NOTES ON MALAYAN PIGS.

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The U. S. National Museum contains 62 Malayan pigs (51 skins and 62 skulls) presented by Dr. W. L. Abbott. This collection, especially rich in local species of the *Sus vittatus* group, was made in the region extending from the Natuna Islands on the east to the Nicobar and Andaman Islands on the west, and from Tenasserim and the Mergui Archipelago on the north to Engano on the south. Four particularly interesting specimens from Johore have also been contributed by Mr. C. B. Kloss. Although this material has been gradually accumulating for nearly ten years, I have been able to publish very little concerning it, owing to lack of information with regard to the exact status of some of the earlier-described Malayan species. During a recent visit to Europe I was enabled, through the courtesy of the directors of the various institutions, to examine the collections of pigs in the Natural History Museum in Berne, the Natural History Museum and Agricultural High School in Berlin, the Natural History Museum in Leyden, and the British Museum in London. Observations on all of this material form the subject of these notes.

I.—THE SUS BARBATUS GROUP.

Much confusion has existed with regard to the members of the *Sus barbatus* group occurring in Borneo and Sumatra, some authors supposing that there are three species, others that there is only one. This is the result not so much of the lack of specimens as of the circumstance that each writer has worked separately and without consulting the material studied by others. The series that I have examined show that the two islands are inhabited by at least three species, but that the status of these forms has hitherto been very imperfectly understood.

The first member of the group to be made known, the Bornean *Sus barbatus*, was briefly described in 1839[a] by Müller, who subsequently[b]

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[a] Tijdschrift voor Natuurlijke Geschiedenis en Physiologie, V, p. 149.

[b] Verhandel. over de Natuurlijke Geschiedenis der Nederl. overzeesche Bezittingen, Zoologie, p. 179, pls. xxx and xxxi.

published a more detailed account of the animal with figures of the skull and of an adult female. Certain peculiarities, probably artificial, of the type specimen were the source of much confusion in the later literature. In 1868[a] Gray made this species the type of a new subgenus, *Eusus*, a name which he afterward[b] changed to *Euhys*, eventually[c] raising the group to generic rank. Nothing more of special importance was published until 1885, when Nehring recognized two species among specimens from southern Borneo, a "gigantic" animal which he considered the same as Müller's *Sus barbatus*, and an animal of less extraordinary size to which he applied the new name *Sus longirostris.*[d] The distinctness of the two species he also clearly showed in several later papers.[e] In 1894 a third generic name, *Rhinosus*, was applied to the group.[f] Although not dealing specially with the Bornean and Sumatran species, Dr. Forsyth Major's paper "On *Sus verrucosus* Müll. & Schleg., and Allies, from the Eastern Archipelago"[g] contains some important data bearing on the distinctness of the two Bornean forms. In 1902 I described a Sumatran representative of *Sus barbatus*, the local form of Nehring's smaller animal, as *Sus oi.*[h] This well-characterized species, together with Nehring's even more conspicuously differentiated Bornean form, were subsequently regarded as identical with *Sus barbatus* by Volz, in a very elaborate paper on Sumatran pigs.[i] More recently, however, Dr. F. A. Jentink[j] has recognized the distinctness of the three animals, and has pointed out that much of the confusion has arisen from the fact that Nehring wrongly identified as *Sus barbatus* his larger animal. Doctor Jentink suggests that this skull is that of "an unknown very large Borneo pig," a conclusion at which I had arrived on seeing the specimen nearly a year before.

The members of this group are large animals, full-grown males weighing 110 kg. or more; the body is high and very narrow, scantily haired in the adult, the head greatly elongated, the cheeks heavily bearded; about midway between eye and nostril there is on each side of the muzzle a warty outgrowth covered with stiff antrorse bristles, large and conspicuous in males, less noticeable in females, though never absent, even in the very young. Skull with rostral

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[a] Proc. Zool. Soc., London, p. 32.

[b] Catal. Carniv. Pachyderm. and Edentate Mamm., Brit. Mus., 1869, p. 339.

[c] Ann. and Mag. Nat. Hist., 4th ser., XI, p. 435, June, 1873.

[d] Zool. Anzeiger, VIII, p. 347, June 15, 1885.

[e] Sitz.-Ber. Gesellsch. naturforsch. Freunde zu Berlin, 1886, pp. 80–85; Abhandl. u. Ber. zool. anthrop.-ethnogr. Mus., Dresden, 1888–1889, pp. 1–34; Sitz.-Ber. Gesellsch. naturforsch. Freunde zu Berlin, 1889, p. 196.

[f] Heude, Mém. concernant l'Hist. Nat. de l'Emp. Chinois, II, p. 213 (footnote).

[g] Ann. and Mag. Nat. Hist., 6th ser., XIX, pp. 521–542, May, 1897.

[h] Proc. Biol. Soc. Washington, XV, p. 51, March 5, 1902.

[i] Zool. Jahrbücher, Abth. Syst., XX, pp. 509–540, pl. XVIII, July 16, 1904.

[j] Notes from the Leyden Museum, XXVI, pp. 155–171, October 16, 1905.

portion so long that the distance from middle of interorbital space to tip of nasals is considerably more than twice that from interorbital space to occipital crest; parietal region narrowing to a ridge in fully adult individuals; interpterygoid space not extending forward between palatines; mandibular tusk of male with outer face nearly as wide as inner and about one and one-half times as wide as posterior face.

While these characters appear to circumscribe the group very definitely, at least so far as the Bornean and Sumatran species are concerned, their taxonomic importance, as well as the question whether *Eusus* should be recognized either as a subgenus or genus, can be properly discussed only in connection with a general revision of the Malayan pigs. The members of the *barbatus* group are confined, so far as is now known, to the islands of the Malay Archipelago. The range of one species, however, extends to Batam Island, close to the southern extremity of the Malay Peninsula. The three known Bornean and Sumatran forms may be distinguished as follows:

KEY TO THE BORNEAN AND SUMATRAN REPRESENTATIVES OF THE SUS BARBATUS GROUP.

Upper length of skull in adult male 570 mm. (probably often more); occiput produced conspicuously behind foramen magnum .... *Sus gargantua*, p. 743.

Upper length of skull in adult male 460–510 mm.; occiput scarcely produced behind foramen magnum.

  Third lower molar with three cross ridges and a terminal heel .. *Sus barbatus*, p. 739.

  Third lower molar with two cross ridges and a terminal heel ...... *Sus oi*, p. 741.

SUS BARBATUS Müller.

Plates XXXIX, XLII, XLV, XLVIII, XLIX, and LI.

1839. *Sus barbatus* Müller, Tijdschrift voor Natuurlijke Geschiedenis en Physiologie, V, p. 149.

1839–44. *Sus barbatus* Müller and Schlegel, Verhandel. over de Natuurlijke Geschiedenis der Nederl. overzeesche Bezittingen, zoologie, p. 179, pls. xxx, xxxi.

1885. *Sus longirostris* Nehring, Zool. Anzeiger, VIII, p. 347, June 15, 1885.

1888. *Sus longirostris* Nehring, Abhandl. u. Berichte des kgl. zool. u. anthrop.-ethnogr. Mus. zu Dresden, 1888–1889, p. 18, figs. 13 and 14.

1902. *Sus longirostris* Miller, Proc. Biol. Soc. Washington, XV, p. 51, March 5, 1902.

1904. *Sus barbatus* Volz, Zool. Jahrbücher, Abth. Syst., XX, p. 518, July 16, 1904 (part).

1905. *Sus barbatus* Jentink, Notes from the Leyden Museum, XXVI, p. 161, pls. ii, v, October 16, 1905.

Type locality.—Banjermassing, southern Borneo.

Geographic distribution.—Borneo; Java?[a]

Characters.—Upper length of skull of adult male, 440-490 mm.; occipital region bent upward so that lower edge of condyle is consid-

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[a] Doctor Volz has shown (Zool. Jahrb. Abth. Syst., XX, pp. 535–536) that the occurrence of this animal in Java is doubtful.

erably above level of alveolar line, and posterior overhang of occiput is only about one-fourth occipital height through condyle (see fig. 1); ratios to basal length: of profile length, about 117; of height of skull when resting on mandibles, about 60; posterior molar both above and below long, the upper tooth containing a compressed anterior median ridge, a middle median ridge, and a large terminal median heel in addition to two well-developed bicusped cross ridges, the lower tooth containing three large bicusped cross ridges and three smaller median ridges, the last of which forms the terminal heel (Plate XLIX, fig. 1.)

Measurements.—For measurements see table, pages 755 and 756.

Specimens examined.—Twenty-seven skulls of adults and two mounted specimens from the following localities: Borneo, Banjermassing, 2 (1 mounted; Leyden); southeastern Borneo, 4 (Berlin, High School); Darvel Bay, 11 (Berlin, Museum); Maruda Bay, 2 (Berlin, Museum); Marude, Sarawak, 1 (British Museum); Baram, 3 (British Museum); near Sandakan (skull and mounted skin; U. S. National Museum); no exact locality, 1 (British Museum); Java, no exact locality, 2 (Leyden).

Remarks.—The series of skulls examined show that the cranial and dental characters of *Sus barbatus* are not subject to any remarkable variation. The upper length in adult males ranges from 450 to 490 mm., the larger skulls occurring among the older individuals. The zygomatic breadth ranges from 156 to 178 mm. The principal variations in form are due to the greater or less angle in the facial profile at posterior extremity of nasals and to slight differences in the width of the rostrum. The Javan skulls show no appreciable differences from the Bornean specimens.[a] The type of *Sus longirostris* agrees perfectly with the other skulls except for two slight peculiarities: The zygoma below and in front of orbit is distinctly concave instead of swollen and convex, and the edge of the ridge above tusks is more noticeably thickened and turned inward than in any other specimen that I have seen.

In the type of *Sus barbatus* (an adult female) the protuberances on the muzzle can scarcely be detected. Their position is, however, clearly indicated by the usual tufts of bristles, and without doubt their apparent absence is due to the treatment that the skin received in the process of mounting. This peculiarity of the original specimen is responsible for much of the confusion which has arisen with regard to the specific characters of the members of this group. It caused Müller to overlook the protuberances in describing *Sus barbatus*, and hence led Nehr-

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[a] Their similarity to specimens from Borneo is so perfect as to suggest that they may have been taken in that island. Diard worked in both Java and Borneo and obtained *Sus barbatus* near Pontianak (see Jentink, Notes from the Leyden Museum, XXIV, p. 164). It is therefore by no means impossible that an error in labeling may have occurred.

ing to regard the presence of these structures as one of the most important characters of *Sus longirostris*, an error which is repeated in my account of *Sus oi*.

SUS OI Miller.

Plates XL, XLIII, XLVI, XLIX, LII, and LXIII.

1902. *Sus oi* MILLER, Proc. Biol. Soc. Washington, XV, p. 51, March 5, 1902.

1904. *Sus barbatus* VOLZ, Zool. Jahrbücher, Abth. Syst., XX, p. 518, pl. XVIII, July 16, 1904 (part).

1905. *Sus oi* JENTINK, Notes from the Leyden Museum, XXVI, p. 165, pls. III, IV, and V, October 16, 1905.

Type locality.—Indragiri River, eastern Sumatra.

Geographic distribution.—Eastern Sumatra; Rhio Archipelago (Pulo Kundur[a]); Banka.

Characters.—Upper length of skull of adult male 460–505 mm.; general form of skull as in *Sus barbatus;* last molar both above and below smaller than in the Bornean animal, the upper tooth retaining all its elements, but with its posterior portion much narrowed, the lower tooth (Plate XLIX, fig. 3) lacking the terminal heel, but with the third transverse ridge reduced to a terete heel-like remnant (see also the figure published by Volz).[b]

Measurements.—For measurements, see table, pages 755 and 756.

Specimens examined.—Nine, from the following localities: Indragiri River, Sumatra, 1; Palembang, Sumatra, 2 (Berne); Banka Island, 4; Pulo Kundur, Rhio Archipelago, 2.

Remarks.—This species is distinguishable from *Sus barbatus* chiefly by the reduced size and complexity of the posterior lower molar, a character shown by the type and by one of Doctor Volz's Palembang specimens, the only adults yet known with this tooth in good condition. No tendency toward a similar reduction could be detected in any of the twenty-seven adults of *Sus barbatus* that I have examined. It is very probable that, as Doctor Jentink states, the skull is more elongated than in the Bornean animal. Though the material thus far

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[a] Though Pulo Kundur is the only island of the Rhio Archipelago from which specimens have been examined, the animal probably occurs throughout the group wherever sufficiently extensive forests remain. In a letter dated April 21, 1904, Doctor Abbott writes: "*Sus oi* is found on the other islands of the Rhio Archipelago. A watchmaker named Maw here in Singapore, who is a great shikari, told me that they got four—one big boar, a sow, and two smaller pigs—a few Sundays ago over on Pulo Batam, opposite Singapore, behind the little island Nongsa. He had never seen them before and did not know what they were. They put the four carcasses into a sampan and started to tow them to Singapore by their launch. But the sampan capsized and all were lost." In a more recent letter (May 14, 1904) he adds that seven of these pigs instead of four were killed on Pulo Batam, and that Maw has never seen the animal in the neighborhood of Singapore, although he has been shooting there for many years.

[b] Zool. Jahrb., Abth. Syst., XX, pl. XVIII, July 16, 1904.

collected is hardly sufficient to demonstrate this, the circumstance that one of the three known adult skulls of *Sus oi* is longer than any among twenty-seven of *Sus barbatus* strongly suggests that such is the fact.

The seven skins collected by Doctor Abbott show no very striking variations other than those due to age. The youngest specimen, a male from Pulo Kundur, with head and body 860 mm. in length (No. 122930), is a uniform blackish brown throughout, the skin fairly well covered by hair, except about ears and along median portion of underparts, most of the hairs tipped with dull ochraceous buff, but this color quite inconspicuous except along middle of back and neck, where, particularly on neck, it forms almost a light median stripe. The hairs along ridge of back and neck are lengthened to form a slight mane. Face uniformly covered with short, soft, unmodified blackish hairs, which scarcely conceal the skin. Rostral protuberances distinct, almost naked, about the size of small peas. The next stage is represented by the four skins from Banka—a female (No. 124761) 1,090 mm. in length (head and body), and three males (No. 124716, No. 124760, and No. 124908), ranging from 1,100 to 1,230 mm. In each of these the body is less thickly haired than in No. 122930, though sufficiently clothed to give the animal a blackish appearance. Light tips to the hairs occur very generally in three of the skins, but in the fourth they are practically confined to the short and inconspicuous mane. In the female and two of the males the beard is well developed, causing the head to appear much more hairy than the body. It is further made conspicuous by the strong contrast of its light color with the blackish body. In the third male (No. 124716) it is partly grown. In all four the bristles hide the rostral protuberances, which, however, are readily appreciable to the touch. Muzzle and forehead blackish, in marked contrast with light beard. The female from Pulo Kundur (No. 122869), with head and body 1,330 mm. in length, though essentially like the smaller individuals, appears lighter in color on account of the more sparse coat. There is a thin though noticeable mane along neck and anterior half of back. Finally, in the type, a young adult male (head and body 1,575 mm.), the general effect is that of a naked, yellowish animal, with the body rather thickly sprinkled with blackish bristles, the light tips of which are scarcely noticeable on account of their close similarity to the color of the skin. The body of this animal is much more scantily haired than in either of the two adults of *Sus barbatus* that I have examined. (See Plates LI and LII.) Only on the cheeks, face, and throat is the hairy covering complete.

SUS GARGANTUA, new species.

Plates XLI, XLIV, XLVII, XLVIII, XLIX, and L.[a]

1885. *Sus barbatus* Nehring, Zool. Anzeiger, VIII, p. 347, June 15, 1885. (Not *Sus barbatus* Müller.)

1888. *Sus barbatus* Nehring, Abhandl. u. Berichte des kgl. zool. u. anthrop.-ethnogr. Mus. zu Dresden, 1888–1889, p. 21, fig. 15. (Not *Sus barbatus* Müller.)

1904. *Sus barbatus* Volz, Zool. Jahrbücher, Abth. Syst., XX, p. 518, July 16, 1904. (Part.)

1905. [*Sus sp.*] Jentink, Notes from the Leyden Museum, XXVI, p. 160, October 16, 1905.

Type specimen.—Young adult male (skull only) No. 4066, Agricultural High School, Berlin. Collected in southeastern Borneo in 1882 by Grabowsky.

Geographic distribution.—Southeastern Borneo.

Characters.—Upper length of skull of young adult male about 570 mm. (in old individuals probably more); occipital region so low that edge of condyle is scarcely above level of alveolar line, and so pro-

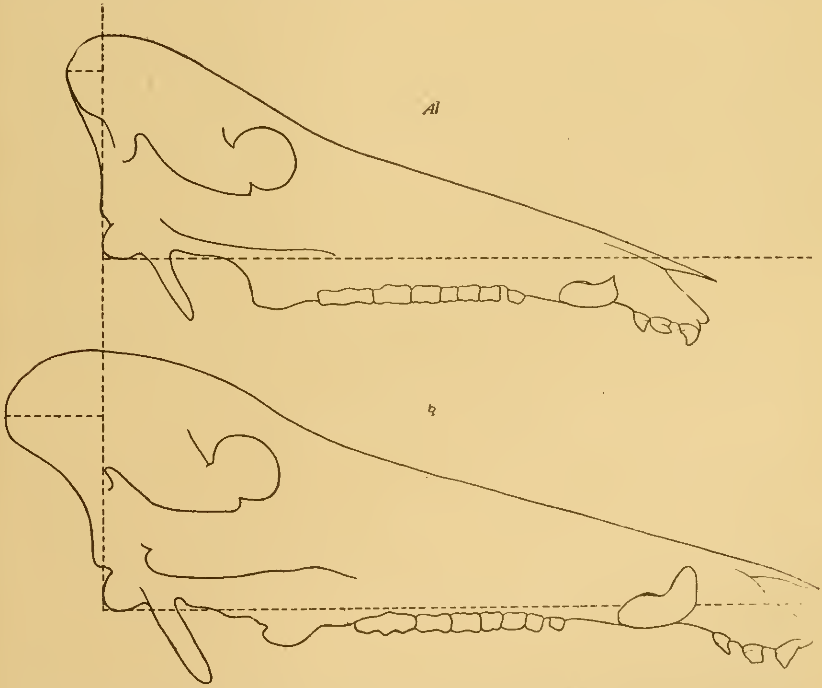

Fig. 1.—Diagrammatic comparison of skulls of *Sus barbatus* (A) and *Sus gargantua* (B).

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[a] For the photographs of the type skull and for permission to publish them I am indebted to Prof. Paul Matschie of the Natural History Museum, Berlin, and to the authorities of the Agricultural High School of the same city.

duced backward that posterior overhang is nearly one-half occipital height through condyle (see fig. 1); ratios to basal length:[a] of profile length, 123.1; of height of skull when resting on mandibles, 53.8; teeth essentially as in *Sus barbatus*. (Plate XLIX, fig. 2, and Plate L.)

Measurements.—For measurements see table, pages 755 and 756.

Specimens examined.—One, the type.

Remarks.—This strikingly characterized species, the largest known living pig, is at once recognizable by the great size of the skull and by the conspicuously low, overhanging occipital region. As the type is a young adult with teeth even less worn than in the type of *Sus oi*, and with the basioccipital suture open (in the type of *Sus oi* it is closed), it is not unreasonable to expect that in aged individuals the skull will be found to reach the enormous length of 600 mm. The exact difference in form between the skull of *Sus gargantua* and that of *Sus barbatus* and *Sus oi*, though readily appreciable to the eye is not easy to describe. If the occipital region in the smaller animals were to be drawn backward and downward until the condyle nearly reached the level of the alveolar line, it would require only a slight further increase in the backward projection of the occiput to give the skull approximately the form that it has in the larger species. In both the ratio of occipital height through condyle to length of skull is about as 1 to 3, though it is slightly more in the smaller than in the larger type. The less relative height of the skull of *Sus gargantua* when resting on the mandibles is therefore chiefly due to the less relative elevation of the condyle above the under surface of the lower jaw. (See Plate XLVIII.)

II.—THE SUS CRISTATUS GROUP.

It has long been known that pigs resembling *Sus cristatus* inhabit the Malay Peninsula, but apparently no critical comparison has recently been made between these animals and the true *Sus cristatus* of India. There are fifteen skins and sixteen skulls in the U. S. National Museum collected by Doctor Abbott on the west side of the peninsula, and also two from Johore presented by Mr. C. B. Kloss. Comparison of this material with two specimens of *Sus cristatus* in the same museum and of one of the Abbott skulls with the extensive series of Indian specimens in the British Museum, shows that the Malayan pigs are not *Sus cristatus*, and that among them are represented at least two local forms.

The members of this group are rather large animals, with the general appearance of the European wild boar, to which they are closely related. The face is without special warty outgrowths or peculiar developments of hair, though the bristles on chin and beneath jaws are occasionally much elongated. The body is covered with coarse hair that nearly or quite conceals the skin, even in fully adult animals;

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[a] Major, Ann. and Mag. Nat. Hist., 6th ser., XIX, May, 1897, pp. 540–541.

along nape and anterior half of back the bristles form a distinct mane. The general color is blackish or dark brown, usually somewhat lightened by ochraceous or whitish tips and annulations, though sometimes almost uniform. A whitish streak extends backward from angle of mouth. Skull with rostral portion not specially elongated, the distance from middle of interorbital space to tip of nasals never conspicuously more than twice distance from same region to posterior median point of occiput. Interpterygoid fossa extending so far forward that it lies mostly between the posterior branches of the palatines. Narrowest region of parietals equal to about half interorbital space. Third lower molar with at least three median cusps, three paired transverse cusps, and a terminal heel representing a modified fourth group of paired cusps. Mandibular canine of male with outer face much shorter than inner and barely equal to the posterior face.

In the Malay region these pigs are strictly confined to the mainland and the near-by islands. In the Archipelago they are replaced by the members of the closely related *Sus vittatus* group. The species may be distinguished as follows:

KEY TO THE INDIAN AND MALAYAN FORMS OF THE SUS CRISTATUS GROUP.

Ear large (about 135 by 130 mm.), conspicuously fringed with hairs 30 to 60 mm. long; upper length of skull about 430 mm.; third molar both above and below with terminal portion behind last complete transverse ridge highly complicated in structure, the number of enamel spaces indicated in m^3 about 10, in $m_{\overline{3}}$ about 7 (see Plates LVIII, fig. 1, and LIX, figs. 1, 2) Indian.................. *Sus cristatus*

Ear medium (about 105 by 100), inconspicuously fringed with hairs less than 20 mm. long; upper length of skull usually less than 400 mm.; third molar both above and below with terminal portion behind last complete transverse ridge simple in structure, the number of enamel spaces indicated in m^3 4 to 6, in m_3 usually 5 (see Plates LVIII, fig. 2, and LIX, fig. 3) Malayan.

Upper length of skull in adult male about 380 mm .... *Sus jubatus*, p. 745.

Upper length of skull in adult male about 330 mm .... *Sus jubatulus*, p. 746.

SUS JUBATUS, new species.

Plates LV, LVI, LVIII, and LIX.

Type.—Adult male (skin and skull), No. 83518, U.S.N.M. Collected in Trong, Lower Siam, by Dr. W. L. Abbott, in 1896.

Geographic distribution.—The range of this species, so far as definitely known, does not extend beyond the central portion of the Malay Peninsula.

Characters.—In general resembling *Sus cristatus*, but a distinctly smaller animal, the skull probably never exceeding 400 mm. in length, the ears relatively smaller and almost naked, never with a conspicuous fringe of hairs, and the enamel pattern of the posterior portion of last molar both above and below distinctly less complicated. (See Plates LVIII and LIX.) In *Sus cristatus* the terminal part of m^3 behind the second transverse ridge contains from eight to twelve partly or wholly isolated enamel spaces, while in *Sus jubatus* there are only from four to six. Similarly in the last lower molar of the Indian boar there are from six to nine small cusps (represented by enamel spaces in worn teeth) behind the third transverse ridge, while in the Malayan animal there are only from three to five. In general form the skulls of the two species do not differ appreciably; at least, no definite characters are shown by the specimens compared.

Measurements.—For measurements see table, pages 755 and 756.

Specimens examined.—Thirteen, from the following localities: Trong, Lower Siam, 2 (1 skin); Victoria Island, opposite Victoria Point, Tenasserim, 1; Boyces Point, Tenasserim, 3 (2 skins); Tanjong Badak, Tenasserim, 4; Champang, Tenasserim, 2; Bok Pyin, Tenasserim, 1.

Remarks.—The series of skins shows considerable variation in the amount of light tipping to the hairs. In the majority of cases a dull, uniform grizzle is produced; but some skins are nearly black, while in others the light brown strongly predominates. The mane is always well developed and the ear is never distinctly fringed. The light streak extending back from angle of mouth is invariably present, though in none of the skins is it as well developed as in some specimens of *Sus vittatus.*

SUS JUBATULUS, new species.

Type.—Adult male (skin and skull), No. 123918, U.S.N.M. Collected on Pulo Teratau (or Trotto), off west coast of Malay Peninsula, November 11, 1903, by Dr. W. L. Abbott. Original number, 2859.

Geographic distribution.—Pulo Teratau, and perhaps other islands off the west coast of the Malay Peninsula.

Characters.—Like *Sus jubatus*, but not as large; head and body of adult male about 1250 mm.; upper length of skull of adult male about 320 mm. Externally the animal closely resembles *Sus jubatus*, except for the difference in size. The skull of the type has the brain case relatively broader and shorter than in any of the specimens of *Sus jubatus*, but this may prove to be an individual character. Otherwise it shows no peculiarities worthy of note. Posterior molar both above and below (the only teeth in which the enamel pattern is not worn away), with cusps behind last transverse ridge more complicated than usual in *Sus jubatus*, but in no way approaching the conditions found in *Sus cristatus.*

Measurements.—For measurements, see table, pages 755 and 756.

Specimens examined.—One, the type.

Remarks.—Two specimens from Kisseraing Island, Mergui Archipelago (young female, No. 124206, February 3, 1904, and adult female, No. 124207, February 4, 1904), also represent a dwarf form of the *cristatus* group, though whether it is the same as *Sus jubatulus* I am unable to say. The principal measurements of the adult skull are as follows: Upper length, 302; basal length, 268; basilar length, 254; palatal length, 189; width of palate at pm ^{1}, 32; width of palate, including last molar, 61.6; least width of palate at front of last molar, 22.4; zygomatic breadth, 130; least interorbital breadth, 63.6; parietal constriction, 33; nasal breadth at posterior extremity of premaxillaries, 29.6; length of nasals, 144; occipital depth, 93.6; mandible, 228; maxillary toothrow, 112; m ^{2}, 20 by 18; m ^{3}, 32 by 19.6; mandibular toothrow, 106; m $_{2}$, 20.4 by 15; m $_{3}$, 35.6 by 16.6.

III.—THE SUS VITTATUS GROUP.

Throughout that portion of the Malay Archipelago thus far explored by Doctor Abbott, the members of the *Sus vittatus* group are the most numerous of the wild pigs. They occur from the Natunas on the east to the Nicobars and Andamans on the west, but are not yet known from the Malay Peninsula, except at its southern extremity. Although not certainly distinguishable from *Sus jubatus* in general external features, at least so far as these are shown by the skins, the animals are immediately recognizable by the reduced condition of the posterior molar. In the upper jaw this tooth (Plate LVIII, fig. 3) contains two cross ridges and a very small terminal heel; while in the lower jaw (Plate LXIV, fig. 1) it may terminate abruptly at the third cross ridge, which is often reduced to a single median tubercle, or a minute supplemental tubercle may occur behind this ridge. The lower canine in males resembles that of *Sus cristatus* and *Sus jubatus*.

Among the forty-one specimens in the National Museum, I find the following species:

KEY TO THE MEMBERS OF THE SUS VITTATUS GROUP COLLECTED BY DOCTOR ABBOTT AND MR. KLOSS.

Upper length of skull in adult male less than 290 mm., in female less than 270 mm.
  Length of upper toothrow about 83 mm .... *Sus andamanensis*, p. 754
  Length of upper toothrow about 95 mm.
    Palate wide, distinctly exceeding width of m^3 posteriorly. *Sus nicobaricus*, p. 754
    Palate not very wide, scarcely or not exceeding width of m^3 posteriorly. *Sus mimus*, p. 753
Upper length of skull in adult male more than 290 mm., in female more than 270 mm.
  Upper molars much enlarged, the greatest breadth of m^3 noticeably greater than width of palate at front of this tooth...................... *Sus niadensis*, p. 751
  Upper molars not specially enlarged, the greatest breadth of m^3 usually much less than width of palate at front of this tooth.
    Width of palate including third molars less than half length of toothrow to front of canine in males or to third incisor in females.
      Width of parietal constriction equal to or greater than combined width of nasals at posterior extremity of premaxillaries ..*Sus vittatus*, p. 748
      Width of parietal constriction decidedly less than combined width of nasals at posterior extremity of premaxillaries......*Sus rhionis*, p. 749

Width of palate including third molars equal to or more than half length of toothrow to front of canine in males or to third incisor in females.

Upper length of skull about 340 mm. in males, 320 mm. in females. *Sus peninsularis*, p. 749

Upper length of skull about 310 mm. in males, 285 mm. in females.

An obvious though short diastema between canine and first premolar .... *Sus babi*, p. 752

No evident diastema between canine and first premolar. *Sus natunensis*, p. 753

SUS VITTATUS Müller and Schlegel.

Plates LVIII and LXIV.

1839–44. *Sus vittatus* MÜLLER and SCHLEGEL, Verhandel. over de Natuurlijke Geschiedenis der Nederl. overzeesche Bezittingen, Zoologie, p. 172, pls. XXIX, XXXII. (Part.)

1905. *Sus vittatus* JENTINK, Notes from the Leyden Museum, XXVI, p. 175, October 16, 1905 (name restricted to Sumatran animal).

Type locality.—Sumatra.

Geographic distribution.—Mainland of Sumatra.

Characters.—Size about the maximum for the group, head and body of adult female about 1250 mm. (male not examined), upper length of skull 300 mm. or more; skull slender, the width of palate including widest part of posterior molars slightly more than half distance from back of last molar to front of canine in female; a distinct diastema between canine and first premolar; braincase not specially narrowed posteriorly, the parietal constriction equal to or wider than nasals; teeth of moderate size, the last two upper molars together about 45 mm. long; greatest breadth of last molar distinctly less than least width of palate at front of this tooth.

Measurements.—For measurements see table, pages 755 and 756.

Specimens examined.—Four collected by Doctor Abbott—one on the Indragiri River, eastern Sumatra, three at Tarussan Bay, western Sumatra; also the Sumatran material in Leyden described by Doctor Jentink,[a] and that in Berne recorded by Doctor Volz.[b]

Remarks.—As Doctor Jentink has already pointed out, the pigs of this group from Java and Sumatra are specifically distinct. In the original discription and figures of *Sus vittatus* the two animals are inextricably confused. The name has, however, been arbitrarily restricted to the Sumatran form.

A young female (No. 113034, August 25, 1901) from Linga Island may represent either this species or the next.

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[a] Notes from the Leyden Museum, XXVI, pp. 174–176, October, 1905.

[b] Zool. Jahrb., Abth. Syst., XX, pp. 513–518, July 16, 1904.

SUS RHIONIS, new species.

Plates LX, LXI, and LXIV.

Type.—Young adult male (skin and skull), No. 122928, U.S.N.M. Collected on Pulo Ungar, Rhio Archipelago, June 26, 1903, by Dr. W. L. Abbott. Original number, 2555.

Characters.—Like *Sus vittatus*, but with distinctly narrower skull, the constriction of the parietals so great that the least width of braincase on upper surface is in adults always noticeably less than width of both nasals together at posterior extremity of primaxillaries (Plate LX, fig. 2; plate LXI, fig. 2). Teeth as in *Sus vittatus*.

Measurements.—For measurements see table, pages 755 and 756.

Specimens examined.—Twelve, from the following islands in the Rhio Archipelago: Pulo Ungar, 9 (6 skins); Pulo Sugi Bawa, 2 (1 skin); Great Karimon, 1.

Remarks.—The pigs from the Rhio Archipelago show an exaggeration of the slenderness of skull that characterizes *Sus vittatus*. This is accompanied by a very marked narrowing of the parietal constriction. In two skulls of adult female *Sus vittatus* (Nos. 113151 and 141028, U.S.N.M.) the least width of this constriction is, respectively, 30 mm. and 33 mm., while the nasal breadth at posterior extremity of premaxillary is 30 mm. and 28 mm. In the four males recorded by Doctor Volz[a] it is 34 mm., 34.5 mm., 34 mm., and 31 mm., as compared with nasal breadths of 31 mm., 29 mm., 34 mm., and 30.5 mm. Therefore in six adult skulls the parietal constriction invariably equals or exceeds the nasal breadth, the averages for the two measurements being 32.7 mm. and 30.4 mm. A like number of adult skulls of *Sus rhionis* give the following measurements: Four females, parietal constriction, 22 mm., 16.4 mm., 13 mm., and 12.8 mm.; nasal breadth, 26 mm., 26 mm., 25 mm., and 22.6 mm.; two males, parietal constriction, 17 mm. and 22.6 mm.; nasal breadth, 27 mm. and 30.6 mm. The parietal constriction in these specimens is invariably narrower than the nasals; averages of the two measurements, 17.3 and 26.3. The average basal length for the two lots of skulls is: *vittatus*, 280 mm.; *rhionis*, 276 mm. In five immature specimens of *Sus rhionis*, the parietal constriction is with only one exception less than the nasal breadth; in this skull (female No. 122929) the two measurements are the same.

Externally the animal resembles *Sus vittatus*, and the skins show no variations worthy of note.

SUS PENINSULARIS, new species.

Plate LVII.

Type.—Adult female (skull only), No. 142470, U.S.N.M. Collected near foot of Gunong Pulai, southwestern Johore, by C. B. Kloss.

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[a] Zool. Jahrb., Abth. Syst., XX, p. 517, July 16, 1904.

Geographic distribution.—Southern extremity of the Malay Peninsula.

Characters.—Largest known member of the *Sus vittatus* group; upper length of skull in adult male about 340 mm.; in adult female about 320 mm. Skull essentially like that of *Sus vittatus* in form. Teeth similar to those of *Sus vittatus*, but much larger, particularly the last two molars both above and below (see table of measurements, pages 755 and 756). Owing to the large size of the skull, however, the teeth do not encroach on the palate, as is the case in *Sus niadensis*.

Measurements.—For measurements see table, pages 755 and 756.

Specimens examined.—Four, all from Johore. The exact localities are as follows: Gunong Pulai (the type), Johore Bahru (skin and skull of immature male, No. 125462, collected May 5, 1904), and Mount Austin (skin and skull of immature male, No. 125463, collected May 23, 1904). Mr. Kloss has also presented the skull of a young adult male (No. 142469), of which the exact locality is not known.

Remarks.—This animal is so large that on first seeing the skulls of the two adults I mistook it for a member of the *Sus cristatus* group. It is, however, readily distinguishable from *Sus jubatulus*, which it resembles in size, by the simpler structure of the molars. In its robust form the skull of this pig differs notably from that of *Sus rhionis*, its nearest ally geographically. As to external characters the two skins furnish no satisfactory basis for comparison with other forms, as both are in scant, much-worn pelage. On posterior half of back there is a noticeable sprinkling of reddish bristles, a character which I have never seen in *Sus jubatus* or *Sus jubatulus*, but which occurs not infrequently in members of the *vittatus* group.

In cranial characters the two adults and one of the young (that from Mount Austin) show no variations except those readily explained as due to differences in sex and age.

The Johore Bahru skull, however (Plate LVII, fig. 1), differs remarkably from these, as well as from all the other specimens of the group or of the *cristatus* group that I have examined, in the peculiar shape of the palatine and pterygoid bones. In the normal form the backward prolongations of the palatines which bound the "interpterygoid"[a] space diverge strongly and at the same time rise noticeably above level of palate (skull held upside down), so that if continued backward they would extend lateral to and above tips of styloid processes; outer plate of pterygoid sufficiently expanded to form between it and the rather short, broad, hamular process a deep pterygoid fossa; greatest palatal width, including outer pterygoid plate, considerably more than half distance from posterior median edge of palate to foramen magnum. In No. 125462 the palatine bones diverge so slightly and rise so little above level of palate that they would, if extended, touch the

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[a] The space here lies chiefly between the palatines.

extremities of styloid processes; outer plate of pterygoid so little expanded that the pterygoid fossa is scarcely more than a flattened depression, from the inner side of which projects the long, slender, hamular process; greatest palatal width, including outer pterygoid plate, much less than half distance from posterior median edge of palate to foramen magnum. That this peculiar structure is not due to immaturity is shown by the perfect constancy of the broadly divergent type at all ages, from suckling young to the oldest adults. It clearly represents a very unusual individual variation or a distinct species. I find it impossible, however, to reach any satisfactory conclusion from the material at hand.

SUS NIADENSIS, new species.

Plates LXII, LXIII, and LXIV.

Type.—Adult female (skin and skull) No. 141167, U.S.N.M. Collected on Nias Island, March 30, 1905, by Dr. W. L. Abbott. Original number, 4155.

Characters.—Similar to *Sus vittatus*, but with posterior molars considerably enlarged, the combined length of the last two teeth more than 50 mm., the greatest width of posterior upper molar noticeably more than least width of palate at front of this tooth. (Plate LXII fig. 1.) No evident diastema between canine and first premolar in female (male not known). Color normal.

Measurements.—For measurements see table, pages 755 and 756.

Specimens examined.—Four (3 skins), all from Nias Island.

Remarks.—The Nias pig differs from all the other known members of the *vittatus* group in the conspicuous enlargement of the posterior two molars both above and below.

The differences in size of these teeth between this animal and *Sus vittatus* and *Sus rhionis* are as follows:

	Number.	Sex.	M^2.	M^3.	M_2.	M_3.
Sus niadensis	141166	Female	21.8 by 19.6	31.4 by 21.0	20.4 by 15.4	33.0 by 17.4
Do	141167	do	22.0 by 20.0	34.0 by 24.0	21.4 by 15.8	37.6 by 19.0
Do	141168	do	22.4 by 20.0	33.0 by 22.4	21.4 by 16.2	38.0 by 19.6
Sus vittatus	113151	do	18.0 by 16.0	26.0 by 16.4	17.0 by 14.0	29.0 by 16.0
Do	141028	do	19.0 by 17.0	27.0 by 20.0	18.8 by 14.0	32.8 by 16.6
Do	141029	do	19.8 by 17.0	30.0 by 19.0	19.8 by 14.8	29.0 by 15.8
Sus rhionis	115682	do	15.6 by 15.0	25.0 by 18.0	....	26.4 by 15.6
Do	122924	do	19.2 by 16.0	26.0 by 18.0	18.8 by 13.4	27.0 by 16.0
Do	122925	do	18.0 by 15.8	24.6 by 17.8	18.0 by 13.0	26.4 by 15.4

In size and form the skull closely agrees with that of *Sus vittatus*, showing no tendency toward the broadening characteristic of the species occurring on the islands north of Nias. In fact, so far as can be determined from the material examined, the zygomata appear to be less abruptly flaring than in the mainland pig.

SUS BABI, new species.

Plates LX and LXI.

Type.—Adult male (skin and skull), No. 114283, U.S.N.M. Collected on Pulo Babi,[a] west Sumatra, January 14, 1902, by Dr. W. L. Abbott. Original number, 1413.

Geographic distribution.—Pulo Babi and Pulo Tuangku, west Sumatra.

Characters.—About the size of *Sus vittatus*, but skull noticeably broader in proportion to its length, the width of palate including last molars distinctly greater than half distance from back of third molar to front of canine in males or to third incisor in females. (Plate LX fig. 1, plate LXI, fig. 1.) Combined length of last two upper molars about 47 mm.; greatest breadth of m^3 noticeably less than least width of palate at front of this tooth. A distinct though short diastema between canine and first premolar. Color very dark.

Measurements.—For measurements see table, pages 755 and 756.

Specimens examined.—Five, three (2 skins) from Pulo Babi and two from Pulo Tuangku.

Remarks.—In the two skins from Pulo Babi the hair is very dark, giving the animal a uniform blackish appearance throughout, except where the yellowish skin shows through at the surface. In the type the bristles of the mane and forehead are rather noticeably lightened by wood-brown annulations, and similar though shorter rings produce an evident light band across muzzle about halfway between eye and snout; throat with a few scattered light tips and annulations, but these not numerous enough to form stripes behind angles of mouth. In the other skin (female, No. 114282) even this slight degree of light marking is absent, and the entire animal is practically black. One of the skins from Pulo Tuangku (female, No. 114415) is nearly as dark as the type, but the other (male, No. 114416) is of the usual grizzled style of coloration. The skulls from the two islands show no variations worthy of note. Two females from Engano—one (No. 140959) very old, the other (No. 140958) immature—resemble *Sus babi*, though I do not feel convinced that they should be considered the same. Upper length of skull of adult, 298; parietal constriction, 29; nasal breadth, 33; last upper molar, 27.6 by 17.6. In both specimens the audital bullæ are somewhat enlarged.

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[a] This island lies about halfway between Simalur and the outermost of the Banjak group, Pulo Bangkaru. It is a small island not shown on ordinary maps, and must be carefully distinguished from Simalur, often called Pulo Babi ("Pig Island").

SUS NATUNENSIS Miller.

1901. *Sus natunensis* MILLER, Proc. Washington Acad. Sci., III, p. 117, March 26, 1901.

Type locality.—Pulo Laut, North Natuna Islands.

Geographic distribution.—The North Natuna Islands.

Characters.—Closely resembling *Sus babi*, but with rostral portion of skull more shortened and broadened; width of palate, including last molars, about half as great as distance from back of third molar to front of third incisor in female (male not known); no diastema between canine and first premolar; color not unusually dark.

Measurements.—For measurements see table, pages 755 and 756.

Specimens examined.—Three, the type and a young female (No. 104857, skull only) from Pulo Laut, and an adult female (No. 105855) from Pulo Lingung.

Remarks.—The Natuna pig is readily distinguishable from *Sus vittatus* by its shorter, broader skull (upper length in adult females about 20 mm. less than in the Sumatran animal, but zygomatic breadth fully as great or slightly more, and combined breadth of nasals decidedly greater). It more closely resembles the geographically distant *Sus babi*, but differs in its broader, more elevated brain case; parietal constriction somewhat wider than nasals, instead of decidedly narrower, as in *Sus babi*. The toothrow is more crowded than in *Sus babi*, as shown by the anterior premolars of the upper jaw.

SUS MIMUS, new species.

Type.—Adult male (skin and skull), No. 114178, U.S.N.M. Collected on Simalur Island,[a] West Sumatra, November 25, 1901, by Dr. W. L. Abbott. Original number, 1353.

Geographic distribution.—Simalur Island.

Characters.—Like *Sus babi*, but much smaller; upper length of skull about 280 mm. in males, 265 mm. in females. Greatest width of third upper molar about equal to least width of palate at front of this tooth. A short but evident diastema between canine and first premolar in female, but not in male. Color, very dark, as in *Sus babi*.

Measurements.—For measurements see table, pages 755 and 756.

Specimens examined.—Five, all from Simalur Island.

Remarks.—This appears to be a well-characterized dwarf species related to the larger animal of Pulo Babi and the Banjak Islands, and with a similarly broadened skull. It also shares the uniform blackish coloration of the related form.

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[a] This is the northernmost of the large islands off the west coast of Sumatra. It is sometimes known as the Pulo Babi (see under *Sus babi*, p. 752).

SUS NICOBARICUS Miller.

1902. *Sus nicobaricus* Miller, Proc. U. S. Nat. Mus., XXIV, p. 755, May 29, 1902.

Type locality.—Great Nicobar Island.

Geographic distribution.—This species is known from the type locality only, though it probably occurs on other islands of the Nicobar group.

Characters.—Very similar to *Sus mimus*, but rostral portion of skull heavier, palate wider, occiput higher, and angle in facial profile at base of nasals much more pronounced. Color, clear black throughout, except for a slight wash of brown on the mane. Hind feet of type specimen white, but probably abnormal in color.

Measurements.—For measurements see table, pages 755 and 756.

Specimens examined.—Two, the type, and an adult male (skull only) from the type locality.

Remarks.—The pig of the Nicobars is closely allied to that of Simalur, though the material examined indicates that the animals are specifically distinct. This relationship finds an exact parallel in that of the monkeys, *Macaca umbrosa* and *M. fusca*, inhabiting the same islands.[a]

SUS ANDAMANENSIS Blyth.

Plate LXII.

1858. *Sus andamanensis* Blyth, Journ. Asiat. Soc. Bengal, XXVII, p. 267.

Type locality.—Port Blair, South Andaman Island.

Geographic distribution.—Andaman Islands.

Characters.—Smaller than *Sus mimus* and *Sus nicobaricus;* skull (Plate LXII, fig. 2) slender, essentially a miniature of that of *Sus vittatus;* a very slight angle in facial profile at base of nasals; upper toothrow only about 83 mm. in length. The one skin seen is black, with a distinct brownish wash on mane. The ears, cheeks, muzzle, and throat are very scantily haired.

Measurements.—For measurements see table, pages 755 and 756.

Specimens examined.—Two, an adult male (skin and skull, No. 111816) from Little Andaman Island, and a nearly adult female with no definite locality (No. 164755, Department of Anthropology, a skull ornamented with red paint by the native Andamanese).

Remarks.—The Andaman pig, though strictly a member of the *Sus vittatus* group,[b] is even more dwarfed than the small *Sus mimus* and *Sus nicobaricus.* Notwithstanding its conspicuously smaller size, *Sus andamanensis* rather closely resembles *Sus vittatus* of the Sumatran mainland in the form of its skull, thus differing notably from its nearest insular allies.

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[a] See Miller, Proc. U. S. Nat. Mus., XXIV, p. 789, May 28, 1902, and XXVI, p. 476, February 3, 1903.

[b] Comparisons of *Sus andamanensis* with *Sus cristatus* (e. g. Miller, Proc. U. S. Nat. Mus., XXIV, pp. 754–757, May 28, 1902) are therefore very misleading.

Table of cranial measurements of Malayan pigs.

Name.	Locality.	Number.	Sex.	Upper length.	Basal length.	Basilar length.	Palatal length.	Width of palate at pm^1.	Width of palate including m^3.	Least width of palate at front of m^3.	Zygomatic breadth.	Least interorbital breadth.	Parietal constriction.	Nasal breadth at posterior extremity of pmx.	Length of nasals.
Sus barbatus	Borneo; Banjermassing	(a)	Female	430	375	......	295	49.0	......	......	136.0	64.0	......	36.0	217.0
Do	do	......	Male	440	395	......	310	47.0	......	......	154.0	73.0	......	31.0	223.0
Do	Borneo; southeastern	(b)	do	450	400	......	320	48.0	......	......	166.0	70.0	......	31.0	......
Do	Borneo; Sandakan	34891	do	465	397	376	......	45.0	71.0	25.0	148.0	76.0	16.0	38.0	230.0
Sus oi	Sumatra; Indragiri River	[a] 113150	do	480	410	390	330	50.0	72.6	28.4	162.0	80.0	11.0	38.0	240.0
Sus gargantua	Borneo; southeastern	(a)	do	570	455	......	367	50.0	......	......	185.0	83.0	......	43.0	278.0
Sus cristatus	India; Nilgiri Hills	122536	do	430	(c)	......	258	50.0	77.8	32.0	172.4	92.6	36.8	41.0	......
Sus jubatus	Lower Siam; Trong	[a] 83518	do	380	320	305	227	42.0	74.6	27.6	154.0	79.6	39.6	36.0	182.0
Do	Tenasserim; Tanjong Badak	111982	Female	364	316	296	225	37.0	72.0	29.0	140.0	70.0	35.6	35.4	175.4
Sus jubatulus	Pulo Teratau	[a] 123918	Male	318	278	260	198	37.4	65.0	26.6	140.0	70.0	44.0	32.0	160.4
Sus vittatus	Sumatra; Palembang	(d)	do	328	284	266	201	......	......	25.0	137.0	......	31.0	30.5	142.0
Do	Sumatra; Indragiri River	113151	Female	305	267	258	193	35.0	60.0	25.0	126.0	61.0	30.0	30.0	143.6
Sus rhionis	Rhio Archipelago; Pulo Ungar	[a] 122928	Male	330	290	275	205	32.6	60.0	22.0	132.0	63.0	17.0	27.0	159.0
Do	do	122924	Female	295	262	248	183	26.4	58.0	21.0	118.0	58.0	22.0	26.0	140.0
Sus peninsularis	Johore	142469	Male	340	302	292	210	40.0	66.6	25.6	133.0	65.0	44.0	32.0	160.0
Do	Johore; Gunong Pulai	[a] 142470	Female	318	276	260	190	38.0	70.0	29.0	131.6	61.0	30.0	32.6	......
Sus babi	Sumatra: Pulo Babi	[a] 114283	Male	305	278	260	197	43.0	66.0	27.0	136.0	64.0	28.0	31.6	151.0
Do	Sumatra; Pulo Tuangku	114415	Female	288	263	250	182	35.0	66.6	28.0	128.0	63.0	22.0	28.0	127.0
Sus natunensis	Natuna Islands; Pulo Laut	[a] 104856	do	282	250	235	174	32.2	66.0	24.8	130.0	64.0	31.4	30.4	135.0
Sus mimus	Sumatra: Simalur Island	[a] 114178	Male	280	258	240	185	32.0	60.2	20.0	120.0	58.0	34.0	26.0	129.0
Do	do	114177	Female	262	230	214	169	31.4	61.0	22.4	121.0	59.0	18.0	26.0	117.0
Sus niadensis	Sumatra: Nias Island	[a] 141167	do	313	278	260	225	31.0	68.0	19.4	119.0	61.8	23.0	28.0	143.0
Sus nicobaricus	Nicobar Islands; Great Nicobar	112011	Male	280	252	235	180	42.0	65.0	28.0	130.0	70.0	26.0	30.0	133.0
Sus andamanensis	Andaman Islands; Little Andaman	111816	do	256	224	213	160	32.0	57.4	21.6	114.0	55.0	18.0	21.6	123.0
Do	Andaman Islands	164765	Female	......	......	......	151	27.0	50.4	21.4	107.0	55.0	37.0	22.0	......

[a] Type.

[b] Type of Sus longirostris Nehring.

[c] Condylobasal length, 370.

[d] From Volz, specimen No. 4.

Table of cranial measurements of Malayan pigs—Continued.

Name.	Locality.	Number.	Sex.	Occipital depth to basion.	Mandible.	Maxillary tooth row (alveoli).	Second upper molar.	Third upper molar.	Mandibular tooth row (alveoli).	Second lower molar.	Third lower molar.
Sus barbatus	Borneo; Banjermassing	(*a*)	Female	119.0	320	127.0	....	33.0 by 19.6	[b]120.0	— by 15.0	....
Do	do	....	Male	130.0	350	127.0	....	37.0 by 23.0	[b]129.0	— by 16.0	....
Do	Borneo; southeastern	(*c*)	do	150.0	350	132.0	....	37.0 by 23.5	[b]137.0	— by 16.0	47.0 by 21.0
Do	Borneo; Sandakan	34891	do	140.0	350	136.4	24.0 by 21.0	37.0 by 24.0	[b]134.0	24.0 by 17.4	45.0 by 20.0
Sus oi	Sumatra; Indragiri River	[a]113150	do	140.0	360	129.4	23.0 by 19.4	31.0 by 21.0	[b]122.0	22.0 by 16.0	33.8 by 18.4
Sus gargantua	Borneo; southeastern	(*a*)	do	167.0	395	137.0	....	37.0 by 23.0	[b]140.0	— by 17.0	47.0 by 21.0
Sus cristatus	India; Nilgiri Hills	122536	do	140.0	338	133.0	22.6 by 22.0	45.0 by 22.6	[b]129.0	23.0 by 17.0	49.0 by 19.0
Sus jubatus	Lower Siam; Trong	[a]83518	do	129.0	295	116.0	21.0 by 19.8	34.0 by 22.0	[b]109.6	19.8 by 16.0	40.0 by 19.0
Do	Tenasserim; Tanjong Badak	111982	Female	114.0	274	122.0	23.0 by 19.6	35.0 by 21.0	[b]117.0	21.4 by 15.8	38.0 by 18.0
Sus jubatulus	Pulo Teratau	[a]123918	Male	101.0	251	106.0	18.0 by 17.6	33.6 by 18.0	[b]103.0	17.0 by 14.6	34.0 by 15.0
Sus vittatus	Sumatra; Palembang	(*d*)	do	108.0	251	....	....	30.5 by —	....	....	30.0 by —
Do	Sumatra; Indragiri River	113151	Female	93.0	233	97.0	18.0 by 16.0	26.0 by 16.4	[b]91.4	17.0 by 14.0	29.0 by 16.0
Sus rhionis	Rhio Archipelago; Pulo Ungar	[a]122928	Male	97.4	255	101.0	18.0 by 15.8	29.0 by 17.0	[b]96.0	18.0 by 13.0	28.4 by 15.0
Do	do	122924	Female	84.4	232	99.0	19.2 by 16.0	26.0 by 18.0	[b]95.0	18.8 by 13.4	27.0 by 16.0
Sus peninsularis	Johore	142469	Male	113.0	270	112.4	20.4 by 18.0	29.6 by 21.0	[b]106.6	19.4 by 15.0	35.0 by 18.0
Do	Johore; Gunong Pulai	[a]142470	Female	105.0	244	107.0	19.4 by 19.0	31.0 by 21.0	[b]99.0	19.0 by 15.4	34.6 by 17.0
Sus babi	Sumatra; Pulo Babi	[a]114283	Male	106.0	243	105.0	20.0 by 17.8	30.0 by 19.0	[b]96.0	18.0 by 13.6	28.8 by 16.0
Do	Sumatra; Pulo Tuangku	114415	Female	89.0	225	102.0	18.6 by 17.4	27.0 by 18.8	[b]97.0	17.8 by 13.6	30.4 by 15.4
Sus natunensis	Natuna Islands; Pulo Laut	[a]104856	do	97.4	225	101.0	18.0 by 18.0	30.0 by 20.0	[b]98.0	18.0 by 13.6	30.0 by 16.0
Sus mimus	Sumatra; Simalur Island	[a]114178	Male	90.4	213	98.0	20.0 by 16.6	27.0 by 20.0	[b]98.0	19.0 by 14.6	29.0 by 15.0
Do	do	114177	Female	85.0	203	95.6	18.0 by 16.6	26.6 by 19.2	[b]92.0	18.0 by 13.0	30.0 by 15.0
Sus niadensis	Sumatra; Nias Island	[a]141167	do	92.0	245	117.0	22.0 by 20.0	34.0 by 24.0	[b]112.6	21.4 by 15.8	37.6 by 19.0
Sus nicobaricus	Nicobar Islands; Great Nicobar	112011	Male	103.0	220	96.0	17.0 by 17.0	26.0 by 18.0	[b]95.0	16.0 by 14.0	30.0 by 15.0
Sus andamanensis	Andaman Islands; Little Andaman	111816	do	90.0	200	83.0	17.0 by 14.0	25.0 by 16.0	[b]88.0	16.0 by 14.0	27.0 by 13.6
Do	Andaman Islands	164765	Female	....	180	83.0	17.4 by 12.8	20.0 by 14.0	....	16.0 by 10.0	....

[a] Type.

[b] Anterior premolar not included.

[c] Type of Sus longirostris Nehring.

[d] From Volz, specimen No. 4.

EXPLANATION OF PLATES.

[Unless otherwise stated the figures are about one-third natural size.]

PLATE XXXIX.

Sus barbatus Müller. Adult male, Cat. No. 34891, U.S.N.M. Sandakan, Borneo.

PLATE XL.

Sus oi Miller. Type.

PLATE XLI.

Sus gargantua Miller. Type.

PLATE XLII.

Sus barbatus Müller. Adult male, Cat. No. 34891, U.S.N.M. Sandakan, Borneo.

PLATE XLIII.

Sus oi Miller. Type.

PLATE XLIV.

Sus gargantua Miller. Type.

PLATE XLV.

Sus barbatus Müller. Adult male, Cat. No. 34891, U.S.N.M. Sandakan, Borneo.

PLATE XLVI.

Sus oi Miller. Type.

PLATE XLVII.

Sus gargantua Miller. Type.

PLATE XLVIII.

1. *Sus barbatus* Müller. Adult male, Cat. No. 34891, U.S.N.M. Sandakan, Borneo.
2. *Sus gargantua* Miller. Type.

PLATE XLIX.

1. *Sus barbatus* Müller. Adult male, Cat. No. 34891, U.S.N.M. Sandakan, Borneo. Mandibular cheek teeth, slightly reduced.
2. *Sus gargantua* Miller. Type. Mandibular cheek teeth, slightly reduced.
3. *Sus oi* Miller. Type. Mandibular cheek teeth, slightly reduced.

PLATE L.

Sus gargantua Miller. Type. Maxillary cheek teeth, slightly reduced.

PLATE LI.

Sus barbatus Müller. Adult male, Cat. No. 34891, U.S.N.M. Sandakan, Borneo. Greatly reduced.

PLATE LII.

Sus oi Miller. Type. Greatly reduced.

PLATE LIII.

Sus cristatus Wagner. Adult male, Cat. No. 122536, U.S.N.M. Nilgiri Hills, India.

PLATE LIV.

Sus cristatus Wagner. Adult male, Cat. No. 122536, U.S.N.M. Nilgiri Hills, India.

Plate LV.

Sus jubatus Miller. Type.

Plate LVI.

Sus jubatus Miller. Type.

Plate LVII.

1. *Sus peninsularis?* Young male, Cat. No. 125462, U.S.N.M. Johore Bahru, Johore.
2. *Sus peninsularis* Young male, Cat. No. 125463, U.S.N.M. Mount Austin, Johore.

Plate LVIII.

1. *Sus cristatus* Wagner. Adult male, Cat. No. 122536, U.S.N.M. Nilgiri Hills, India. (About $\frac{7}{5}$ nat. size). Maxillary teeth.
2. *Sus jubatus* Miller. Type. (About $\frac{7}{5}$ nat. size). Maxillary teeth.
3. *Sus vittatus* Müller and Schlegel. Adult female, Cat. No. 141028, U.S.N.M. Tarussan Bay, west Sumatra. (About $\frac{7}{5}$ nat. size). Maxillary teeth.

Plate LIX.

1. *Sus cristatus* Wagner. Adult male, Cat. No. 122536, U.S.N.M. Nilgiri Hills, India. (About $\frac{7}{5}$ nat. size.) Mandibular teeth.
2. *Sus cristatus* Wagner, or closely related form, Cat. No. 61310, U.S.N.M. Ceylon. (About $\frac{7}{5}$ nat. size.) Mandibular teeth.
3. *Sus jubatus* Miller. Type. (About $\frac{7}{5}$ nat. size.) Mandibular teeth.

Plate LX.

1. *Sus babi* Miller. Type.
2. *Sus rhionis* Miller. Type.

Plate LXI.

1. *Sus babi* Miller. Type.
2. *Sus rhionis* Miller. Type.

Plate LXII.

1. *Sus niadensis* Miller. Type.
2. *Sus andamanensis* Blyth. Adult male, Cat. No. 111816, U.S.N.M. Little Andaman Island.

Plate LXIII.

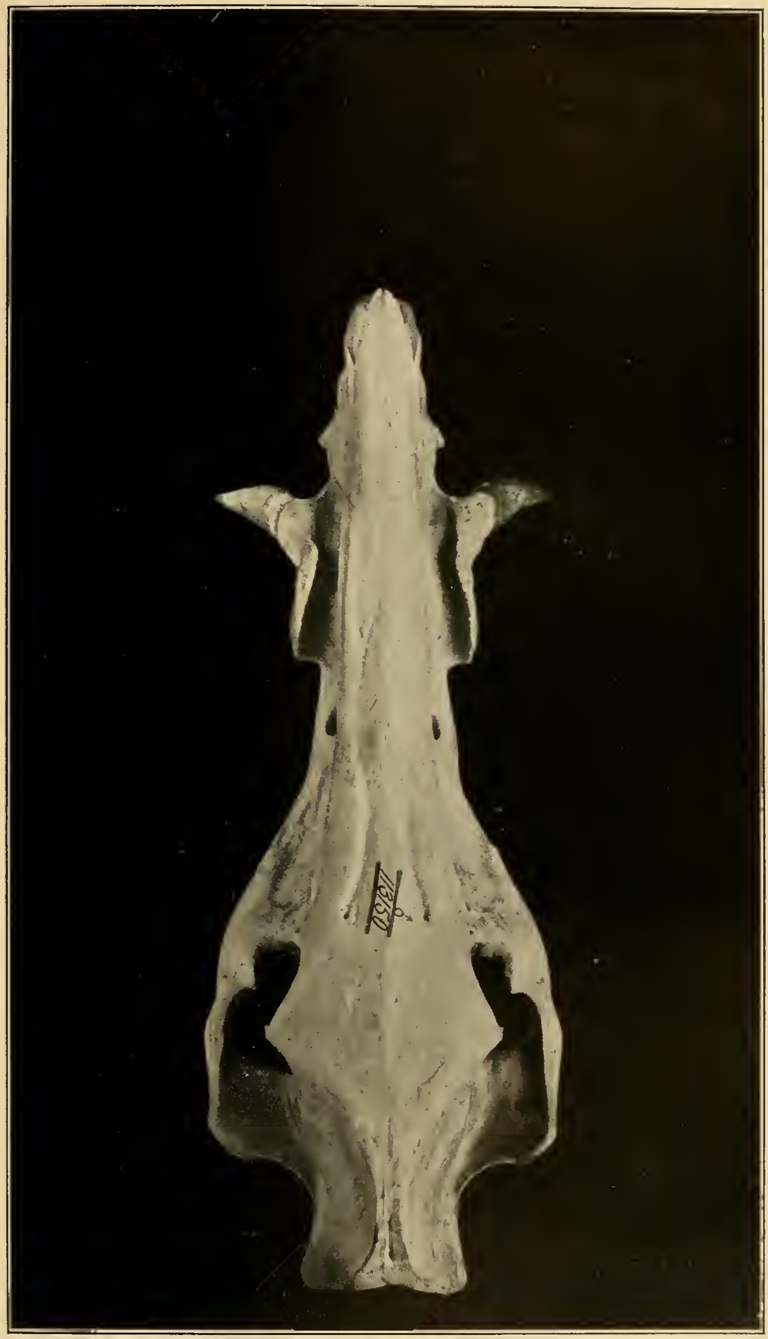
1. *Sus niadensis* Miller. Young female, Cat. No. 141169, U.S.N.M. Nias Island, west Sumatra.
2. *Sus oi* Miller. Young male, Cat. No. 122930, U.S.N.M. Pulo Kundur, Rhio Archipelago.

Plate LXIV.

1. *Sus vittatus* Müller and Schlegel. Adult female, Cat. No. 141028, U.S.N.M Tarussan Bay, west Sumatra. (About $\frac{7}{5}$ nat. size.) Mandibular teeth.
2. *Sus niadensis* Miller. Type. (About $\frac{7}{5}$ nat. size.) Mandibular teeth.
3. *Sus rhionis* Miller. Type. (About $\frac{7}{5}$ nat. size.) Mandibular teeth.

SUS BARBATUS.

FOR EXPLANATION OF PLATE SEE PAGE 757.



Sus oi. Type.

For explanation of plate see page 757.

SUS GARGANTUA. TYPE.

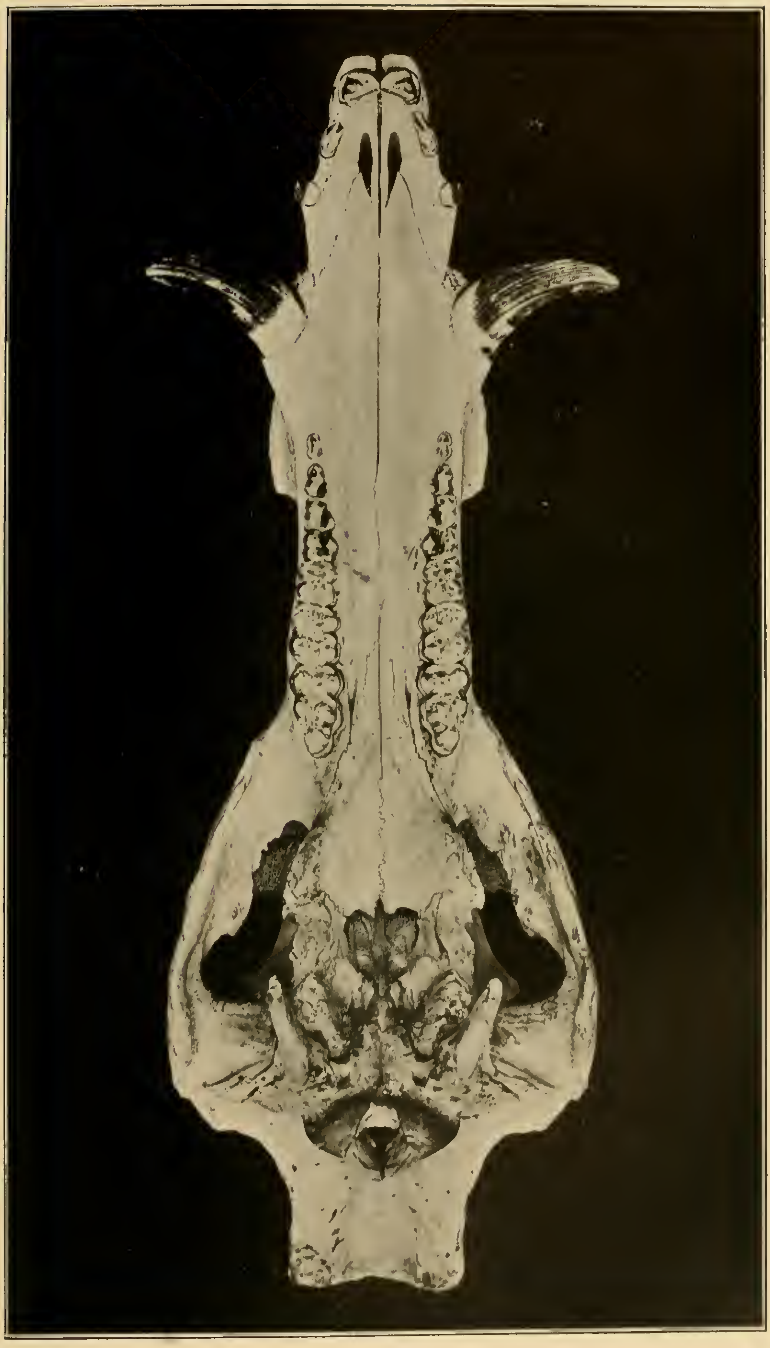
FOR EXPLANATION OF PLATE SEE PAGE 757.

SUS BARBATUS.

FOR EXPLANATION OF PLATE SEE PAGE 757.

Sus oi. Type.

For explanation of plate see page 757.



SUS GARGANTUA. TYPE.

FOR EXPLANATION OF PLATE SEE PAGE 757.

SUS BARBATUS.

FOR EXPLANATION OF PLATE SEE PAGE 757.

Sus oi. Type.

For explanation of plate see page 757.

SUS GARGANTUA. TYPE.

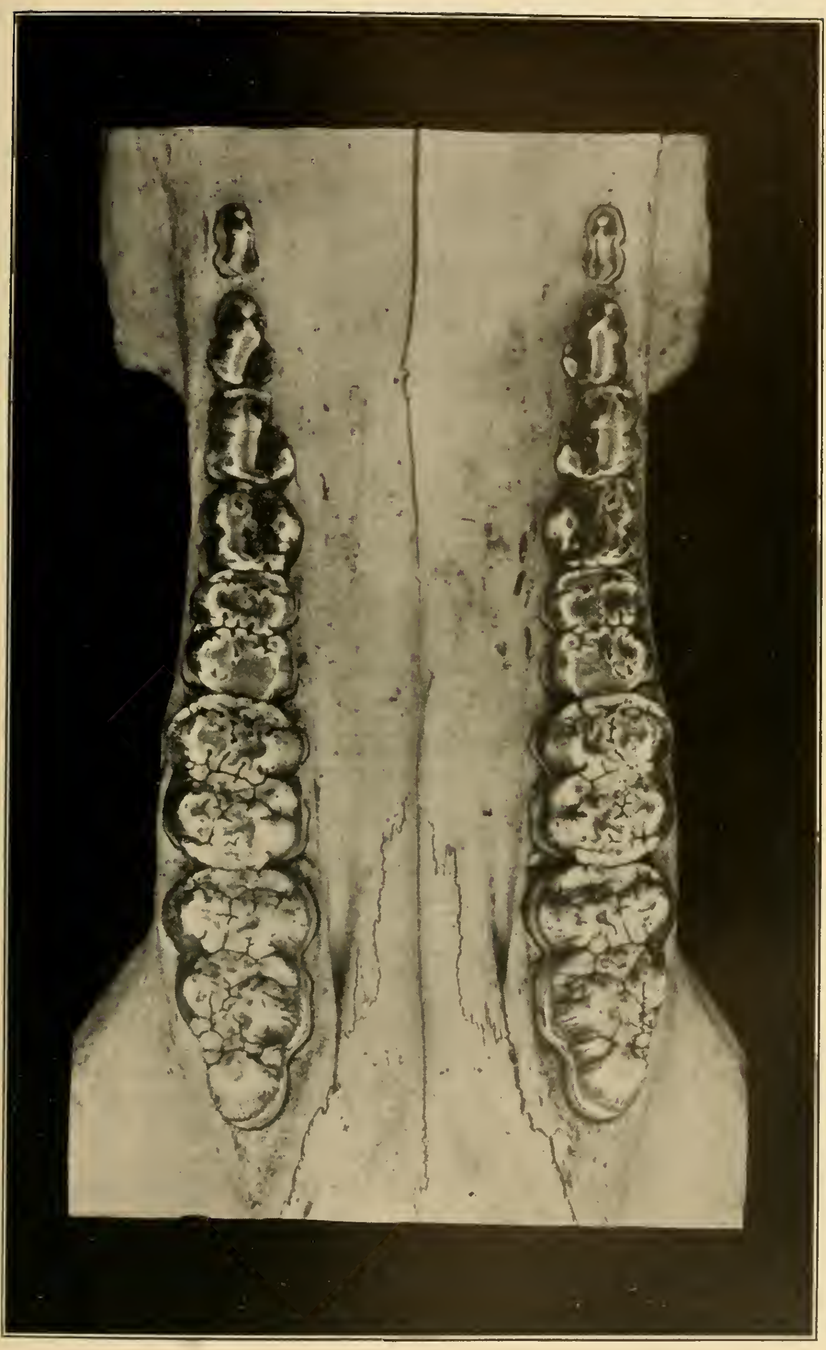
FOR EXPLANATION OF PLATE SEE PAGE 757.

1. SUS BARBATUS.—2. SUS GARGANTUA. TYPE.

FOR EXPLANATION OF PLATE SEE PAGE 757.

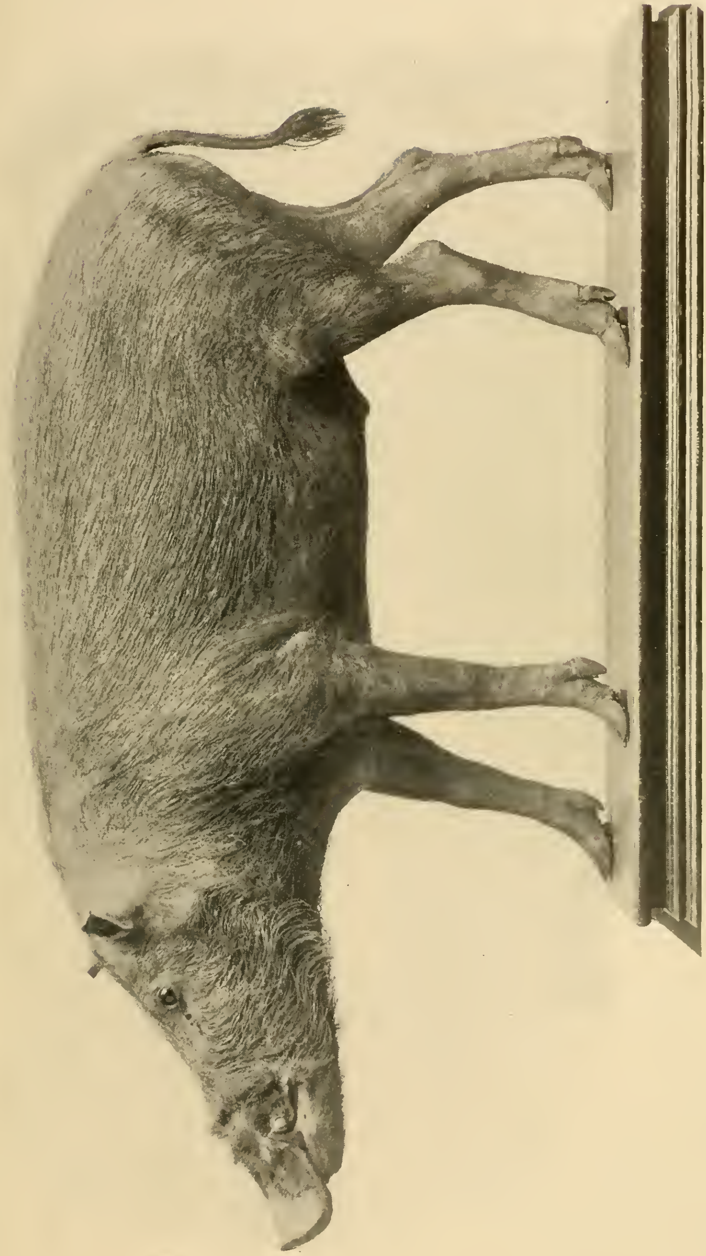
1. Sus barbatus.—2. Sus gargantua. Type.—3. Sus oi. Type.

For explanation of plate see page 757.



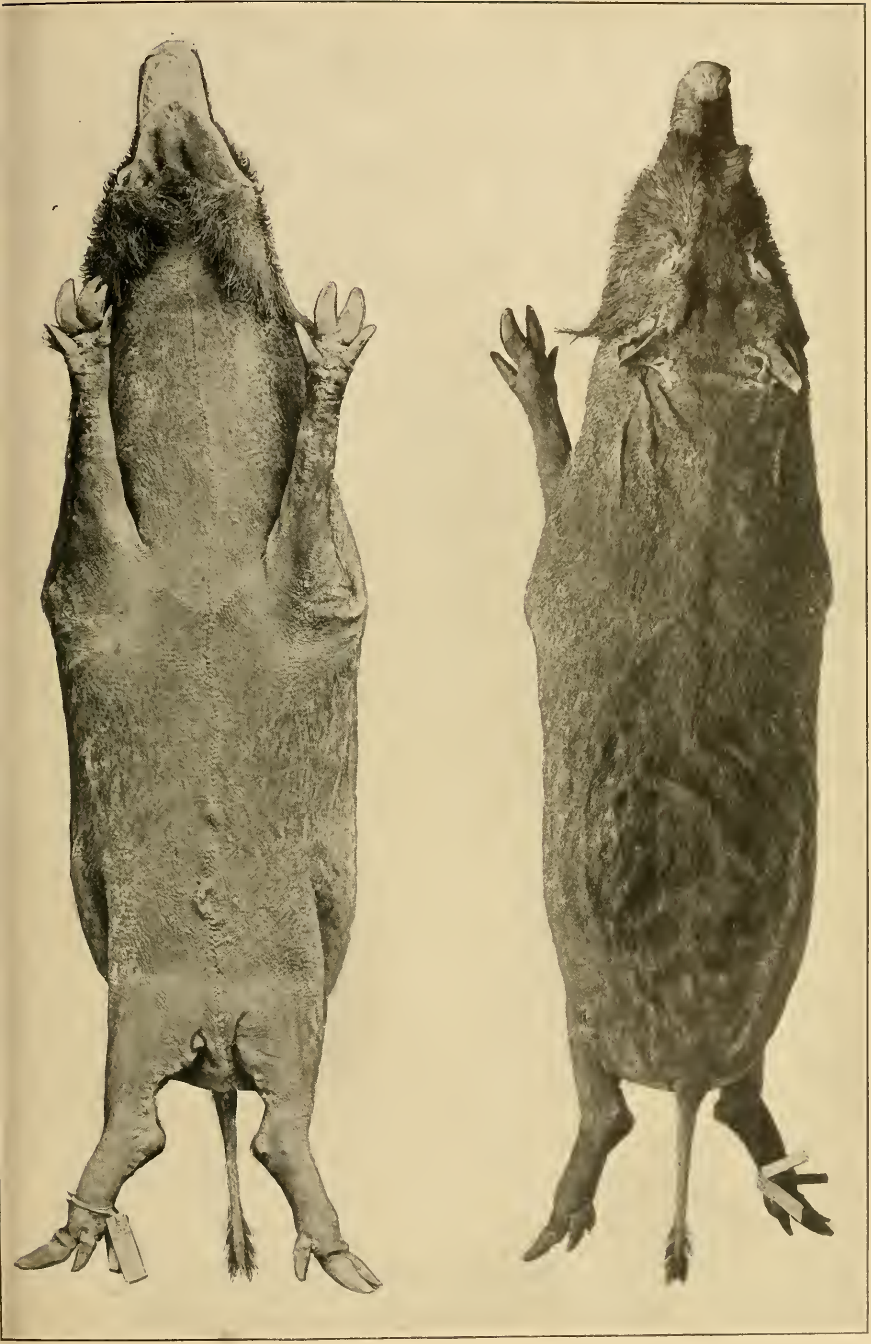
SUS GARGANTUA. TYPE.

FOR EXPLANATION OF PLATE SEE PAGE 757.



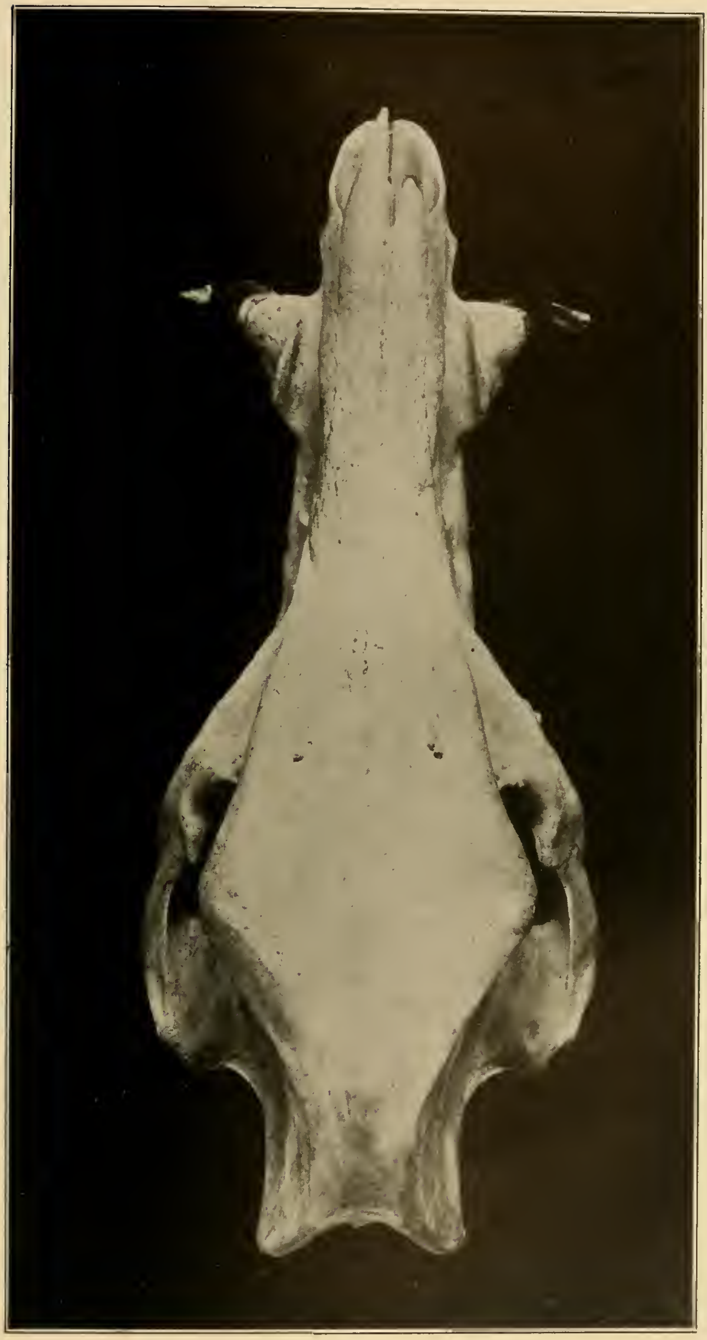
SUS BARBATUS.

FOR EXPLANATION OF PLATE SEE PAGE 757.



SUS OI. TYPE.

FOR EXPLANATION OF PLATE SEE PAGE 757.

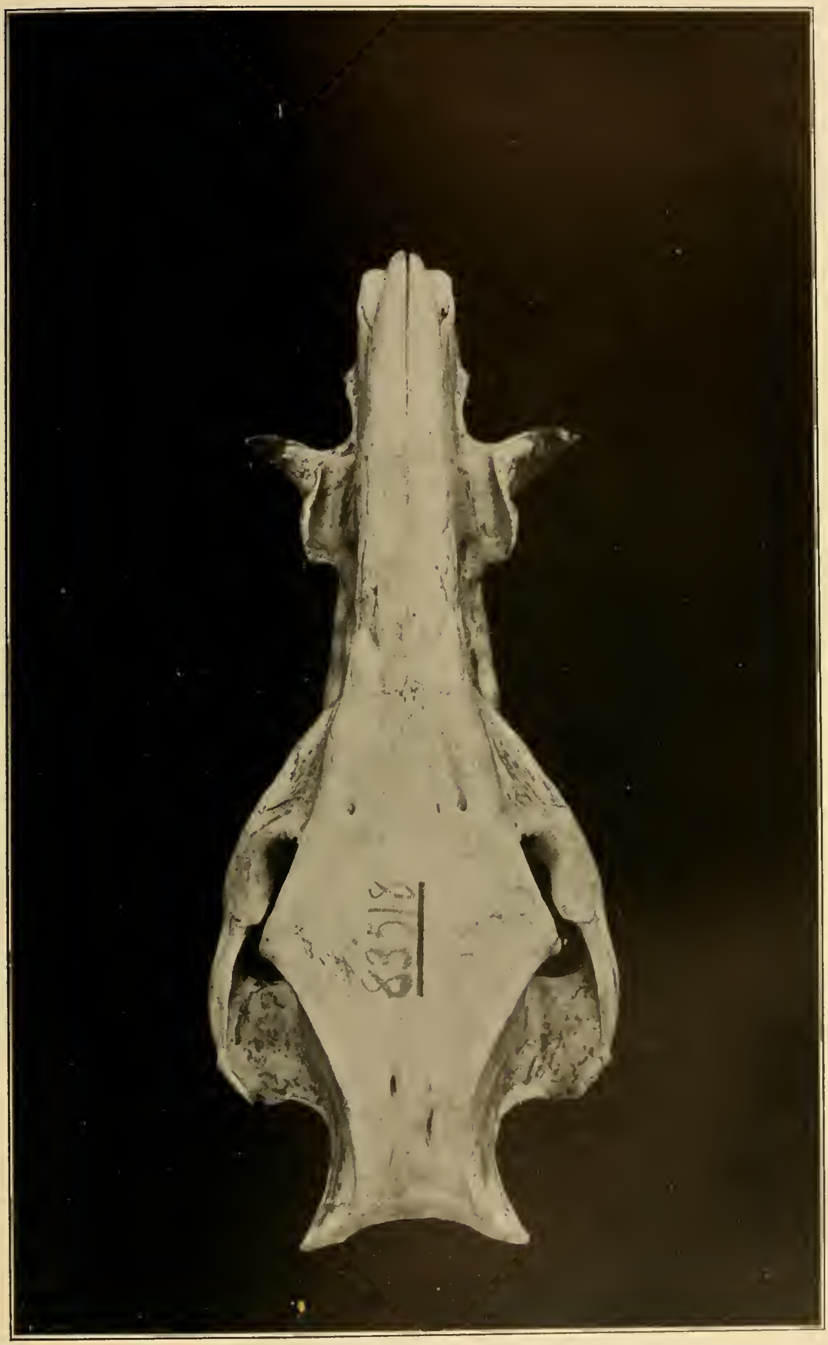


SUS CRISTATUS.

FOR EXPLANATION OF PLATE SEE PAGE 757.

SUS CRISTATUS.

FOR EXPLANATION OF PLATE SEE PAGE 757.

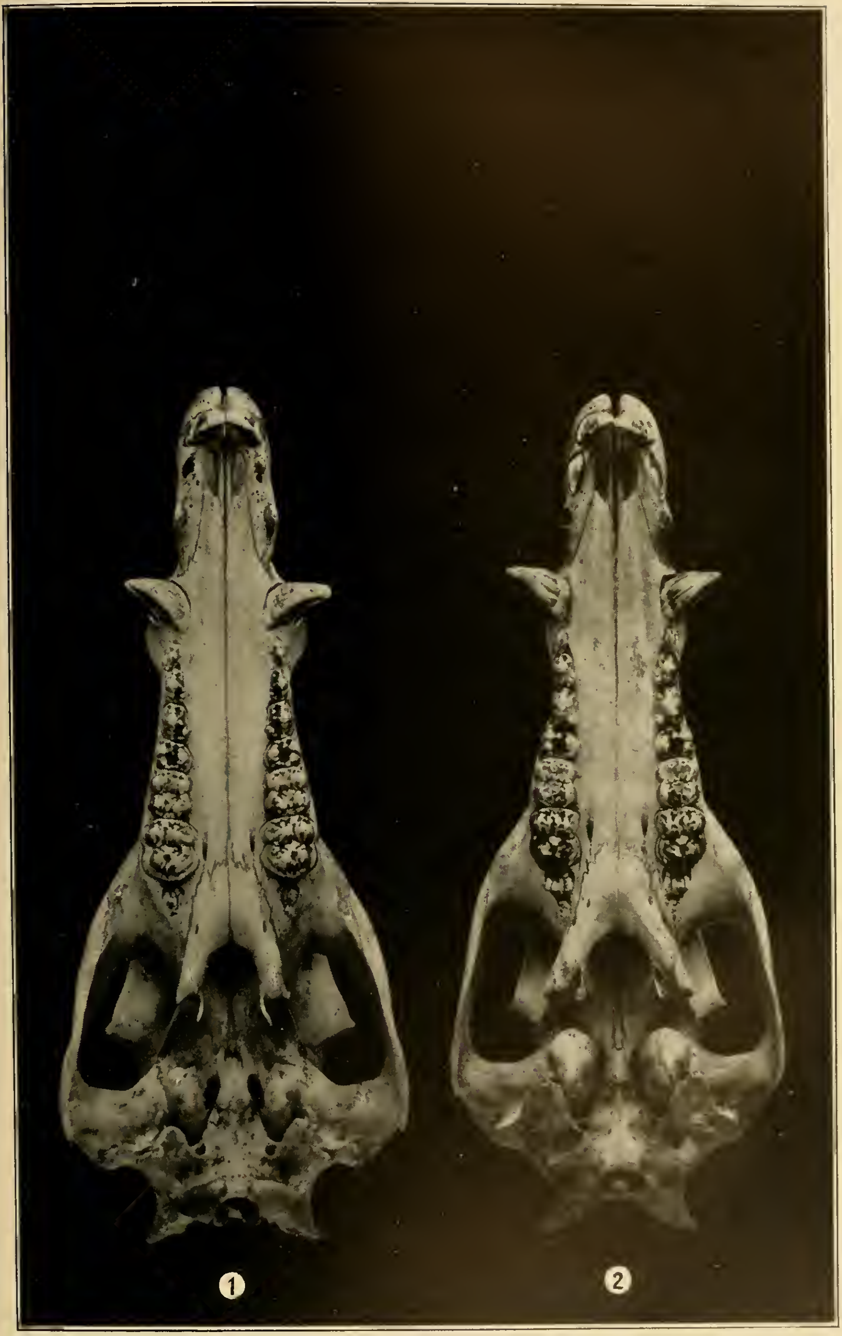


Sus jubatus. Type.

For explanation of plate see page 758.

Sus jubatus. Type.

For explanation of plate see page 758.



1. SUS PENINSULARIS?—2. SUS PENINSULARIS.

FOR EXPLANATION OF PLATE SEE PAGE 758.

1. SUS CRISTATUS.—2. SUS JUBATUS. TYPE.—3. SUS VITATTUS.

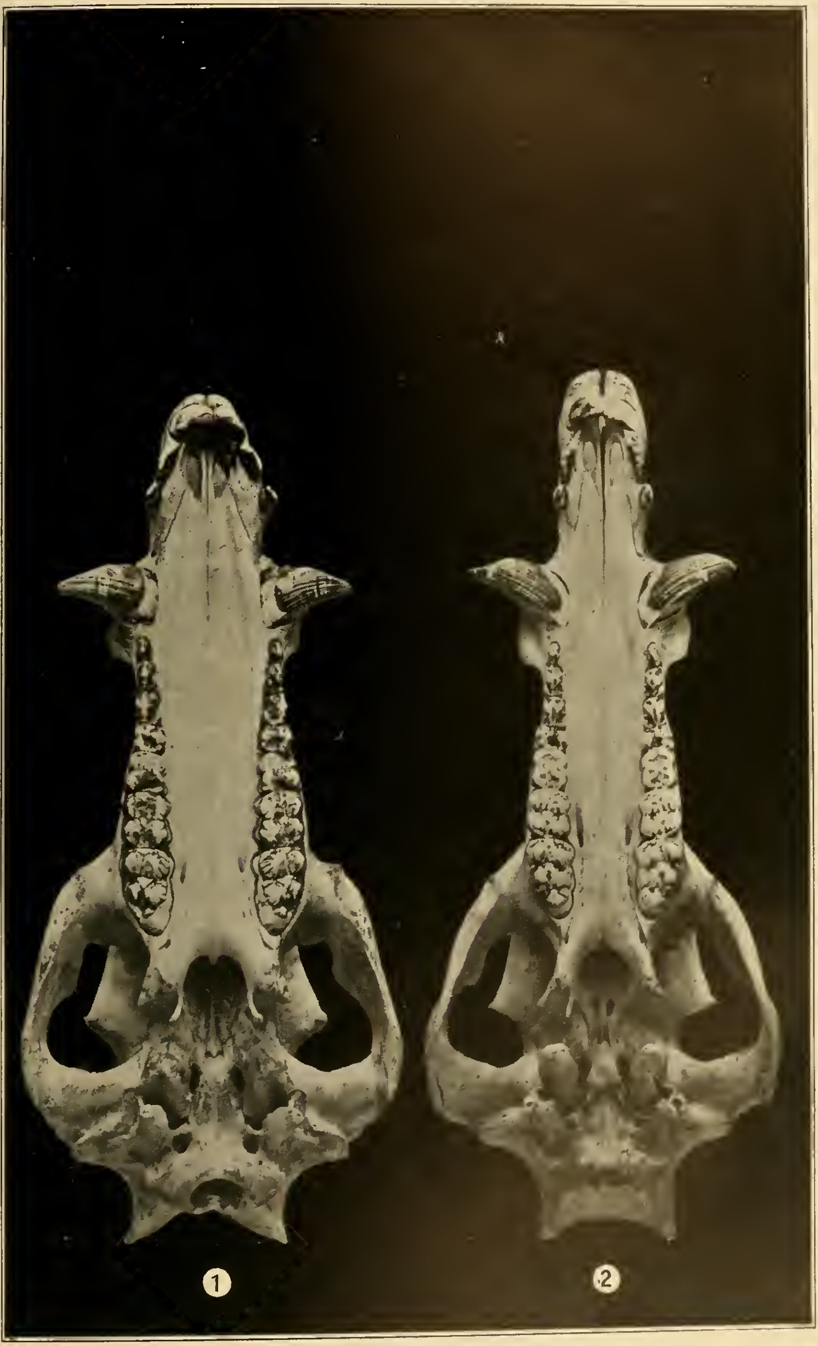
FOR EXPLANATION OF PLATE SEE PAGE 758.

1, 2. Sus cristatus.—3. Sus jubatus. Type.

For explanation of plate see page 758.

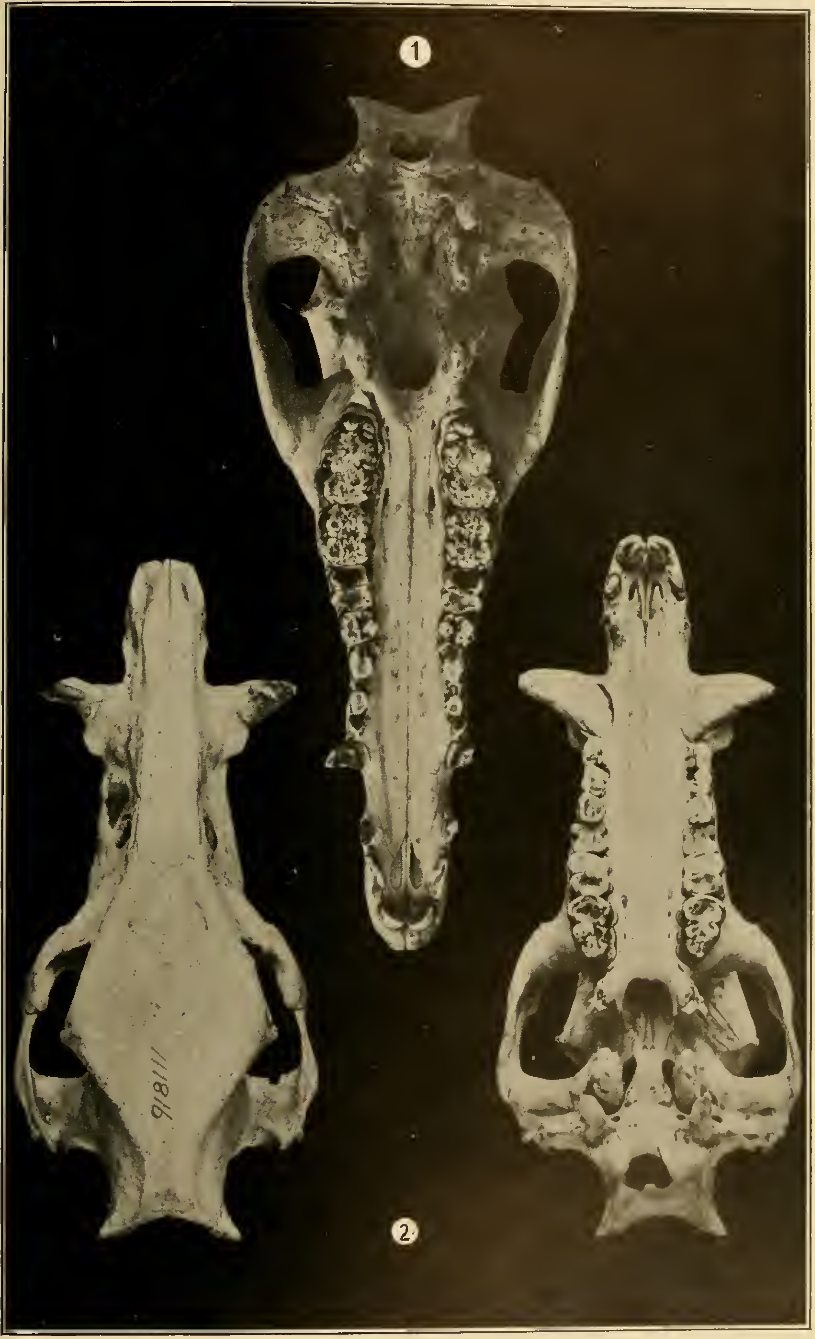
1. Sus babi. Type.—2. Sus rhionis. Type.

For explanation of plate see page 758.



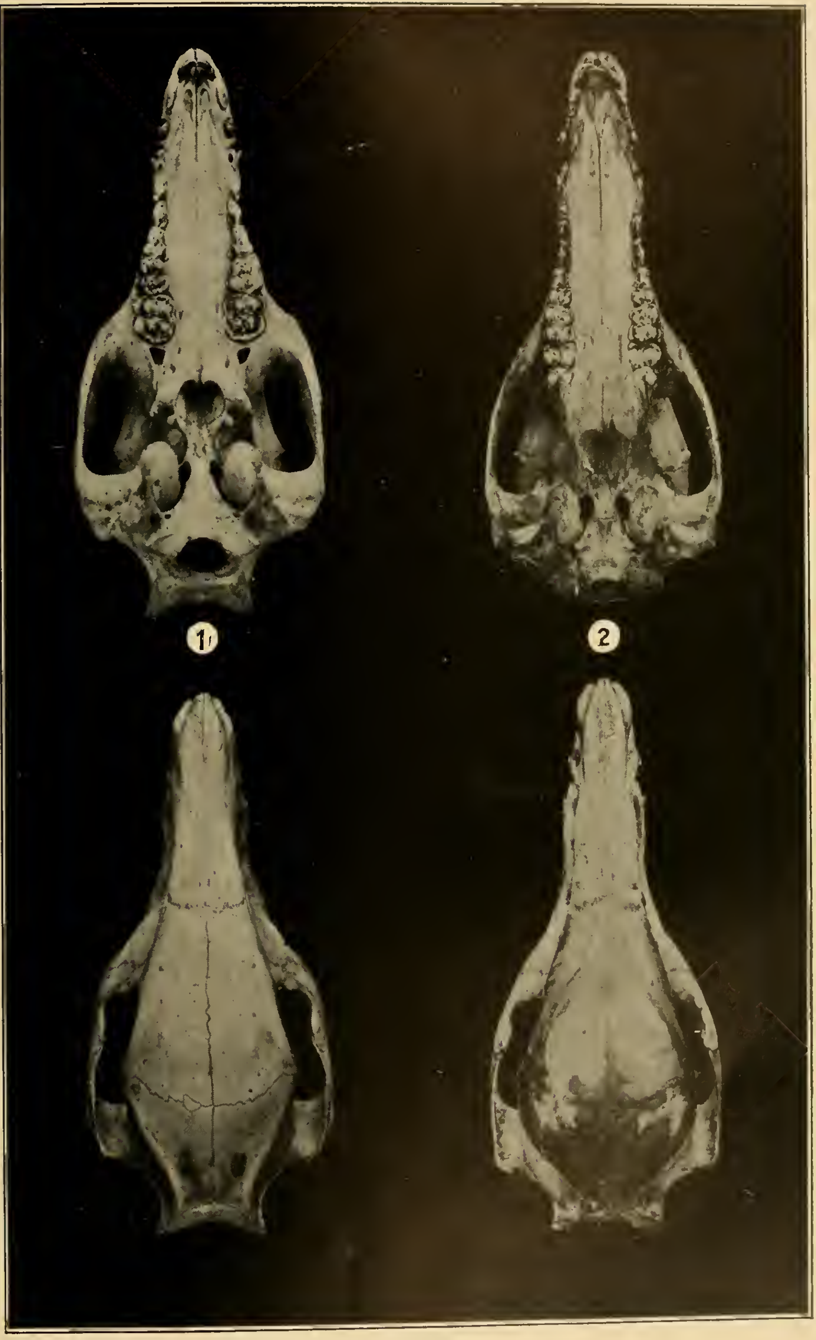
1. Sus babi. Type.—2. Sus rhionis. Type.

For explanation of plate see page 758.



1. Sus niadensis. Type.—2. Sus andamanensis.

For explanation of plate see page 758.



1. Sus niadensis.—2. Sus oi.

For explanation of plate see page 758.

1. Sus vittatus.—2. Sus niadensis. Type.—3. Sus rhionis. Type.

For explanation of plate see page 758.