New Oligocene Mustelid From Western India

Article *in* Journal of Vertebrate Paleontology · June 2008

DOI: 10.1671/0272-4634(2008)28[565:NOMFWI]2.0.CO;2

2 authors:

J G M Thewissen
Northeast Ohio Medical University
212 PUBLICATIONS **7,067** CITATIONS
SEE PROFILE

Sunil Bajpai
Indian Institute of Technology Roorkee
151 PUBLICATIONS **5,448** CITATIONS
SEE PROFILE

Journal of Vertebrate Paleontology 28(2):565–567, June 2008

SHORT COMMUNICATION

NEW OLIGOCENE MUSTELID FROM WESTERN INDIA

J. G. M. THEWISSEN[*,1] and S. BAJPAI[2]; [1]Department of Anatomy, Northeastern Ohio Universities College of Medicine, Rootstown 44272, Ohio, U.S.A., thewisse@neoucom.edu; [2]Department of Earth Sciences, Indian Institute of Technology, Roorkee, Uttarakhand, India, sunilfes@iitr.ernet.in

The District Kutch in Gujarat State (India) is well known for its Eocene cetacean fauna (Bajpai and Thewissen, 1998), and a variety of sirenians has been discovered in Eocene and Oligocene rocks (Bajpai et al., 2006). Dugongids of the species *Bharatisiren indica*, are particularly common at the locality Matanomadh (68°57′ E, 23°32′37″ N), approximately 1 km south of the village of that name. This locality yields marine vertebrate fossils of late Oligocene (Chattian) or possibly early Miocene age in soft, yellow silty marls classified as Maniyara Fort Formation and Waiorian Stage according to Biswas (1992). Coral limestones and clastic beds mostly consisting of *Turitella*-like gastropods are also common in this formation. Sirenians are by far the most abundant vertebrate fossils at Matanomadh, but we also recovered sharks (including a skeleton), crocodiles, parrotfish, and rays. Other than sirenians, mammals are rare, although some small fragments may suggest the presence of cetaceans. Fauna and geological setting leave no doubt that this locality sampled a marine environment, no terrestrial or freshwater taxa have been recovered until recently. However, in 2004, we discovered a mustelid mandible in this formation, the first landmammal from Matanomadh and the first pre-Siwalik mustelid from India. This specimen is the subject of this note.

Institutional Abbreviations—**IITR-SB**, Indian Institute of Technology, Roorkee, curated by Sunil Bajpai; **MNHN**, Muséum national d'Histoire naturelle, Laboratoire de Paléontologie, Paris, France.

SYSTEMATIC PALEONTOLOGY

Order CARNIVORA Bowdich, 1821
Family MUSTELIDAE Fischer von Waldheim, 1817
MATANOMICTIS gen. nov.

Diagnosis—Mustelid with trigonid that is wide and long and has a high protoconid on the lower carnassial. Trigonid of m1 is barely longer than talonid. Talonid has a large hypoconid and rounded posterior side. Diastema between p4 and m1. The p4 lacks cusps on the talonid.

Age and Distribution—Chattian (late Oligocene) or possibly Aquitanian (early Miocene), type locality only.

Etymology—Named for the village of Matanomadh near which the holotype was found; *-ictis* is a common suffix for carnivorans.

Discussion—*Matanomictis* lacks the pronounced specializations of the subfamilies of mustelids, but appears to bear some incipient specializations of lutrines. Ginsburg (1968) listed the low carnassial trigonid and the crowding of the premolars as diagnostic features of lutrines. *Matanomictis* displays the first, but not the second of these features. The carnassial trigonid is lower and broader than in primitive carnivores such as Oligocene *Palaeogale* from Europe which was formerly considered a musteline de Bonis, 1981, but probably best thought of an a carnivore *incertae sedis*, Mörs, 1996). *Matanomictis* retains a secondary cusp on the last lower premolar, unlike meline mustelids. Pilgrim (1933) indicated that the carnassial of early representatives of the mustelids, as well as later mustelines, had a high trigonid with a small metaconid and a short talonid, all unlike *Matanomictis*. Pilgrim (1933) further indicated that early mustelids had a large hypoconid and double-rooted m2, features similar to *Matanomictis*. He also suggested that the anterior position of the metaconid occurs in melines and lutrines, and this is similar to *Matanomictis*. *Matanomictis* is unlike early amphicyonids, such as *Pseudocyonopsis* and *Cynelos*. These amphicyonids are larger, lack a diastema between p4 and m1, and have larger carnassial talonids (Springhorn, 1977). *Matanomictis* is also unlike early ursids, such as *Pachycynodon* (Dehm, 1935), which are more bunodont and have a carnassial trigonid lower than *Matanomictis*.

MATANOMICTIS MANIYARENSIS sp. nov.
Fig. 1

Holotype and Only Specimen—IITR-SB 5135, right mandible with p4, m1, and two alveoli for m2.

Type Locality—Matanomadh, District Kutch, Gujarat, India. The village of Matanomadh is also near the type section of the Paleocene Matanomadh Formation, but the Maniyara Fort Formation and the Matanomadh Formation are clearly distinct.

Age and Horizon—Maniyara Fort Formation (Bermoti Member) of Chattian (or possibly Aquitanian) Age.

Etymology—*Maniyaranensis* is the genitive of Maniyara, the formation of origin of the holotype.

Description—The holotype consists of a right mandibular fragment with p4, m1, and two alveoli for m2. The p4 is high and triangular in lateral view. It bears a high protoconid, and immediately behind it a small metaconid. The tip of the protoconid is somewhat anterior to the midpoint of the tooth. A weak cingulum surrounds the tooth, strongest posteriorly. This tooth is 6.6 mm long and 3.0 mm wide. The p4 is separated from the m1 by a diastema of 2.3 mm. The carnassial (m1) has three cusps on the trigonid. The trigonid, as measured from the posterior side of the protoconid anteriorly, is slightly longer than the talonid. The trigonid is a wide-open basin, with a large protoconid and similarly-sized paraconid and metaconid. The carnassial blade, between protoconid and paraconid is distinct, but not high. The metaconid is large and placed lingual and slightly posterior to the protoconid. A single cusp is present on the talonid, the hypoconid, which is low but long and broad. The talonid basis is

[*]Corresponding author.

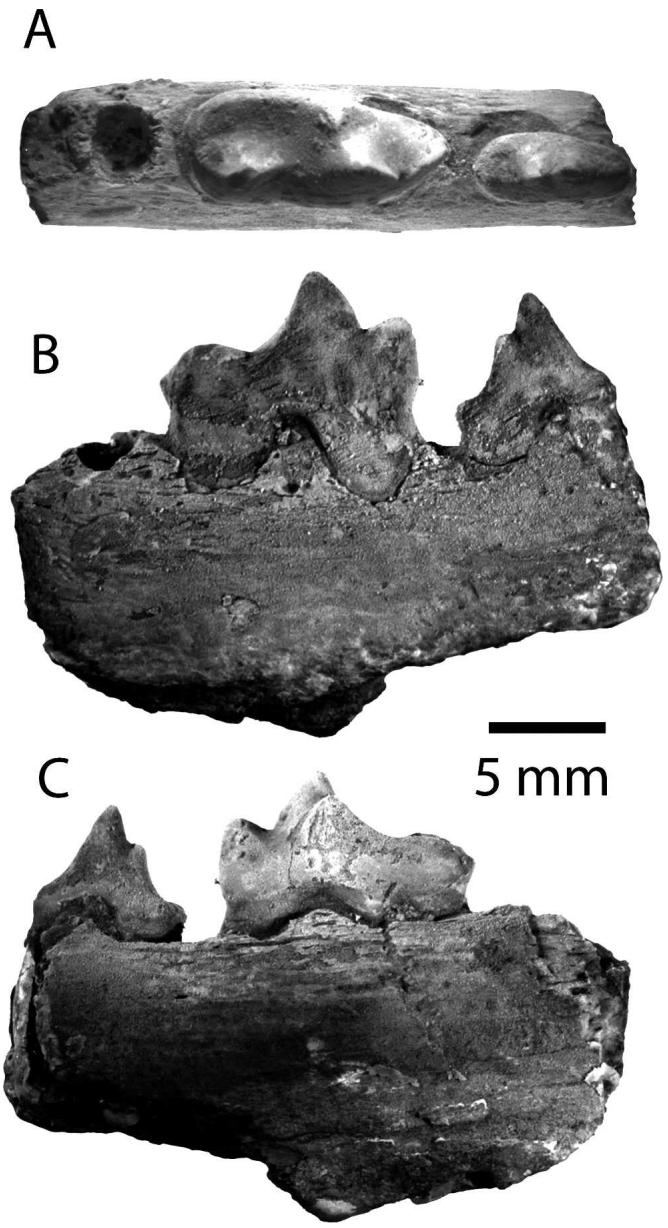

FIGURE 1. Holotype of *Matanomictis maniyarensis* (IITR-SB 5135). **A**–**C**, right mandible with p4 and m1, and two alveoli for m2 in occlusal, labial, and lingual view, respectively.

rimmed posteriorly and lingually by a low crest, which extends from the lingual side of the hypoconid to the posterior side of the metaconid. The posterior part of the talonid is not square, but ends more or less in a single point in the midline. The m1 is 11.0 mm long and 4.9 mm wide. There are two alveoli for m2, indicating that this tooth was not rounded, but rectangular in outline.

Comparisons—Comparison of *M. maniyarensis* with the mostly European, late Oligocene to early Miocene otter-like mustelid *Potamotherium* is informative. The carnassial of *Potamotherium* (Savage, 1957; Ginsburg, 1968; Morlo, 1996; Mörs and von Koenigswald, 2000) shows several important differences. The carnassial trigonid is relatively longer with respect to the talonid in *Potamotherium*, and m2 is single-rooted, both unlike *Matanomictis*. *M. maniyarensis* and *P. miocenicum* are similar in the relative large size of the metaconid, and the narrow trigonid basin (close proximity of protoconid and metaconid). *M. maniyarensis* differs significantly from the species of *Potamotherium* which is best known, *P. valletoni*. Unlike *M. maniyarensis*, *P. valletoni* has strong, complete cinguli on both p4 and m1, the secondary cusp on p4 is not labially displaced, with a large hypoconid (Savage, 1957; Morlo, 1996). *Potamotherium* was in the past often considered to be one of the earliest otters (Savage, 1957; Ginsburg, 1968), and is now variously thought to be of uncertain affinities in musteloids, close to pinnipeds, or placed in the extinct Oligobuninae or Semantoridae (Tedford, 1976; Morlo, 1996; Baskin, 1998). It is skeletally well-known from early Miocene deposits of France (Savage, 1957).

Baskin (1998) listed American *Mionictis* as a Miocene lutrine, and its carnassial talonid is similar to that of Matanomictis. Unlike *Mionictis*, *Matanomictis* has a diastema between p4 and m1, higher trigonid cusps, and a weaker carnassial blade between protoconid and paraconid (Cook and MacDonald, 1962), all features suggesting that *Matanomictis* lacks specializations present in *Mionictis*. Comparison of *M. maniyarensis* to the holotype of European *Larteticts dubia* (MNHN Sa 801, listed by Ginsburg, 1968, previously included in *Mionictis*) shows that the carnassial of *Matanomictis* has a smaller metaconid, smaller talonid basin, but that its trigonid proportions are similar (Ginsburg, 1968; Ginsburg and Morales, 1996). The m2 has a single root in *Lartetictis* (Ginsburg, 1968). *Trochictis artenensis* Ginsburg, 1968 (also previously included in *Mionictis*, see Ginsburg and Morales, 1996), differs from *M. maniyarensis* in the absence of a secondary cusp on p4 and a low trigonid with low protoconid and small hypoconid on m1. *T. artenensis* was considered a meline by Ginsburg (1968), and *Lartetictis* was considered a meline by Ginsburg and Morales (1996) Roman and Viret (1934) described *Paralutra* from the early Miocene of France. This taxon has a relatively longer trigonid on the carnassial, and lacks an accessory cusp on p4.

A number of otter-like mustelids have been described from the Oligocene and Miocene of Asia (Russell and Zhai, 1987), and some of these may play a role in the origin of the modern South and Southeast Asian musteloids (Schmidt-Kittler, 1984). The Oligocene and Miocene mustelids from Asia all differ significantly from the new species, in particular musteline genera such as *Palaeogale*. *M. maniyarensis* is similar to *Cynodon (Pachycynodon) teilhardi* in arrangement and number of cusps on trigonid and talonid, as described by Matthew and Granger (1924) from the Oligocene of Mongolia. *Matanomictis* has a longer talonid, lower protoconid, and is larger than *C. teilhardi*. The latter was considered a phocoid by McKenna and Bell (1997).

Sivaonyx and *Vishnuonyx* are two enhydrine otters from the Miocene of South Asia (McKenna and Bell, 1997). *Sivaonyx bathyonyx* was figured by Colbert (1935) and shows many differences from the new species, especially the broad trigonid with low protoconid and the short, rounded talonid. The presence of a two-rooted m2 is a similarity. Both *Sivaonyx* and earlier Miocene *Vishnuonyx* lack cusps on the talonid, although the talonid rim is crenulated (Colbert, 1935). This is a difference with *Matanomictis*.

Ginsburg et al. (1983) described the lutrine *Siamogale thailandica* from the Miocene of Thailand. *Siamogale* differs greatly from *Matanomictis* in having a lower shearing crest and greatly expanded talonid on m1.

Discussion—*Matanomictis* is the oldest known mustelid from the Indian subcontinent. As most other Oligocene mustelids, it retains many plesiomorphic features. *Matanomictis* displays some specializations of early lutrines, such as the low carnassial trigonid and its long talonid. However, these specializations are not unique to lutrines, and *Matanomictis* lacks other lutrine specializations, such as the absence of a diastema between p4 and m1. The depositional environment in which it was found was clearly near-shore marine, consistent with an otter-like lifestyle,

but at this point the morphological evidence is insufficient to assign the new genus to a subfamily of mustelids.

Acknowledgments—We thank John Barry for providing us with casts and advice concerning Miocene mustelids, and we thank reviewers Jon Baskin and Thomas Mörs for their suggestions. We thank Vivesh Kapur, Debasis P. Das, and Ritu Sharma for help in the field. This research was supported by the National Science Foundation of the U.S.A. and the Department of Science and Technology.

LITERATURE CITED

Bajpai, S., and J. G. M. Thewissen. 1998. Middle Eocene cetaceans from the Harudi and Subathu Formations of India; pp. 213–233 in J. G. M. Thewissen (ed.), The Emergence of Whales, Evolutionary Patterns in the Origins of Cetacea. Plenum Press, New York.

Bajpai, S., J. G. M. Thewissen, V. V. Kapur, B. N. Tiwari, and A. Sahni. 2006. Eocene and Oligocene sirenians (Mammalia) from Kachchh, India. Journal of Vertebrate Paleontology 26:400–410.

Baskin, J. A. 1998. Mustelidae; pp. 152–173 in C. M. Janis, K. M. Scott and L. L. Jacobs (eds.), Evolution of Tertiary Mammals of North America, Volume 1: Terrestrial Carnivores, Ungulates, and Ungulatelike Mammals. Cambridge University Press, United Kingdom.

Biswas, S. K. 1992. Tertiary stratigraphy of Kutch. Journal of the Palaeontological Society of India 37:1–29.

Bonis, L. de. 1981. Contribution à l'étude du genre *Palaeogale* Meyer (Mammalia, Carnivora). Annales de Paléontologie (Vertebrés) 67: 37–56.

Bowdich, T. E. 1821. An analysis of the natural classifications of Mammalia for the use of students and travelers. J. Smith, Paris, 115 pp, 16 pl.

Colbert, E. H. 1935. Siwalik mammals in the American Museum of Natural History. Transactions of the American Philosophical Society 26: 1–401.

Cook, H. J., and J. R. MacDonald. 1962. New Carnivora from the Miocene and Pliocene of Western Nebraska. Journal of Paleontology 36:560–567.

Dehm, R. 1935. Über tertiäre Spaltenfűllungen im Fränkischen und Schwäbischen Jura. Abhandlungen der Bayerischen Akademie der Wissenschaften, Mathematisch-naturwissenschaftliche Abteilung, Neue Folge 29:1–82, 5 pl.

Fischer von Waldheim, G. 1817. Adversaria zoologica. Mémoires de la Societé Impérialle Naturelle (Moscow), 5:368–428.

Ginsburg, L. 1968. Les Mustélidés piscivores du Miocène français. Bulletin du Muséum national d'Histoire naturelle, Série 2, 40:228–238.

Ginsburg, L., and J. Morales. 1996. *Lartetictis* et *Adroverictis*, nouveaux genres de Melinae (Mustelidae, Carnivora, Mammalia) du Miocène de l'ancien monde. Bulletin du Museum national d'Histoire naturelle, 18, Série C:663–671.

Ginsburg, L., R. Ingavat, and P. Tassy. 1983. *Siamogale thailandica*, nouveau Mustelidae (Carnivora, Mammalia) néogène du Sud-Est asiatique. Bulletin de la Societé géologique de France 25:953–956.

Matthew, W. D, and Granger, W. 1924. New Carnivora from the Tertiary of Mongolia. American Museum Novitates 104:1–9.

McKenna, M. C., and S. K. Bell. 1997. Classification of Mammals above the species level. Columbia University Press, New York, 631 pp.

Morlo, M. 1996. Carnivoren aus dem Unter-Miozän des Mainzer Beckens (2. Mustelida, Pinnipedia, Feliformia, *Palaeogale*). Senckenbergiana lethaea 76:193–249.

Mörs, T., and von Koenigswald, W. 2000. *Potamotherium valletoni* (Carnivora, Mammalia) aus dem Oberoligocän von Enspel im Westerwald. Senckenbergiana lethaea 80:257–273.

Pilgrim, G. E. 1933. The genera *Trochictis*, *Enhydrictis*, and *Trocharion*, with remarks on the taxonomy of the Mustelidae. Proceedings of the Zoological Society, London 1932:845–867.

Roman, F., and Viret, J. 1934. La fauna de mammifères du Burdigalien de la Romieu (Gers). Mémoires de la Societé Géologique de France, Nouvelle Série 9 (2–3), no. 21.

Russell, D. E., and Zhai, R.-j. 1987. The Paleogene of Asia: mammals and stratigraphy. Mémoires du Muséum National d'Histoire Naturelle, Série C., 52:1–488.

Savage, R. J. G. 1957. The anatomy of *Potamotherium*, an Oligocene lutrine. Proceedings of the Zoological Society of London 128: 151–249.

Schmidt-Kittler, N., 1984. On the phylogenetic and biogeographic history of the musteloid carnivores in east and southeast Asia; pp. 710–723 in R. O. Whyte (ed.), The Evolution of the East Asian Environment. Proceeding of an International Conference at the Centre of Asian Studies, University of Hong Kong, 1983, Vol. 2.

Springhorn, R. 1977. Revision der alttertiären europäischen Amphicyonidae (Carnivora, Mammalia). Palaeontographica, Abteilung A, 158:26–113.

Tedford, R. H. 1976. Relationships of pinnipeds to other Carnivora (Mammalia). Systematic Zoology 25:363–374.

Submitted June 1, 2007; accepted November 15, 2007.