. *Sus barbatus*, MILLER, Proc. U. S. Nat. Mus., XXX, p. 739, June 13, 1906.

Six skulls, without skins, obtained from the natives along the Landak River. Cranial measurements are given in the table below, the points between which they are taken being the same as those used by Miller in his Notes on Malayan Pigs.[a] Of the six skulls, five are evidently males and one a female. They are all skulls of adult or

[a] Proc. U. S. Nat. Mus., XXX, pp. 755, 756, June 13, 1906.

nearly adult animals. Cat. No. 142355, U.S.N.M., is the youngest, the last upper molar is just through the alveolus, and is entirely unworn. Cat. No. 142353, U.S.N.M., is of about the same age. Cat. No. 142350, U.S.N.M., the female, is a little older than the two preceding, as the last upper molar is beginning to show wear. The last upper molar in Cat. No. 142354, U.S.N.M., shows more wear than any of the foregoing, but not so much as the remaining two, Cat. Nos. 142352 and 142351, U.S.N.M., which are fully adult boars. The teeth of No. 142351, U.S.N.M., show considerable wear. The lower jaw sent in with this specimen evidently came from another individual, as it does not fit the skull accurately. However, it is the lower jaw of a male of about the same age, or perhaps a trifle older, and from an animal about the same size.

Cranial measurements of Sus barbatus from western Borneo.

Dimensions.	Cat. No. 142355, male, nearly adult.	Cat. No. 142353, male, nearly adult.	Cat. No. 142350, female, adult.	Cat. No. 142354, male, adult.	Cat. No. 142352, male, adult.	Cat. No. 142351, male, adult.
	mm.	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*
Upper length	395	430	418	473	.....	487
Basal length	360	.....	.....	401	.....	.....
Basilar length	338	.....	.....	377	.....	.....
Palatal length [a]	278	294	284	323	312	333
Width of palate at pm^1	40	42.5	32.2	45	40	43
Width of palate, including m^3	68.2	79.3	66.6	67	69	75
Least width of palate at front of m^4	25	27	24.5	24	27.5	31
Zygomatic breadth	128	155	138	160	158	172
Least interorbital breadth	58	69	66	65	76.5	69
Parietal constriction	14.6	12.7	17.7	10.5	17.5	20.8
Nasal breadth at posterior extremity of premaxillary	30.2	32.5	32.4	30.7	33.6	36
Length of nasals	200	222	212	250	.....	267
Occipital depth to basion	115	.....	.....	141	.....	.....
Mandible	315	327	306	350	349	376
Maxillary toothrow (alveoli)	129.5	129	126.4	129	132	138
Second upper molar	23	24.5	23	22.5	23.5	25
	×	×	×	×	×	×
	20	20	18.5	18.5	19.5	20
Third upper molar	34	33	33.5	33.5	35.5	36
	×	×	×	×	×	×
	20.5	21.5	20.5	20.5	21	20.5
Mandibular toothrow (alveoli)	127	123	128	125	136	138
Second lower molar	22.5	23.5	22	23	23	25
	×	×	×	×	×	×
	17	16	15	15	17	17.5
Third lower molar	38	36	38	27.5	41	45
	×	×	×	×	×	×
	18	17.5	17.5	17	19	20

[a] Palatal length measured from the most anterior portion of the posterior edge of the lateral halves of the palate, and not from the notch between the two halves of the palate. The latter point seems to be variable and becomes pushed farther backward with advancing age.

[I did not see a single live pig in Borneo. Judging from the tusks, the Dyaks keep the lower jaws only, some of the boars must be enormous.—W. L. Abbott.]

SCIURUS BORNEOENSIS BORNEOENSIS (Müller and Schlegel).

1839–44. *Sciurus rafflesii* var. *borneoensis* MÜLLER and SCHLEGEL, Verhandl. Natur. Geschied. Nederland. Overz. Bezitl. Leiden, p. 86.

Ten of the *prevostii* squirrels collected by Doctor Abbott in western Borneo may be referred to this form. For a list of them, with exact localities, see table of measurements, page 556. *Sciurus borneoensis* appears to be a very variable species, inhabiting western Borneo north of the Kapuas River. South of that river a very different *prevostii* squirrel occurs, which is described on page 554. The squirrels north of the river fall into two distinct forms, the typical red-shouldered *borneoensis*, apparently confined to the uplands, and a dark-bellied black-shouldered form, described below as a new subspecies, confined to the swampy lands near the mouths of the rivers. Above Tanjong Putus, on the Landak River, and above Pulo Saparo, on Kapuas River (see map, frontispiece), Doctor Abbott collected the red-shouldered form, while below these points the specimens all have blackish shoulders. Three skins from Tanjong Putus, collected on July 15, are referable to the typical form, while two others also marked Tanjong Putus, collected on July 16, are referable to the dark-shouldered variety. As Doctor Abbott collected while descending the rivers, the two skins obtained on July 16 are probably from a slightly lower point on the river than the three taken on the previous day.

While visiting the Leyden Museum, Mr. Gerrit S. Miller, jr., made the following notes on the cotypes of *Sciurus borneoensis*.

Cotypes, three [lettered: *o*, *p*, and *q*], all from Pontianak. They are very uniform in color, all showing the strongly grizzled sides above the pale lateral stripe, the clear black area on shoulders being reduced to 20–25 mm. Most of the caudal hairs, except at base and pencil, with cream buff tips about 10 mm. long. In one specimen the feet are red, in the others they are black sprinkled with red hairs. Red area rufous, darkening to chestnut. Cheek and sides of neck a mixture of black, red, and white, each color slightly predominating in one specimen. Whitish spot below eye distinct but very small; whitish patch at base of whiskers conspicuous. Measurements: *o* (300) [head and body] 250 [tail vertebræ] 60 (55) [hind foot with and without claws], *p* (280) [head and body] 250 [tail vertebræ] 58 (53) [hind foot with and without claws], *q* (290) [head and body] 280 [tail vertebræ].

The three specimens taken on July 15 at Tanjong Putus, on the Landak River, about 25 to 30 miles above Pontianak, agree very well with the above account. Cat. No. 142307, U.S.N.M., from the north bank of the Kapuas at Sanggau, agrees most closely with the published figure[a] of *S. borneoensis* in respect to general coloration. It lacks the conspicuous white spot at base of whiskers, however, and the white lateral stripe is not subtended by a conspicuous black stripe. None of the squirrels of this species collected by Doctor Abbott either of the typical form or not, has a conspicuous white patch at

[a] Nederland. Tijds. Dierkunde, I, pl. 1, fig. 3.

base of whiskers, but some of the nontypical forms do show small whitish areas at base of whiskers. The present material indicates that *Sciurus borneoensis* is a very variable species. Including in the species the lowland form described below, the following are some of the more striking variations, but all sorts of intermediate conditions are found between the extremes:

Base of whiskers whitish to bright ferruginous; cheeks and sides of neck and shoulders black with slight grizzling of whitish, to conspicuous grizzling with buffy and reddish, to almost a clear bright ferruginous; area above pale lateral stripe pure black grizzled with white or ochraceous or both in varying mixtures; feet, pure black, or bright rufous or various mixtures of these, or black with slight grizzling of buffy; underparts bright rufous to a general effect of seal-brown, the latter caused by a mixture of dark chestnut and blackish.

SCIURUS BORNEOENSIS PALUSTRIS, new subspecies.

Type.—Adult male, skin and skull, Cat. No. 142330, U.S.N.M. Collected on the north bank of the Kapuas River, below Pulo Limbang, western Borneo, September 22, 1905, by Dr. W. L. Abbott. Original number 4467.

Diagnostic characters.—Similar to *Sciurus borneoensis borneoensis*, but no red or rufous color appearing on cheeks, sides of neck, or shoulders.

Color.—Top of head, top of neck for a width of about 20 mm., back for a width of 25–30 mm. over shoulders, 50–60 mm. in the middle portion, narrowing to 20 mm. on the rump, base of the tail above and terminal hairs of the tail above and below, black; lateral stripe, about 100 mm. long, extending from behind the shoulder where it is 5 mm. wide, to front of thigh, where it is 15 mm. wide, and an inconspicuous spot under the eye, white; sides of neck, shoulder, outer side of upper arm, side of body between the white lateral stripe and the black back, a fine and equal grizzle of black and white, becoming a coarse grizzle of black and white, the latter color in excess, on the sides of the rump above the thigh; sides of head, upper surface of feet, outer side of forearm, and ears, black, finely grizzled with inconspicuous white; base of whiskers and area around lips, buffy; underparts of body and inner sides of legs, an equal grizzle of black and ferruginous; underside of tail, between the black basal portion and the black pencil, a coarse mixture of black and white.

Variations from the type.—Some specimens have more black in the underparts, so that the general effect is almost seal brown. One skin from Pulo Saparo, Cat. No. 142324, U.S.N.M., and one from Pulo Kanchil, Cat. No. 142319, U.S.N.M., have more extensive black backs and no grizzling appears between the pure black back and the white lateral stripe. The amount of light grizzling above the shoulder is variable. Two skins, Cat. No. 142321, U.S.N.M., opposite Pulo

Jambu, and Cat. No. 142322, U.S.N.M., opposite Pulo Saparo, show very slight traces of the red about the shoulder, which becomes such a conspicuous feature of *Sciurus borneoensis borneoensis*. In about half the specimens the white side stripe is subtended by a fairly well, marked black stripe. This black stripe is not very evident in the type. The white is often so arranged on the tail that in certain lights it appears black and white ringed.

Skull and teeth.—These show no characters by which they may be distinguished from those of the typical form or other species of the same size.

Measurements.—For measurements of the type and series see table, page 556.

Specimens examined.—Fifteen. See table, page 556.

Remarks.—*Sciurus borneoensis palustris* appears to be a dark-shouldered, dark-bellied form of *S. borneoensis* confined to the low swampy lands near the sea. No single specimen in the present series shows a complete intergradation with the typical form, but by picking out various specimens in the two series and using only homologous characters complete intergradation may be found from any style of one to any style of the other form.

SCIURUS SANGGAUS, new species.

Type.—Adult female, skin and skull, Cat. No. 142296, U.S.N.M. Collected at Sanggau, western Borneo, south bank of Kapuas River, August 21, 1905, by Dr. W. L. Abbott. Original number, 4357.

Diagnostic characters.—A member of the *Sciurus prevostii* group, most like *Sciurus carimatæ* Miller,[a] but shoulder darker, a grizzle of black and buff, and the white area of thigh finely mixed with black.

Color of type.—Nose, top of head, entire upper parts of body, and entire tail, black; entire underparts, inner side of legs, and upper surfaces of feet, ferruginous to orange-rufous; base of whiskers, small spot under eye, lateral stripe 100 mm. long by 10 wide, from just behind shoulder to front of thigh, white; outer side of thigh a coarse grizzle of black and white; sides of head and neck a fine grizzle of black and white, the black in excess; region of shoulder a grizzle of black and pale ochraceous or buff blending in with the ochraceous of the upper arm.

Variations in the series.—With the exception of two specimens from Pulo Kubu (opposite Pulo Limbang), no noteworthy variations in color are found in the series. In some individuals the cheeks are grayer than they are in the type. One or two specimens show the shoulder area nearly clear gray while in others a light ochraceous predominates. Compared with the series taken on the north bank of the Kapuas, the squirrels south of that river are remarkably uniform.

[a] Proc. U. S. Nat. Mus., XXXI, p. 57, July 23, 1906.

The two skins from Pulo Kubu (Cat. Nos. 142327, and 142328, U.S.N.M.) differ from the rest of that series in being slightly larger and in having the shoulder area tawny-ochraceous and the white on the thighs with scarcely any admixture of black.

Skull and teeth.—Apparently there are no constant differences by which skulls of *Sciurus sanggaus* may be distinguished from those of related species.

Measurements.—See table, page 556. *Sciurus sanggaus* averages slightly smaller than *S. borneoensis*.

Specimens examined.—Twenty-one; see table, page 556.

Remarks.—It is possible the two specimens from Pulo Kubu may represent a race distinct from the typical form. They average slightly larger than the rest of the series and differ somewhat in color as already noted. Except for a slightly smaller size they are practically indistinguishable from specimens of *Sciurus bangkanus*.

[The *Sciurus rafflesi* [or *prevostii*] class was particularly interesting and there is a large series. All those from the left bank of the Kapuas (facing sea) have black tails and all from the right bank and its adjacent islands have gray tails and are much more variable.—W. L. Abbott.]

SCIURUS DULITENSIS (Bonhote).

1901. *Sciurus vittatus dulitensis* Bonhote, Ann. Mag. Nat. Hist., 7th ser., VII, May, 1901, p. 451.

Doctor Abbott secured nine plantain squirrels in western Borneo which may be referred to this species. I have seen no examples from Mount Dulit, but Doctor Abbott's specimens do not differ essentially from plantain squirrels from Sarawak, though they apparently have less yellow on cheeks, sides of neck, and forearm. In color of the underparts, size and distinctness of the lateral stripes, the west Borneo squirrels show considerable variation, but it does not seem to be correlated with definite areas as in the case of the *prevostii* group of squirrels. For measurements see table, page 557.

Measurements of the squirrels of the Sciurus prevostii group in western Borneo.

Name.	Locality.	Number.	Sex and age.	Head and body.[a]	Tail vertebræ.[a]	Hind foot with claws.[a]	Greatest length of skull.	Interorbital constriction.	Zygomatic breadth.
				mm.	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*
S. sanggaus	Pulo Kubu, south bank of Kapuas.	142327	Male adult	245	252	61	57.0	20.6	33.8
Do	do	142328	Female adult	270	240	63	57.5	23.1	34.6
Do	Op. Pulo Saparo, south side of Kapuas.	142313	Male adult	245	235	61	53.4	22.6	33.8
Do	do	142314	do	250	248	62	56.0	21.9	34.0
Do	do	142315	do	235	245	61	54.9	21.8	32.9
Do	do	142316	do	253	230	61	55.7	21.9	34.6
Do	do	142317	Female adult	255	255	62	57.4	23.4	34.9
Do	Sanggau, south bank of Kapuas.	142293	Male adult	255	195	64	54.5	21.4	33.8
Do	do	142294	do	235	210	60	.....	20.2	.....
Do	do	142295	do	240	220	61	53.0	21.6	32.0
Do	do	142296[b]	Female adult	244	238	60	56.3	23.5	35.8
Do	do	142297	do	241	235	60	55.6	21.5	34.0
Do	do	142298	do	245	235	60	54.6	22.2	33.3
Do	do	142299	do	240	.....	62	54.9	20.8	32.4
Do	do	142300	do	245	240	61	53.9	20.9	32.3
Do	do	142301	do	251	238	63	55.6	23.5	34.2
Do	do	142302	do	280	225	62	55.8	21.7	34.0
Do	do	142303	Male adult	245	245	60	55.2	21.6	33.0
Do	do	142304	do	240	225	61	55.4	23.2	34.4
Do	do	142305	Female juv	228	224	60	53.1	20.2	31.7
Do	do	142306	Female adult	250	240	64	54.9	22.6	.....
S. borneoensis palustris.	Sungei Sama, near Pontianak.	142286	do	265	255	64	58.8	24.3	35.9
Do	Tg. Putus, Landak River.	142290	Male adult	255	240	65	54.5	24.4	35.0
Do	do	142291	do	248	253	64	54.6	.....	32.4
Do	Below Pulo Limbang, north side of Kapuas.	142329	do	268	.....	65	57.5	22.0	33.7
Do	do	142330[b]	do	260	270	65	58.7	22.6	34.6
Do	do	142331	do	255	245	65	58.6	23.3	34.8
Do	Op. Pulo Jambu, north side of Kapuas.	142320	do	245	277	65	.....	23.2	33.5
Do	do	142321	Female adult	263	257	64	58.0	23.3	35.6
Do	do	142323	do	260	245	62	57.5	23.0	34.9
Do	Op. Pulo Saparo, north side of Kapuas.	142322	do	260	260	64	59.3	22.3	35.4
Do	Pulo Saparo, north side of Kapuas.	142324	do	255	260	63	56.2	21.2	33.8
Do	do	142325	do	265	255	65	56.6	21.5	33.8
Do	do	142326	do	265	247	61	57.6	22.0	34.5
Do	Pulo Kanchil, north side of Kapuas.	142319	do	243	237	62	54.9	21.7	32.8
Do	do	142318	Male adult	238	250	62	56.9	23.7	35.5
S. borneoensis borneoensis.	10 miles below Tyan, north bank of Kapuas.	142309	do	240	250	60	53.8	21.4	32.3
Do	do	142310	do	240	260	63	58.0	22.2	35.0
Do	do	142311	Female adult	235	240	60	54.3	21.0	33.9
Do	do	142312	do	254	248	64	.....	22.3	.....
Do	Sanggau, north bank of Kapuas.	142307	Male adult	237	235	55	55.5	23.4	34.3
Do	do	142308	do	240	240	55	54.0	21.0	33.0
Do	Sungei Nya, Landak River.	142292	Female adult	240	225	60	54.5	22.7	33.9
Do	Tg. Putus, Landak River.	142287	Male adult	250	235	64	56.5	21.7	35.0
Do	do	142288	do	245	245	62	57.0	22.0	34.7
Do	do	142289	do	245	250	63	54.0	22.9	.....

[a] Collector's measurements.

[b] Type.

SCIURUS HIPPURELLUS Lyon.

1907. *Sciurus hippurellus* LYON, Smithsonian Misc. Coll., L, p. 27, April 8, 1907.

Three specimens, two from the Landak River and one from the Kapuas River below Tyan. For measurements, see table below.

Measurements of squirrels from western Borneo.

Name.	Locality.	Number.	Sex and age.	Head and body.[a]	Tail vertebræ.[a]	Hind foot with claws.[a]	Greatest length of skull.	Zygomatic width.	Interorbital constriction.
				mm.	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*
S. dulitensis	Pontianak	142275	Male, immature.	205	195	52	49.4	.....	17.4
Do	Sungei Sama	142276	Male, adult	210	208	51	49.0	29.0	17.5
Do	Sanggau	142277	do	213	182	53	50.2	28.8	16.7
Do	do	142278	do	200	195	52	49.4	29.9	17.3
Do	Kapuas River below Pulo Limbang.	142279	do	225	195	55	52.3	30.0	17.3
Do	Kwala Pontianak	142280	Female, adult	217	180	53	51.0	31.7	18.3
Do	do	142281	Female, young	190	180	50	48.4	27.8	16.6
Do	Sungei Sama	142282	do	195	195	52	48.7	28.3	17.4
Do	Sanggau	142283	do	201	145	52	49.0	29.0	16.0
S. hippurellus	Kapuas River below Tyan.	142272	Male, adult	250	250	61	55.7	34.2	18.2
Do	Landak River, Ngabong.	142273	Female, adult	240	260	61	56.1	34.2	19.5
Do	Landak River, Batu Ampar.	142274	Female, old	250	280	63	58.5	35.7	19.7
R. ephippium	Sanggau	142332	Male, adult	345	425	88	65.5	43.4	28.3
Do	North bank of Kapuas.	142333	do	330	385	83	64.4	40.4	25.7
Do	Sanggau district, Sungei Sakaiam.	142334	Female, adult	370	445	90	68.0	42.0	29 0
Do	Kapuas River, opposite Pulo Jambu.	142335	Female, nearly adult.	320	415	82	63.9	38.4	25.1

[a] Collector's measurements.

RATUFA EPHIPPIUM (Müller).

1838–39. *Sciurus ephippium* MÜLLER. Tijds. Natuur. Geschied. Physiol., V, p. 147.

Four specimens collected by Doctor Abbott in western Borneo agree fairly well with the original description, with the published figure,[a] and with notes made on the type in Leiden in 1904 by Mr. Gerrit S. Miller, jr., who remarks: "No locality can be given beyond southeastern Borneo in the low country," and further: "The plate[a] is a good representation of this specimen, except that color is a little too light, especially on cheeks, neck, feet, and along the sides, and the dark dorsal area does not come down far enough on the hips."

Of Doctor Abbott's specimens, Cat. No. 142334, U.S.N.M., from Sungei Sakaiam agree best with Müller's figure as modified by Mr. Miller's statement. The other three specimens are lighter and duller colored; especially along the sides and thighs, where they are even lighter in color than Müller's figure. The skulls show no essential differences from Müller's figures, although in general the rostrum is less pointed; but this may be accounted for by a certain degree of immaturity in the skull figured by him, which shows a distinct fronto-parietal suture which is always lacking in fully adult skulls.

[a] Verhandl. Natuur. Geschied. Nederl., 1839–1844, p. 91, pl. XIII.

Thus Cat. No. 142335, U.S.N.M., a nearly mature female, has a much more pointed rostrum than No. 142334, U.S.N.M., an old female. For measurements, see table, page 557.

NANNOSCIURUS BORNEANUS Lyon.

1906. *Nannosciurus borneanus* LYON, Proc. Biol. Soc. Washington, XIX, p. 54, May 1, 1906.

Thirteen specimens as follows: One skin and skull from Sungei Sama; five skins and skulls and one alcoholic from Tanjong Putus, Landak River; five skins and skulls and one alcoholic from the Kapuas River. (For table of measurements of these and related species, see Lyon, Proc. U. S. Nat. Mus., XXXI, 1906, p. 594.)

NANNOSCIURUS EXILIS (Müller).

One skin and skull, an adult male, from Sanggau. Collector's measurements: Head and body, 77 mm.; tail vertebræ, 50; hind foot, 25.

MUS EPHIPPIUM Jentink.

1880. *Mus ephippium* JENTINK, Notes Leyden Museum, II, p. 15.
1894. *Mus ephippium*, THOMAS, Ann. Mag. Nat. Hist., 6th ser., XIV, p. 453.

Nine small rats, most of them immature, from various localities, may be referred to this species. They are somewhat smaller and have darker bellies and narrower audital bullæ than a specimen that seems to be *Mus ephippium* from Tarussan Bay, Sumatra, but the material is not sufficient to determine their status satisfactorily.

For measurements see table below.

[Caught in Dyak houses. —W. L. Abbott.]

MUS RAJAH Thomas.

1894. *Mus rajah* THOMAS, Ann. Mag. Nat. Hist., 6th ser., XIV, p. 454.

One specimen, a young adult male, from the Kapuas River below Tyan. The single specimen is somewhat smaller than specimens of *Mus rajah* in the U. S. National Museum from the Natuna Islands, perhaps owing to its immaturity.

For measurements, see table below.

Measurements of Mus from western Borneo.

Name.	Locality.	Number.	Sex.	Age.	Head and body.[a]	Tail.[a]	Hind foot with claws.	Greatest length of skull.
					mm.	*mm.*	*mm.*	*mm.*
Mus ephippium..	Sungei Sama.....	[b] 142250	Male.....	Young adult..	115	112	23	27.6
Do.....	.....do.....	[b] 142251	Female...	Adult.....	123	125	25	29.5
Do.....	.....do.....	[b] 142252	.....do....	.....do.....	125	121	24	30.0
Do.....	Pulo Jambu.....	[c] 142253	.....do....	Young adult..	110	115	24	28.5
Do.....	.....do.....	[c] 142257	.....do....	.....do.....	114	122	24	.....
Mus rajah.....	Kapuas River below Tyan.	[c] 142248	Male.....	.....do.....	162	158	42	41.7

[a] Collector's measurements. [b] Alcoholic. [c] Skin and skull.

FELIS BENGALENSIS of Authors.

One specimen from Ngabong, Landak River, a young female, with none of the permanent teeth in place.

Measurements: Cat. No. 142343, U.S.N.M.; head and body, 387 mm.; tail, 158; hind foot, 88; greatest length of skull, 69; zygomatic breadth, 47.5.

ARCTOGALIDIA STIGMATICA (Temminck).

An adult male from the Landak River. Cat. No. 142341, U.S.N.M.

Measurements: Head and body, 555 mm.; tail, 660; hind foot, 96; weight, 7¼ lbs. (3.29 kgs.); greatest length of skull, 110; basal length, 105.6; basilar length, 103.5; zygomatic width, 67.7; interorbital constriction, 13.7; front of canine to back of last upper molar, 41.

PARADOXURUS PHILIPPINENSIS Jourdan.

1885. *Paradoxurus philippinensis*, Blanford, Proc. Zool. Soc. London, p. 800.

Two specimens of *Paradoxurus*, collected by Doctor Abbott in western Borneo, do not appear essentially different from two skins collected by Dr. E. A. Mearns in the Philippine Islands.

Measurements: Adult male, Pontianak, Cat. No. 142338, U.S.N.M., and adult male, Sanggau, Cat. No. 142339, U.S.N.M., head and body, 500, 470 mm.; tail, 443, 375; hind foot, 85, 84; greatest length of skull, 101.4, 100.5; basal length, 95.7, 92.4; basilar length, 93.5, 91.5; front of canine to back of last upper molar, 36.5, 35.7.

[Brought alive by a Malay, very thin.—W. L. Abbott.]

HERPESTES SEMITORQUATUS Gray.

1846. *Herpestes semitorquatus* Gray, Ann. Mag. Nat. Hist., XVIII, 1846, p. 211.

1879. *Herpestes semitorquatus*, Anderson, Zool. Western Yunnan, p. 191, pl. IX, figs. 1, 2.

I refer a young male mongoose from Sanggau to this species with some hesitation. It is a very immature individual, and while the characters of the skin answer in a general way to the description of that of *Herpestes semitorquatus*, the appearance of the skull suggests that at maturity it would more nearly resemble that of *H. vitticollis*.[a] The light area on the sides of the neck is not at all conspicuous, as the description of *H. semitorquatus* indicates. The back and upper sides are not "finely marked with yellow," but most of the long hairs of those regions have a rather wide yellow subterminal band.

Measurements: Cat. No. 142340, U.S.N.M., immature male, head and body, 370 mm.; tail, 235; hind foot, 82; greatest length of skull, 78; zygomatic width, 43.

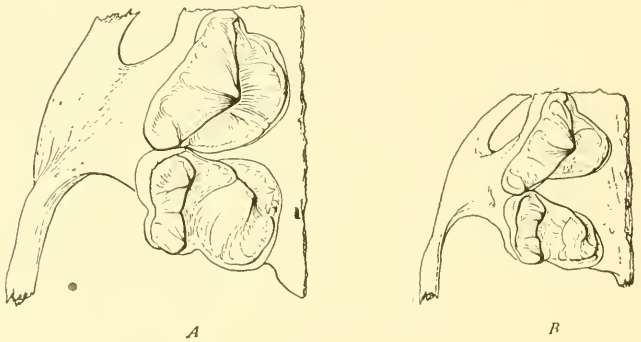
[a] Anderson, Zool. West. Yunnan, p. 191, pl. IX, figs. 3, 4.

LUTRA LOVII Günther.

1876. *Lutra lovii* Günther, Proc. Zool. Soc. London, p. 736. (Type-locality, Borneo, opposite island of Labuan.)

1905. *Lutra lovii*, Willink, Natuurkundig Tijdschrift Nederlandsch Indië, LXV, p. 222.

Two small hairy-nosed otters may be referred to this species, which is almost an exact miniature of the large *Lutra barang* of the Malay region. The color of *Lutra lovii* is generally darker throughout, both above and below. The light area on the throat is more restricted and more contrasted with the general dark color of the animal. The tail is relatively much larger than it is in the *Lutra barang* and considerably longer (about 4 inches = 100 mm.) than the published measurements (11 inches) of *Lutra lovii*. The skull of *Lutra lovii* has about the same general size as that of the clawless otter, *Aonyx*



A. Last two maxillary teeth (right side) of Lutra barang, adult female, Cat. No. 104437, U.S.N.M., Pulo Lankawi, × 1½. *B*. Last two maxillary teeth of Lutra lovii, adult female, Cat. No. 142337, U.S.N.M., Pulo Saparo, in Kapuas River, western Borneo, × 1½.

cinerea, but in shape and in relative proportions it is almost an exact counterpart of that of *Lutra barang*. In addition to the differences in size between the skulls of *Lutra lovii* and *L. barang* may be mentioned the enlarged bullæ of the smaller species, the distinctly smaller foramina along the inner side of the bullæ and the reduction of the inner segment of the upper carnassial tooth.

The marked differences between the carnassial teeth of the small *Lutra lovii* and the large *L. barang* are well shown in the figure above, and require no detailed description. They may indicate more than a specific difference.

The two adult females collected by Doctor Abbott measure as follows: Cat. No. 142336, U.S.N.M. (near Pontianak), and No. 142337, U.S.N.M. (Pulo Saparo); head and body, 615, 575 (585)[a] mm; tail, 385, 375 (280); hind foot with claws, 107, 103; greatest length of skull, 101, 100.2; basal length, 94.3, 91.4; upper length, 85, 83.7

[a] See foot note on page 561.

[about 90];[a] mastoid breadth, 51.4, 53 [about 55]; zygomatic breadth, 58, 58.9[—]; interorbital constriction, 11.4, 13.7 [—]; upper tooth row to front of canine, 30.5, 30.7 [32.4]; lower tooth row to front of canine, 38, 38 [42.4].

Mr. Gerrit S. Miller, jr., writes that the type of *Lutra lovii* in the British Museum is "a young hairy-nose with milk canine and next to last premolar in place. Skull broken away behind." It will be seen from the above measurements that Doctor Abbott's two small otters have much longer tails than has the type of *L. lovii*, and slightly smaller skulls; and it is not at all unlikely that they represent a different race. As the type of *L. lovii* is young and of the opposite sex from Doctor Abbott's two specimens, it does not seem advisable for the present to name the Bornean form.

HELARCTOS EURYSPILUS Horsfield.

1826. *Helarctos eurysplilus* Horsfield, Zool. Journ., II, pp. 221–234, pl. VII.

A single skull, Cat. No. 142344, U.S.N.M., without lower jaw, from the Landak River, may be referred to *Helarctos eurysplilus*, which most authors have regarded as a synonym of *H. malayanus*, and not without reason, for Horsefield's description of *Helarctos eurysplilus* was based on a living example in London, and no characters are given to differentiate the two forms. In 1903 Doctor Abbott collected a full-grown male of the Sumatran *Helarctos malayanus* along the Kateman River, eastern Sumatra. A comparison of its skull with the Bornean skull shows well-marked differences between the two insular forms. It should be noted, however, that the type of *H. malayanus* came from Bencoolen, some little distance from the Kateman River, and that no locality in Borneo is mentioned for *H. eurysplilus*, so that the following comparison may not be made between typical examples of the two species. Both skulls are fully adult and of nearly equal age, although the Sumatra one is the older. The sex of the Bornean skull is unknown, but judging from the large size of the canine and other teeth it is without question not different in sex from the Sumatran skull.

In addition to the difference in size shown in the following table may be mentioned the greater relative size of the maxillary teeth in the Bornean bear, which are actually as large as in the Sumatran species; the relatively wider palate and its greater posterior extension behind the toothrow in *Helarctos malayanus*, relatively larger bullæ in *H. eurysplilus*, and the very large expansion of that portion of the mastoid applied to the posterior aspect of the auditory canal in the Sumatran species.

[a] Measurements in parentheses are those given in the original account of *Lutra lovii* (Proc. Zool. Soc. London, 1876, p. 736), and those in brackets measurements of the type skull of *Lutra lovii* made by Mr. Gerrit S. Miller, jr.

Cranial measurement of Sumatran and Bornean sun-bears.

Dimensions.	*Helarctos malayanus*, Cat. No. 123138, Kateman River, eastern Sumatra.	*Helarctos euryspilus* Cat. No. 142344, Landak River, Borneo.
	mm.	*mm.*
Basal length	215	189.5
Basilar length	210	186
Condylo-basal length	234	205
Palatal length	117	102.3
Greatest length	256	222
Zygomatic width	208	176.4
Mastoid width	156	134.5
Width of braincase above zygomata	104	91.8
Width at postorbital processes	87.5	74.6
Least interorbital width	69	60
Least width of palate between last upper molars	41	36
Posterior edge of last upper molar (alveolus) to palation	36	28
Posterior edge of last upper molar (alveolus) to tip of pterygoid	66	60
Alveolar length of last three upper cheek teeth combined	44	44.5
Antero-posterior diameter of canine at alveolus	25	22.5

TUPAIA DORSALIS Schlegel.

1857. *Tupaia dorsalis* SCHLEGEL, Handl. beoef. Dierkunde, Pt. 1, p. 59, pl. III, fig. 31.

1890. *Tupaia dorsalis*, JENTINK, Notes Leyden Museum, XII, p. 228.

Skin and skull of adult female from the Kapuas River opposite Pulo Saparo. Region of that river is the type-locality.

Measurements, Cat. No. 142247, U.S.N.M.: Head and body, 175 mm.; tail vertebræ, 145; hind foot 43; greatest length of skull, 49; zygomatic width, 22.4; interorbital constriction, 12.8.

[Snared by Malay.—W. L. Abbott.]

TUPAIA SPECIOSA (Wagner).

1840. *Cl[adobates] speciosus* WAGNER, Schrebers Säugthiere, Supplementband von J. A. Wagner, II, p. 43.

Two specimens, an adult male from the Kapuas River opposite Pulo Jambu and a young male from the Tyan district. Owing to the general distinctness of species in related groups from Borneo and Sumatra, I have used the name *Tupaia speciosa* (type-locality, Borneo) in preference to the usual name *T. tana* (type-locality, Sumatra). The adult, Cat. No. 142247, U.S.N.M., measures: Head and body, 229 mm.; tail, 196; hind foot, 55; greatest length of skull, 64; zygomatic width, 29.3; interorbital constriction, 16.6.

CYNOPTERUS BRACHYOTIS (Müller).

1839. *Pachysoma brachyotis* MÜLLER, Tijdschrift Natuur. Geschied. Physiol., V, p. 146.

Twenty-five specimens, 2 skins with skulls and 23 in alcohol, all from the Kapuas River, Sanggau district.

For external measurements of ten adults see table, page 564. Nearly all of the specimens are pregnant females.

RHINOLOPHUS TRIFOLIATUS Temminck.

1835–1841. *Rhinolophus trifoliatus* Temminck, Monogr. Mammalogie, II, p. 27, pl. xxxi. (Java, type-locality.)

1878. *Rhinolophus trifoliatus*. Dobson, Cat. Chirop. British Mus., p. 106, pl. vii, fig. 3.

1905. *Rhinolophus trifoliatus*, Andersen, Ann. Mag. Nat. Hist., 7th ser., XVI, August, 1905, p. 249, and table opposite p. 256, and figs. 2 and 2*a*, p. 245.

One specimen, an adult male, Cat. No. 142384, U.S.N.M., preserved, in alcohol from Pulo Kanchil, Kapuas River. The type of *Rhinolophus trifoliatus* came from Java, but I quite agree with Andersen, in the absence of specimens, in using Temminck's name for the Bornean animal, although, as Andersen has pointed out, there are some discrepancies between Temminck's natural-size illustration and Bornean specimens. The example secured by Doctor Abbott is a large-sized individual, agreeing in most respects with Andersen's maximum measurements.

For external measurements see table, page 564. The principal cranial measurements are: Total length, 24.9 mm.; mastoid width, 11.1; zygomatic width, 12.4; width of nasal swellings, 6.5; maxillary toothrow, 9.4; mandibular toothrow (not including incisors), 9.9.

MYOTIS MURICOLA (Hodgson).

Seven specimens from Sanggau, an adult male, four adult females, and two young, all in alcohol.

For external measurements see table, page 564.

[Caught roosting in the plantain leaves.—W. L. Abbott.]

GLISCHROPUS TYLOPUS (Dobson).

1875. *Vesperugo (Glischropus) tylopus* Dobson, Proc. Zool. Soc. London, p. 473 (type-locality, northern Borneo).

1907. *Glischropus tylopus*, Miller, Bull. 57, U. S. Nat. Mus., p. 205, June 29, 1907.

Doctor Abbott secured 56 specimens of this interesting bat, all preserved in alcohol from the following localities: Sungei Sama, near Pontianak, 38; Kapuas River opposite Pulo Jambu, 11, and on Pulo Jambu, 7.

For external measurements see table, page 564.

[Caught in banana leaves, caught in a hollow bamboo.—W. L. Abbott.]

KERIVOULA HARDWICKII (Horsfield).

One specimen, an adult female, from along the Kapuas River. For external measurements see table, page 564. The skull of this specimen is a trifle smaller than two Javan skulls of *Kerivoula hardwickii* in the U. S. National Museum collection, but one of the latter is almost as much smaller than the other as the Bornean skull is smaller than it. There are no appreciable differences externally.

External measurements of bats from western Borneo.

Name.	Locality.	Number.	Sex.	Ear from crown.	Tail.	Forearm.	Second finger.	Third finger.	Fourth finger.	Fifth finger.	Tibia.	Foot.
				mm.	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*
Cynopterus brachyotis	Kapuas River, near Sanggau	142382	Male	13.5	7	.....	41	99	81	75	25	16
Do	do	142383	do	14	7.5	60	42	96	80	76	24	14
Do	do	142361	Female	15	8.5	61	41	98	80	74	22	14
Do	do	142364	do	14	10	61	42	96	82	78	24	13
Do	do	142368	do	16	9	64	43	100	86	84	25	13.5
Do	do	142370	do	15	8	65	42	98	85	84	23	14
Do	do	142373	do	14	9	65	41	96	81	81	25	14.5
Do	do	142374	do	15	11	64	44	100	83	81	25.5	15
Do	do	142375	do	13.5	9	62	40	96	82	79	25	14
Do	do	142377	do	14	8	63	41	98	80	79	24	14.5
Rhinolophus trifoliatus	Kapuas River, Pulo Kanchil	142384	Male	22	33	50	37	77	66	70	25	11
Glischropus tylopus	Sungei Sama, near Pontianak	142387	do	7.5	32	27.8	.....	53	45	40	13	5
Do	do	142393	do	7.5	34	27.5	.....	52	45	37	13	6
Do	do	142396	do	8	31	28.5	.....	52	44	39	13.5	5.5
Do	Kapuas River, Pulo Jambu	142407	do	8	32	28	.....	52	45	37	13	6
Do	do	142408	do	8	32	27.5	.....	53	44	38	13	6.2
Do	do	142409	do	8	32	27.6	.....	55	47	38	13.5	6.5
Do	Sungei Sama, near Pontianak	142417	Female	7.5	31	27	.....	53	43	39	13	6.5
Do	do	142420	do	7	31	28	.....	54	47	40	13.5	6
Do	do	142428	do	7.5	33	28	.....	51	45	39	13.5	6
Do	Kapuas River, opposite Pulo Jambu	142449	do	8	32	29	.....	57	47	42	13.5	6.2
Do	do	142451	do	7.5	30	28.4	.....	56	47	38	13	6
Do	do	142452	do	8	30	29.5	.....	57	48	43	13.7	6.2
Kerivoula hardwickii	Kapuas River	142455	do	10	37	32.5	.....	63	52	48	17	8.5
Myotis muricola	Kapuas River, Sanggau	142402	Male	9.5	37	34	.....	56	47	43	16.5	6
Do	do	142442	Female	10	38	34.5	.....	62	50	46	16	6.5
Do	do	142444	do	10	34	33	.....	60	50	43	16	7

TARSIUS TARSIER (Erxleben).

Four specimens of Tarsiers from western Borneo may be referred to this species provisionally. The only skin preserved, a female, is practically indistinguishable from a Philippine skin (Cat. No. 105475, U.S.N.M.), from Mindanao. The skulls of the Bornean specimens are larger, with heavier teeth and more inflated bullæ than has the Philippine skull.

[Dyak name Lingseng.—W. L. Abbott.]

Measurements of Tarsius tarsier from western Borneo.

Locality.	No.	Sex and age.	Head and body.	Tail.	Hind foot.	Greatest length of skull.	Greatest width of skull.	Greatest breadth of brain case.
			mm.	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*
Pontainak	142243	Female, adult	[a] 145	[a] 208	[a] 67	39.5	35.5	23.7
Do	142244	Female, young	[a] 95	[a] 125	[a] 52	30	.....	21.6
Sakaiam River	142241	Male, adult	[a] 155	[a] 215	[a] 71	38.8	35.3	23.4
Landak River	142242	Female, immature	[b] 120	[b] 190	[b] 69	36.5	30	23.8

[a] Measurements by writer from alcoholic specimens.
[b] Measurements in the flesh by collector.

NYCTICEBUS BORNEANUS Lyon.

1906. *Nycticebus borneanus* LYON, Proc. U.S. Nat. Mus., XXXI, p. 535, November 9, 1906.

Five specimens from Sanggau, one from Tyan, one from the Landak River, and two from the Sakaiam River. For measurements of this and other species see Proceedings of the U. S. National Museum, XXXI, page 537. In his notes Doctor Abbott says: "Brought in alive by Malays. Many of these animals are caught at this season (August) when the jungle is being felled for *ladangs* (clearings for paddy)."

MACACA FASCICULARIS (Raffles).

One skin and skull of an adult male, Cat. No. 142225, U.S.N.M., from Sungei Sama, near Pontianak.

Measurements: Head and body, 445 mm.; tail, 570; hind foot, 140; greatest length of skull, 119; zygomatic width, 77; maxillary tooth row, 37.5; mandibular tooth row, 41.3.

MACACA NEMESTRINA (Linnæus).

It is with much hesitation that I refer three skulls, without skins to *Macaca nemestrina*. They were obtained by Doctor Abbott from the natives, one from the Landak and two from the Sakaiam River. Either the species is represented at these two places by two forms or else the range of individual variation is considerably greater than the specimens studied by Mr. Miller[a] would indicate.

[a] The monkeys of the *Macaca nemestrina* group, Proc. U. S. Nat. Mus., XXIX, pp. 555–563, pls. XIII–XX, February 3, 1906.

The two skulls from the Sakaiam River are almost exactly alike and show no appreciable differences from skulls of *Macaca nemestrina* from Sumatra. See table of measurements below, and the measurements given by Mr. Miller, place cited, page 562. The skull from the Landak River more nearly resembles the type skull of *Macaca broca* Miller (page 558, place cited), but the zygomatic width is not as great (see table below), and the angle of the plane of the orbits with the plane of the nasals is not so well marked. In many ways the Landak skull is an intermediate between the type skull of *Macaca broca* and the Sakaiam skull or skulls from Sumatra, but rather nearer the *Macaca broca* type. It is possible that more than one form of the *Macaca nemestrina* group should occur in Borneo, but at present specimens are too few to determine this fact satisfactorily or to map out their ranges. For the present it seems best to consider the three skulls from western Borneo as being *Macaca nemestrina*, or very near that, and still consider that *Macaca broca* Miller, from northern Borneo, is a well-marked form.

It may be noted in this connection that the description of the color of *Macaca broca*, quoted by Mr. Miller from Hose's Mammals of Borneo, was not written by Mr. Hose, but copied by that author verbatim from the account of *Macaca nemestrina* as written by Anderson in his Western Yunnan Report in 1878. Many of Hose's descriptions seem to have been taken from earlier writers, such as Anderson and Blanford.

[On one occasion, at Sintass, a Dyak Kampong away up the Sakaiam River, near Sarawak frontier, I saw 21 broks (*Macaca nemestrina*), all brought in together one evening and eaten. A drove was surrounded in a clearing, and all killed.—W. L. Abbott.]

Measurements of five skulls belonging to adult males of the Macaca nemestrina group.

Dimensions.	*Macaca broca*, type Cat. No. U.S.N.M. 34930, Sapagaya River, northeast Borneo.	*Macaca nemestrina*, Cat. No. U.S.N.M. 142226, Landak River, west Borneo.	*Macaca nemestrina*, Cat. No. U.S.N.M. 142227, Sakaiam River, west Borneo.	*Macaca nemestrina*, Cat. No. U.S.N.M. 142228, Sakaiam River, west Borneo.	*Macaca nemestrina*, Cat. No. U.S.N.M. 141143, Tarussan Bay, Sumatra.
	mm.	*mm.*	*mm.*	*mm.*	*mm.*
Condylo-basilar length	111.0	112.5	121.0	121.0	115.0
Basilar length	100.0	104.0	108.0	107.0	103.0
Greatest length	145.6	153.0	160.0	154.0	153.0
Palatilar length	60.0	62.0	64.0	66.0	62.0
Orbit to gnathion	59.0	68.5	68.8	68.0	66.8
Front of orbit to posterior point of brain case	96.0	96.0	100.0	96.0	100.0
Zygomatic breadth	104.0	96.0	95.0	96.0	102.0
Breadth of brain case above roots of zygomata	71.0	74.3	70.0	68.0	73.0
Depth of brain case from posterior extremity of frontal to lower edge of occipital condyle	63.0	63.0	58.0	57.0	[a]62.0
Maxillary toothrow (alveoli)	47.4	49.0	51.5	50.7	48.5
Mandible, back of condyle to front of symphysis	110.4	111.0	115.4	114.0	110.0
Mandibular toothrow (alveoli)	54.4	55.5	58.8	56.8	58.9

[a] This measurement in Cat. No. 123143 U.S.N.M. from Kateman River, Sumatra, is only 56 mm. a trifle less than in the two flat-headed Bornean skulls.

PRESBYTIS CHRYSOMELAS (Schlegel).

1838–39. *Semnopithecus chrysomelas* SCHLEGEL, Tijdscrift Natuur. Geschied. Physiol., V, p. 138. (Type-locality, Pontianak, western Borneo.)

1839–1844. *Semnopithecus chrysomelas*, MÜLLER and SCHLEGEL, Verhandl. Natuur. Geschied. Nederlandsch Bezittingen, p. 71, pl. x, figs. 1 and 2; pl. xi, figs. 2, 3.

Nine specimens, seven skins with skulls, one skin without skull, and one skull without skin, all of them practically topotypes of *Presbytis chrysomelas* (Schlegel). For list of the specimens and measurements see table on page 568. In addition to the eight mentioned in the table is Cat. No. 143628, U.S.N.M., adult male, skin without skull, no measurements taken by collector, from 10 miles below Pulo Limbang.

The color of these specimens is very similar to that of the figure of the male shown in Müller and Schlegel's plate (fig. I, pl. x, volume cited) except that the underside of the tail for its basal half or three-quarters is white or whitish in Doctor Abbott's series, instead of yellowish, as in the plate. Doctor Abbott's series shows no difference in color between the two sexes. The white on the underside of the tail is a very conspicuous marking, so that the basal portion of that organ is sharply bicolor. The lower belly, a narrow line down the inner side of the thigh and legs, are whitish, while a spot on the breast, a line on the throat, and a line down the arms and forearms are gray. The rest of the animal, whether male or female, is black or blackish.

The chief difference in color between *Presbytis chrysomelas* and *P. sumatranus* appears to be in the clearer and more contrasted white markings of the Bornean form. The skulls of the two species appear to have slight if any differences, the most conspicuous being the greater inflation of the cranium, just below the lambdoid suture in *P. chrysomelas*, and slightly narrower opening of the anterior nares in *P. sumatranus*.

[The commonest *Semnopithecus* along the Kapuas was a black one with whitish belly and under the tail. The black was deep and dull, not like *sumatranus*, and entirely different from *Semnopithecus hosei* and *everetti*, both of which are in the museum here [Singapore]. I did not meet with the red form [*Presbytis rubicundus*], but the natives said it was common in the hills.—W. L. Abbott.]

External and cranial measurements of Presbytis chrysomelas (Schlegel).

Locality.	Number.	Sex and age.	Head and body.[a]	Tail.[a]	Hind foot.[a]	Weight.[a]	Weight.	Basal length of skull.	Front of canine to back of m^3.	Zygomatic width.
			mm.	*mm.*	*mm.*	*lbs.*	*kilos.*	*mm.*	*mm.*	*mm.*
Near Pontianak	142203	Male adult	490	695	175	14	6.350	61.9	28.0	71.1
Do.	142204	do	460	725	180	14	6.350	64.2	29.6	71.0
Landak River, at Batu Ampar.	142205	do	460	765	184	14	6.350	62.0	28.7	69.8
Landak River	142206	do	515	750	171	15¾	7.144	61.2	28.6	70.0
Kapuas River below Tyan.	142207	do	470	695	170	13	5.897	58.8	27.5	67.5
Kapuas River below Pulo Limbang.	142208	do	480	725	185	15½	7.031	64.5	30.8	71.4
Near Pontianak	142209	Female adult	465	695	173	15¼	6.917	58.4	26.5	67.7
Kapuas River	[b]142211	do	.....	.....	.....	.....	.....	63.3	29.7	67.2

[a] Collector's measurements taken in the flesh. [b] Skull only, no skin.

PRESBYTIS CRISTATA (Raffles).

1822, *Simia cristata* RAFFLES, Trans. Linn. Soc. London, XIII. p. 244. (Type-locality, Sumatra).

There seems to be no essential differences between specimens of *Presbytis cristata* from Sumatra, Banka,[a] and Borneo, as is so often the case with other groups of species of mammals. Doctor Abbott secured two skins with skulls. These specimens with their measurements are: Cat. No. 142212 U.S.N.M., adult male, from Kwala Pontianak, and Cat. No. 142213 U.S.N.M., an adult female from Sanggau; head and body, 540, 530 mm.; tail 760, 660; hind foot, 174, 152; weight 14½ lbs. (6.577 kgms.), 13½ lbs. (6.124 kgms.); basal length of skull, 72, 65; front of canine to back of m^3, 33, 30; zygomatic width, 74, 68.7.

As most of the writers on monkeys have paid but little attention to the skull characters and devote considerable attention to the physiognomy it may not be without interest to point out some of the rather striking cranial differences between the *Presbytis chrysomelas* and *P. cristata* groups of monkeys, which may be tabulated thus:

Presbytis cristata.	*Presbytis chrysomelas.*
Anterior nares gradually tapering to a point antero-inferiorly.	Anterior nares suddenly contracted to a point antero-inferiorly.
Supercilliary ridge well marked.	Supercilliary ridge barely indicated.
No well-marked arch under malo-maxillary suture.	A well-marked arch under malo-maxillary suture.
Constriction behind orbits considerable.	Constriction behind orbits less well marked.
No prominent swelling of braincase just beneath lambdoid suture.	A well-marked swelling of braincase just beneath lambdoid suture.
Palate longer.	Palate shorter.
Rostrum more pronounced.	Rostrum less pronounced.
Ramus of mandible deep, and angular process enlarged.	Ramus of mandible shallow, and angular process not unusually enlarged.

[a] Lyon, Proc. U. S. Nat. Mus., XXXI, 1906, p. 607.

NASALIS LARVATUS (Wurmb).

Of this handsome and strikingly marked monkey, Doctor Abbott secured nine skins with skulls, and one odd skull. The skins are quite uniform in color and markings. Cat. No. 142418, U.S.N.M., has the legs grayer than the average and is slightly more gray across the shoulders than the majority of specimens. Cat. No. 142219, U.S.N.M., an adult male, is distinctly gray across the shoulders, and is further different from the other specimens in having the diamond-shaped rump patch smoky gray instead of cream color, as have all the other specimens except Cat. No. 142222, U.S.N.M., an immature female, where the color is likewise smoky gray. In Cat. Nos. 142221 and 142224, U.S.N.M., adult females, the rump patch is intermediate in color between cream color and smoky gray. The dorsal neck stripe is most pronounced in the adult males.

Compared with a mounted specimen in the United States National Museum, from northern Borneo, the present series is distinctly brighter in color, but the pattern is everywhere the same. This difference is probably due to fading in the mounted specimen, or to the action of pickling fluids. For external and cranial measurements see table below. The difference in size between the two sexes is very marked. The skins of the females have the hair softer and more immature looking than do the skins of males. The oldest female has less than half the weight of adult males which are not quite so old.

External and cranial measurements of Nasalis larvatus from western Borneo.

Locality.	Number.	Sex	Age.	Head and body.[a]	Hind foot.[a]	Tail.[a]	Weight.[a]	Weight.	Basal length.	Zygomatic width.	Front of canine to back of m^3.
				mm.	*mm.*	*mm.*	*lbs.*	*kilos.*	*mm.*	*mm.*	*mm.*
Sungei Sama near Pontianak.	142214	Male	Adult	690	220	670	38	17.24	91.0	92.0	42.3
Do	142215	do	do	700	240	660	44	19.95	92.3	94.9	40.4
Sungei Nya	142216	do	Immature[b]						74.7	77.3	37.2
Kapuas River below Tyan.	142217	do	Adult	705	232	725	52	23.58	93.2	93.3	40.8
Do	142218	do	do	700	235	675	46	20.86	91.9	91.7	43.5
Pulo Kanchil	142219	do	do	700	225	700	45	20.41	91.8	94.0	42.3
Kapuas River below Pulo Limbang.	142220	do	do	700	235	675	48	21.77	94.0	90.0	40.0
Sungei Sama near Pontianak.	142221	Female	Old	605	203	620	23	10.43	79.0	77.7	35.0
Kapuas River below Tyan.	142224	do	Adult	540	182	570	22	9.98	72.8	77.0	37.0
Do	142222	do		505	175	530	16	7.26			

[a] Collector's measurements.
[b] Skull only; milk teeth all shed but permanent teeth not quite fully in place.

HYLOBATES LEUCISCUS (Schreber).

1800. *Simia leucisca* SCHREBER, Säugthiere Suppl., pl. III B. No description or locality. For date of this plate see Sherborn, Proc. Zool. Soc. London, 1891, p. 590. (The locality of the specimen from which the plate was made is given by Matschie as northwestern Borneo, Sitz.-Ber. Gesellsch. naturforsch, Freunde, Berlin, 1893–1894, pp. 60–62.)

1876. *Hylobates concolor* SCHLEGEL,[a] Mus. d'hist. nat. Pays-Bas. Simiæ, p. 20.

1904. *Hylobates leuciscus*, TROUESSART, Catalogus Mammalium, Suppl., p. 5.

Six skins with skulls and one odd skull from the Landak and Kapuas rivers. In point of color the six skins agree remarkably well with Schreber's plate of this species. The general color is a drab or smoke gray. On the rump this color becomes lighter and has a buffy cast. On one individual, Cat. No. 142178, U.S.N.M., the greater portion of the body is of this lighter color. The underparts of the body are lighter in color than the upper parts, except for a narrow collar of about the same color as are the upper parts, extending from one axilla to the other. The naked or nearly naked portions of the face are blackish, as well as a narrow band of hair adjoining the naked portion. This ill-defined blackish band is succeeded by a narrow, not very well marked band, lighter and more buffy in color than the rest of the head. The naked portions of the hands and feet are black, and in a few specimens the hair on the backs of the fingers is somewhat darker than the color of the arm.

External and cranial measurements of Hylobates leuciscus from western Borneo.

Locality.	Number.	Sex.	Age.	Head and body.[a]	Hind foot.[a]	Weight.[a]	Weight.	Basal length.	Zygomatic width.	Front of canine to back of m^3.
				mm.	*mm.*	*lbs.*	*kilos.*	*mm.*	*mm.*	*mm.*
Landak River, Sungei Nya..	142172	Male.....	Adult..	497	152	14.25	6.463	73.2	67.0	33.0
Do.....	142173	....do.....	....do..	460	145	14	6.350	76.3	70.7	36.5
Kapuas River below Tyan..	142174	....do.....	Old....	475	150	14	6.350	77.5	72.6	35.3
Do.....	142175	....do.....	....do..	480	150	13	5.896	71.3	66.1	34.7
Pontianak.....	142176	Female[b]..	Young.	.....	.....	.....	.....	53.6	53.7	.....
Kapuas River below Tyan..	142177	....do.....	Adult..	465	151	13.25	6.010	73.2	69.0	31.0
Do.....	142178	....do.....	Old....	465	158	12.25	5.557	73.0	68.3	32.2

[a] Collector's measurements.
[b] Skull only, very young, last teeth in place are the first permanent molars.

[Only one sort of Gibbon was seen, *H. leuciscus*, common all along the river except in the islands of the Delta. Some of the specimens,

[a] Not of Harlan, Journ. Acad. Nat. Sci. Phila. V, 1827, p. 231, which was evidently a young *Symphalangus*. Containing only its milk dentition it was almost as large as adults of *Hylobates leuciscus*.

particularly one female, had the second and third toes joined in the manner of *Symphalangus*, but neither in voice nor appearance was there any other resemblance.—W. L. Abbott.]

PONGO PYGMÆUS PYGMÆUS (Linnæus).

1763. *Simia pygmæus* Linnæus, Amœnitates Academicæ, VI, p. 68.
1904. *Pongo pygmæus pygmæus*, Rothschild, Proc. Zool. Soc. London, 1904, II, p. 438.

Twenty-six specimens, namely, three skins with skulls from Sungei Sama, and twenty-three skulls without skins from along the Sakaiam River. The odd skulls were obtained from the dwellings of natives (Dyaks) who had used the animals for food. This collection of skulls has been very carefully studied by Dr. Aleš Hrdlička,[a] Assistant Curator, Division of Anthropology, United States National Museum, and no remarks on them are here necessary. The general color of the skins is nearest Ridgway's chestnut or burnt sienna, darkest on the head and back; in places, as at the extremities, and especially around the buttocks, the color passes into ferruginous. The scant hairs on the underparts are not different in color from those of the back. Cat. No. 142170, U.S.N.M., has the hairs under the chin ferruginous. The three skins are somewhat darker in color than are skins from Sumatra in the United States National Museum. The hair is long, coarse, and shaggy, attaining its greatest length (120–130 mm.) on the back. External measurements of the two adult females, Cat. Nos. 142169 and 142170, U.S.N.M.: Head and body, 720, 785 mm.; hind foot, 290, 283; weight, 70 lbs. (31.75 kg.) "gutted," 75 lbs. (34 kg.).

[It was apparently the wrong time for orangs along the lower Kapuas. No wild fruit, but the natives said there were plenty during the rains of January, etc., and especially when the durians and rambutans were ripe, said they were close to the kampongs [villages]. Up the Sakaiam they were scarce. I saw many old sarongs up the Landak, about 50 miles above Pontianak, but no orangs. Was afterwards sorry I did not make a longer stay there, as the country thereabouts was magnificent forest, with scarcely any inhabitants.—W. L. Abbott.]

[a] Proc. U. S. Nat. Mus., XXXI, 1906, pp. 539–568.