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Enigmatic bilophodont molariform tooth from the Eocene of Central Russia

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ABSTRACT. A partial upper molariform tooth from the Upper(?) Eocene of Srednyaya Akhtuba, Volgograd Province, is described. The tooth is characterized by an incipient bilophodont structure with paracone and metacone placed extremely labially and almost without the labial cingulum. The tooth is compared with the members of mammalian orders Rodentia, Perissodactyla, Embrithopoda, Proboscidea, and Sirenia having the bilophodont dentition. It is most similar with the teeth of extinct sea cows of the family Dugongidae and may belong to this group.

KEY WORDS: tooth morphology, Eocene, Volgograd Province.

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Загадочный билофдонтный моляроподобный зуб из эоцена Центральной России

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РЕЗЮМЕ. Описан фрагментарный верхний моляроподобный зуб из верхнего(?) эоцена Средней Ахтубы, Волгоградская область. Зуб характеризуется зачаточным билофодонтным строением с параконом и метаконом в максимально лабиальном положении и практически лишен лабиального цингулюма. Зуб сравнивается с представителями отрядов Rodentia, Perissodactyla, Embrithopoda, Proboscidea и Sirenia имеющими билофодонтные зубы. Он наиболее сходен с зубами морских коров вымершего семейства Dugongidae и может принадлежать представителю этой группы.

КЛЮЧЕВЫЕ СЛОВА: морфология зубов, эоцен, Волгоградская область.

Introduction

A peculiar mammal tooth fragment was found in the Recent alluvial deposits of Akhtuba River near village Srednyaya Akhtuba on the left bank of the Volga River in Volgograd Province. It was reworked from older, possibly Upper Eocene deposits together with other fossils, including a carapace of a crab *Xanthopsis* sp., teeth of sharks *Jakelotodus trigonalis* (Jaekel, 1895), *Striatolamia macrota* (Agassiz, 1843), *Palaeocarcharodon turgidus* (Agassiz, 1843) and *Myliobatis* sp., and a chimaeroid toothplate (determinations by AYa).

The tooth shows brachyodont and incipiently bilophodont morphology and is compared with the representatives of the mammalian orders which have bilophodont dentition.

Collection abbreviation. VGI — Museum of Natural History, Humanitarian Institute, Volzhskii, Volgograd Province, Russia.

Systematic paleontology

MAMMALIA Linnaeus, 1758
Mammalia indet.
Fig. 1

Material. VGI 231/20, labial part of a right upper molariform tooth. Srednyaya Akhtuba, Volgograd Province, Russia; upper(?) Eocene.

Description. The tooth is relatively little worn but polished by postmortem abrasion. The brachyodont crown consists of two main transverse lophs, protoloph and metaloph, and prominent pre- and postcingulum with narrow basins between cingula and the main lophs. The protoloph is somewhat higher than the metaloph, with a distinct wear facet occupying almost all the paracone. The precingulum is smooth, not cuspulate. In the anterior basin there are two small cuspules. The central valley is an irregular broken line, widely open labially. The metaloph is not worn in the region of the metacone, but there are two small circular wear facets at the location of metaconule, indicating presence of a double metaconule. In the region of the metaconule the metaloph and postcingulum possibly were connected by a thin longitudinal ridge. On the labial-most end of the postcingulum there is a distinct cusp with a well-developed wear facet, the metastyle. There is a very weak labial cingulum along the base of the paracone and anterior half of the base of the metacone. The enamel is smooth on the occlusal side and finely wrinkled on the labial side. The roots are not preserved. Labially there is a common swelling of the basal crown side with two narrow pulp canals for labial roots.

Measurements. VGI 231/20: Labial crown length 24.7 mm.

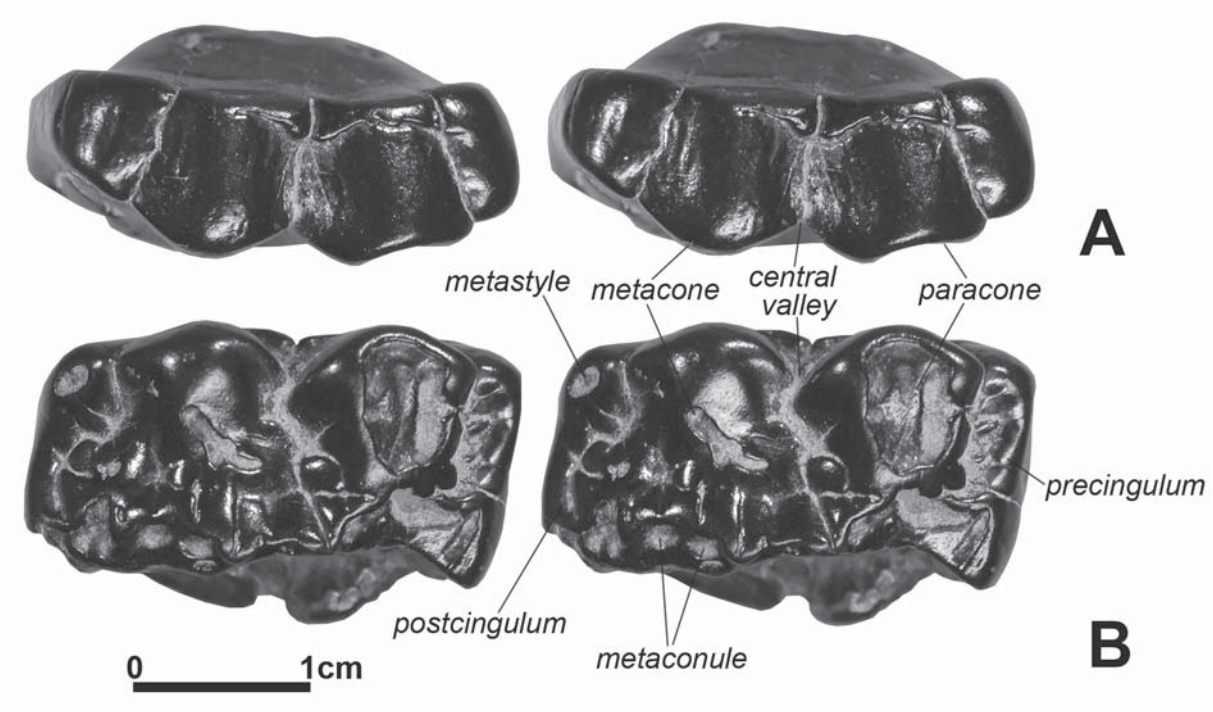

Figure 1. VGI 231/20, labial part of a right upper molariform tooth in labial (A) and occlusal (B) views (stereopairs). Srednyaya Akhtuba, Volgograd Province, Russia; upper(?) Eocene.

Comparison

Determination of VGI 231/20 is difficult because of its incompleteness. Representatives of several mammalian orders show bilophodont dentition: Diprotodontia, Rodentia, Perissodactyla, Embrithopoda, Proboscidea, Sirenia, Pyrotheria, and Xenungulata (e.g., Thenius, 1989). Below VGI 231/20 is compared with selected representatives of these groups apart from marsupials (Diprotodontia) and South American ungulates (Pyrotheria and Xenungulata) which occurrence in European Russia seems unlikely.

Rodentia. Attribution of VGI 231/20 to a rodent would be unrealistic because of its large size. Nevertheless, this specimen shows similarities with dentition of some early rodents, like members of Ischyromyidae (e.g., Wood, 1962). The most obvious difference of VGI 231/20 from such teeth is complete lack of the mesostyle.

Perissodactyla. Even in the earliest perissodactyls there is a labial cingulum, distinct ectoloph, and enlarged parastyle (e.g., Ting, 1993; Holbrook *et al*., 2004; Hooker & Dashzeveg, 2004), features which distinguish VGI 231/20 from the members of this order.

Embrithopoda. In a primitive embrithopod, Paleocene *Phenacolophus* Matthew & Granger, 1925 from Mongolia, the paraloph is more crest-like and there is a better developed labial cingulum compared with VGI 231/20 (McKenna & Manning, 1977). By relative labial position of the paracone and metacone and virtual lack of the labial cingulum VGI 231/20 is similar with premolars of the middle(?) Eocene embrithopod *Hypsamasia* Maas *et al*., 1998 from Turkey (Maas *et al*., 1998: fig.2A). Unfortunately, poor preservation of *Hypsamasia* precludes further comparisons. In more derived embrithopods the crowns are more hypsodont and strongly bilophodont (Radulesco & Sudre, 1985; Court, 1992), inviting no comparison with VGI 231/20.

Proboscidea. The earliest proboscidean, early Eocene *Phosphatherium* Gheerbrant, Sudre & Cappetta, 1996 from Morocco, is similar with VGI 231/20 in having no labial cingulum and labial position of the paracone and metacone (Gheerbrant, 2005). However, the paraloph in this taxon is already a real loph (crest), unlike condition in VGI 231/20. In the Eocene-Oligocene *Moeritherium* Andrews, 1901 from Egypt the labial cusps are more bunodont and placed more lingually compared with VGI 231/20 (Thenius, 1989: figs.741 and 742). In more derived bilophodont proboscideans (Deinotherioidea) the dentition is fully bilophodont, with marked paraloph and metaloph (Thenius, 1989).

Sirenia. VGI 231/20 is similar with teeth of primitive Eocene sea cows, like *Prorastomus* Owen, 1855 (Prorastomidae), *Protosiren* Abel, 1907 (Protosirenidae), *Eotheroides* Palmer, 1899, and *Prototherium* de Zigno, 1887 (Dugongidae). In more derived Dugongidae the dentition becomes bunodont. In the Recent *Dugong* Lacépède, 1799 the teeth become hypsodont evergrowing, and lacking enamel in adults, and with the cusp pattern totally eliminated by early wear. In mana-

tees (Trichechidae) a primitive brachyodont bilophodont pattern of molariform teeth is retained, but nevertheless their teeth are more lophodont than in VGI 231/20, with reduced cusp pattern. Moreover, the evolution of this group was confined to America and West Africa and it would be unlikely to be present in the Eocene of Eastern Europe. By sirenian standards, VGI 231/20 could be DP5 or M1-3, but it is likely not a DP5, because of considerable enamel thickness, and not a M3, because it is not so asymmetrical.

The differences among upper molariform teeth of primitive Eocene sirenians are hard to assess, because in the majority of specimens they are damaged or heavily worn, and because the molar pattern in these forms is generally very similar.

Detailed comparison of VGI 231/20 with *Prorastomus* is impossible, because the only known specimen of the latter genus with upper molars has the teeth considerably worn (Savage *et al*., 1994).

In *Protosiren fraasi* Abel, 1907 from the Middle Eocene of Egypt (Sickenberg, 1934: fig.10, pl.1, fig.8) and *Protosiren* sp. from the Middle Eocene of Florida and North Carolina (Domning *et al*., 1982: figs.15 and 24) the upper molariform teeth are considerably smaller, with the paracone and metacone more cusp-like, and usually with a well-developed longitudinal spur connecting the metaconule with the postcingulum.

In *Eotheroides libycum* (Andrews, 1902) and *E. stromeri* (Abel, 1913) from the Late Eocene of Egypt (Sickenberg, 1934: pl.2, figs.2, 3) the upper molariform teeth are distinctly smaller and more lophodont.

VGI 231/20 is quite similar in size (somewhat larger) and morphology to *Prototherium veronense* (Zigno, 1875) from the Upper Eocene of Italy (Sickenberg, 1934: fig.27a; Pilleri *et al*., 1989: pl.17). A pronounced metastyle, present in VGI 231/20, is a peculiar feature of this taxon; it is rarely distinct in early sirenians, but can be more developed in younger forms, like Halitheriinae indet. from the Early Miocene of Oregon (Domning & Ray, 1986: figs. 5a, b, 6), where, however, the postcingulum is totally reduced.

Conclusions

Morphological comparison of VGI 231/20 shows its most similarity with the sirenians, specifically with members of Dugongidae. Attribution of this specimen to a sea cow would be in agreement with the paleoenvironmental context of its discovery in marine deposits. However, its incompleteness precludes from a definite referral.

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