

Fossil proboscideans (Mammalia) from the vicinities of Varna: a rare indication of middle Miocene vertebrate fauna in Bulgaria

Georgi N. MARKOV

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Abstract. Proboscideans from the area of Varna (NE Bulgaria) are discussed, with emphasis on two finds from Galata: an elephantoid molar mistakenly identified as *Tetralophodon longirostris* in earlier Bulgarian literature but actually belonging to an amebelodontid, and a previously unpublished premolar of *Deinotherium giganteum*. The proboscideans from the region of Varna are a rare example of pre-Turolian vertebrates from Bulgaria and might indicate middle Miocene fossiliferous outcrops in the area.

Key words: Proboscidea, Deinotheriidae, Elephantoidea, Amebelodontidae, middle Miocene, Bulgaria

Introduction

The vast majority of the ca. 400 fossil proboscidean specimens known from Bulgaria are of Turolian age or later (MARKOV, 2004a, 2004b). Proboscideans, and indeed any land vertebrates of pre-Turolian age are quite rare in the country. Several finds from the area of Varna (Northeast Bulgaria, Fig. 1) belong to taxa of certain pre-Turolian age. They are discussed below, particularly focusing on two finds from Galata, Varna, stored at the collections of the Sofia University. One is an elephantoid molar, mistakenly attributed by BAKALOW (1911) to *Tetralophodon longirostris* and referred by MARKOV (2004a, 2004b) to *Platybelodon* cf. *danovi*; the other is a hitherto unpublished premolar, attributed here to *Deinotherium giganteum*.

Institutional abbreviations:

HNHM: Hungarian Museum of Natural History, Budapest.

MNHN: Muséum National d'Histoire Naturelle, Paris.

NHM: Natural History Museum, London.

NMNH: National Museum of Natural History – BAS, Sofia.

SU: Palaeontology Museum of the Sofia University, Sofia.

Methods:

Dental nomenclature follows TASSY (1996a). Measurements in mm; estimated values designated by “e”.

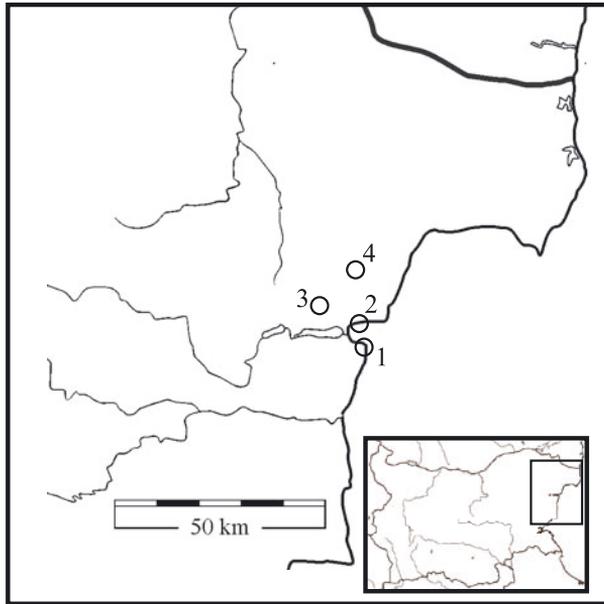


Fig. 1. Map of the localities in the vicinities of Varna mentioned in the text. 1: Galata; 2: Pochivka; 3: Aksakovo; 4: Yarebichna.

Systematic part:

Amebelodontidae Barbour, 1927

? *Platybelodon* cf. *P. danovi* Borissiak, 1928

Material: m3 sin (SU 230) from Galata, Varna.

Description and discussion. SU 230 was originally published by BAKALOW (1911, Pl. 8, Fig. 2) as m2 of *Mastodon longirostris*, an erroneous determination repeated by BAKALOV & NIKOLOV (1962, Pl. 64, Fig. 2, as m2 of *Tetralophodon longirostris*). The shape of the tooth (Fig. 2) however clearly demonstrates that the locus was misidentified by these authors: the narrowing posterior end of the tooth is typical for a third molar.

The molar is rather well preserved, with the crown almost entirely intact apart from the anterior cingulum. Currently, the anterior half of the tooth is covered with plaster of Paris, especially the second pretrite semilophid. There was no plaster on the specimen when it was figured by BAKALOW (1911) and BAKALOV & NIKOLOV (1962), and apparently it was broken along the second lophid at some later point and subsequently repaired.

The tooth has five lophids and a small, asymmetric talonid. (Both previous descriptions report the number as four plus a well-developed posterior talonid, but the fifth ridge is differentiated by an entoflexus, and followed by a talonid on the posttrite side). Occlusion on all lophids, dentine not yet revealed on the fifth posttrite semilophid. Posttrite conules are present in all interlophids except the fourth. On the pretrite side, mesoconelets are clearly separated from the anterior and posterior pretrite conules, forming a trefoil pattern. On the posttrite

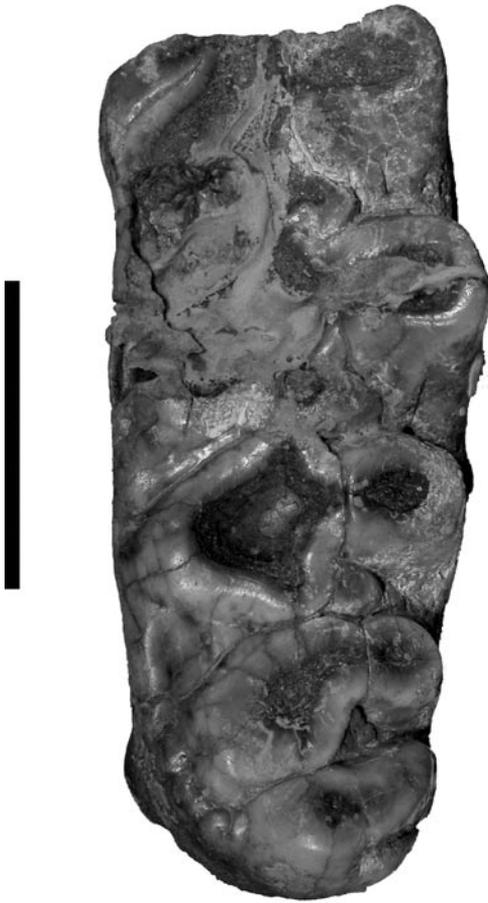


Fig. 2. SU 230, m3 sin, Amebelodontidae indet. (? *Platybelodon* cf. *danovi*), Galata. Scale bar: 5 cm. Note the plaster of Paris on first and second lophids.

Belomechetskaya described by BORISSIAK (1928, 1929), SU 230 deviates from them within the range observed for the En Péjouan *G. angustidens* sample which includes female as well as male individuals, representing a good example of sexual dimorphism within a single population (TASSY, 1996b). Showing the same kind of sexual dimorphism, *A. filholi* on the other hand is a larger animal, with females matching the size of male *G. angustidens*, and males surpassing it (TASSY, 1985, 1996b). With the size of a female *G. angustidens*, SU 230 is below the known range for *A. filholi*.

With *Archaeobelodon filholi* ruled out, SU 230 was referred to *Platybelodon* cf. *danovi* by MARKOV (2004a, 2004b) who dismissed affinities with *Protanancus* (MARKOV, 2004b) on the base of differences with the two known species of the genus, *P. macinessi* and *P. chinjiensis*. Another possibility, not discussed by MARKOV (2004b), is that SU 230 might represent a *Protanancus* species different from both *P. macinessi* and *P. chinjiensis*. *Protanancus* probably occurs at the Turkish locality Yürükali at the Sea of Marmara coast (TASSY, 1983, 1984;

half, the main cones and the mesoconelets are not clearly distinguished, especially on the third and fourth posttrite semilophids where mesoconelets are reduced. Traces of cement in the interlophids are weak but visible. Length: 144; width: 61/66/62/54/41; enamel thickness: 3.5 mm.

The underdeveloped fifth lophid, the pronounced trefoil pattern and the posttrite ornamentation preclude relations to *Tetralophodon* or any other tetralophodont gomphothere. The combination of posttrite ornamentation, relatively narrow crown and cement deposits, as well as enlarged central pretrite conules, is characteristic for amebelodontids (see TASSY, 1984, 1986). Of the amebelodontids known from Europe, the late Miocene "*Mastodon*" *grandincisivus* differs significantly in dental morphology from SU 230, having large m3s with a fully developed fifth and even sixth lophid, and a complex crown showing pseudo-anancoidy. Two other European amebelodontids, *Archaeobelodon filholi* and *Platybelodon danovi*, although readily set apart by a number of cranio-mandibular characters and by the entirely different structure of the lower tusks, may have similar lower molars (TASSY, 1985) and the identification of an isolated m3 is difficult. Still, the size of SU 230 fits better with *Platybelodon danovi* rather than *Archaeobelodon filholi*. Smaller than the m3s in the type mandible of *P. danovi* from

originally published as “*Amebelodon (Amebelodon) cf. fricki*” by GAZIRY, 1976). Judging from the morphology of the only molar from that locality, an M3 (GAZIRY, 1976, Pl. 4, Fig. 5), the Yürükali *Protanancus* seems to be more primitive than the two named species of the genus. With the Yürükali material in mind, presence of *Protanancus* at Galata would not be absurd from a geographical viewpoint; as for the morphology of SU 230, there are several similarities to *Protanancus*: some alternation of the semi-lophids, cross-contacts between the pretrite and posttrite halves, and reduction of the mesoconelets. On the other hand, these characters are simply insufficient for an unequivocal determination of an isolated lower molar.

Attribution of SU 230 to *Platybelodon cf. danovi* by MARKOV (2004a, 2004b) was additionally influenced by the reported occurrence of *Platybelodon* sp. at the nearby locality Pochivka, northern part of Varna, by NIKOLOV (1985). Unfortunately, this information is not very reliable. Nikolov’s 1985 paper, a posthumously published catalogue of Bulgarian Tertiary mammal localities, provides little detail apart from faunal lists and assumed age, and includes unpublished material. This is exactly the case with the material from Pochivka: it was never published and its present location is unknown. According to N. Spassov (pers. comm. 2003), the material in question was a mandible, brought to I. Nikolov for determination and pictured in a newspaper in the 1970s, the preserved symphysis having the typical flat, wide *Platybelodon* lower tusks. A short newspaper note (*Trud*, 27.04.1977: personal archive of Prof. Z. Boev, NMNH) indeed includes a comment by I. Nikolov, who noted the shovel-like symphysis of the mandible and determined it as belonging to *Platybelodon*. Unfortunately, the symphysis is not shown on the newspaper photo, and while the mandible almost certainly belonged to a shovel-tusker judging from the brief interview, it must be remembered that the genus *Archaeobelodon* Tassy, 1984 was yet to be described, and that *A. filholi* was regarded as a subspecies of *P. danovi* by TOBIEN (1973), a work Nikolov was familiar with. Similarly, *Protanancus macinessi* material was most probably known to Nikolov as “*Platybelodon kisumuensis*” (again according to Tobien’s concepts), so a determination as *Platybelodon* could actually also refer to two other genera, *Archaeobelodon* and *Protanancus*. If, nevertheless, Nikolov’s determination (and Spassov’s recollection of the shape of the symphysis and the lower tusks) is assumed to be correct, the occurrence of *Platybelodon* at the Black Sea coast would not be too surprising, especially with *Platybelodon cf. danovi* known from the middle Miocene locality Araplı, European Turkey, Marmara Sea coast (GAZIRY, 1976; TASSY, 1986).

Ranging from Africa through Eurasia to North America and from the early to the late Miocene (accepting synonymy with *Torynobelodon*), the amebelodontid genus *Platybelodon* is not known later than the middle Miocene (MN7/8) in the Old World. The earliest finds are *Platybelodon* sp. from Loperot, Kenya (MAGLIO, 1969: a single tusk fragment and the only *Platybelodon* find from Africa), and the recently described *Platybelodon dangheensis* Wang et Qiu, 2002 from the Danghe area, Gansu, China. The age of the Danghe *Platybelodon* is early Miocene, according to WANG & QIU (2002) (see also WANG X. et al., 2003 and WANG B. et al., 2003, for a detailed discussion of Danghe stratigraphy). The only European member of the genus is its type species¹, *P. danovi*, described by BORISSIAK (1928, 1929) from Belomechetskaya, Russia, the age of Belomechetskaya generally considered to be MN6 (see GÖHLICH, 1999; PICKFORD et al., 2000). A later and more derived species with complex dental morphology, *P. grangeri* occurred in the middle Miocene (MN7/8) of northern China

¹ *P. jamandzhalgensis* Belyaeva et Gabunia, 1960 from the area of Belomechetskaya was synonymized with *P. danovi* by TOBIEN (1973).

(it has also been reported from Kyrgyzstan: ALEXEEVA, 1957). The status of *P. belijaevae* Alexeeva, 1971, based on fragmentary material from Western Mongolia, is unclear.

So far, Araplj is the westernmost *Platybelodon* locality in the Old World (TASSY, 1986). However, two molars from Grivac – Slana Bara (Gruža Basin, Serbia), determined by MARKOVIĆ-MARJANOVIĆ & PAVLOVIĆ (1970, Pl. 1, 2) as M2-M3 of “*Bunolophodon angustidens*” deserve a brief comment. The first of the two molars is highly reminiscent of a *P. danovi* M2 from Belomechetskaya figured by BORISSIAK (1929, Pl. 2, Fig. 3). Posttrite ornamentation and symmetric pretrite trefoil rule out affinities with *G. angustidens*, and indicate an amebelodontid. The other molar (both from the same individual, according to the authors) has a somewhat unusual morphology for M3: the two last of the four lophs are of almost equal height, and the tapering of the posterior end of the crown, typical for third molars, is slight. Apart from the posttrite ornamentation and the trefoil pattern, the specimen resembles more a second molar of a tetralophodont gomphothere. On the other hand, it is very similar to an M3 of *Platybelodon tongxinensis* from China figured by TOBIEN et al. (1986, Fig. 15, as “*Gomphotherium* sp. (“*Gomphotherium tongxinensis*”)”) in almost every detail apart from the small posterior talon present in the Chinese specimen. *P. tongxinensis* (Chen, 1978) is a synonym of *P. danovi* according to GUAN (1996). If the molars from Serbia belong to *Platybelodon*, Grivac – Slana Bara would be the westernmost known locality of the genus.

Platybelodon sp. has been reported from yet another East European locality, namely Hirova in Moldova, by LUNGU & OBADĂ (2001) who claim a Vallesian (MN9) age for a mandible with preserved third molars. Such a late age is astonishing, since no *Platybelodon* finds are known anywhere in Eurasia after MN7/8. However, determination of the Hirova specimen cannot be taken at face value in the absence of data on diagnostic characters such as shape of the lower tusks if preserved (or of the alveoli if not), dentine structure if observable, structure of the molars (e.g. presence or absence of posttrite ornamentation, shape of pretrite trefoil). Without this information, the presence of *Platybelodon* at Hirova, and in the Vallesian, remains to be confirmed.

There are two named species of *Protanancus*, *P. macinessi* from (mainly) the middle Miocene of East Africa, and *P. chinjiensis* from the middle Miocene and possibly Vallesian of Indo-Pakistan (see TASSY, 1983, 1986), but the range of the genus was probably wider. Apart from Yürükali material, cf. *Protanancus* sp. was reported from the middle Miocene Turkish localities Çandır in Central Anatolia (GERAADS & GÜLEÇ, 2003) and Mordoğan in Western Turkey (KAYA et al., 2003). The middle Miocene proboscidean assemblage at Tha Chang sandpits, Northeast Thailand, includes *Protanancus* (SAEGUSA et al., 2005); in addition, the genus might have occurred in China: a lower tusk with concentric dentine from Gansu published by TOBIEN et al. (1986, Fig. 24) as *Amebelodon* sp. is, according to the authors, “very similar, if not identical with the lower incisor from Yürükali”. Middle Miocene amebelodontid material published by GUAN (1988, 1996), or at least a part of it, might belong in *Protanancus* too. The M3 of *Serbelodon zhongningensis* figured by GUAN (1996, Pl. 13.4c) shows pseudo-anancoid contacts as well as the M2 figured by GUAN (1988, Pl. 2, Fig. 2); as far as can be judged from the photos (GUAN, 1988, Pl. 2, Fig. 2, and GUAN, 1996, Pl. 13.4a,b), this condition seems to be present also in the holotype, a palate with left and right M2-M3. North American *Serbelodon* (apart from referred Chinese material, the genus is not known in the Old World) lacks posttrite conules (TASSY, 1996c), a feature unique among amebelodontids. The presence of posttrite conules in the Chinese material casts doubts on its attribution to *Serbelodon*.

As can be seen, Western Turkey (and potentially the Eastern Balkans) was one of the areas where both genera occurred. Araplı and Yürükali in Western Turkey were used by TOBIEN et al. (1986) as an example of possible co-existence of *Platybelodon* and “*Amebelodon*” (i.e. *Protanancus*); thus any of these two genera, or both, could be present at the localities in and near Varna. Information on the unpublished mandible from Pochivka is simply insufficient to confirm the occurrence of *Platybelodon* sp. reported by NIKOLOV (1985), and characters observed in SU 230 do not rule out possible affinities with *Protanancus* as an alternative to the determination as *Platybelodon* cf. *danovi* by MARKOV (2004a, 2004b). Even so, the amebelodontids at Galata and Pochivka are certainly pre-Turolian, and might be regarded as an indication for middle Miocene fossiliferous layers in the area.

Deinotheriidae Bonaparte, 1841

Deinotherium giganteum Kaup, 1829

Material: P4 sin (SU 305) from Galata, Varna.

Description. The tooth (Fig. 3) is relatively well preserved, with the ectoloph somewhat damaged at the metacone (a small enamel fragment preserved on the tooth's posterior wall permits an adequate measurement of the length). Between the proto- and hypocone, there is an additional cusp blocking the interloph. Lingually from the first, the base of another, damaged additional cusp is preserved. Marked anterior cingulum. Length: 65; width: 71/67e. (NB: a dental fragment from Hrabarsko near Sofia at the SU collections has the same number, obviously by mistake).

Discussion. Here, *Deinotherium giganteum* is considered a species separate from *D. gigantissimum*, the giant Turolian deinothere of Europe and Southwest Asia. Known mainly from Vallesian localities, *D. giganteum* appears in Europe as early as the middle Miocene (MN6: ANTOINE et al., 1997; DURANTHON et al., 2007), apparently migrating from the east: large deinotheres (genus *Deinotherium*) are known from the early Miocene of Saudi Arabia (TASSY in THOMAS et al., 1982). Earlier views (e.g. HARRIS, 1975) on *D. giganteum* as a direct descendant of *Prodeinotherium bavaricum*, evolving *in situ*, should be rejected (MARKOV, 2004b). The size of SU 305, surpassing maximum values for *P. bavaricum* (see GRÄF, 1957) but significantly smaller than Turolian *D. gigantissimum*, falls within the variation range for *D. giganteum*, a species occurring from MN6 to MN10. The specimen from Galata is a rare trace of *D. giganteum*'s presence in Bulgaria: almost all the material from the country published in earlier literature as *D. giganteum* belongs to *D. gigantissimum* (MARKOV, 2004b). The only exception is a molar from Yarebichna near Varna, published by BAKALOV (1949, Pl. 2, Fig. 2) as a right M2 of “*Dinotherium giganteum* Kaup, race minor” (i.e. *P. bavaricum*), and referred to *D. giganteum* by BAKALOV & NIKOLOV (1962, Pl. 44, Fig. 2: although figured, the specimen is not discussed in the text). The molar which, judging from the figures is rather a left M3, couldn't be found at the SU collections and seems to be lost. Drawing in BAKALOV (1949) and photo in BAKALOV & NIKOLOV (1962) are reproduced on Fig. 4. Measurements provided by BAKALOV (1949) are 86/96/84.5 but this is clearly a mistake. Taken from the natural-sized drawing (BAKALOV, 1949, Pl. 2, Fig. 2), length of the tooth is 84 – close enough to the published value, but widths of the first and second loph are 84 and 74, correspondingly, i.e. the width of the first loph equals the length of the tooth. It seems that an extra centimeter was added by mistake to both widths, and measurements in BAKALOV (1949)



Fig. 3. SU 305, P4 sin of *Deinotherium giganteum*, Galata. Scale bar: 5 cm.

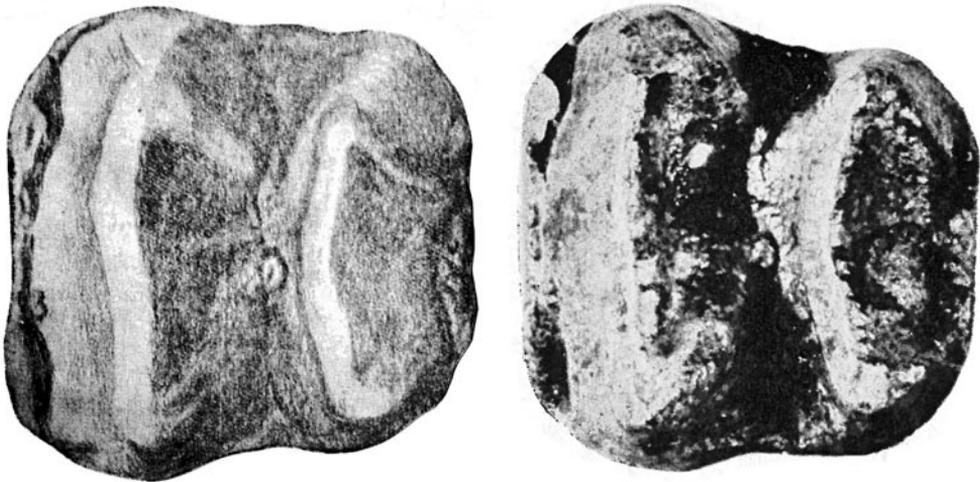


Fig. 4. *Deinotherium giganteum* molar from Yarebichna (now lost), as figured by BAKALOV (1949, Pl. 2, Fig. 2) (left) and BAKALOV & NIKOLOV (1962, Pl. 44, Fig. 2) (right).

should read 86/86/74.5 instead. A deinothere (“*D. bavaricum*”) listed from Pochivka, Varna, by NIKOLOV (1985) – together with the elephantoid mandible discussed above – might be indeed *P. bavaricum*, but also *D. giganteum*: earlier Bulgarian literature (e.g. BAKALOV, 1914; BAKALOV, 1949; BAKALOV & NIKOLOV, 1962) lumped together all deinotheres into *D. giganteum*, distinguishing between two “races”, small and large. Later, they were equated to *P. bavaricum* and *D. giganteum* correspondingly; however, as virtually all finds of “large

deinotheres” from Bulgaria belong to the Turolian species *D. gigantissimum*, anything smaller than them ended up as “race minor” and then “*D. bavaricum*”. An example is the *Deinotherium giganteum* molar from Yarebichna discussed above, listed as “*D. bavaricum*” by NIKOLOV (1985). Unfortunately, as with the elephantoid mandible, the present location of the deinotherere material from Pochivka is unknown, and its determination is impossible.

***Prodeinotherium bavaricum* (von Meyer, 1833)**

Material: M2 sin (cast, SU 193) from Aksakovo, Varna region.

Description. The cast (Fig. 5) represents a well preserved tooth with marked anterior and posterior cingula and a broad interloph. Dentine revealed on both lochs. Length: 72; width: 66/68. SU 193 was originally published by BAKALOV & NIKOLOV (1962, Pl. 43, Fig. 3), erroneously determined as m2 dext (I am grateful to Martin Pickford for pointing out this error).

Discussion. Prevailing opinion regards *Prodeinotherium bavaricum* as the only European prodeinotherere species, ranging from MN3b (Lesvos, Greece: KOUFOS et al., 2003) to MN9. GASPARIK (1993, 2001) considered the species *P. hungaricum* Éhik, 1930 valid, with *P. petenyii*, a species described by VÖRÖS (1989) from the early Miocene (MN4) of Hungary its junior synonym. I agree with GASPARIK (1993, 2001) that early Miocene European prodeinothereres do not belong in *P. bavaricum*, but the taxonomical designation is somewhat problematic. The type mandible of *P. petenyii* differs from Astaracian mandibles referred to *P. bavaricum* to an extent granting its separate specific status (pers. observations, HNHM 2005). In addition to its significantly smaller size (even considering the ontogenetic age of the individual), the mandible’s symphysis is only slightly curved downwards (this trait is visible despite some *post mortem* deformation), as could be expected in early deinothereres since their Paleogene ancestors must have had a straight, non-curved symphysis (MARKOV et al., 2001). The type mandible of *P. hungaricum* (pers. observations, NHM London, 2006: a cast; the original at HNHM Budapest was destroyed in 1956) is larger and more robust than the type of *P. petenyii*. Compared to the Hungarian finds, the type mandible of *P. cuvieri* (Kaup, 1832) (pers. observations, MNHN Paris, 2007) is more similar in its proportions to the type of *P. petenyii* – except for the apparently stronger curvature of the symphysis – rather than to the type of *P. hungaricum*. On the other hand, dental measurements in all three specimens are close enough to make conspecificity very likely (in that case, *P. cuvieri* would have priority)². The skeleton from Langenau near Ulm (Southern Germany, MN4), referred by GÖHLICH (1999, Fig. 13.3) to *P. cf. bavaricum*, seems to provide additional support for the separate specific status of early Miocene prodeinothereres: differences in the postcranial morphology of that specimen and the *P. bavaricum* skeleton from Unterzolling (Southern Germany, MN6) were noted by HUTTUNEN & GÖHLICH (2002)³. The two species apparently differ in cranio-mandibular morphology too, e.g. in the shape of the mandibular angle – well developed in

² Subsequently, the type species of *Prodeinotherium* would be *P. cuvieri* (*P. hungaricum* being a synonym for *P. cuvieri* and not *P. bavaricum*).

³ For dental measurements of prodeinothereres from Langenau and other German MN4 material, see SACH & HEIZMANN (2001).



Fig. 5. SU 193, M2 sin (cast) of *Prodeinotherium bavaricum*, Aksakovo. Scale bar: 5 cm.

P. bavaricum, weaker and more highly positioned in the Orleanian species⁴. Shape of mandibular angle is a useful differential character for the two European *Deinotherium* species (see MARKOV, 2008 for details), and a similarly different condition in the two *Prodeinotherium* species would not be surprising. Thus, the small early Miocene specimens from Europe (e.g. those from Lesvos and various European MN4 localities) should rather be assigned to a species different from *P. bavaricum*, as well as later Orleanian material: molars from Pontlevoiy (France, MN5) are comparable in size to the earlier specimens (pers. observations, MNHN Paris, 2002, 2007)⁵. In that case, the time span of *P. bavaricum* would be from MN6 to MN9.

The larger size of SU 193 sets it apart from early Miocene material, and corresponds to *P. bavaricum* s. str., suggesting an age of MN6 or later. Together with two molars from the area of Plevan (NW Bulgaria) and two more from Sovolyano near Kyustendil (SW Bulgaria), SU 193 is one of the few finds of *P. bavaricum* from the country⁶. The species was mistakenly reported

⁴ A potential falsifier of this observation is the skeleton from Franzensbad, described by HUTTUNEN (2004). Of supposed MN5 age, its mandible has a morphology corresponding to *P. bavaricum* and not the Orleanian species. However, although no dental measurements are provided, teeth dimensions of the Franzensbad prodeinothere closely match those of the MN6 Unterzolling specimen according to the author (HUTTUNEN, 2004, p. 347, Fig. 4). Thus, the Franzensbad skeleton most probably belongs in *P. bavaricum* s. str., and either this species appears in MN5, briefly co-existing with the earlier form (see also comment on Pontlevoiy below), or, very probably, the age of Franzensbad is later than MN5.

⁵ Part of the material from the Pontlevoiy area reaches the size of *P. bavaricum* s. str.; this might be taken either as evidence for an early appearance of that species in MN5, or – more likely – imply the presence of fossils of different age.

⁶ Two rather small, unpublished prodeinothere teeth from an unknown locality at the SU collections, SU 304 (P3d; L:53; W:48/50) and SU 309 (M2s; L:58; W:62/56), are comparable in their size to Orleanian material from Greece, Hungary, Germany, France and Spain, and might represent the only early Miocene faunal remains from Bulgaria – as well as a species new to the country's fossil fauna, *P. cuvieri*.

from Nessebar near Burgas (SE Bulgaria) by BAKALOW (1914), an error further repeated by BAKALOV & NIKOLOV (1962), KOJUMDGIEVA et al. (1984), NIKOLOV (1985), and later authors relying on Nikolov's 1985 catalogue – e.g. SPASSOV (2000, 2002), SPASSOV & KOUFOS (2002), KOUFOS (2006). In fact the Nessebar finds (two mandibles and a maxillary fragment) belong to juvenile *D. gigantissimum* individuals (MARKOV, 2004a, 2004b). Similarly, the “*P. bavaricum*” listed from Kalimantsi by NIKOLOV (1985), and subsequently by KOSTOPOULOS et al. (2001), is a deciduous tooth of *D. gigantissimum* (MARKOV, 2004b).

Stratigraphical and zoogeographical implications

Much of the information provided by NIKOLOV's (1985) summary of early 1980's knowledge on Tertiary large mammal localities in Bulgaria has been subsequently revised, especially regarding the Turolian localities (e.g. SPASSOV, 2000, 2002). The localities in and around Varna however have remained outside the scope of later revisions, no doubt due to the scarcity (and, alas, inaccessibility in several cases) of the material, consisting entirely of proboscideans. NIKOLOV's (1985) assumed ages for the localities discussed here are: Pochivka: “Miocene after mammals, Middle Karagian after mollusks”; Yarebichna: “probably Sarmatian” (according to E. Kojumdieva's foreword to Nikolov's catalogue, ‘Sarmatian’ in the text corresponds to MN9-10); Aksakovo: “Middle Miocene – Sarmatian after mammals”. For unknown reasons, Galata is absent from the catalogue, although the elephantoid molar was published and discussed earlier, if misidentified.

Data on the proboscideans from Galata are indeed scarce and ambiguous, but the amebelodontid seems to imply a middle Miocene age for the locality, regardless of its determination. *Platybelodon* cf. *danovi* would imply MN6; the Yürükali *Protanancus* is most probably of similar age as the Arapli *Platybelodon*. The premolar of *Deinotherium giganteum* could be middle Miocene (MN6) to Vallesian (MN10). The age of the unpublished ?*Platybelodon* mandible from Pochivka should be MN6 if the determination by NIKOLOV (1985) was correct (and could be MN4 to Vallesian if it was not), and the unpublished deinother material (“*D. bavaricum*” in NIKOLOV, 1985) could be anything from a small Orleanian prodeinother to late Vallesian *D. giganteum* (the ‘*bavaricum*’ designation meaning only that it was apparently smaller than the vast majority of deinother finds from Bulgaria belonging to *D. gigantissimum*). Similarly, the isolated finds from Yarebichna (*D. giganteum*, despite being listed as “*D. bavaricum*” by NIKOLOV, 1985) and Aksakovo (*P. bavaricum* s. str.) could be middle Miocene to Vallesian. Bearing in mind the rarity of pre-Turolian localities in Bulgaria however, such a sudden concentration of variously aged fossiliferous outcrops in the small area in and around Varna seems unlikely. Making a bold assumption, a middle Miocene (?MN6) age for the whole fossiliferous area around Varna seems plausible, neither the amebelodontids nor the deinotheres contradicting it. Another possible middle Miocene locality from the region could be Balchik (north of Varna): NIKOLOV (1985) listed “*D. bavaricum*” (unpublished), estimating the age as “Middle Miocene – Sarmatian after mammals, Upper Sarmatian (Hersonian) after mollusks and ostracods”. Conspicuously absent from Nikolov's catalogue is an elephantoid from the vicinities of Balchik referred by BAKALOW (1911, Pl. 3, Figs. 1, 2) to *Mastodon angustidens* (the same specimen is figured in a slightly different view by BAKALOV & NIKOLOV, 1962, Pl.

50, Fig. 3, as *Trilophodon angustidens*). As with the rest of the Bulgarian material referred in 20th century literature to *G. angustidens* (see MARKOV, 2007), the Balchik specimen is misidentified, its morphology fitting better with a choerolophodontid. The figures in BAKALOW (1911, Pl. 3, Figs. 1, 2) and BAKALOV & NIKOLOV (1962, Pl. 50, Fig. 3) show only a left m2 (SU 209, according to these authors; currently stored at SU under that number is a mammutid mandibular fragment with m3d from an unknown locality) but the original publication by BAKALOW (1911) describes a mandible which, according to the author, is “similar to the one found near Burgas”, referred by BAKALOW (1911, Pl. 1) to *Mastodon angustidens* but actually representing *Choerolophodon pentelici*. BAKALOW (1911, p. 12) provided some measurements of the Balchik mandible but did not figure it; the text describes a third molar removed from its alveolus by the author but provides no measurements or figure. On the other hand, the description by BAKALOV & NIKOLOV (1962, p. 101) claims that “the mandible was completely destroyed during the excavations”. The lack of any certain data on the morphology of the Balchik mandible (apart from Bakalov’s vague allusion to the *Ch. pentelici* mandible from Burgas) is especially frustrating: it would permit a positive determination of the Balchik elephantoid (and thus the age of the locality); besides, if the age of Balchik is indeed middle Miocene as claimed by NIKOLOV (1985), and the specimen is a choerolophodontid, this would be the third find in the world of the middle Miocene *Ch. chioticus* (see below), and only the second mandible. The figured m2, however, is insufficient for a certain determination, adding to the list of potentially very interesting but lost, unpublished, or unidentifiable proboscidean specimens from the area of Varna. Again, the scarce information on Balchik does not contradict an assumed middle Miocene age for the whole fossiliferous area around Varna and again this cannot be proved with the available material.

The Orleanian/Astaracian transition was evidently a time of major proboscidean dispersals into Europe. TASSY (1990) drew attention to the Astaracian arrival of *Choerolophodon* and *Platybelodon* in the eastern Mediterranean, the former with *Ch. chioticus*, described by TOBIEN (1980) from Chios (MN6) and probably present at Sofça, Turkey (GAZIRY, 1976; TASSY, 1990), and the latter with *P. cf. danovi*. It seems that more proboscidean taxa took part in this event: apart from *Protanancus* which might or might not have entered the Balkans (but certainly reached Western Turkey), *Tetralophodon* and *Deinotherium* appear in Europe in MN6 (ANTOINE et al., 1997), apparently migrating from the east; *Gomphotherium angustidens*, too, might be an Astaracian immigrant (see TASSY, 1990). The Astaracian migration of several proboscidean groups to Europe is reminiscent of a similar event in the beginning of the Turolian, when *Deinotherium gigantissimum*, “*Mammuth*” cf. *borsoni*, *Choerolophodon pentelici*, “*Mastodon*” *grandincisivus* and *Tetralophodon atticus* (the so-called “Pikermian proboscidean fauna”: MARKOV, 2004a, 2004b) migrated to Europe. Incidentally, there are similarities in the ranges reached by different groups in the Astaracian and the Turolian: *Choerolophodon chioticus* is not known west of Chios, and *Ch. pentelici* west of Greece and Macedonia; the migration of *Platybelodon cf. danovi* was limited to the Balkans (Araplı in European Turkey, and possibly the localities in Bulgaria and Serbia discussed above) and that of “*M.*” *grandincisivus* to Central Europe; *Deinotherium* and *Tetralophodon*, on the other hand, reached Western Europe both in the Astaracian and in the Turolian (*D. gigantissimum* and *T. atticus* are present in Turolian localities from Western Europe to Iran: MARKOV, 2008).

Summary and conclusions

A molar from Galata (Varna) belongs to an amebelodontid, which could be *Platybelodon* cf. *danovi* as claimed by MARKOV (2004a, 2004b), or, alternatively, *Protanancus* sp. A deinotherid premolar from Galata is attributed to *Deinotherium giganteum* and is one of the only two finds of this species in Bulgaria (the other, a molar from Yarebichna near Varna, seems to be lost). The reported occurrence of *Platybelodon* sp. at Pochivka (NIKOLOV, 1985), though quite likely, cannot be taken at face value. Another reported but unpublished find of unknown present location from Pochivka is a deinotherid which could be either *Deinotherium giganteum* or *Prodeinotherium bavaricum*. Middle Miocene age can be assumed as a working hypothesis for the area, and *D. giganteum* at Yarebichna and *P. bavaricum* at Aksakovo, two localities near Varna, while not necessarily contemporaneous, do not contradict this. Pre-Turolian localities are rare in Bulgaria, and middle Miocene vertebrate faunas are virtually unknown. The vicinities of Varna, yielding faunal remains of possibly middle Miocene and certainly pre-Turolian age, are an area of potential interest for future research.

Platybelodon cf. *danovi* is known on the Balkans from Araplı on the Marmara Sea coast. Two molars from Grivac – Slana Bara, Serbia, referred to *Gomphotherium angustidens* by previous authors, probably belong to *Platybelodon* cf. *danovi* and would represent the westernmost known occurrence of the species. The dispersal of *Platybelodon* to the Balkans in MN6 seems to be a part of a larger proboscidean migration, including *Protanancus* (not known west of the Turkish Aegean coast), *Choerolophodon* (with *Ch. chioticus* known only from Chios and Western Turkey), *Deinotherium* and *Tetralophodon*, the latter two genera reaching Western Europe. This Astaracian migration is reminiscent of a similar event in the Turolian, the arrival in Europe of the five species of the so-called “Pikermian proboscidean fauna”.

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References

- ALEXEEVA I. 1957. Sur la trouvaille de *Platybelodon grangeri* en Kirghizie. – *Vertebrata Palasiatica*, **1** (3): 215-222. (In Russian with French and Chinese summaries).
- ANTOINE P.-O., DURANTHON F., TASSY P. 1997. L'apport des grands mammifères (rhinocéros, suidé, proboscidiens) à la connaissance des gisements du miocène d'Aquitaine (France). – In: Aguilar J.-P., Legendre S., Michaux J. (eds.). *Actes du Congrès Biochrom'97. Mémoires et Travaux EPHE, Institut Montpellier*, **21**: 581-590.
- BAKALOV P. 1911. Beiträge zur Paläontologie Bulgariens. I. Mastodonreste aus Bulgarien. – *Annuaire de l'Université de Sofia*, **6**: 1-41. (In Bulgarian with German summary).
- BAKALOV P. 1914. Beiträge zur Paläontologie Bulgariens. II. Dinotheriumreste aus Bulgarien. – *Annuaire de l'Université de Sofia*, **8-9**: 1-29. (In Bulgarian with German summary).
- BAKALOV P. 1949. Einige neue Dinotheriumfunden in Bulgarien. – *Annuaire de l'Université de Sofia*, **46** (3): 99-106. (In Bulgarian with German summary).
- BAKALOV P., NIKOLOV I. 1962. Les Fossiles de Bulgarie. X. Mammifères Tertiaires. BAS, Sofia, 162 p. (In Bulgarian with French summary).
- BORISSIAK A. A. 1928. On a new mastodon from the Chokrak Beds (middle Miocene) of the Kuban region, *Platybelodon danovi* n. gen., n. sp. – *Annuaire de la Société paléontologique de la Russie*, **7**: 105-120. (In Russian with English summary).
- BORISSIAK A. 1929. On a new direction in the adaptive radiation of Mastodonts. – *Palaeobiologica*, Wien & Leipzig, **2**: 19-33.
- DURANTHON F., ANTOINE P. O., LAFFONT D., BILOTTE M. 2007. Contemporanéité de *Prodeinotherium* et *Deinotherium* (Mammalia, Proboscidea) à Castelnau-Magnoac (Hautes-Pyrénées, France). – *Revue de Paléobiologie*, **26** (2): 403-411.
- GASPARIK M. 1993. Deinotheres (Proboscidea, Mammalia) of Hungary. – *Annales historico-naturales Musei nationalis hungarici*, **85**: 3-17.
- GASPARIK M. 2001. Neogene proboscidean remains from Hungary; an overview. – *Fragmenta Palaeontologica Hungarica*, **19**: 61-77.
- GAZIRY A. W. 1976. Jungtertiäre Mastodonten aus Anatolien (Türkei). – *Geologisches Jahrbuch*, **22**: 3-143.
- GERAADS D., GÜLEÇ E. 2003. Proboscidea from the middle Miocene hominoid site of Çandır (Turkey). – In: Güleç E., Begun D., Geraads D. (eds.). *Geology and Vertebrate Paleontology of the Middle Miocene Hominoid Locality Çandır (Central Anatolia, Turkey)*. Courier Forschungsinstitut Senckenberg, **240**: 235-239.
- GÖHLICH U. 1999. Order Proboscidea. – In: Rössner G., Heissig K. (eds.). *The Miocene Land Mammals of Europe*. Verlag Dr. Friedrich Pfeil, München, 157-168.
- GRÄF I. 1957. Die Prinzipien der Artbestimmung bei *Dinotherium*. – *Palaeontographica*, Abt. A, **108**: 131-185.
- GUAN J. 1988. The Miocene Strata and Mammals from Tongxin, Ningxia and Guanghe, Gansu. – *Memoirs of Beijing Natural History Museum*, **42**: 1-21. (In Chinese with English abstract).
- GUAN J. 1996. On the shovel-tusked elephantoids from China. – In: Shoshani J., Tassy P. (eds.). *The Proboscidea. Evolution and Palaeoecology of Elephants and their Relatives*. Oxford University Press, Oxford, New York, Tokyo, 124-135.
- HARRIS J. M. 1975. Evolution of feeding mechanisms in the family Deinotheriidae (Mammalia: Proboscidea). – *Zoological Journal of the Linnean Society*, **56**: 331-362.

- HUTTUNEN K. 2004. On a *Prodeinotherium bavaricum* (Proboscidea, Mammalia) skeleton from Franzensbad, Czech Republic. – *Annalen des Naturhistorischen Museums in Wien*, **105 A**: 333-361.
- HUTTUNEN K., GÖHLICH U. 2002. A partial skeleton of *Prodeinotherium bavaricum* (Proboscidea, Mammalia) from the Middle Miocene of Unterzolling (Upper Freshwater Molasse, Germany). – *Geobios*, **35**: 489-514.
- KAYA T., GERAADSD., TUNA V. 2003. A new Middle Miocene mammalian fauna from Mordoğan (Western Turkey). – *Paläontologische Zeitschrift*, **77** (2): 293-302.
- KOJUMDGIEVA E. I., NIKOLOV I. M., MEIN P. 1984. Les associations des grands mammifères du miocène supérieur en Bulgarie et leur corrélation avec l'échelle régionale de la Paratethys. – *Comptes rendus de l'Académie bulgare des Sciences*, **37** (3): 341-343.
- KOSTOPOULOS D. S., SPASSOV N., KOVACHEV D. 2001. Contribution to the study of *Microstonyx*: evidence from Bulgaria and the SE European populations. – *Geodiversitas*, **23** (3): 411-437.
- KOUFOS G. D. 2006. Palaeoecology and chronology of the Vallesian (late Miocene) in the Eastern Mediterranean region. – *Palaeogeography, Palaeoclimatology, Palaeoecology*, **234**: 127-145.
- KOUFOS G. D., ZOUROS N., MOUROUZIDOU O. 2003. *Prodeinotherium bavaricum* (Proboscidea, Mammalia) from Lesvos island, Greece; the appearance of deinotheres in the eastern Mediterranean. – *Geobios*, **36** (3): 305-315.
- LUNGU A., OBADĂ T. 2001. New data on Early Vallesian fauna from Moldova. – *Analele Științifice ale Universității de Stat din Moldova, seria "Științe chimico-biologice"*: 51-55.
- MAGLIO V. J. 1969. A shovel-tusked gomphothere from the Miocene of Kenya. – *Breviora*, **310**: 1-10.
- MARKOV G. N. 2004a. The fossil proboscideans of Bulgaria and the importance of some Bulgarian finds – a brief review. – *Historia naturalis bulgarica*, **16**: 139-150.
- MARKOV G. N. 2004b. The Fossil Proboscideans of Bulgaria. – Unpubl. PhD Thesis, Sofia, 225 + 81 p. (In Bulgarian with English summary).
- MARKOV G. N. 2007. *Gomphotherium angustidens* (Mammalia: Proboscidea) in Bulgaria. – *Historia naturalis bulgarica*, **18**: 167-171.
- MARKOV G. N. 2008. The Turolian proboscideans (Mammalia) of Europe: preliminary observations. – *Historia naturalis bulgarica*, **19**: 153-178.
- MARKOV G. N., SPASSOV N., SIMEONOVSKI V. 2001. A reconstruction of the facial morphology and feeding behaviour of the deinotheres. – In: Cavaretta G., Gioia P., Mussi M., Palombo M. R. (eds.). *The World of Elephants. Proceedings of the 1st International Congress. Consiglio Nazionale delle Ricerche – Roma*, 652-655.
- MARKOVIĆ-MARJANOVIĆ J., PAVLOVIĆ M. 1970. Novo nalazište *Bunolophodon angustidens* Cuvier u Gružanskom basenu i značaj srodnih oblika za stratigrafiju neogena Srbije. – VII Kongres geologa Jugoslavije, 193-200.
- NIKOLOV I. 1985. Catalogue of the localities of Tertiary Mammals in Bulgaria. – *Paleontology, Stratigraphy and Lithology*, **21**: 43-62.
- PICKFORD M., GABUNIA L., MEIN P., MORALES J., AZANZA B. 2000. The middle Miocene mammalian site of Belometchetskaya, North Caucasus: An important biostratigraphic link between Europe and China. – *Geobios*, **33**: 257-267.
- SACH V. J., HEIZMANN E. P. J. 2001. Stratigraphie und Säugetierfaunen der Brackwassermolasse in der Umgebung von Ulm (Südwestdeutschland). – *Stuttgarter Beiträge zur Naturkunde, Serie B*, **310**: 1-95.

- SAEGUSA H., THASOD Y., RATANASTHIEN B. 2005. Notes on Asian stegodontids. – *Quaternary International*, **126-128**: 31-48.
- SPASSOV N. 2000. The Turolian *Hipparion* – fauna and the character of the environment in the Late Miocene of West Bulgaria. – *Review of the Bulgarian Geological Society*, **61** (1-3): 47-59.
- SPASSOV N. 2002. The Turolian Megafauna of West Bulgaria and the character of the Late Miocene “Pikermian biome”. – *Bollettino della Società Paleontologica Italiana*, **41** (1): 69-81.
- SPASSOV N., KOUFOS G. D. 2002. The first appearance of *Dinocrocota gigantea* and *Machairodus aphanistus* (Mammalia, Carnivora) in the Miocene of Bulgaria. – *Mitteilungen der Bayerischen Staatssammlung für Paläontologie und historische Geologie*, **42**: 83-101.
- TASSY P. 1983. Les Elephantoidea miocènes du plateau du Potwar, groupe de Siwalik, Pakistan. – *Annales de Paléontologie (Vert.- Invert.)*, **69** (2): 99-136; (3): 235-297; (4): 317-354.
- TASSY P. 1984. Le mastodonte à dents étroites, le grade trilophodonte et la radiation initiale des Amebelodontidae. – In: Buffetaut E., Mazin J.-M., Salmon E. (eds.). *Actes du Symposium paléontologique Georges Cuvier, Montbéliard*, 459-473.
- TASSY P. 1985. La place des mastodontes miocènes de l’ancien monde dans la phylogénie des Proboscidea (Mammalia): hypothèses et conjectures. – Unpublished Thèse Doctorat ès Sciences, UPMC, Paris, 85-34, Volumes I-III.
- TASSY P. 1986. Nouveaux Elephantoidea (Mammalia) dans le miocène du Kenya: essai de réévaluation systématique. – *Cahiers de Paléontologie. Éditions du Centre National de la Recherche Scientifique (CNRS), Paris*, 135 p.
- TASSY P. 1990. The “proboscidean datum event”: how many proboscideans and how many events? In: – Lindsay E. H., Fahlbusch V., Mein P. (eds.). *European Neogene Mammal Chronology*. Plenum Press, New York, 237-252.
- TASSY P. 1996a. Dental homologies and nomenclature in Proboscidea. – In: Shoshani J., Tassy P. (eds.). *The Proboscidea. Evolution and Palaeoecology of Elephants and their Relatives*. Oxford University Press, Oxford, New York, Tokyo, 21-25.
- TASSY P. 1996b. Growth and sexual dimorphism among Miocene elephantoids: the example of *Gomphotherium angustidens*. – In: Shoshani J., Tassy P. (eds.). *The Proboscidea. Evolution and Palaeoecology of Elephants and their Relatives*. Oxford University Press, Oxford, New York, Tokyo, 92-100.
- TASSY P. 1996c. Who is who among the Proboscidea? – In: Shoshani J., Tassy P. (eds.). *The Proboscidea. Evolution and Palaeoecology of Elephants and their Relatives*, Oxford University Press, Oxford, New York, Tokyo, 39-48.
- THOMAS H., SEN S., KHAN M., BATTAIL B., LIGABUE G. 1982. The Lower Miocene Fauna of Al-Sarrar (Eastern province, Saudi Arabia). – “*ATLAL*” *The Journal of Saudi Arabian Archaeology*, **5** (3): 109-136.
- TOBIEN H. 1973. On the Evolution of Mastodonts (Proboscidea, Mammalia). Part 1: The bunodont trilophodont Groups. – *Notizblatt des Hessischen Landesamtes für Bodenforschung zu Wiesbaden*, **101**: 202-276.
- TOBIEN H. 1980. A note on the skull and mandible of a choerolophodont mastodont (Proboscidea, Mammalia) from the Middle Miocene of Chios (Aegean Sea, Greece). – In: Jacobs L. L. (ed.). *Aspects of Vertebrate History. Essays in Honor of E. H. Colbert*. Museum of Northern Arizona Press, Flagstaff, 299-307.

- TOBIEN H., CHEN G., LI Y. 1986. Mastodonts (Proboscidea, Mammalia) from the Late Neogene and Early Pleistocene of the People's Republic of China. Part 1: Historical Account; the Genera *Gomphotherium*, *Choerolophodon*, *Synconolophus*, *Amebelodon*, *Platybelodon*, *Sinomastodon*. – Mainzer geowissenschaftliche Mitteilungen, **15**: 119-181.
- VÖRÖSI. 1989. *Prodeinotherium petenyii* sp. n. from the Lower Miocene at Putnok (North Hungary). – Fragmenta Mineralogica et Palaeontologica, **14**: 101-110.
- WANG B.-Y., QIU Z.-X. 2002. A new species of *Platybelodon* (Gomphotheriidae, Proboscidea, Mammalia) from early Miocene of the Danghe area, Gansu, China. – Vertebrata Palasiatica, **40** (4): 291-299. (In Chinese with English summary).
- WANG B.-Y., QIU Z.-X., WANG X., XIE G.-P., XIE J.-Y., DOWNS W., QIU Z.-D., DENG T. 2003. Cenozoic stratigraphy in Danghe Region (Gansu Province) and uplift of Tibetan Plateau. – Vertebrata Palasiatica, **41** (1): 66-75. (In Chinese with English summary)
- WANG X.-M., WANG B.-Y., QIU Z.-X., XIE G.-P., XIE J.-Y., DOWNS W., QIU Z.-D., DENG T. 2003. Danghe area (western Gansu, China) biostratigraphy and implications for depositional history and tectonics of northern Tibetan Plateau. – Earth and Planetary Science Letters, **208**: 253-269.

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Author's address:

Georgi N. Markov, National Museum of Natural History – BAS, Tsar Osvoboditel Blvd. 1, 1000 Sofia, Bulgaria, e-mail: markov@nmnh.bas.bg

Фосилните хоботни от района на Варна: рядка индикация за средномiocенска гръбначна фауна в България

Георги Н. МАРКОВ

(Резюме)

Статията разглежда фосилните хоботни от района на Варна, по-специално две находки от Галата: молар на елефантоид, погрешно отнесен към *Tetralophodon longirostris* от предишни автори, но всъщност представляващ амелелодонтид, и един премолар на редкия за България вид *Deinotherium giganteum*. Разгледани в контекста на други находки от Варненско, материалите от Галата са индикация за възможни средномiocенски разкрития в района. Подобна индикация е от значителен интерес, тъй като средномiocенската гръбначна фауна на България е практически непозната. Изложена е хипотеза за миграция на няколко групи хоботни от Предна Азия към Европа през средния миоцен – събитие, наподобяващо раселването на шикермийската хоботна фауна в началото на турола.