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A NEW SIRENIAN FROM KUTCH, INDIA

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ABSTRACT

The occurrence of the sirenian *Metaxytherium* in the Miocene of Kutch, India is recorded.

GEOLOGY

The sirenian comes from deposits near the villages of Vinjhan and Waior in southeast Kutch, Western India. A succession of marls with *Taberina malabarica* (Carter) is overlain by limestones with *Miogypsina* (s. s.). These foraminifera enable us to date the sequence ; *Miogypsina* is characteristic of Lower and Middle Miocene, while *Taberina malabarica* is restricted to the Burdigalian stage of the Lower Miocene. Some sharks (*Carchariolamna* and *Hypoprion*) are also recorded. Details of the associated mollusc fauna are to be found in Tewari (1959).

Description : Fragments of a skull, mandible, vertebrae and ribs were recovered by one of us (B. S. T.). They are clearly associated fragments of one individual and a reconstruction is shown in Fig. 1. The specimens are in the museum of the Centre of Advanced Studies, Panjab University, Chandigarh.

The fronto-parietal has well developed temporal crests that run almost parallel to each other for some distance along the roof of the skull. The endocranial impression on the parietal suggests that the cerebral lobes were not expanded posteriorly. The rostrum has a large downturned premaxilla ; on the left side an ovoid alveolus marks the root of the incisor. The palatal surface of the maxilla forms a long narrow trough, flanked on each side by a ridge which appears to continue the line of the cheek dentition. The ridge flattens out and disappears about the premaxillary-maxilla junction. The nasal aperture is bounded anteriorly by the dorsally swollen premaxillae. Part of the zygomatic ramus of the squamosal and one occipital condyle are also recognisable amoogst the fragments.

There are two recognisable mandibular fragments, one with the last two molars on the right side (Fig. 2) and the other more broken with the roots only of the same teeth on the left side. The last molar is the smaller and unfortunately the tooth anterior to it is badly broken and very worn. Enough can be seen to suggest that the tubercles were probably aligned transversely as in *Metaxytherium*. Behind the last molar the bone is spongy, suggesting a further tooth may have been forming.

A rib fragment shows the typically dense bone of Sirenia and a lumbar vertebra is complete save for the neural arch.

Remarks : Identification of the fossil to specific level is not possible. The sum total of the characters detailed above strongly favours identity with *Metaxytherium*. The species of *Metaxytherium* recorded from the Miocene of France, Austria, Germany and Italy are poorly defined, and indeed may all belong to a single polymorphic species. *Halianassa* of the North American Miocene is regarded as a junior synonym of *Metaxytherium*.

In Figure 3. all the information on fossil sirenian occurrences along the shores of the Indian Ocean is summarised. These fall into two clear stratigraphic levels, Eocene and Miocene. Five occurrences are known from the Eocene, three in Somali, one each in India and Java. Most are attributable to strata of Middle Eocene age. Three sites have only rib fragments and a fourth has yielded a vertebra—none of the material is identifiable below ordinal level. From the Mogadishu area four molar teeth are known.

Seven occurrences of sirenians are known from the Miocene of the Indian Ocean ; three from Java and one each from Madagascar, Iran, Sri Lanka and India. The remains are mostly fragmentary and so identification is limited. On the basis of an isolated and probably deciduous molar from western Java, von Koenigswald (1952)

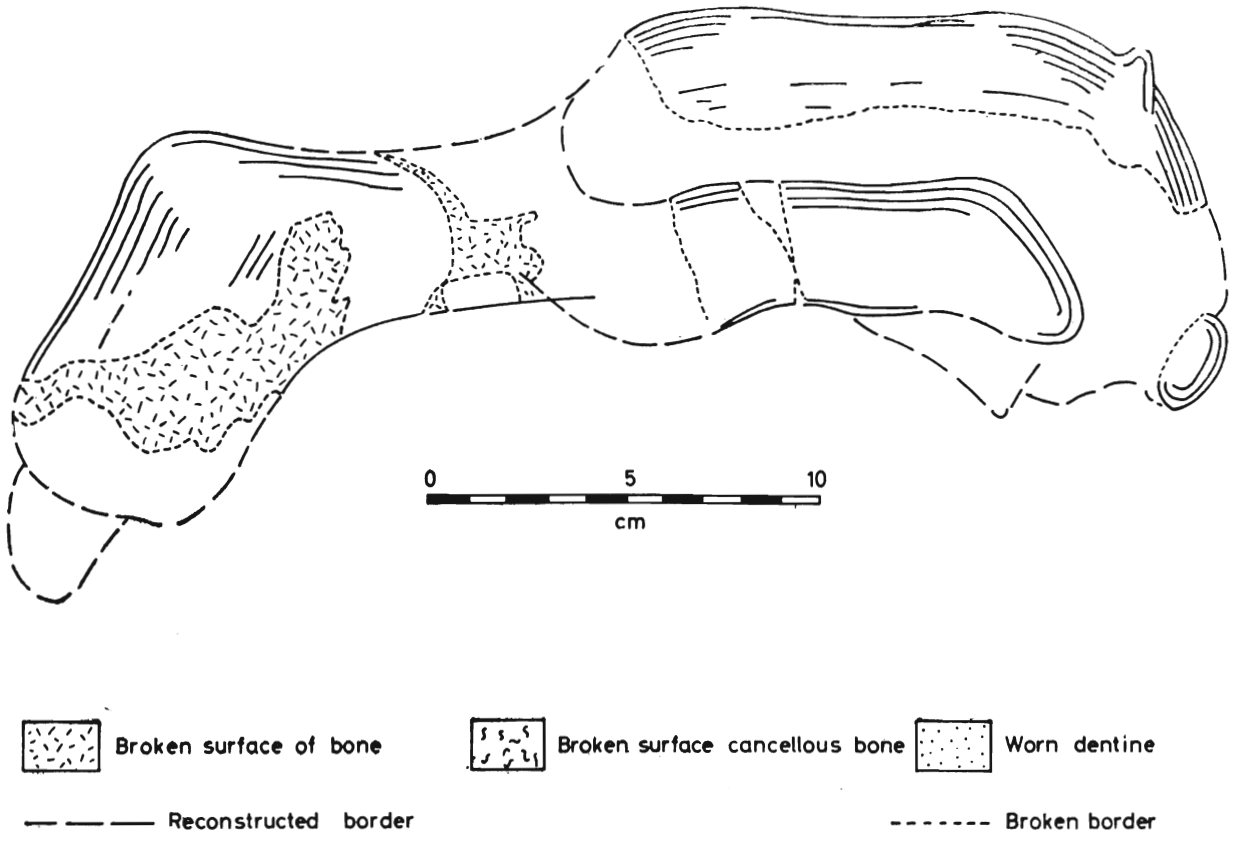

Fig. 1. *Halitherium* sp. Lateral aspect of cranium.

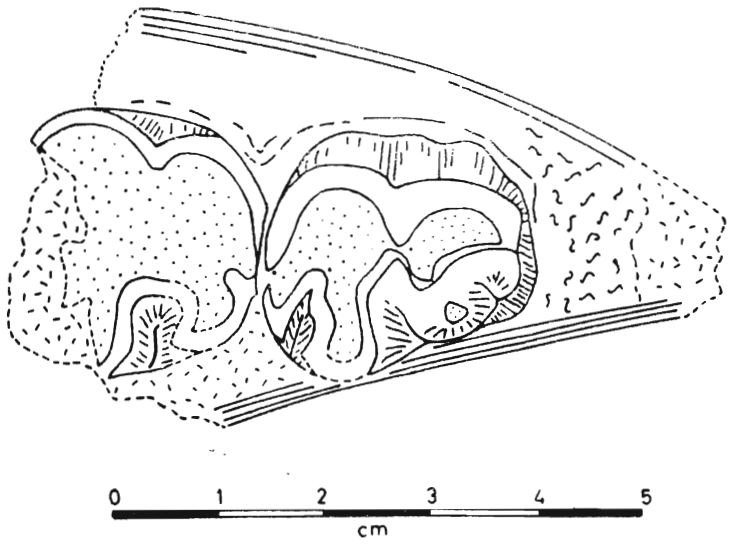

Fig. 2. *Halitherium* sp. Occlusal aspect of last two right mandibular molars.

erected a new genus *Indosiren*. It seems best to the writers to regard all the Javanese material as sirenian indeterminate. Collingnon & Cottreau (1927) described a cranial fragment from Madagascar as *Halitherium* sp.; again this seems overoptimistic and we would prefer to regard it as Dugongidae, genus and species indeterminate. Deraniyagala (1969) described a skull fragment from Ceylon as *Miodugong brevicranius* ; we see no justification for a new genus. The specimens are poorly preserved and indistinguishable from *Metaxytherium*, and so we could regard it as *Metaxytherium*, species indeterminate.

The material described in this paper from Kutch in

Fig. 3. Fossil Sirenian Records from the Indian Ocean

	LOCALITY	HORIZON	REMAINS	IDENTITY	REFERENCE
1	25 Km SE. of Berbera, Somali.	Lower Daban Series M. Eocene.	Ribs (B.M.N.H.)	Sirenian indet . .	Geology in Macfadyen 1932
2	Mogadishu, Somali . .	Carcar Series M. Eocene	4 Molar teeth (Casts in Florence)		. .
3	20 Km SW of Callis Somali	Carcar Series M. Eocene	Rib (Florence) . .	Sirenian indet.	. . Savage 19 69
4	Matanomadh Kutch Pen., India.	M. Eocene . .	Vertebra (B M .N.H.)	Sirenian indet.	. . Found by Srinivasan
5	Nanggulan, Central Java	Eocene	Rib fragment . .	Sirenian indet.	. . v. Koenigswald 1952
6	near Muchang, Java . .	Level of *Cycloclypeus annulatus*. Lower Miocene.	2 Tusks (lost) . .	Sirenian indet.	. . Rigg 1839 v. Koenigswald 1952
7	near Bogar, Java . .	*ditto*	Bone fragment . .	Sirenian indet.	. . Found by Musper 1930s v. Koenigswald 19 52
8	Ile Makamby Madagascar	Burdigalian-Helvetian L-M Miocene.	Cranial fragment . .	Dugongid indet.	. . Collignon & Cottreau 1927
9	Agha Jari, E. of Abadan, Iran.	Middle Fars Limestone ? Mid Miocene.	Ribs	Sirenian indet.	. . . .
10	Njalindung West Java . .	Level of *Vicarya callota* Upper Miocene.	Bone fragments & isolated molar	Sirenian indet.	. . v. Koenigswald 1952
11	Dutch Bay, NW Provence, Ceylon.	Molu Member Miocene.	Skull fragment . .	*Metaxytherium* sp.	. . Deraniyagala 1969
12	Kutch Peninsula, India . .	Miocene	Skull fragment, mandible, vertebrae & ribs (Chandigarh)	*Metaxytherium* sp.	Associated fauna in Tewari 1959.

India, while being more complete than any other sirenian from the shores of the Indian Ocean, is still not good enough to identify specifically, and hence we leave it as *Metaxytherium* sp.

Since identifications cannot be more precisely determined on the Indian Ocean fossils, little can be deduced regarding their relationships to Mediterranean faunas. It would seem reasonable that sirenians had free communication in Eocene times across Tethys from France to Java ; indeed the Lutetian or Middle Eocene often marks the maximum of the marine transgression in early Tertiary. The closing of Tethys probably occurred after the spread of dugongids which are known from the Miocene strata of western Europe through to Madagascar and India. There is a possible alternative explanation that the dugongids migrated round the African coast, but more and better fossil evidence is needed to decide between these alternatives.

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