Rec. zool. Surv. India, 80 : 251-263, 1983

THE CALCUTTA COLLECTION OF ASIAN RHINOCEROS

By

COLIN P. GROVES[1] AND S. CHAKRABORTY[2]

The rarity of preserved skulls of the three living Asian species of rhinoceros is most annoying for a mammalian taxonomist, especially when one considers the thoughtless slaughter of these animals by so-called sportsmen in the last century. Pollok (in Pollok and Thom, 1900) massacred forty-four rhinos in Assam, one in Burma ; Thom (loc. cit.) three in Burma ; Baker (1881) killed three in the Sundarbans (protesting that the rhino was rarely disturbed and 'must be multiplying fast' there. Rhinos became extinct in the Sundarbans not long after Baker wrote). And so on. Of the authors mentioned, a single skeleton was presented by Pollok to the Indian Museum; the remains of the others either rotted where they fell, or are cluttering up some obscure attic. From any point of view, the slaughter is a tragedy ; had it resulted in some specimens being made available for science, there would have been some slim compensation, but even this cold comfort is denied us.

It is, therefore, of great importance to seek full documentation in those specimens that actually are preserved in museums. According to the list published long ago by Sclater (1891), the Indian Museum, Calcutta, should have one of the largest collections in the world, fairly well documented, and from a taxonomic point of view are very valuable as many of them are from localities—especially Lower Burma—not well represented in any other collection. Sclater lists the following number of specimens (skulls unless otherwise specified) :

Rhinoceros unicornis — 17 (6 with locality), including 5 complete or incomplete skeletons, 2 stuffed skins and 3 hoofs.

Rhinoceros sondaicus — 19 (9 with locality), including 9 skeletons, all said to be complete, and 2 stuffed.

Rhinoceros (now **Dicerorhinus) sumatrensis** — 18 (10 with locality), including 7 full or partial skeletons ; but two of the skulls fragmentary ; 3 skins (2 stuffed) ; and a pair of horns.

1. *Australian National University, Canberra, Australia*
2. *Zoological Survey of India, Calcutta, India*

The nucleus of the Indian Museum collection was that of the Asiatic Society of Bengal. In 1863, this latter collection contained (Blyth, 1863) :

Rhinoceros sondaicus	—	9 (6 with locality), one being a nearly complete skeleton, one stuffed skin.
'Rhinoceros sumatranus' (=D. sumatrensis)	—	7 (5 said to have locality data) and the remaining two, one complete skeleton and one stuffed headskin also said to have locality data according to Blyth (1862).

R. unicornis='**R. indicus**'—No specimen, although 'skulls immediately expected' (as stated in a footnote).

In 1865, the Asiatic Society's collection, according to Anderson (1881) 'practically became the property of the Government of India, although the legal transfer was not completed until 1876'. With the birth of the Zoological Survey of India in 1916, all these collections were vested with that institution. The collection remained in the Indian Museum until the Second World War (1942) when, in anticipation of possible Japanese bombing raids on Calcutta, the ZSI headquarters were transferred to Benares (Varanasi) ; but the osteological collection was left in a room in the Indian Museum in Calcutta. Calcutta remained free of bombs, but the uncurated collection suffered loss and damage, and many labels got mixed up ; it was a much depleted collection to which the ZSI returned to Calcutta in 1948-49. There was a move to a rented building some $2\frac{1}{2}$ km away in Bhowanipore, Calcutta, in 1964 ; and there was a further move into the present quarters of the Zoological Survey of India at 8 Lindsay Street (Calcutta) in 1966. Thus, the collections were subjected to the rigours of transfers and retransfers on several occasions. Today, the rhinoceros collection (now newly registered with ZSI numbers) is as follows.

R. unicornis :	8 skulls (4 with locality), 1 skeleton
R. sondaicus :	9 skulls (5 with locality), 1 lower jaw, 1 stuffed skin
D. sumatrensis :	9 skulls (4 with locality), 1 headskin, 2 fragmentary postcranial specimens.

Loss of specimens seems to have taken place from the very beginning. Blyth (1863) notes that some whose earlier accession was recorded were lost even before his curatorship ! In Sclater's (1891) catalogue, only 5 specimens of *R. sondaicus* are recorded as 'ASB'—some had evidently

been lost. In some cases, of course, it may have been the information about the specimen which was lost, not the specimen itself.

Thanks to the assistance of Dr. B. Biswas., Emeritus Scientist, Zoological Survey of India, Mr P. K. Das, and Mr T. P. Bhattachariya (Mammal Section, Zoological Survey of India). All the rhino specimens still in the collection of the ZSI and the Indian Museum have been examined and measured by one or both of us. By rubbing off the accumulated dust and mud, italic letters can be detected written in black indelible ink on the forehead of most of the skulls corresponding to the letters of Sclater's catalogue.

Identification of the material

Wherever the Sclater catalogue letter is given without qualification, it means that the letter can be discerned written on the skull. Listing of these specimens, and commentary upon them, follows.

R. unicornis

1. 19262. Mounted skeleton on display in the Indian Museum. This is probably Sclater's catalogue No. *b*. Mounted skeleton of a female from Barrackpore park, received from the Calcutta Medical College Museum in 1879. A different specimen (see below) is at present labelled as from Barrackpore, but as there was only one mounted skeleton then and is only one now, and no record that more than one from Barrackpore was preserved, there may have been a switching of labels.

2. 2735. Skull on display in the Indian Museum. The label in front of it identifies it as a female presented by Maddock in 1863. However, no *unicornis* skull appears to have been presented by Maddock ; according to Sclater one, according to Blyth two, *sondaicus* skulls were presented by Maddock (from Tenasserim). Another case of label switching is indicated, but to which *sondaicus* skull the label should belong is undertain. The *unicornis* skull in question is probably Sclater's *h*, an old male from the Nepal terai presented by Sir E. Baring.

3. 2736/19243, Sclater's *j*. A juvenile skull, from the Nepal terai, presented by Baring.

4. 17948. Sclater's *r*. Juvenile skeleton, ASB. No locality.

5. 7306/19263. Juvenile skull on display in museum, Sclater's *o* (from ASB).

6. 10437. From Nepal, presented by Watts & Co. in 1907.

7. 10438. This is not a Sclater specimen ; it was presented by Watts & Co. in 1907 and is from Nepal, like 10437.

8. 20387. Skull, no data.

9. 19240. On display in museum ; stated to be Sclater's *b* from Barrackpore, but see under (1) above. The skull is in fact probably Sclater's *1* presented by Raja R. Mullick in 1871 ; the animal probably died in Raja Mullick's private zoo in Calcutta.

R. sondaicus

1. 3521. Female skull, Chillichang Creek, Sundarbans. Capt. Charling. Sclater's *t*.

2. 19241. Skull, Sundarbans. W. W. Shepperd, 1867. Sclater's *q*. Lacks mandible.

3. 17685. Skull, young adult, no locality. Dr. N. Wallich, ASB. Sclater's *1*. Lacks mandible. Pearson (1840) recorded that 'Dr. Wallich presented five crania of the Rhinoceros' ; Blyth (1863) could find only one in the ASB collection in his day, so presumably this is the one. Nathaniel Wallich (1786-1854) was a Danish Botanist who entered the East India Company's service in 1813 ; he explored Nepal in 1820, northwestern India in 1825, and Lower Burma and Ava (Mandalay district) in 1826-27. He was invalided home in 1828, and returned to explore Assam—in search of the wild tea plantin 1832. As there is no question of this skull's identification as *R. s. sondaicus* it must be from Lower Burma (unless it is true that, as Pollock (1900) asserts, this species formerly occurred in Assam).

4. 17684. Skull, juvenile (Stage 4 of Groves, 1967). Tenasserim, Sir T. H. Maddock. Probably Sclater's *m*. Blyth (1863) records two skulls (one minus lower jaw) presented by Maddock ; Sclater, only one. All the other skulls in Sclater's lists seem satisfactorily documented, so the skull itself must have been lost. Blyth (1862, pl. II, fig. 2) figures dorsal view of a skull from Tenasserim which he does not otherwise identify ; it is in fact the present one, recognisable by a healed fracture on the left zygomatic arch. The skull may at one time have been on exhibition, as there is a label which might apply to it (see above, *unicornis* (No. 2)).

5. 17144. Skull, adult. No identification.

6. 17688. Skull, male, adult. Sclater's *s*, from Mathabhanga R. Barisal district, Sundarbans.

7. 17693. Skull, adult, on display in the Indian Museum. Sclater's *p*, from Java, presented by the Batavian Society.

8. 19378. Badly damaged skull, male, juvenile. Sclater's *j* ; W. Rutledge, 1875. Rutledge was an animal dealer in Calcutta (B. Biswas,

pers. comm.) ; evidently this animal died in captivity, but its origin is impossible to locate.

9. 20386. Mandible. Sclater's *v* ; no history.

D. sumatrensis

1. 2707/17691. Skull, young adult (Stage 5) ; on display in the Indian Museum. Donated by W. Rutledge in 1875 ; imported from Singapore. Though there is no identifying mark on the skull, Sclater (1891) lists only two skulls from Singapore, Nos. *a* and *o*. As skull *o* is available (see below), the present skull is surely *a*. Its origin is likely to have been Malaysia.

2. 17686. Skull, aged ; nasals hacked off ; lacking mandible. Sclater's *n*. This skull in Sclater's catalogue is said to have 'no history' ; but it is unquestionably Blyth's (1862) plate III, fig 1, which is stated to be from Tenasserim. In Blyth's figure, the nasals are present but connected to the rest of the cranium by the merest point of bone, quite contrary to the law of gravity ; for the photograph (from which the figure was made) an assistant must have held them in place. The jagged front edge of the maxilla is exactly similar in the figure and in 17686 ; but the skull at present lacks a mandible. It is noteworthy that in the same paper (1862 p. 163) Blyth briefly catalogues the Asiatic Society rhinos, mentioning 'the skulls of an old male and of an adult female of SUMATRANUS, [and] the skin of the head of the latter... presented to the Society by E. O' Reilly, Esq. (then of Amherst) in 1847' ; but in his 1863 catalogue he mentions only the old male as being presented by O'Reilly, while the collector of the adult female skull (and the headskin) is not given. Sclater (1891) follows Blyth's catalogue in attributing only a single (male) skull to O'Reilly ; no headskin is even mentioned. Headskin there is, nonetheless, on display today in the Indian Museum ; while the acknowledged O'Reilly skull is far from being 'old'—it is, in fact, a juvenile—and probably a female. The present skull thus actually increases the number of documented specimens by giving a locality and collector to a 'no history' skull in Sclater's catalogue.

3. 17687. Skull, juvenile (Stage 3), with associated limb bones registered 450. ASB. Sclater's *g*. Tenasserim, collected by E. O'Reilly, 1847, supposedly male (but see above). This is certainly Blyth's (1862) plate III, fig. 3 and plate IV, fig. 2 (not fig. 4, as incorrectly stated by Blyth on p. 157), and is the same individual as the mounted head (in the Indian Museum), as recorded by Blyth. Despite Blyth's characterisation of it as 'adult', it is clearly far from mature.

4. 17692. Skull, young adult male. Sclater's *h*. Tenasserim, presented by Sir T H. Maddock, 1842, ASB. This is an edentulous skull, probably not one of those figured by Blyth.

5. 17689. Skull, young adult female. Sclater's *o*, presented by W. Rutledge, 1885, who imported it from Singapore. It is therefore most likely to be from Malaya like No. 1 above.

6. 17690. Skull, adult. The extreme breadth and long toothrow make it likely to be one of the ASB skulls of no history to which Sclater (1891 p. 205) draws attention, i.e. *k* or *l* ; *k* being present in the collection, it is doubtless *l*.

7. 19313. Skull with horns and mandible. There is no entry in either Blyth or Sclater corresponding to this description.

8. 17942. Skull, adult. No history or identifying marks.

9. 17949. Sclater's *k*, adult from ASB, no history. See under 6 above.

10. No number. Scapula and long bones of forelimb. Male, Tenasserim, presented by E. O'Reilly. ASB. Blyth's (1863) cat. No. 450D.

11. No number. Limb bones and some vertebrae. Female, no locality ; ASB. Blyth's (1863) cat No. 450B.

Significance of the material

R. unicornis

Although four of the Calcutta skulls of this species are of known locality, (Nepal in each case) the species appears at present to be monotypic. One of us (C. P. G) is investigating this proposition at present in collaboration with C. Guerin.

R. sondaicus

As can be seen from Table I, the differences between the five geographic isolates of *R. sondaicus* are not great ; the differences between the Javan, Sumatran and Malayan populations are not worth recognising at subspecific level, while the Vietnam and Bengal (Sundarbans) populations are somewhat more distinct and can be retained as subspecies (Guerin & Groves, 1980). *R. s. inermis*, Bengal, has a shorter basal length and so a less inclined occipital plane than *R. s. sondaicus* from Sundaland ; the toothrow is longer ; the occiput is broader and higher ; the skull is generally broader. (Face height and dorsal concavity depth, which also tend to distinguish this race, were not taken on many of the Calcutta skulls and so will not be included here). *R. s. annamiticus*, from Vietnam, has a remarkably short occipitonasal length,

so that the occipital plane is more forwardly inclined (contrary to *inermis*) ; the occiput (indeed the cranium as a whole) is rather narrow, but the zygomatic arches are comparatively flared.

Among the Calcutta skulls, as the premaxillae have not been retained in any skull, basal length is difficult to estimate ; although it has been attempted in a few cases (premaxilla length is generally about 60mm), basal to occipitonasal length ratios cannot be securely worked out. All three Sundarbans skulls (Table Ia) do, however, have rather less inclined occipital planes than the others ; the toothrow is long in all. Occiput breadth is very great in 19241, the only one of the three Sundarbans skulls for which this measurement is available ; occipital height is very great in two of the known Sundarbans skulls but not in 17688. The three skulls known to be from the Sundarbans, therefore, fit very well into the pattern previously established ; one (17688) not as well as the other two.

The Java skull is very like those previously examined from Java : relatively short occipitonasal length ; narrow ; small teeth ; low occiput.

It is perhaps the Tenasserim skull which is of most interest here, as previously only a single skull—and that a juvenile—has been known from this area. The Tenasserim population was perhaps continuous with that in Malaya, but the most northerly *sondaicus* until Vietnam to the northeast and the Sundarbans to the northwest. There is thus interest in seeing whether the Tenasserim skulls shown an approach to those from more northerly regions.

In Table Ia, skull 17685 (not absolutely certainly from Tenasserim, although very probably so) is compared with the previously analysed data. The skull is nearly adult but still rather small, so recalling *annamiticus* ; but its basal length is short compared to occipitonasal—an *inermis*-like feature, as is the long toothrow. The occiput is narrow like *annamiticus*, but not especially low, so being more like *sondaicus*. For its narrow skull the zygomatic arches are flared, again resembling *annamiticus*.

The only skull that is beyond question from Tenasserim is 17684, which is juvenile (Stage 4). Unfortunately no skulls of this developmental stage are known from Vietnam ; but the British Museum specimen from Tenasserim is of this age. The measurements of a Malayan skull of this age have been kindly sent by Dr. David Wells, of the Zoology Department, Kuala Lumpur.

It is to be noted (Table Ib) that the occipitonasal/basal ratio and broad occiput so characteristic of adult *R. s. inermis* has not developed by Stage 4. Evidently the occiput expands and grows backwards

TABLE. Ia. Cranial measurements of *R. sondaicus*: adults

	R. s. sondaicus										*R. s. annamiticus*				*R. s. inermis*				Calcutta Specimens				
	Java				Sumatra				Malaya				Vietnam				Bengal				p	l	s	q	t
																					17693	17685	17688	19241	3521
	$\bar{x}$	s	d	n	$\bar{x}$	s	d	n	$\bar{x}$	s	d	n	$\bar{x}$	s	d	n	$\bar{x}$	s	d	n	Java	Lower Burma	Sundarbans	Sundarbans	Sundarbans
Occipitonasal l.	518.5	22.0		17	528.6	20.1		5	532.7	24.0		3	499.3	30.1		3	527.3	16.8		7	532	501	499	545	546
Basal l.	580.3	19.2		12	578.4	16.0		5	581.8	31.3		4	581.3	39.8		4	560.4	18.4		5	—	(531)	—	(573)	—
Toothrow l.	225.6	8.5		15	233.0	6.0		5	226.8	4.7		4	230.1	7.4		4	238.5	5.9		7	222	237	237	235	230
Zygomatic br.	346.2	13.2		16	350.4	16.2		5	361.8	3.3		4	343.5	15.3		4	359.1	9.8		7	337	355	338	374	370
Bimastoid br.	295.0	13.5		15	284.6	6.4		5	291.3	14.4		4	282.5	8.6		4	296.3	16.9		6	283	273	—	315	—
Occipital ht.	158.5	9.9		15	161.8	4.4		5	170.5	12.9		4	157.3	12.0		4	179.3	7.5		4	172	166	162	180	171
M^1br	54.8	1.6		10	56.9	2.8		7	58.6	2.2		4	56.0	3.4		4	57.4	2.3		6	—	60.5	57.0	59.0	—
M^2br	55.3	1.8		11	58.3	2.8		5	60.0	3.4		3	58.7	3.7		4	59.2	2.4		6	(64)	61.0	60.0	62.5	—
M^3br	48.0	2.7		12	54.3	2.0		3	45.8	4.3		3	53.1	3.3		3	50.2	1.8		7	51.0	52.0	51.0	53.3	51.0

TABLE IIa. Cranial measurements of *D. sumatrensis* : adults (stages 5-6).

	D. s. harrissoni			*D. s. sumatrensis*						*Subsp.*		*D. s. lasiotis*			Calcutta Specimens			
	Borneo			Sumatra			Malaya			Pegu		N. Burma			o 17689	a 17691	h 17692	n 17686
	$\bar{x}$	s d	n	$\bar{x}$	s d	n	$\bar{x}$	s d	n	$\bar{x}$	n	$\bar{x}$	s d	n	? Malaya	? Malaya	Tenas-serim	Tenas-serim
Occipitonasal l.	471.0	19.8	9	530.1	29.2	3	525.0	13.9	6	519.0	2	549.7	40.2	3	519	533	542	—
Basal l.	475.6	12.3	10	508.6	18.9	8	503.7	17.0	6	508.5	2	505.5	—	2	517	500	—	507
Toothrow l.	194.4	6.3	10	198.3	12.0	7	193.5	3.5	4	206.5	2	209.7	2.9	3	192	—	—	191
Zygomatic Br.	261.1	14.1	11	288.6	11.3	8	295.5	10.4	6	282.0	1	304.3	17.9	3	282	272	282	292
Occipital br.	116.9	8.6	11	127.5	5.5	10	120.3	9.9	6	141.0	2	156.0	10.2	3	121	117	133	139
Occipital ht.	114.0	5.1	9	114.9	3.9	8	119.4	4.5	6	128.3	2	126.7	3.1	3	123	121	127	122
M^1br.	48.7	1.8	14	49.0	2.2	18	50.9	1.8	6	47.3	2	54.0	2.0	3	50.0	48.5	—	53.0
M^2br.	48.7	1.9	8	51.0	2.4	13	52.3	2.2	4	50.8	2	54.6	0.8	3	53.0	49.5	—	53.5
M^3br.	42.4	2.7	5	45.6	2.8	8	47.3	0.6	3	48.0	1	48.3	—	2	41.0	—	—	47.0

relatively rapidly towards maturity. The two juvenile Tenasserim skulls are narrow compared to their size, the occiput being relatively narrow. The other characteristics—occiput height, skull breadth—vary so markedly between the two specimens that nothing can really be said about them.

In conclusion, then, it is probably most convenient to classify the Tenasserim population in *R. s. sondaicus* but the evidence—meagre as it is—suggests that there is some variation in the direction of the two more northerly subspecies.

D. sumatrensis

The subspecies of *Dicerorhinus sumatrensis* are much more clear-cut than those of *Rhinoceros sondaicus* (Groves, 1967). The fairly respectable sample sizes of *D. s. harrissoni* and *D. s. sumatrensis* amply confirm their distinctiveness ; since 1967 no further skulls of *D. s. lasiotis* have come to light but the differences from the other two remain quite large. Dr. G. G. Musser has kindly supplied the measurements of an adult female from Pegu (in the American Museum of Natural History, New York), which like those of the British Museum skull with this locality (Groves, 1967) are mainly intermediate between the races *sumatrensis* and *lasiotis* (toothrow length, occipital breadth) ; in occipital height the Pegu skulls resemble *lasiotis*.

The Calcutta skulls supposedly from Malaya (Table IIa) are in no way different from those previously measured. Again, it is the skulls from Tenasserim that are of special interest. The only available toothrow length (of 17686) falls in the range of *D. s. sumatrensis* ; its molar widths are however large like *lasiotis*. The occiput of 17686 is broad like Pegu but low ; that of 17692 fairly broad, but high like Pegu and *lasiotis*. Thus the two Tenasserim skulls show decided tendencies towards *lasiotis*—perhaps less markedly so than the two Pegu skulls, as one would expect from their more southerly origin. Whether the relationship between *D. s. sumatrensis* and *D. s. lasiotis* is clinal, or whether the Pegu-Tenasserim population as a whole represents a hybrid swarm, is difficult to say on the evidence of so few specimens ; some characters, especially the molar breadth measurements, suggest increased variability which would support the second hypothesis. For convenience, as in the analogous case of *R. sondaicus*, the Tenasserim (and Pegu) populations of *D. sumatrensis* are probably best classified in the southern subspecies, *D. s. sumatrensis*. However, cranial features of Z S I specimen of stage 3 from Tenasserim have been compared with that of Borneo and Sumatra and found to be somewhat different (Table IIb).

TABLE Ib. Cranial measurements of *R. sondaicus* : stage 4.

	R. s. sondaicus Java	*R. s. inermis* Bengal	Kuala Lumpur Skull C Perak	*BM* 1921 5.15.1 Tenasserim	*m* ZSI 1768 Tenasserim
Occipitonasal l.	508.8 (4)	486.5 (2)	490	503	499
Basal l.	547.3 (3)	552.5 (2)	(559)	(569)	(556)
Zygomatic Br.	342.0 (5)	326.0 (2)	(322)	345	317
Bimastoid Br.	281.5 (4)	251.5 (2)	244	252	254
Occipital ht.	153.8 (4)	164.5 (2)	—	150	171
M^1 br.	54.8 (10)	57.4 (6)	58.0	54.1	55.5

TABLE IIb. Cranial measurements of *D. sumatrensis* stage 3.

	D. s. harrissoni Borneo	*D. s. sumatrensis* Sumatra	*g* ZSI 17687 Tenasserim
Occipitonasal l.	443.4 (5)	490.0 (2)	451
Basal l.	461.7 (3)	484.5 (2)	—
Zygomatic br.	254.1 (5)	273.5 (2)	277
Bimastoid br.	105.8 (4)	114.0 (2)	120
Occipital ht.	115.0 (3)	115.0 (2)	128
M^1 br.	48.7 (14)	49.0 (18)	45.0

Types in the Calcutta collection

As noted above, three specimens of *D. sumatrensis* (as well as certain other specimens) were figured by Blyth (1862) : one of these (plate III, fig. 1) is definitely 17686, the second (plate III, fig. 3, also Plate V, fig. 2) is almost certainly 17687, while the third (Plate III, fig. 2, also Plate IV, fig. 3) appears no longer to be in the collection.

In 1873 Gray commented on the figures in Plate III. He noted the contrasts in their ages (fig. 1, the oldest ; fig. 2, 'half-grown' (nearly adult) ; fig. 3, the youngest), and the fact that the occiput in fig. 2 is more produced backward than the other two, while the hinder end of the mandible shelves in figs. 2 and 3 instead of being expanded and rounded on the lower edge. 'It may turn out', he wrote, 'that more than one species of two-horned rhinoceros inhabit Tenasserim'. The oldest skull, fig. 1, resembled the type skull (also aged !) of his recently-described species *Ceratorhinus* (=*Dicerorhinus*) *niger* whereas 'the lower jaw in the two younger specimens does not agree in form with the lower jaw of *C. niger* and therefore I should provisionally name them *C. blythi*'.

It is difficult to be sure from Gray's description exactly which of the three skulls is meant to represent his new race, and which is not; most likely, 'the two younger specimens,' i. e. figs., 2 & 3. The skull depicted by fig. 2 is lost, as noted above; fig. 3 is 17687, which is accordingly hereby designated lectotype of *Ceratorhinus blythi* Gray.

It is almost superfluous to add that a species named on the evidence of ageinfluenced characters is unlikely to withstand the test of time. As has been shown above, Tenasserim skulls do show some deviation, on average, from *D. s. sumatrensis*, in the direction of *lasiotis*; but it would be nonsensical to dignify this with a subspecific name. So *Ceratorhinus blythi* Gray, 1873, falls as a junior synonym of *D. s. sumatrensis*.

Summary

The paper deals with the documentation of the osteological collection of the Asian species of rhinoceros present in the Zoological Survey of India. Altogether 31 specimens have been documented. The skulls of the rhinoceros present in the Zoological Survey of India have been taxonomically compared with those present in the other museums of the world. It has been found that the difference between the five geographic isolates of *R. sondaicus* are not great; the differences between the Javan, Sumatran and Malayan population are not worth recognizing at subspecific level, while the Vietnam and Bengal population are somewhat more distinct.

Acknowledgements

We are most grateful to the Director, Zoological Survey of India, Dr. B. Biswas, Dr. V. C. Agrawal, Mr P. K. Das, Mr T. P. Bhattachariya, for their help in studying these specimens; and to Dr. D. Wells and Dr. G. G. Musser for sending us measurements of specimens respectively in the Zoology Department, University of Malaysia (Kuala Lumpur) and the American Museum of Natural History (New York).

References

Anderson, J. 1881. *Catalogue of the Mammalia in the Indian Museum, Calcutta.* Part I, Primates, etc., Calcutta, xv+223pp.

Baker, E. R. 1887. *Sport in Bengal* : and how, when and where to seek it. London, xi+368 pp.

Blyth, E. 1862. A memoir on the living Asiatic species of Rhinoceros. *J. Asiat. Soc. Beng.*, **31** : 151-175.

BLYTH, E. 1863. *Catalogue of the Mammalia in the Museum Asiatic Society.* Calcutta, xiii+187 pp.

CHAKRABORTY, S. 1972. On some cranial features of the living Asian genera of the family Rhinocerotidae (Mammalia : Perissodactyla). *Proc. zool. Soc., Calcutta*, **25** : 123-128.

GRAY, J. E. 1873. On the dentition of rhinoceroses (Rhinocerotes) and on the characters afforded by their skulls. *Ann. Mag. nat. His,t.* (4) **11** : 356-361.

GROVES, C. P. 1967. On the Rhinoceroses of South-East-Asia. *Säugetierkundl. Mitt.*, **15** : 221-237.

GUERIN, C. AND GROVES, C. P. 1980. Le *Rhinoceros sondaicus annamiticus* (Mammalia, Perissodactyla) d' Indochine : distinction taxonomique et anatomique ; relations phyletiques. *Geobios*, **13** : 199-208.

PEARSON, J. T. 1840. Zoological catalogue of the Museum of the Asiatic Society. *J. Asiat. Soc. Beng.*, **9** : 514-530.

POLLOK, F. T. AND THOM, W. S. 1900. *Wild Sports of Burma and Assam.* London, xx+507 pp.

SCLATER, W. L. 1891. *Catalogue of the Mammalia in the Indian Museum, Calcutta.* Part II, Rodents etc. Calcutta, xxix+375 pp.