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Notes on Southeast Asian Porcupines (Hystricidae, Rodentia) I. On the taxonomy of the genus *Trichys* Günther, 1877

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ABSTRACT

Porcupines of the genus *Trichys* occur in Malaya, Sumatra and Borneo. In the present paper the confused nomenclatorial history is described and arguments are put forward to show that *Hystrix fasciculata* Shaw, 1801 (Malay Peninsula) is referable to *Trichys* Günther, 1877, and not to *Atherurus* F. Cuvier, 1829. In the interest of stability of nomenclature, a neotype of *Trichys fasciculata* (Shaw, 1801) is designated. The evidence presented demonstrates that, on the basis of the scarce material available now, the three populations must be considered one species without subspecific division.

INTRODUCTION

The taxonomy of the longtailed porcupines with less specialized tailbrush of Borneo, Sumatra and Malaya, genus *Trichys* Günther, 1877, is a history of confusion and errors to this day. The scant knowledge we have of this group is the result of the confusion of specimens of *Trichys* and *Atherurus macrourus* (Linnaeus, 1758), the partial overlap of their ranges (Malaya) and the scarceness of *Trichys* specimens in museum collections.

Buffon (1789) was the first to give a description of this type of animal under the vernacular name "le Porc-épic de Malaca". He based this description, to which a more or less caricaturelike illustration was added, on two living animals. Shaw (1801) repeated Buffon's description, gave an illustration apparently based on Buffon's, and used the name *Hystrix fasciculata* for it. Although Shaw's figure is little true to nature, it can be associated with *Trichys* with certainty because of the correct representation of the tailbrush. He describes the peculiar tailbrush of *Trichys* as follows: "terminated by a tuft of long flat hairs, or rather small white laminae, resembling strips of parchment". This description perfectly fits *Trichys* and it is impossible to associate it with *Atherurus macrourus*, particularly because in

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the same paper Shaw (1801) described the more specialized tailbrush of *A. macrourus* as follows: "a thick brush of quills of an extraordinary form, consisting each of a long slender stem, swelling out at intervals into knots resembling grains of rice."

Günther (1877) based his new genus and species *Trichys lipura* on the quite different skull structure and the strongly reduced tail of a Bornean specimen. Probably this specimen was tailless by mutilation. Waterhouse (1848) studied three specimens from Malacca from the collections of the Leiden Museum and referred them to Shaw's *fasciculata*, but Günther (1889), even after having studied one of these specimens and having recognised it as belonging to his genus *Trichys*, rejected the name *fasciculata* for the Malayan and Bornean *Trichys* forms. Günther attached too much value to some details of Buffon's and Shaw's figures and consequently considered the name *fasciculata* a synonym of "*Atherura macrura*", which was also Thomas' opinion (1889). Jentink (1894) discussed this problem thoroughly and demonstrated clearly that Günther's *lipura* and Shaw's *fasciculata* are identical, stating that the valid name for this species is *Trichys fasciculata* (Shaw). Bonhote (1900), too, comparing a specimen from Ulu Selama, Malaya, with six specimens from Borneo, argued that the *Trichys* forms of Malaya and Borneo are identical. He also compared that specimen with Shaw's description, but, either because of characteristics probably resulting from individual variation, or because he used subjective criteria, he judged Shaw's *fasciculata* to be quite different from the Malayan specimen studied. He therefore associated Buffon's and Shaw's description with *Atherurus macrourus* (Linnaeus, 1758) as Günther and Thomas did. Lyon (1906 and 1907), on the contrary, accepted Jentink's arguments and regarded *fasciculata* as the valid name for the Malayan representative of the genus *Trichys*; however, he seems to have changed his mind (1907, footnote p. 590) after Thomas' new argumentation (1907) that *H. fasciculata* Shaw should be a synonym of *H. macroura* Linnaeus. This last opinion can also be found in Ellerman (1940) and in Chasen (1940). Consequently, they used the later name *lipura* Günther for the Malayan animal, just as certain other authors have done recently: Hill (1960), Harrison (1966), Medway (1966) and Yong Hoi-Sen (1973).

Miller (1903) based a new species *Trichys macrotis* on the material from Sumatra of which the ears were larger and the hamular processes of the pterygoids had quite a different form. However, he did not have Malayan material at his disposal to make comparisons with his five Sumatran specimens and only one Bornean specimen. Chasen & Kloss (1932) and Chasen (1940) supposed that the Sumatran form might differ little, if it all, from the continental animal. Lyon (1907) as well as Mohr (1963 and 1965) listed the three populations of the genus as different species under the three available names, but neither studied specimens from Malaya.

From the foregoing it must be concluded that the difference of opinion about the valid specific name can only be solved by designating a neotype, that the morphological differences between the three *Trichys* populations are

insufficiently known and, consequently, nomenclature and classification are rather confused. The aim of the present paper is to solve these problems as far as possible with the aid of the West European and American museum material available to me.

MATERIAL AND METHODS

Sources. — In the list of specimens studied 36 skulls and 34 skins, from the collections of the institutions mentioned below, are recorded.

AMNH = American Museum of Natural History, New York.

BMNH = British Museum (Natural History), London.

FMNH = Field Museum of Natural History, Chicago.

RMNH = Rijksmuseum van Natuurlijke Historie, Leiden.

USNM = National Museum of Natural History, Washington.

ZMA = Zoölogisch Museum, Amsterdam.

Dental age. — In the present paper a specimen is considered adult when the deciduous premolar in the upper jaw (DP4) has been shed and the permanent premolar (P4) shows wear. Specimens are termed subadult when the permanent molar in the upper jaw (M3) shows wear and the DP4 is not yet shed or the P4 is still unworn. In *Hystrix* the deciduous premolar is shed relatively late in life; therefore, the specimens in this category are nearly fullgrown. A specimen is termed young when the M3 is unerupted or not yet showing wear.

Cranial measurements. — The following measurements, partly illustrated in figure 1, have been made on all the adult skulls examined.

Occipito-nasal length: distance from the anteriormost point of a nasal to the posterior margin of the occiput (Fig. 1).

Basilar length: distance from the line connecting the posterior margins of the alveoli of the upper incisors to the anteriormost inferior border of the foramen magnum (Fig. 1).

Length of the nasals: distance from the anteriormost point of the nasals to the posteriormost point of the suture between the nasals and the frontal bones (Fig. 1).

Length of the frontals: length of the suture between the frontal bones (Fig. 1).

Palatal length: distance from the anteriormost point of the premaxillary bones to the anteriormost point of the hinder edge of the palate (Fig. 1).

Length of the diastema: distance between the line connecting the posterior margins of the alveoli of the upper incisors and the line connecting the anterior margins of the alveoli of the premolars (Fig. 1).

Breadth of the nasals posterior: distance between the left and the right conjunction point of the nasal-premaxillary suture and the premaxillary-frontal suture (Fig. 1).

Breadth of the nasals anterior: widest anterior breadth of the combined nasals (Fig. 1).

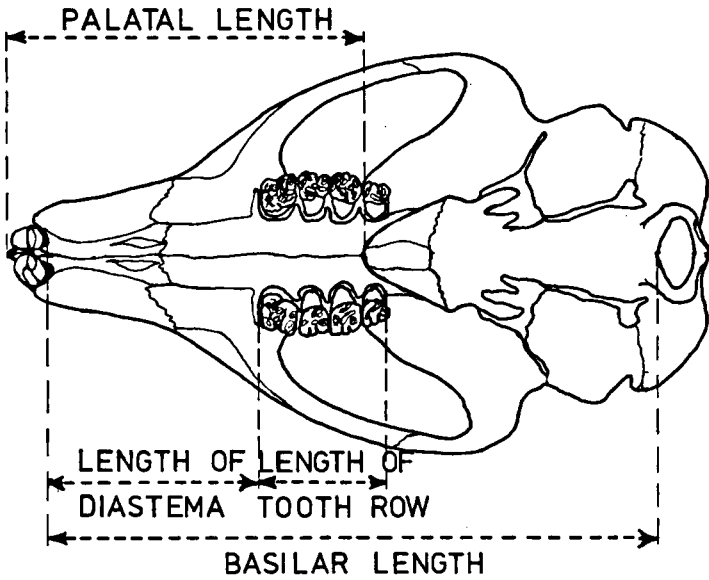
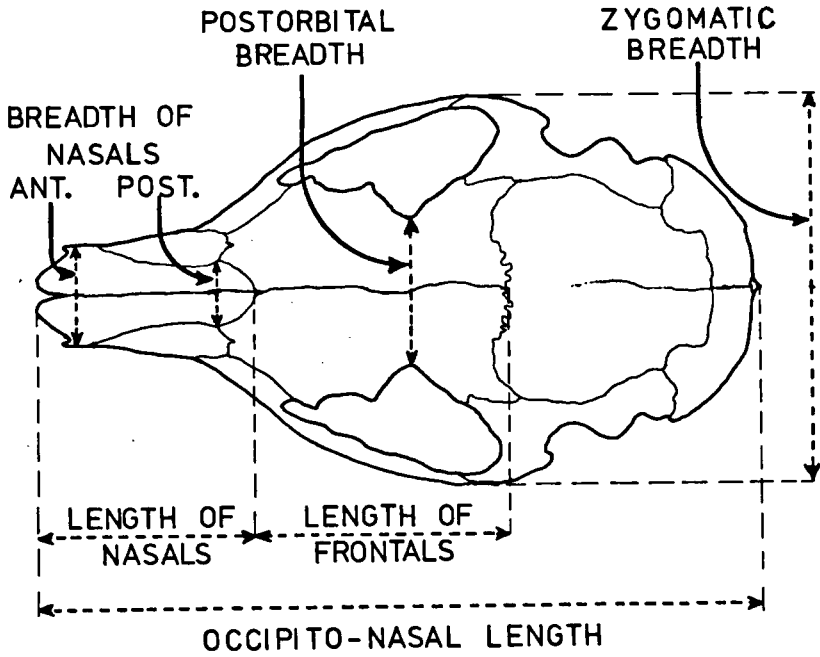


FIG. 1. Diagrams of dorsal and ventral views of the skull of *Trichys fasciculata* showing limits of cranial measurements.

Postorbital breadth: least width of the postorbital constriction (Fig. 1).

Zygomatic breadth: greatest distance across the zygomatic arches of the skull, perpendicular to the long axis of the skull (Fig. 1).

Height of the skull near the rostrum: distance between the line connecting the anterior edges of the alveoli of the premolars and the top of the skull, perpendicular to the palate.

Length of a mandible: distance between the anteriormost point of the bone to the posteriormost point of the articular process.

Height of a mandible: distance between the top of the articular process and the lower edge of the ascendent ramus of the mandible.

Alveolar length of a maxillary tooth row (Alv. P4 - M3): distance from the anterior edge of alveolus of the premolar to the posterior edge of the alveolus of the third molar (Fig. 1).

Alveolar length of a mandibular toothrow (Alv. p4 - m3): distance from the anterior edge of the alveolus of the premolar to the posterior edge of the alveolus of the third molar.

External measurements. — The length of the longest spine, tactile bristle and tail bristle of each skin has been measured with a measuring ruler.

Spines are stiff, flattened and grooved bristles.

Tactile bristles (term after Banks, 1932), are flexible, circular in cross-section, have the largest diameter near the base and a number of them are considerable longer than the spines. Tactile sense function has been suggested by Mohr (1965: 23) as well.

Tail bristles are the long flattened hairs of the tail brush.

Genus *Trichys* Günther, 1877

Trichys Günther, 1877: 739. *Trichys fasciculata* (Shaw, 1801), type by monotypy.

Trichys fasciculata (Shaw, 1801)

Hystrix fasciculata Shaw, 1801: 11, pl. 124; Malacca.

Trichys lipura Günther, 1877: 739, pl. 71; N.W. Borneo, opposite to Labuan.

Trichys guentheri Thomas, 1889: 235. Invalid nomen novum for *Trichys lipura*.

Trichys macrotis Miller, 1903: 469; Tapanuli Bay, Northwestern Sumatra.

Type specimen. — No holotype designated. I inquired at the Muséum National d'Histoire Naturelle in Paris if the material of the animals described by Buffon (1789) under the vernacular name "le porc-épic de Malaca" is present in the collection. J. Roche (in litteris, d.d. 27.XI.1975) kindly communicated: "J'ai le regret de vous faire savoir, en dépit d'une recherche attentive, aussi bien dans les collections du laboratoire que dans celles de la galerie (types et collection générale), que je n'ai trouvé aucun exemplaire que lui soit référible".

As neotype of the species I designate the skin and skull of an adult male

specimen from "Runuk Tanjong", Malaya, in the British Museum (Natural History), BMNH 55.3213. The holotype of *Trichys lipura* is skin and skull BMNH 76.9.20.17, that of *Trichys macrotis* is skin and skull USNM 114488.

Type locality. — Malaya. The exact locality of the neotype, "Runuk Tanjong", could not be found on any available map or in any gazetteer. This specimen is from the collections of the original Federated Malay States Museum, brought to London by H. C. Robinson and passed into the British Museum (Natural History) after his death. Hill (1960: 106) mentioned Perak as locality of this specimen but that is not quite certain. Dr. Hill (in litteris, d.d. 28.XI.1975) kindly sent me the following notes: "The only evidence available to me is from the typewritten lists (with comments) of the collection, prepared either by Robinson or by Kloss. A number of the specimens (*Lariscus insignis jalorensis*, *Rhinosciurus laticaudatus tupaoides*, *Trichys lipura macrotis*) are simply labelled Runuk Tanjong, all collected in August, 1918 (the *Trichys* apparently on the 7) with no collectors name. In the typewritten lists of specimens those from Runuk Tanjong are listed at the end of the specimens of each taxon from Perak, either followed by another specimen from Perak or by others from Pahang. Each list for each taxon is arranged geographically from north to south. So my assumption was that the unknown compiler of the lists had placed the locality in Perak, but quite clearly there is no certainty that this is correct. "Nevertheless, this specimen has been chosen as neotype because it is the only adult one available with both skin and skull. Its origin from Malaya is beyond any doubt and is in accordance with Shaw's "Malacca", considered synonymous with "Malay Peninsula".

The type locality of *Trichys lipura* appears from the label of the holotype: "N.W. Borneo", and from Günther (1876: 424): "opposite to Labuan"

The type locality of *Trichys macrotis* is Tapanuli Bay, Northwestern Sumatra.

Distribution. — Malaya, Sumatra and Borneo. The geographic distribution of *Trichys fasciculata* as determined by specimens examined, is indicated on the map in Fig. 2.

Besides "Runuk Tanjong" in Malaya, also "Sungei Manipan" in East Sumatra, "Peleben" in Northeast Borneo and "Mt. Salikan" in Borneo could not be found in any available gazetteer or atlas.

Description. — More or less detailed descriptions are given by Ellerman (1940: 203-204), skin and skull, skull figures; Lyon (1907: 588-589), skin and skeleton; Günther (1877: 739-741, pl. 71), especially skull, skull figures; Günther (1889: 75-77), tail covering, figure; Waterhouse (1848: 471-472), skin.

The length of head and body is, as appears from some fourteen collector measurements, from about 35 to 48 cm, and the length of the tail without brush is about half the length of head and body. The body weight, in seven collector measurements, varies from 1750 to 2155 grammes. Collector measurements of the ears give lengths from 28 to 32 mm. The colour of the

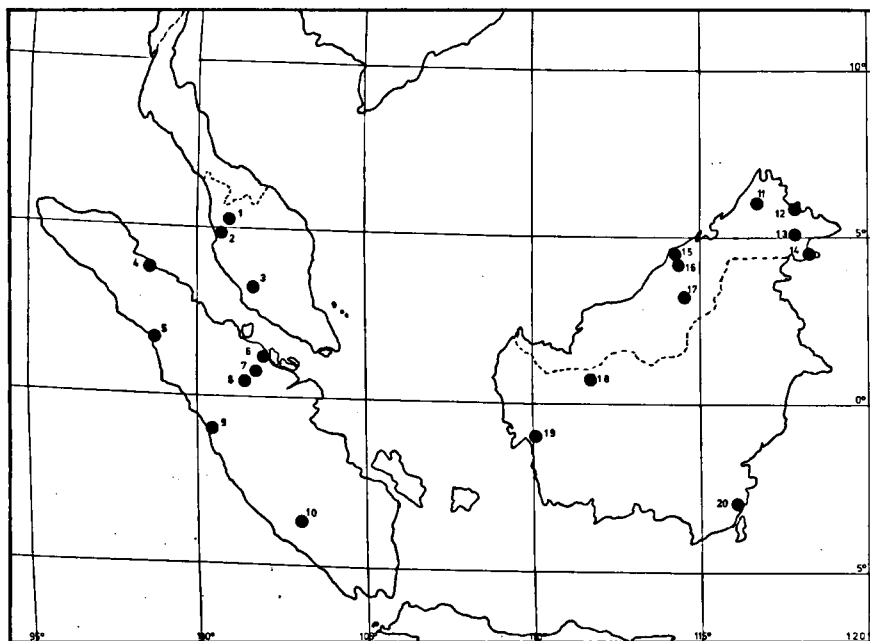


FIG. 2. Distribution of *Trichys fasciculata* in Southeast Asia as determined by specimens examined. For coordinates see Gazetteer. 1 Ulu Selama, 2 Larut, 3 Kuala Lumpur, 4 Deli, 5 Tapanuli Bay, 6 Siak River, 7 Sungei Mandau, 8 Pakanbaru, 9 Padang, 10 Tebingtinggi, 11 Ranau and Mt. Kinabalu, 12 Sandakan, 13 Sapagaya Forest Reserve, 14 Quoin Hill, 15 Baram, 16 Claudetown, 17 Kalulong, 18 Mt. Kenepai, 19 Sungei Matan, 20 Saratok River.

upper part of the skin varies from blackish-brown to light brown, but this individual variation may be due, to a certain degree, to the way the skins have been prepared and preserved. The colour of head, neck and shoulders is somewhat lighter than that of the posterior part of the back. The under parts of the skin are whitish, sometimes very light brown. The dorsal spines have the basal half white and the terminal half brown. The longest spine of adult specimens varies from 33 to 46 mm, the longest tactile bristle from 60 to 80 mm. Tactile bristles have the same dark colour as the spines, with a white base of 10 to 30 mm only. The soft and flexible bristles of the head have essentially the same form as the larger spines of the back. The length of the tail bristles greatly depends on the wear they have been exposed to. The largest one in the skins studied varies from 55 to 220 mm. They are parallel-sided, about 1.1 mm broad and 0.3 mm thick.

Both the deciduous and permanent premolars are rooted, or, more exactly, show evidence of being multi-rooted when in place. Often all the cheekteeth show these clearly visible roots above the edge of the alveole.

The numbers of cervical, dorsal, lumbar and sacral vertebrae (in five

specimens) are respectively 7, 16, 5 and 3, the number of the tail vertebrae varies from 22 to 25.

An indication of sexual dimorphy could not be found in colour or in measurements.

Measurements. — Skull measurements of ten adult specimens are represented in table I, and range, mean, number of measurements and standard deviation of all the measurements of adult specimens are represented in table II.

Discussion. — As already argued in the introduction, it seems necessary to discuss the valid name for the species of this genus. After Shaw's description and figure (1801: 11-12, pl. 124) under the name *Hystrix fasciculata*, both derived from Buffon's "porc-épic de Malaca" (1789: 303-304, pl. 77), Waterhouse (1848: 470-472) was the first to publish a description based on museum material. He studied the specimens from Malacca in the Leyden Museum (erroneously he recorded Siam), referred them to Shaw's *fasciculata* and clearly distinguished this form from Linnaeus' *Hystrix macroura*. That Günther (1889: 75-76) could not accept the identity of these specimens nor that of his *Trichys lipura* with *fasciculata* Shaw can only be explained by the fact that he attached too much importance to Buffon and Shaw's figures without consulting and comparing the descriptions, as Jentink (1894: 207-208) clearly demonstrated. According to Günther (1889: 76) the spines were figured too long and the tail brush was rendered too thick. Bonhote (1900:

TABLE I. Skull measurements in millimetres of ten adult specimens of *Trichys fasciculata* from Malaya, Sumatra and Borneo. For definitions of the measurements see Material and Methods.

1-BMNH 55.3213, neotype, 2-BMNH 16.11.16.1, 3-BMNH 16.11.16.2, 4-USNM 114488, 5-USNM 144216, 6-RMNH 737, 7-BMNH 76.9.20.17, 8-BMNH 89.1.8.7, 9-USNM 151880, 10-USNM 145571.

	Malaya			Sumatra			Borneo			
	1	2	3	4	5	6	7	8	9	10
	♂	-	-	♀	♂	♂	-	♀	♀	♂
Occ. nasal l.	79.8	83.2	82.4	81.6	83.4	86.6	—	92.2	79.6	85.5
Basilar l.	64.6	68.4	67.7	67.8	67.6	73.0	—	76.0	66.1	68.4
L. nasals	23.0	26.5	—	26.3	28.1	26.0	31.0	30.0	23.5	23.5
L. frontals	24.2	—	—	—	22.1	29.0	27.4	—	27.5	31.2
Palatal l.	38.5	41.2	41.5	40.5	40.4	45.3	44.6	46.0	37.6	42.7
L. diastema	22.2	24.3	23.0	23.5	22.5	26.8	25.4	28.5	22.2	25.2
Br. nas. post.	8.1	8.6	—	9.8	9.4	10.0	8.9	9.4	8.5	8.4
Br. nas. ant.	10.5	10.8	11.0	11.7	10.6	12.6	13.2	11.0	10.0	10.1
Postorb. br.	16.9	16.2	17.2	16.0	18.4	16.2	18.2	18.3	18.7	17.7
Zygomatic br.	40.5	41.0	43.6	43.4	44.7	46.4	47.8	46.7	44.0	45.4
Height of skull	19.8	21.1	21.5	22.2	21.6	22.7	22.9	25.1	21.0	21.4
L. mandible	48.6	51.3	52.4	52.2	51.6	56.5	56.0	59.3	53.2	54.8
Height mand.	18.1	18.4	20.0	18.8	18.7	20.3	21.8	21.6	19.6	21.5
Alv. P4—M3	13.9	12.3	14.6	13.2	14.6	15.2	16.7	14.6	14.2	14.7
Alv. p4—m3	13.7	12.7	13.9	—	14.0	—	16.7	14.7	14.1	14.9

TABLE II. Skull measurements in millimetres of adult specimens from geographic samples of *Trichys fasciculata* (Shaw, 1801), with range, mean of sample in parentheses, number of measurements (n) and the standard deviation (s). For definitions of the measurements see Material and Methods.

	Malay peninsula	Sumatra	Borneo
Occ. nasal l.	79.8—83.2 (81.8) n = 3	81.6—86.6 (83.3) n = 11 s = 1.51	79.6—92.2 (85.5) n = 13 s = 3.36
Basilar l.	64.6—68.4 (66.9) n = 3	64.5—73.0 (67.9) n = 10 s = 2.13	66.0—76.2 (69.9) n = 13 s = 3.30
L. nasals	23.0—26.5 n = 2	25.0—28.1 (26.4) n = 11 s = 0.97	23.4—31.0 (26.4) n = 14 s = 2.93
L. frontals	24.2 n = 1	22.1—29.0 (26.0) n = 9 s = 1.94	27.0—35.5 (29.2) n = 11 s = 2.45
Palatal l.	38.5—41.5 (40.4) n = 3	35.7—45.3 (40.4) n = 9 s = 2.49	37.6—46.0 (42.7) n = 12 s = 2.51
L. diastema	22.2—24.3 (23.2) n = 3	21.9—26.8 (23.4) n = 9 s = 1.39	22.2—28.5 (24.6) n = 12 s = 1.81
Br. nas. post.	8.1—8.6 n = 2	7.6—11.0 (9.3) n = 10 s = 1.04	7.2—9.6 (8.6) n = 14 s = 0.78
Br. nas. ant.	10.5—11.0 (10.8) n = 3	9.7—12.6 (11.3) n = 10 s = 0.99	10.0—13.2 (10.9) n = 13 s = 0.85
Postorb. br.	16.2—17.2 (16.8) n = 3	15.6—18.4 (16.8) n = 9 s = 0.88	15.0—19.8 (17.6) n = 13 s = 1.31
Zygomatic br.	40.5—43.6 (41.7) n = 3	41.2—46.4 (43.5) n = 10 s = 1.44	41.8—47.8 (44.3) n = 13 s = 1.85
Height of skull	19.8—21.5 (20.8) n = 3	19.6—22.7 (21.3) n = 11 s = 0.92	21.0—25.1 (22.2) n = 14 s = 1.10
L. mandible	48.6—52.4 (50.8) n = 3	51.6—56.5 (52.8) n = 8 s = 1.58	52.9—59.3 (55.7) n = 12 s = 2.32
Height mand.	18.1—20.0 (18.8) n = 3	17.7—20.3 (18.9) n = 8 s = 0.76	19.6—22.5 (21.3) n = 11 s = 0.80
Alv. P4—M3	12.3—14.6 (3) n = 3	13.2—15.6 (14.5) n = 8 s = 0.74	14.2—16.7 (15.3) n = 12 s = 0.84
Alv. p4—m3	12.7—13.9 (13.4) n = 3	14.0—15.3 (14.7) n = 6 s = 0.50	14.1—16.8 (15.4) n = 12 s = 0.97

881-882) did not associate his specimen from Ulu Selama, Malaya, with *fasciculata* Shaw, because it differed from Shaw's description in two respects: firstly its tail was one half of the length of the body instead of one third, and secondly, only brown tipped spines occurred whereas in Shaw's description also white tipped ones were mentioned. It is, however, highly probable that these features are due to individual variation or are based on incorrect observation, whereas it is highly improbable that "... a tuft of long flat hairs, or rather small white laminae, resembling strips of parchment" in Shaw's description should refer to the much more specialised tail bristles of

Atherurus. Thomas (1907: 66) also tried to prove that Shaw's *Hystrix fasciculata* should be referred to *Atherurus*. His statement: "... Buffon's animal was said to come from Malacca where *Atherurus* is common and *Trichys* is as yet unknown", was after Waterhouse, Günther, Jentink and Bonhote's papers, a conspicuous mistake. Thomas concentrated his argument on the assumption that the translation of "rognures de parchemin" (Buffon 1789: 303) into "strips of parchment" (Shaw 1801: 11) might not be correct. However, this argument is invalid because Shaw's description derives its nomenclatorial significance from its own. Besides, the term "parings" or "clippings", proposed by him, leave no room for other credible interpretations. Therefore we must agree with Mohr (1963: 299) that the reference of *fasciculata* Shaw to *Trichys* is unmistakable and that the reference to *Atherurus* is undoubtedly out of the question. Consequently, the valid name of the Malayan *Trichys* must be *Trichys fasciculata* (Shaw, 1801), and if the genus is considered monotypic, as in my opinion it is, it also applies to the Bornean and Sumatran population. In the interests of stability of nomenclature in the present paper a neotype of *Trichys fasciculata* (Shaw, 1801) is designated.

Apart from the nomenclatorial problem, the similarity of the Malayan and Bornean populations was recognized by Günther (1889: 75-77), Jentink (1894: 207) and Bonhote (1900: 882), whereas both Lyon (1907: 590) and Mohr (1963: 300) doubted this view because of the general distinctness of mammals of the Malay Peninsula and those from Borneo. The Sumatran form was listed as a valid species, *T. macrotis* Miller, 1903, by Lyon (1907: 591) and Mohr (1963: 298), and was given subspecific rank in Chasen (1940: 189) and in Ellerman (1949: 3). The tables I and II in the present paper may show, however, that the three populations cannot be separated on cranial measurements, not even on subspecific level. Although there are differences, there is an essential overlap of all the measurements of the three populations presented in table II. For the occipito-nasal length of the skulls this is shown in Fig. 3.

Some other cranial measurements are represented below in frequency diagrams: length and breadth of the nasals because these are of diagnostic value in the other genera of the Hystricidae and length of the frontals because, as is shown in table II, there are relatively large differences between these measurements. The differences in size of the skulls of the three populations are sufficiently shown by Fig. 3, so in the next diagrams (Figs. 4-6) relative sizes are represented.

With the overlap of the measurements as represented in the figures 4 to 6, statistical differences, significant or not, are of secondary importance and not dealt with here. Standard deviations in table II enable further analysis if required.

According to Miller (1903: 469) *Trichys macrotis* from Sumatra has different ears, in form as well as in size, and pterygoids with different hamular processes. Lyon (1907) and Mohr (1963) accepted these characters

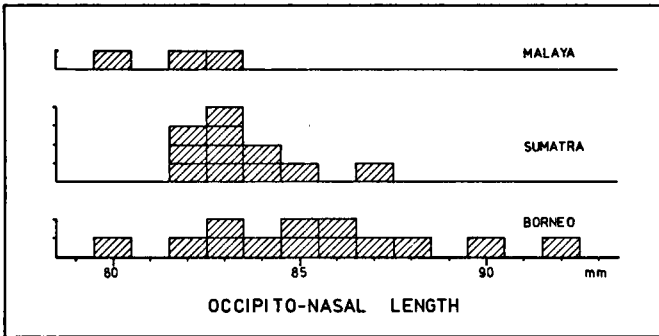


FIG. 3. Frequency distribution of the occipito-nasal length of the skulls of *Trichys fasciculata* from Malaya, Sumatra and Borneo. Adult specimens only.

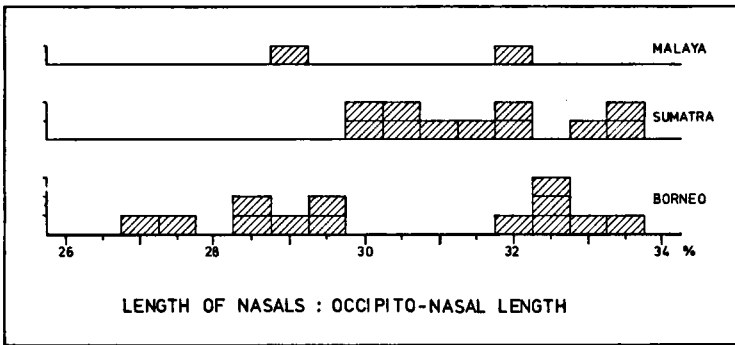


FIG. 4. Frequency diagram of the relative length of the nasals of *Trichys fasciculata* from Malaya, Sumatra and Borneo, expressed as a percentage of the occipito-nasal length of the skull. Adult specimens only.

for specific distinction. In table III measurements of the ears, taken from dry skins, are represented. The length has been measured from the lowest point of the intertragic incisure to the uppermost margin of the ear. The table shows that the dimensions of the ears in the samples from Borneo and Sumatra are quite alike.

The form of the hamular processes appeared to vary very much in the

TABLE III. Length and breadth in millimetres of the ears of *Trichys fasciculata*, measured from dry skins.

	length			breadth		
	range	mean	n	range	mean	n
Malaya	23		1	11.5		1
Sumatra	22—27	23.8	9	12—15	13.4	9
Borneo	19—28	23.6	9	12—15	13.1	9

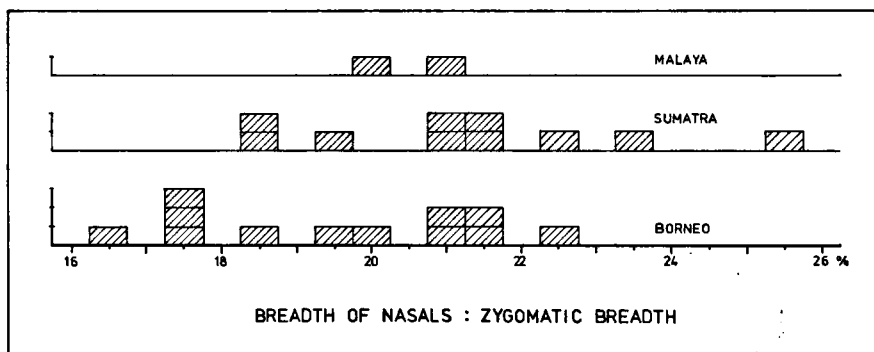


FIG. 5. Frequency diagram of the relative posterior breadth of the nasals of *Trichys fasciculata* from Malaya, Sumatra and Borneo, expressed as a percentage of the zygomatic breadth. Adult specimens only.

series studied and the same can be said of the length of the lacrymal bone that, according to Lyon (1907: 591), should be smaller in the Sumatran population than in the Bornean. Moreover, the hamulars often get lost in the preparation of the skull and in many cases the sutures of the lacrymal bone are obliterated so much that they cannot be measured. Therefore the published diagnostic characters do not hold in larger series and I could not find others, neither in skull dimensions nor in external features.

With the material available now, I recognize only one species in the genus *Trichys* Günther, 1877 without subspecific division.

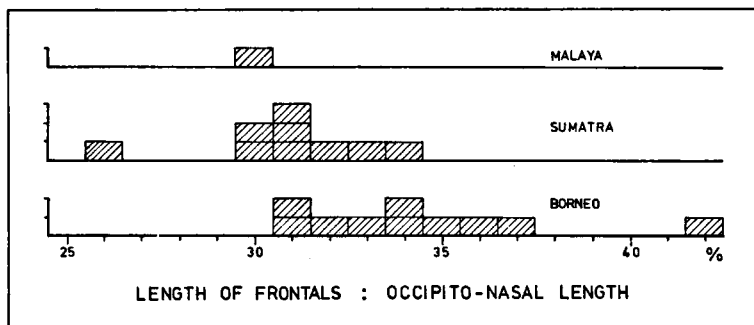


FIG. 6. Frequency diagram of the relative length of the frontals of *Trichys fasciculata* from Malaya, Sumatra and Borneo, expressed as a percentage of the occipito-nasal length of the skull. Adult specimens only.

SPECIMENS EXAMINED

The localities in the following list of specimens are plotted on the map of Fig. 2 and the coordinates are given in the gazetteer. Localities within quotation marks could not be located by me.

Malaya:

“Runuk Tanjong”, Malaya, BMNH 55.3213, neotype of *Trichys fasciculata* (Shaw, 1801), skin and skull, adult male, (“Robinson collection”, see Type specimen).

Ulu Selama, Perak, Malay Peninsula, BMNH 16.3.9.13, skull, young, Skeat expedition January 12, 1900.

Larut, Perak, BMNH 16.11.16.1, skull, adult, F.M.S. Museum no. 640/16.

Kuala Lumpur, BMNH 16.11.16.2, skull, adult, F.M.S. Museum 1912.

Malacca, RMNH 20015, skin and skeleton, young, Diard, (= Jentink's 1887 and 1888 *Atherura macrura* no. a).

Malacca, RMNH 20016, skin, probably non-adult, Diard, (= Jentink's 1888 *Atherura macrura* no. c).

Malacca, RMNH 20017, skin, young, Diard, (= Jentink's 1888 *Atherura macrura* no. d).

Sumatra:

Tapanuli Bay, West Sumatra, USNM 114488, holotype of *Trichys macrotis*, skin and skull, adult female, W. L. Abbott no. 1555, February 20, 1902, weight 5 lbs, H.B. anus 428, T. from anus 225.

Tapanuli Bay, West Sumatra, USNM 114487, skin and skull, adult female, W. L. Abbott no. 1551, February 20, 1902, weight 4.75 lbs, H.B. 425.

Tapanuli Bay, West Sumatra, USNM 114489, skin and skull, adult male, W. L. Abbott no. 1673, March 18, 1902, weight 4.5 lbs, H.B. 410, T. 180.

Tapanuli Bay, West Sumatra, USNM 114490, skin and skull, adult male, W. L. Abbott no. 1681, March 22, 1902, weight 4.5 lbs, H.B. 415, T. 185.

Tapanuli Bay, West Sumatra, USNM 114491, skin and skull, adult female, W. L. Abbott no. 1691, August 22, 1902, weight 4.75 lbs, H.B. 422, T. 195.

Siak River, Sumatra, near mouth of Gassip River, USNM 144216, skin and skull, adult male, W. L. Abbott no. 4934, December 4, 1906, weight 4 lbs, H.B. 400, T. 190, H.F. 66.

Siak River, Sumatra, near mouth of Gassip River, USNM 144217, skin and skull, adult female, W. L. Abbott no. 4950, December 14, 1906, H.B. 430.

“Sungei Manipan”, East Sumatra, USNM 49924, skeleton, adult female, W. L. Abbott January 30, 1906.

S. Mandau, Sumatra, USNM 144218, skin and skull, adult male, W. L. Abbott no. 4905, November 24, 1906, H.B. 385, H.F. 63.

Padang, West Sumatra, RMNH 737, skin and skeleton, adult male, Diergaarde Rotterdam March 21, 1917, imported February 2, 1915.

Sumatra, RMNH 1846, skin and skeleton, adult female, Diergaarde Rotterdam June 3, 1930.

Tebing Tinggi, Palembang, Sumatra, RMNH 1507, skin, female, Diergaarde Rotterdam July 23, 1926.

Deli, Sumatra, ZMA 8883, skin and skull, subadult female, L.P. Cosquino de Bussy 1905-1917.

Pakan Baroe, E. Sumatra, BMNH 53.674, skin and skull, young female, W. J. C. Frost 25-1-48, sea level.

Borneo:

N.W. Borneo, BMNH 76.9.20.17, holotype of *Trichys lipura* Günther, 1877, skin and damaged skull, adult, Low 1687a.

Baram, Sarawak, BMNH 0.3.30.6, skull and skeleton, adult, Dr. Hose.

Baram, N.W. Borneo, BMNH 89.1.8.7, skin and skull, adult female, Chas. Hose, Esq. 1687 c, 24-8-88.

N. Borneo, BMNH 8.7.17.20, skin and skull, adult, B.N. Borneo Co.

Cocoa Research Station, Quoin Hill, Tawau, N. Borneo, BMNH 71.3062, skull, adult male, J. L. Harrison 1368.

Cocoa Research Station, Quoin Hill, Tawau, N. Borneo, BMNH 71.3061, skin and skull, subadult, Lim B. L. (C), J. L. Harrison (P) July 21, 1961, J.L.H. 2140, height 750'.

Claude Town, Baram River, BMNH 95.7.26.1, skin with skull inside, foetal young in spirit, adult female, C. Hose 5-8-1891.

"Peleben", N.E. Borneo, AMNH 103975, skin and skull, adult female, N.O. Borneo Exped., Baron Victor Plessen 1935, Länge 655, Schwanz 223, Füsze 66, Ohr 31.

"Peleben", N.E. Borneo, AMNH 103974, skin and skull, subadult female, N.O. Borneo Exped., Baron Victor Plessen no. 286, Länge 604, Schwanz 217, Füsze 65, Ohr 27.

Saratok River, S.E. Borneo, USNM 151880, skin and skull, adult female, W. L. Abbott no. 5878 February 25, 1908, H.B. 445, H.F. 64, Tl. 190.

Ranau, N. Borneo, USNM 317276, skin and skull, adult female, September 22, 1960, 6214, MJ 1755, PJ 9376, T.L. 735, T. 260, H.F. 65, E. 32, Wt. 4 lb 2½ oz.

Sungei Matan, W. Borneo, USNM 145571, skin and skull, adult male, W. L. Abbott no. 5509 August 19, 1907, H.B. 420, T. 200, H.F. 65.

British N. Borneo, USNM 34785, skull and skeleton, adult, C. F. Adams.

"Mt. Salikan", Borneo, USNM 83940, skin and skull, adult male, Ernest and Chas. Hose, July 1895, 2000 ft.

Sandakan, Mile 8, Br. N. Borneo, FMNH 32691, skin and skull, adult male, F. C. Wonder 372, Crane Pacific Expedition, 570, 240, 55, E. 28.

Sandakan, Sandakan Distr., E. Coast Residency, N. Borneo, FMNH 68752, skin and skull, adult, D. D. Davis.

Sapagaya Forest Res., East Coast Residency, N. Borneo, FMNH 68753, skin and skull, adult female, D. D. Davis no. 483, August 6, 1950, logged forest, native snare trap, tail lost in live.

Southern foot of Mt. Kenepai, Roema Manoeal, Borneo, RMNH 20019, skin and skull, subadult male, Büttikofer.

Cocoa Research Station, Quoin Hill, Tawau, N. Borneo, BMNH 71.3060, skin and skull, young male, Lim. B.L. (C), J. L. Harrison (P) J.L.H. 1221, height 750'.

Mt. Kina Balu, BMNH 95.10.4.39, skin and skull, young, J. Whitehead (C), O. Thomas (P), height 3000.

GAZETTEER

The following geographic names are those from the list of specimens examined. Different spellings of synonyms are enclosed in parentheses. Most of the coordinates were taken from the "Official Standard Names Gazetteer" of the United States Board on geographic Names, Washington, some of them were derived from the "Atlas van tropisch Nederland", Kon. Ned. Aardr. Gen., 1938, Batavia, or from published information of the collectors.

Malaya:

Kuala Lumpur	3° 10' N, 101° 42' E
Larut	4° 48' N, 100° 45' E
Ulu Selama, (Selama River)	5° 15' N, 100° 42' E

Sumatra:

Deli	3° 45' N, 98° 41' E
Padang	0° 58' S, 100° 22' E
Pakan Baroe, (Pakanburu)	0° 32' N, 101° 27' E
Siak River	1° 13' N, 102° 09' E
Sungei Mandau, (Mandau River)	0° 48' N, 101° 47' E
Tapanuli Bay	1° 38' N, 98° 45' E
Tebing Tinggi, (Tebingtinggi)	3° 36' S, 103° 05' E

Borneo:

Baram	4° 36' N, 113° 59' E
Claude Town, (Claudetown; Marudi)	4° 11' N, 114° 19' E
Mount Kenepai	0° 42' N, 111° 43' E
Mount Kina Balu, (Mt. Kinabalu)	6° 03' N, 116° 32' E
Quoin Hill	4° 01' N, 118° 13' E
Ranau	5° 58' N, 116° 41' E
Sandakan	5° 50' N, 118° 07' E
Sapagaya Forest Reserve	5° 05' N, 118° 04' E
Saratok River (Lyon 1911: 57)	ca. 3° 00' S, 116° 00' E
Sungei Matan, (Matan River)	1° 03' S, 110° 06' E

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REFERENCES

- BANKS, E.
1932 A popular account of the mammals of Borneo. — *J. Malayan Branch roy. Asiatic Soc.*, 9 (2) : 1—139, pls. XI—XIX, 1 map.
- BONHOTE, J. L.
1900 On the mammals collected during the "Skeat Expedition" to the Malay Peninsula, 1899-1900. — *Proc. zool. Soc. London*, 1900 : 869—883, pl. LVI.
- BUFFON, (G. L. LE CLERC COMTE) DE
1789 Le porc-épic de Malaca. In: Buffon, *Histoire naturelle générale et particulière, servant de suite à l'histoire des animaux quadrupèdes*. Paris, supplément, 7 : 303—304, pl. LXXVII.
- CHASEN, F. N.
1940 A handlist of Malaysian mammals (A systematic list of the mammals of the Malay Peninsula, Sumatra, Borneo and Java, including the adjacent small islands). — *Bull. Raffles Mus.*, 15 : 1—XX, 1—209, 1 map.
- CHASEN, F. N. & C. B. KLOSS
1932 On a collection of mammals from the lowlands and islands of North Borneo. — *Bull. Raffles Mus.*, 6 : 1—82, 1 pl.
- ELLERMAN, J. R.
1940 The families and genera of living rodents, 1 : 1—XI, 1—689, (British Museum (Natural History), London).
1949 The families and genera of living rodents, 3 (1) : 1—V, 1—210, (British Museum (Natural History), London).
- GÜNTHER, A.
1876 Remarks on some Indian and, more especially, Bornean Mammals. — *Proc. zool. Soc. London*, 1876 : 424—428, pls. XXXVI—XXXVII.
1877 Report on some of the additions to the collection of mammalia in the British Museum. — *Proc. zool. Soc. London*, 1876 : 735—751, pls. LXIX—LXXIV.
1889 Note on a Bornean porcupine, *Trichys lipura*. — *Proc. zool. Soc. London*, 1889 : 75—77.
- HARRISON, JOHN
1966 An introduction of mammals of Singapore and Malaya : 1—XI, 1—340, (Singapore Branch, Malayan Nature Society, Singapore).

HILL, J. E.

- 1960 The Robinson collection of Malaysian mammals. — Bull. Raffles Mus., 29 : 1—112.

JENTINK, F. A.

- 1887 Musée d'Histoire naturelle Pays-Bas, Leiden. Catalogue ostéologique des Mammifères, 9 : 1—360, 12 pls. (Brill, Leiden).
1888 Musée d'Histoire naturelle Pays-Bas, Leiden. Catalogue systématique des Mammifères (Rongeurs, Insectivores, Cheiroptères, Edentés, et Marsupiaux), 12 : 1—280 (Brill, Leiden).
1894 On *Trichys fasciculata* (Shaw). — Notes Leyden Mus., 16 : 205—209.

LINNAEUS, C.

- 1758 Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis, 1 (ed. 10): 1—824, I—III (Salvii, Holmiae).

LYON, M. W.

- 1906 Type of the genus *Atherurus*, brush-tailed porcupines. — Proc. biol. Soc. Washington, 19 : 199.
1907 Notes on the porsupines of the Malay Peninsula and Archipelago. — Proc. U.S. nation. Mus., 32 : 575—594, pls. LIV—LVII.
1911 Mammals collected by Dr. W. L. Abbott on Borneo and some of the small adjacent islands. — Proc. U.S. nation. Mus., 40 : 53—146, 7 pls.

MEDWAY, LORD

- 1969 The wild mammals of Malaya and offshore islands including Singapore : I—XIX, 1—127, 15 pls., (Oxford University Press, London).

MILLER, G. S.

- 1903 Mammals collected by Dr. W. L. Abbott on the coast and islands of Northwest Sumatra. — Proc. U. S. nation. Mus., 26 : 437—484, pls. XVIII—XIX.

MOHR, E.

- 1963 Zur Nomenklatur und Systematik der Pinsel-Stachler, Gattung *Trichys* Günther, 1876 (Rodentia, Hystricidae). — Z. Säugetierk., 28 (5) : 294—301, 5 pls.
1965 Altweltliche Stachelschweine : 1—164, (Ziemsen Verlag, Wittenberg Lutherstadt).

SHAW, G.

- 1801 General zoology or systematic natural history, 2 (1) : I—V, 1—226, pls. 122—165 (London).

THOMAS, O.

- 1889 On the mammals of mount Kina Balu, North Borneo. — Proc. zool. Soc. London, 1889 : 228—236.
1907 Buffon's "Porc-épic de Malaca". — Proc. biol. Soc. Washington, 20 : 66.

WATERHOUSE, G. R.

- 1848 A natural history of the mammalia, 2 : 1—500, 22 pls. (Baillière, London).

YONG HOI-SEN

- 1973 Totally protected and protected wild mammals of Peninsular Malaysia. — Malayan Nat. J., 26 : 77—80.

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Aquamarijn 7

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