

«MICROSTONYX» MAJOR (SUIDAE, ARTIODACTYLA) FROM THE TYPE AREA OF THE NAGRI FORMATION, SIWALIK GROUP, PAKISTAN

J. van der Made* and S. Taseer Hussain**

ABSTRACT

Microstonyx major is described for the first time from the Nagri Formation type section. The species is compared to *Hippopotamodon sivalense* and *Dicoryphochoerus titanoides*. The latter species is found to be a junior synonym of *M. major*. *Microstonyx* and *Hippopotamodon* might also be synonymous but further research is needed to substantiate this hypothesis. The Indian and Eurasian suid faunas had many species and genera in common.

Key words: *Microstonyx*, *Hippopotamodon*, *Suidae*, *Nagri*, *Dhok Pathan*, *Vallesian*, *Turolian*.

RESUMEN

Se describe *Microstonyx major* por primera vez en la sección típica de la Formación de Nagri. Se compara esta especie con *Hippopotamodon sivalense* y con *Dicoryphochoerus titanoides*. Esta última especie es un sinónimo reciente de *M. major*. *Microstonyx* y *Hippopotamodon* pueden ser sinónimos entre sí, pero para asegurarlo se necesita una investigación más profunda. Las faunas de suidos de la India y de Eurasia tenían muchas especies y géneros en común.

Palabras clave: *Microstonyx*, *Hippopotamodon*, *Suidae*, *Nagri*, *Dhok Pathan*, *Vallesiense*, *Turoliense*.

Introduction

Hippopotamodon sivalense Lydekker, 1877 from the Indian subcontinent is a large suid. In the morphology of the cheek teeth and the skull it resembles *Microstonyx*, which is known from Europe and Asia. The two taxa are closely related and several workers have speculated on the possibility of synonymy; the main difference seems to be the reduced canines in *Microstonyx*.

Besides *Hippopotamodon sivalense*, Lydekker, 1877, *Hippopotamodon/Microstonyx*-like suids from Pakistan and India were described as *Sus titan* Lydekker, 1884 (which is type species of *Dicoryphochoerus* Pilgrim.); *Dicoryphochoerus robustus* Pilgrim, 1926; *Dicoryphochoerus titanoides* Pilgrim, 1926 and *Sus praecox* Pilgrim, 1926. Recently Pickford (1988) revised the Indian Suidae and considered all species synonymous to *Hippopotamodon sivalense*.

One of us studied material of *Hippopotamodon* in the collection of the Geological Survey of Pakistan (GSP) in Islamabad and in the Indian Museum in Calcutta. Most of the material studied forms a homogenous group on the basis of morphology and size.

A mandible from the Nagri Formation in the collection of the faculty of geology and geophysics of the university of Utrecht (Ng 103) is smaller than the *Hippopotamodon* material in the Pakistani and Indian collections. The morphology of the teeth in the mandible is the same as *Hippopotamodon*. The mandible forms part of a collection made in 1964 and 1966 by G. H. R. Von Koenigswald, P. Y. Sondaar, A. J. van der Meulen and the second author. The material was collected from the type section of the Nagri Formation. There is also a P₂ and a part of a last lower molar of the same species. A part of a last lower molar bears the number «Ng 516» at one side and the indication «Ng» at the

* Faculteit Geologie en Geofysica, Rijksuniversiteit Utrecht, Budapestlaan 4, Postbus 80.021, 3508 TA Utrecht.

** Department of Anatomy, Howard University and Department of Paleobiology, National Museum of Natural History, Smithsonian Institution, Washington, D.C.

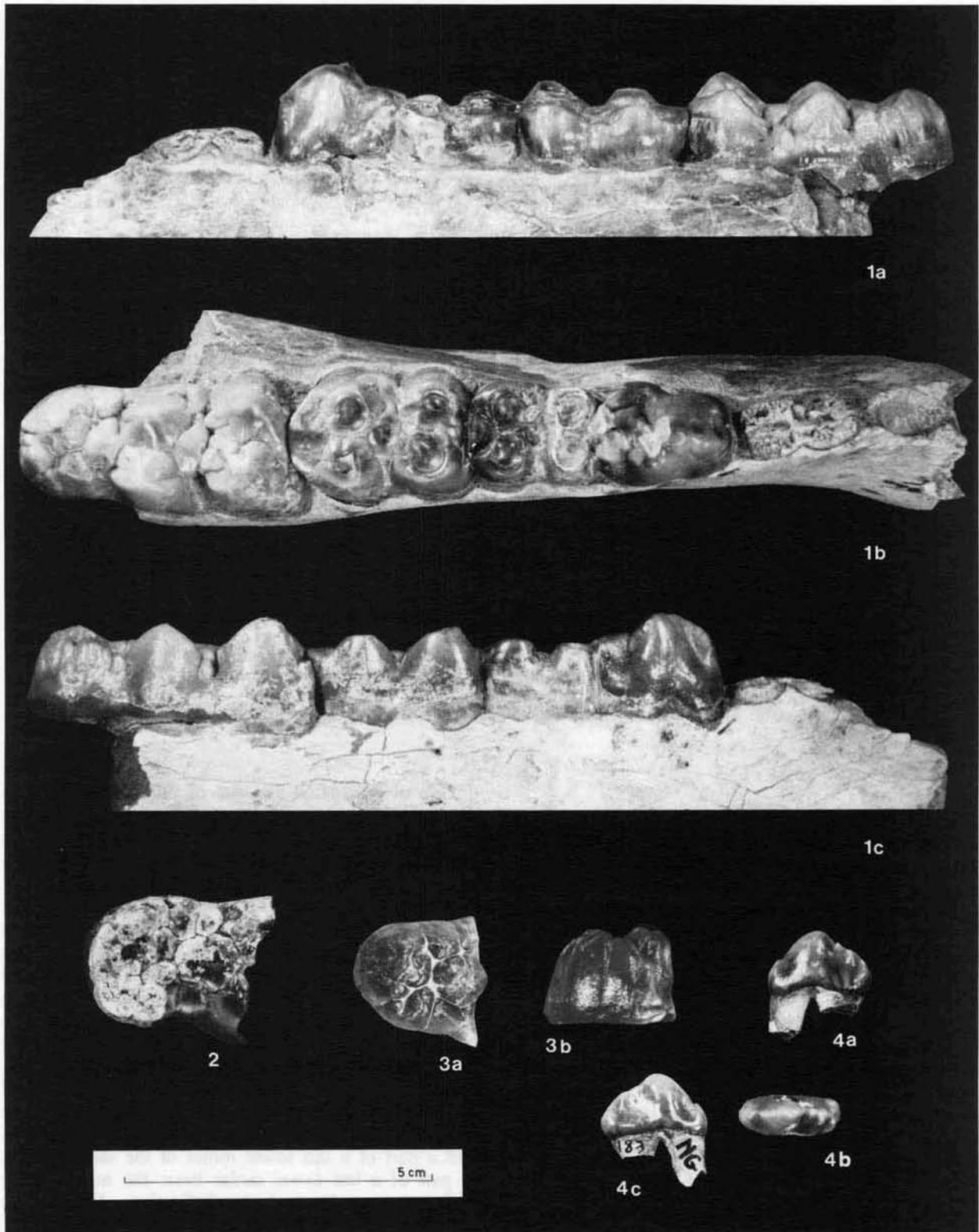


Plate 1.—Fig. 1: Ng 103 *Microstonyx major*, a left mandible with P_4 to M_1 from the Nagri Formation. Fig. 2: Ng 516 cf. *Hippopotamodon sivalense*, the last lobe of a left M_3 from the Nagri Formation. Fig. 3: Ng 184 *Microstonyx major*, the last lobe of a left M_3 from the Nagri Formation. Fig. 4: Ng 183 *Microstonyx major*, a left P_2 from the Nagri Formation.

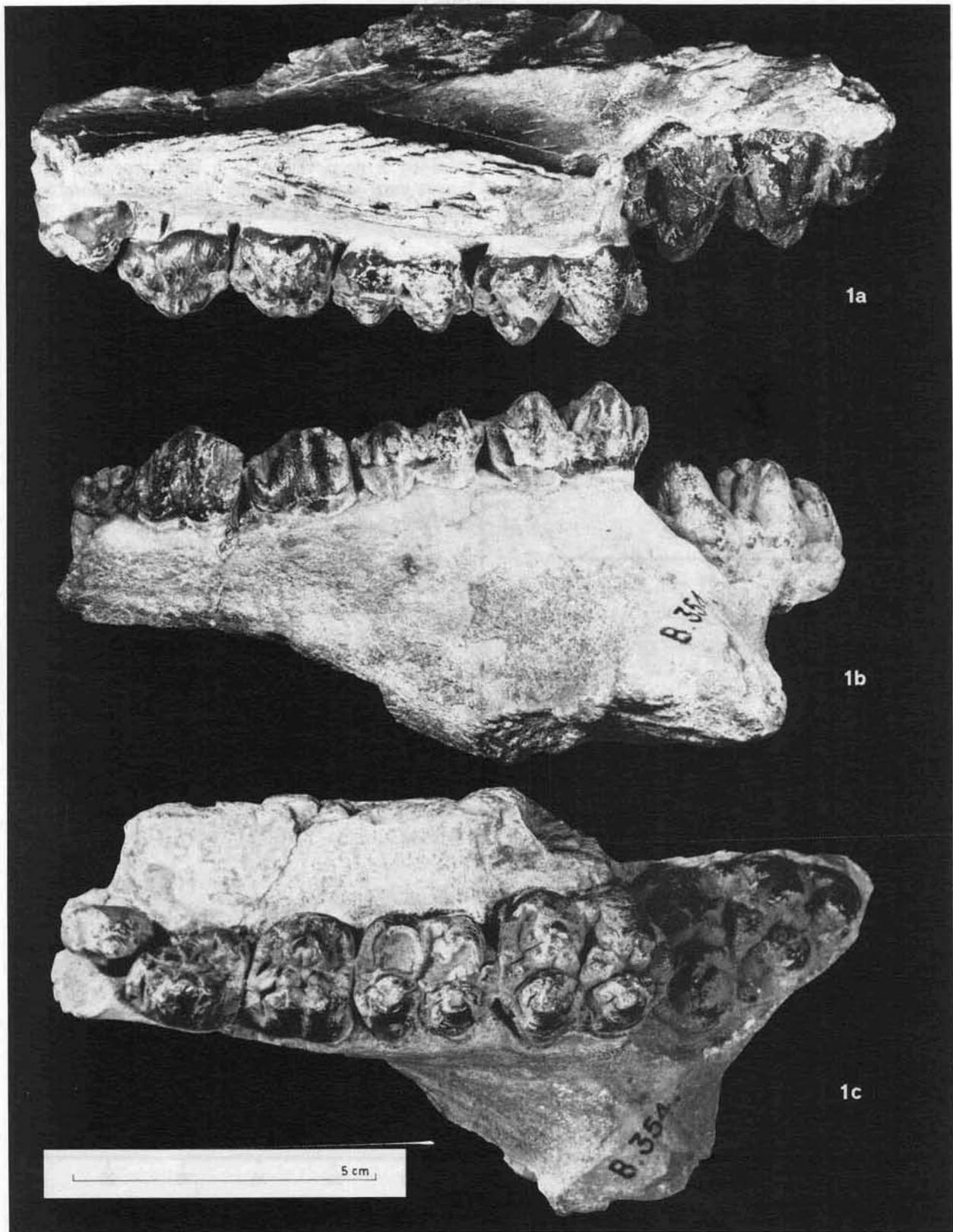


Plate 2.—Fig. 1: B 354 *Microstonyx major*, a right maxilia with P¹ to M¹ and an abnormal tooth («P²»), Punjab.

other: it seems that there were doubts about its provenance. This molar fragment probably belongs to *H. sivalense*. The only other suid in this collection is *Propotamochoerus hysudricus*.

Description of the material and comparison

The mandible contains the last premolar, the last two molars and the posterior half of the first molar,

besides there are the roots of the second and third premolars. The morphology of the P_4 is typical of Dicoryphochoerini (Schmidt-Kittler, 1971). The second largest cusp of the tooth is placed postero-lingually to the largest cusp. Another morphotype occurring in Dicoryphochoerini has the second largest cusp placed lingually of the largest cusp; the two cusps are separated by a deep valley. In a third type the second largest cusp may be smaller and placed more backwards and near to the axis of the tooth. It is

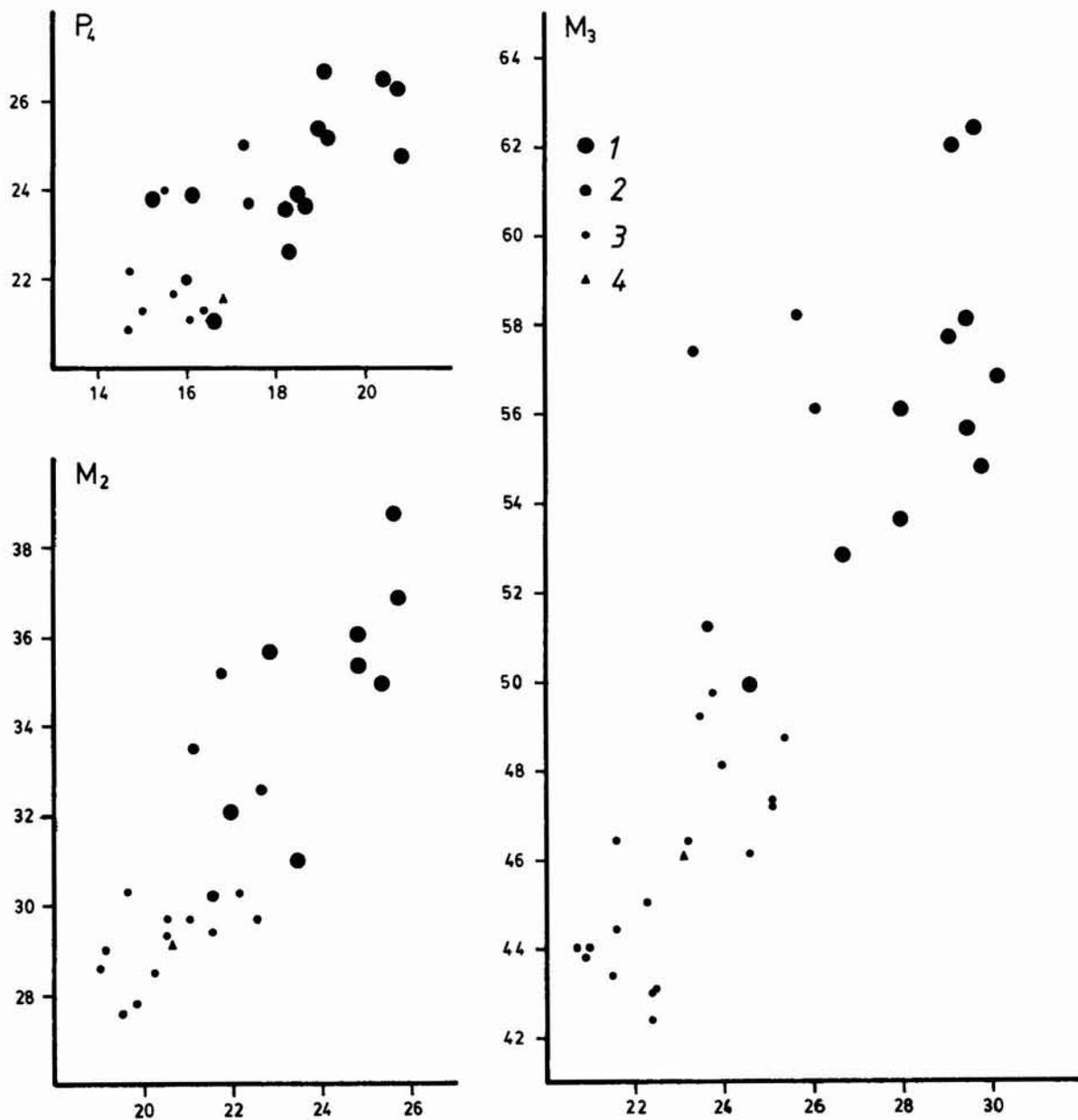


Fig. 1.—Length (vertical) versus greatest width (horizontal) of P_4 , M_2 and M_3 of *Hippopotamodon*-like Suidae in the collections of the GSP and Indian Museum (1), *Microstonyx antiquus* from Eppelsheim (2; measurements from Hünemann, 1968), *Microstonyx major* from western Europe (3) and mandible Ng 103 (4).

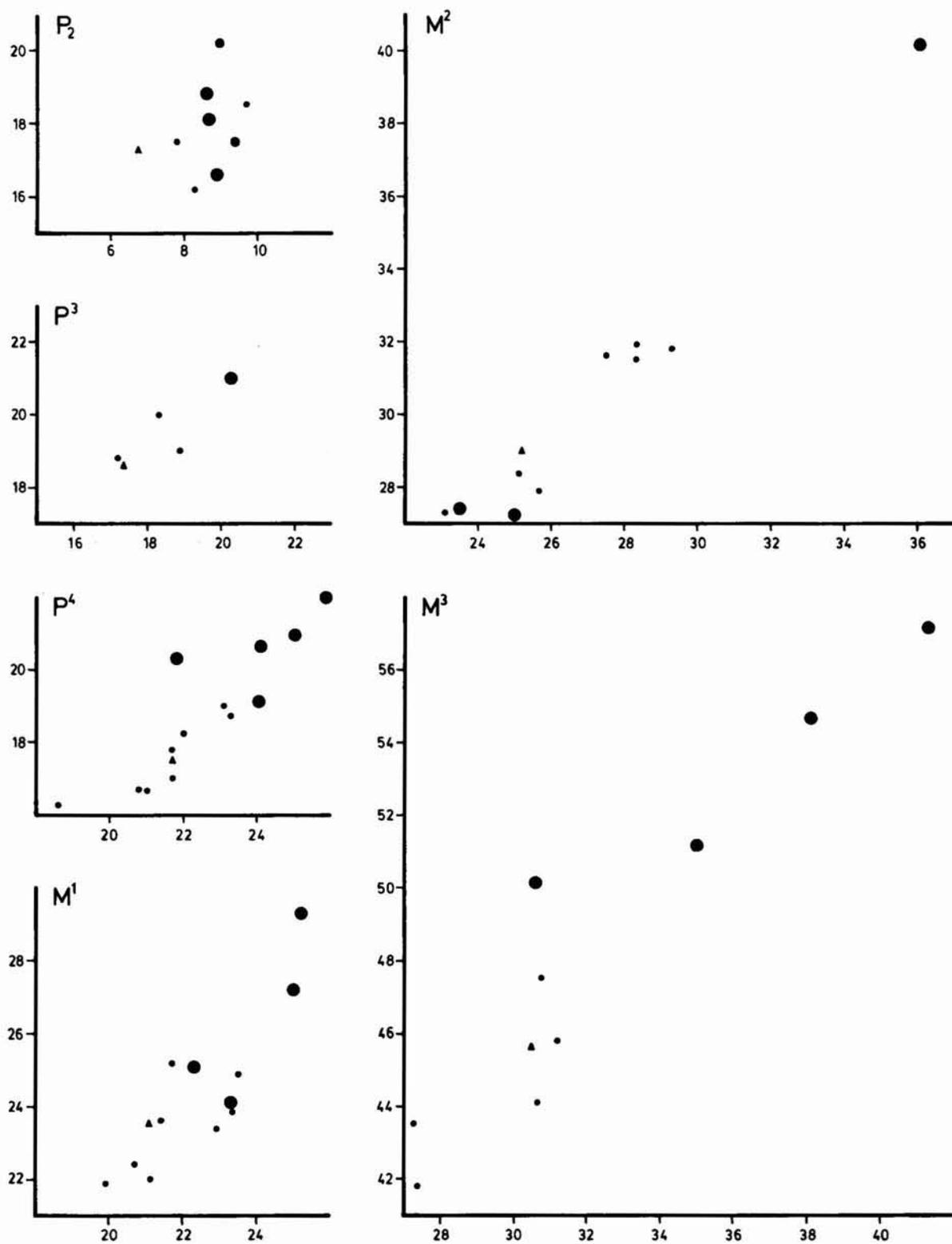


Fig. 2.—Length and width of upper dentition. Legend as in figure 1, save for symbol 4 which represents the holotype of *Dicoryphochoerus titanoides*. Length and width of P₂. Legend as in figure 1, symbol 4 represents Ng 183.

common to find two of these types in one population. The molars are of a common suid morphology. The last molar has a third lobe with two large cusps of which the labial one is the largest and posterior to them is a very small cusp near the axis of the tooth. This is a common morphotype in *Hippopotamodon* and *Microstonyx*.

It can be seen that Ng 103 is much smaller than the material in the GSP collection and the Indian Museum and that it has the same dimensions as *Microstonyx major* from Europe (figure 1). The dimensions of *M. antiquus* from Eppelsheim are also shown, which are closer to the material in the GSP and Indian Museum collections.

Ng 184 and Ng 516 are the last lobes of two last lower molars. Ng 184 is smaller in size as compared to third lobes of the molars of *H. sivalense*, and is of similar size to those of *M. major* from Europe. Ng 516 has a size and morphology similar to the molars of *H. sivalense*.

The P₂ (Ng 183) has the typical morphology of this group. No clear separation in two groups can be seen on the basis of size.

Discussion

Most of the material in the collections of the GSP and the Indian Museum forms a homogenous group

Table 1.—Dimensions of the material from Nagri and B 354, the holotype of *Dicoryphochoerus titanoides*

	P2	P3	P4	M1	M2	M3
Ng 103						
Length			21.6	19.4	29.1	46.1
Width of lobe 1 ...				—	20.5	23.1
Width of lobe 2 ...			16.8	16.6	20.6	21.5
Width of lobe 3 ...						17.8
Ng 184						
Width of lobe 3 ...						18.3
Ng 516						
Width of lobe 3 ...						20.8
Ng 183						
Length	17.3					
Width of lobe 1 ...	6.8					
Width of lobe 2 ...	6.8					
B 354						
Length	18.6	17.5	23.5	29.0	45.6	
Width of lobe 1 ...	13.8	21.7	21.1	25.2	30.5	
Width of lobe 2 ...	17.4		20.1	24.9	26.6	
Width of lobe 3 ...						14.8

with greater dimensions than *Microstonyx major*. Some teeth are however closer to *M. major*. The dimensions and morphology of the holotypes or lectotypes of *Sus titan*, *Sus praecox* and *Dicoryphochoerus robustus* fall within the ranges of the group of larger teeth.

In figure 2 dimensions of upper cheek teeth of *Hippopotamodon*-like suids are shown. Again, *Microstonyx major* and the bulk of the Pakistani and Indian material form two groups. The holotypes of *Hippopotamodon sivalense* is a maxilla with the size similar to the large group. The holotype of *Dicoryphochoerus titanoides* falls in the range of *Microstonyx major*.

It seems that there are two large species in the Indian subcontinent: a very large *Hippopotamodon sivalense* and a smaller species of the size of *Microstonyx major*. Both species have approximately the same morphology.

D. titanoides is reported from the Dhok Pathan Formation and possibly Tatrot Formation as stated by Pilgrim (1926). Ng 103 is from the Nagri Formation. The fauna of the Nagri Formation has been correlated with late Vallesian or early Turolian faunas of Europe. It is also correlated with faunas from Samos of about 9 Myr and from Turkey between 9 and 10 Myr (Pilbeam *et al.*, 1977).

Microstonyx major is well known from Europe (V. d. Made & Moyà Solà, in press), Russia (Trofimov, 1951), Turkey (Ozansoy, 1965), Marageh in Iran (Campbell *et al.*, 1980), but also from China (Erdbrink, 1969; Pearson, 1928; *M. erymanthius*-should be considered a subspecies of *M. major*). It ranges in Europe from the late Vallesian to the middle Turolian (MN 10 to MN 12).

Both *Microstonyx major* and the small Indian form have the same morphology and size, as far as the dentition is known. Both enter in the Vallesian and range nearly to the beginning of the Pliocene. There seems to be no reason for not considering *D. titanoides* a junior synonym of *Microstonyx major*. The only alternative is that *D. titanoides* evolved locally and reached a similar morphology and size at approximately the same time as *M. major*, which seems less likely. It is concluded that *Dicoryphochoerus titanoides* is a junior synonym of *Microstonyx major*.

Erdbrink (1969) while studying Chinese material reached more or less a similar conclusion: *Dicoryphochoerus titanoides* a junior synonym of «*Sus erymanthius*» (= *Microstonyx major*). However in this opinion the species was less related to *Dicoryphochoerus* (= *Hippopotamodon*) than to *Sus*. We certainly do not agree with this assumption. Erdbrink is not followed by later students of Indian Suidae.

An other problem is the right generic name. The main difference between *Microstonyx* and *Hippopotamodon* is the reduced canine in *Microstonyx*, it was the reason that Pilgrim (1926) erected a new genus. *Microstonyx antiquus* differs from *M. major* in lesser

reduced canines and retention of a P₁. It resembles *Hippopotamodon sivalense* in the retention of the P₁ and in size (see figure 1). *Hippopotamodon sivalense* is only slightly larger. It seems likely that *Microstonyx* and *Hippopotamodon* are synonymous because only a reduced canine is not sufficient for generic distinction. However a comparative study of the skull of *H. sivalense* (B 26) in the Indian Museum should be made for obtaining further information.

For a long time, India was thought to be rich in endemic Suidae (Pilgrim, 1926). Pickford (1988) revised the Indian Suidae and found that species diversity was not so high. He also found that the European and Indian suid fauna resembled each other. The occurrence of *M. major* in the Indian subcontinent and the probability of very close ties between *M. antiquus* and *M. sivalense* corroborate the findings of Pickford (op. cit.).

ACKNOWLEDGEMENTS

This paper is a contribution to the Howard University-Geological Survey of Pakistan project entitled «Cenozoic Mammals and Biostratigraphy of Pakistan», which is under the overall direction of S. T. Hussain (Howard University) and S. M. Ibrahim Shah (Geological Survey of Pakistan).

We thank the Director General of the Geological Survey of Pakistan and his staff for providing facilities to work on the material which is housed in the Paleontological Laboratories in Islamabad. The Director General of the Geological Survey of India kindly allowed one of us to study the material housed in the Indian Museum.

This research was partially supported by a grant from the Smithsonian Institution (No. 41007800).

References

Campbell, B. G.; M. H. Amini, R. L. Bernor, W. Dickenson, W. Drake, R. Morris, J. A. Van Couvering & J. H. Van

- Couvering (1980). Maragheh: A classic late Miocene vertebrate locality in north western Iran. *Nature*, 287, 837-841.
- Erdbrink, D. P. (1969). A collection of mammalian fossils from S. E. Shansi, China. III. *Publicaties van het Natuurhistorisch Genootschap in Limburg*, 19, 17-24.
- Hünemann, K. A. (1968). Die Suidae (Mammalia, Artiodactyla) aus den Dinotheriensanden (Unterpliozän=Pont) Rheinheßens (Südwestdeutschland). *Schweizerische Palaeontologische Abhandlungen/Mémoires Suisses de Paleontologie*, 86, 1-96.
- Lydekker, R. (1877). Notices of new and rare Mammals from the Siwaliks. *Records of the geological Survey of India*, 10, 76-83.
- Lydekker, R. (1884). Indian Tertiary and Post-Tertiary Vertebrata. Siwalik and Narbada Bunodont Suina. *Memoirs of the Geological Survey of India. Palaeontologica indica*, series 10, 3, 35-104.
- Ozansoy, F. (1965). Etude des gisements continentaux et des Mammifères du Cenozoïque de Turquie. *Mem. Soc. Geol. France*, 44, 102, 1-91.
- Pearson, H. S. (1928). Chinese fossil Suidae. *Palaeontographica sinica*, series C, 5, 1-75.
- Pickford, M. (1988). Revision of the Miocene Suidae of the Indian Subcontinent. *Münchener Geowissenschaftliche Abhandlungen*, series A, 12, 1-95.
- Pilbeam, D.; J. Barry, G. E. Meyer, S. M. I. Shah, M. H. L. Pickford, W. W. Bishop, H. Thomas & L. L. Jacobs (1977). Geology and Palaeontology of Neogene Strata of Pakistan. *Nature*, 270, 684-689.
- Pilgrim, G. E. (1925). *Presidential address to the geological section of the 12th Indian Science Congress*. *Proceedings 12th Indian Scientific Congress*, 200-218.
- Pilgrim, G.E. (1926). The fossil suidae of India. *Memoirs of the Geological Survey of India, Palaeontologica indica*, 8, 1-68.
- Schmidt-Kittler, N. (1971). Die obermiozäne Fossilagerstätte Sandelzhausen. 3. Suidae (Artiodactyla, Mammalia). *Mitteilungen der Bayerische Staatssammlung für Paleontologie und historische Geologie*, 11, 129-170.
- Trofimov, B. A. (1951). On the fossil pigs of the genus *Microstonyx*. *Doklady Akademia Nauk SSSR*, 76, 881-884 (in Russian).

Recibido el 29 de marzo de 1989
Aceptado el 23 de octubre de 1989