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Description of a new subspecies of Rhinoceros, from Borneo, Didermocerus sumatrensis harrissoni

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About a century ago, the Sumatran rhinoceros (*Didermocerus sumatrensis* Fischer, 1814) was distributed over a large area of southeast Asia, from the borders of Sikkim, Bhutan and China in the north to Sumatra and Borneo in the south (Talbot, 1960, 171). In such a wide range, the existence of subspecific variation is very probable, but the study of specimens to ascertain the existence and nature of such variation does not ever seem to have been undertaken, except on a small scale by Gray (1873). The subspecies which have been named were distinguished mainly on external appearance – which changes with age from "*lasiotis*"-type to "*niger*"-type (Thomas, 1901, 157)! Moreover the named subspecies have never been compared with the typical race from Sumatra.

A total of 13 skulls of the Sumatran rhinoceros is available for study in the British Museum (Natural History), and the Zoologische Staatssammlung in Munich, which are adequate for taxonomic work in that they are wild-killed, full-sized, of known locality. The localities are: Borneo 5, Sumatra 2, Malaya 4, Burma 2. In addition there is a skull in Vienna (no. 4294) which is reported to be from Borneo, and indeed fits very well in the Borneo sample; also B. M. no. 72.12.31.1, type of *Ceratorhinus niger* Gray, 1873, was already aged when captured for the London zoo, so that its morphology would not have been affected by captivity. On the other hand, a specimen which must decidedly be excluded from taxonomic consideration is B. M. no. 1901.1.22.1, type of *Rhinoceros lasiotis* (Buckland, 1872), which was captured when not yet mature and lived for some 30 years in the zoological gardens. The possibility of it being atypical must be borne in mind; also, any animal reared in captivity should on principle be excluded from taxonomic consideration.

The specimens here consedered to be "full-sized" are those in which the third molar has erupted, or is erupting. The inclusion of the second category as full-sized is justified because no increase in size can be seen from the second category to the first. For exemple in the Borneo series the skulls in which the third molars have already erupted measure 427–446 mm.; those in which it is in process of erupting measure 430–468 mm., showing a fortuitous increase in size over the completely erupted skulls! There is also a skull from Sumatra with third molar erupting; and one from Burma.

Accordingly, growth may be said to have been completed by the time the third molars begin to erupt. Among adult specimens, variation by sex was found absent in the Malayan series, in which all the skulls are sexed. On these grounds it may reasonably be assumed to be absent in the other populations: but the Sumatra and Burma samples are too small, and only two from the Borneo sample are sexed. It is of course quite possible that a larger series might reveal the existence of small average differences, but at present it should be noted only that any sexual differences that do exist do not obscure subspecific ones.

Of the various measurements taken on each skull, those which showed interpopulation variation were the following:

1. Occipitonasal length: front tips of nasals to inion.
2. Basal length: prosthion to basion.
3. Occipital breadth: from "corner" to "corner" of crista occipitalis.
4. Greatest zygomatic breadth.
5. Occipital height: from opisthion to inion.

Other measurements, such as Toothrow length, Nasal breadth, Intertemporal breadth, did not seem to vary from one population to another. In addition to direct measurement, photographs of specimens were taken on which ZEUNER's (1936, 206) angles *po* (between plane of occiput and plane of palate) and *o* (between frontal and occipital planes) were measured. The variations thus found in the slope of the occiput differ from race to race; also, as shown by ZEUNER, they differ in the four living genera of rhinoceroses. Incidentally, the values given in ZEUNER's table for *po* appear to be incorrect (unless the present author has misinterpreted their meaning); the true values should be: *Rhinoceros unicornis* 60–70° (in ZEUNER's Fig. 1 it is drawn as 60°, not as 48.5° as stated in the table); *R. sondaicus* 70°; *Diceros bicornis* 82–88° (possibly varying according to race); *Ceratotherium simum* 114–120°.

These altered figures do not in the least affect the thesis of ZEUNER's paper, which is that the angle of slope of the occiput is a reflection of the species' feeding habits. The present author has not found a way to measure the third angle, *y*, between palatal plane and axis of foramen magnum.

In the present study, the means of measurements and indices for each of the four populations of *Didermocerus* were compared, and the t-test employed in order to assess the significance of the differences. In this case, a probability of 0.01 or less was considered necessary to give the difference any taxonomic value, meaning that there would be only a 1 % chance of obtaining such a result if the populations in question were not, in fact, distinct. This 99 % level is much stricter than the 75 % discrimination required by ornithologists, but is used by some recent authors (e. g. BROOKS, 1961).

The values for the means and standard deviations are given in Table 1.

Table 1.

a. Means and standard deviations for each series.

Measurement	1 (mm.)	2:1	3:1	4:1	5:1	po^0	o^0
Borneo	447 ± 12.4	99.7 ± 2.7	23.1 ± 1.9	56.6 ± 2.4	25.4 ± 0.8	87 ± 1.4	66 ± 3.0
Sumatra	562 ± 14.5	92.3 ± 0.9	22.6 ± 1.6	52.2 ± 1.1	20.9 ± 0.4	100 ± 0.0	59 ± 1.7
Malaya	521 ± 17.6	95.8 ± 1.0	22.9 ± 1.6	56.9 ± 2.4	22.3 ± 0.5	96 ± 3.8	59 ± 1.0
Burma	527 ± 3.6	95.6 ± 1.1	26.0 ± 1.4	54.6 ± 1.5	22.8 ± 0.8	96 ± 2.7	59 ± 2.4

b. Values for t, and probabilities, for each series compared with the Malayan.

Borneo	t =	10.0	2.375	0.29		13.81	6.72	3.93
	p =	<0.01	>0.01	>0.01		<0.01	<0.01	<0.01
Sumatra	t =	3.32	6.53		3.08	14.47	8.30	
	p =	>0.01	<0.01		>0.01	<0.01	>0.01	
Burma	t =			5.68	1.34			
	p =			<0.01	>0.01			

It will be seen that in virtually every respect the Malayan population is central: that is to say, the Sumatran and Bornean means (and the Burmese where these differ from the Malayan) stand on opposite sides of the Malayan one. The Malayan series accordingly becomes the standard of comparison in Table 1, b; in most cases (in fact, in all cases except indices 3:1 and 4:1) the Burmese series has been united with the Malayan in order to increase the sample size, which can be done because in those cases the means for the Burmese skulls do not differ appreciably from those for the Malayan. In one case – index 3:1 – the Sumatran series has been pooled with the Malayan; in another instance, the Bornean mean was very close to the Malayan, but it was felt safer not to pool them.

In Table 1, b, the Bornean series differs at the 99 % significance level from the Malayan (and therefore from the others) in 4 out of 7 features; the Sumatran, in 2 out of 7 features; the Burmese, in only 1 out of 7. Of the 7 features, the two angles (*po* and *o*) possibly do not represent entirely the same phenomenon, as there is a slight, but not

fully significant, difference between the Sumatran and Burmo-Malayan series in *po*, but none in *o*.

The conclusion is that, while four populations of the Sumatran rhinoceros appear to be distinguishable on skull-shape, the possibility must be borne in mind that the populations of Sumatra, Malaya and Burma are identical. The only well-marked form is the Bornean one. This form most certainly merits the rank of a subspecies on account of its very small size and other features; since it has not yet received a name it may be here be designated

Didermocerus sumatrensis harrissoni subsp. n.

Diagnosis: skull markedly smaller than in other subspecies; occiput forward-sloping, with a higher surface than in other subspecies.

Remarks: named for Mr. Tom Harrisson, D. S. O., O. B. E., well-known for work on Bornean zoology and anthropology. Type: B. M. no. 1.8.15.1, ♀ juv., from Suan-Lambah, Sabah. Distribution: Borneo; nearly extinct.

The new subspecies has a forwardly-inclined occiput, slanting the head upwards. The most likely explanation is with regard to feeding habits, that the subspecies may be more of a browser than its larger Sumatran, Malayan and Burmese relatives; alternatively, since it is a smaller animal, its food would be at a higher average height relative to itself. Questions of attack and defence are probably secondary to questions of diet; the Asiatic species of rhinoceros find themselves in forest surroundings (except for the Assam form of *R. unicornis*) where they must raise their heads to browse, making it more efficient to use the teeth for fighting rather than the horn(s), which have atrophied. On the other hand the African species live on open plains, and more often graze than browse although there is a certain amount of contrast between the two species of Africa in this matter; this lowers the head, bringing it into a suitable position for fighting with the horns, which have become very long: it is in this case the incisors which have atrophied.

The other three subspecies may be provisionally characterised as follows:

(1) *D. s. sumatrensis* (Fischer, 1814). Sumatra. Large with backwardly sloping occiput with lower surface; occipitonasal length very long compared to basal length (index 2:1; angle *po* is almost significant in its greater measurement than in the Malayan and Burmese skulls, and might be completely significant if more specimens were available).

(2) *D. s. niger* (Gray, 1873). Malaya, north probably to the isthmus of Kra. This isthmus, not 50 miles wide, would act as a genetic bottleneck. Intermediate between the other three populations; differs from the Sumatran in its slightly higher, more upright occipital surface.

(3) *D. s. lasiotis* (Buckland, 1872). Synonym probably *Ceratorhinus blythi* Gray, 1873, from Tenasserim. Ranges from isthmus of Kra to northern limits of distribution. Differs from the last only in greater breadth of occipital crest. The type (B. M. no. 1901.1.22.1, ♀, from Chittagong) was reared in the London zoo and lived there for about 30 years. It is the largest specimen by 20 mm., being 596 mm. long (occipitonasal length). This is unlikely to be due to its great age: reasons have been given above for supposing that the size does not increase, in general, after the third molar has begun to erupt. B. M. 72.12.31.1, ♀, 515 mm. long, is equally aged in all probability. 1901.1.22.1's size may be part of its "zoo morphology".

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