

Fossil Proboscideans (Mammalia) from the Collections of the Varna Regional Museum of History

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Abstract: The paper describes the fossil proboscideans stored in the Varna Regional Museum of History – Department of Natural History in Varna, Northeast Bulgaria. Small but important, the collection contains remains of proboscidean taxa ranging from the middle Miocene to the Pleistocene.

Key words: Proboscidea, Deinotheriidae, Elephantoidea, Bulgaria

Introduction

The natural history museum in Varna (Varna Regional Museum of History – Department of Natural History) has a collection of fossil mammals, mostly proboscideans. The specimens described below are accidental finds, and not the result of systematic excavations. Thus, often localities and stratigraphy of the finds are unknown, and their age can be estimated only in broadest terms. Even so, the collection of the museum in Varna is important, storing specimens that contribute to the knowledge of fossil proboscideans not only in Bulgaria but in general. Materials of unknown localities are most probably from the Varna Province and almost certainly from northeast Bulgaria; for a map of the known localities see Fig. 1.

Institutional abbreviations:

VRMH: Varna Regional Museum of History – Department of Natural History.

NHMW: Naturhistorisches Museum Wien, Vienna.

Material and methods:

Material: All fossils are stored in the collections of VRMH.

Methods: Dental nomenclature for non-elephantid teeth follows TASSY (1996); measurements of elephantid teeth after LISTER (1996). All measurements are in mm. Abbreviations used: L: length; W: width; H: height; ET: enamel thickness; LF: lamellar frequency. Estimated values marked “e”; “>”: exceeds provided value (e.g. height of worn specimens). Plate formulae for elephantid teeth: missing parts designated with “-”; x: talon(id)s.

Systematic palaeontology

Deinotheriidae BONAPARTE, 1841

Prodeinotherium ÉHIK, 1930

Prodeinotherium bavaricum (VON MEYER, 1831)

The species is represented in the collection by the following finds:

VRMH 165, left m2 from the vicinities of Varna, precise locality unknown (Fig. 2). L: 72; W: 59/56. The molar, built of two lophids and a well developed posterior cingulum, is relatively well preserved, with the first lophid damaged on the lingual side. A small fragment of enamel preserved near the base of the lophid permits measuring its width with some precision. The tooth is of elongated, rectan-

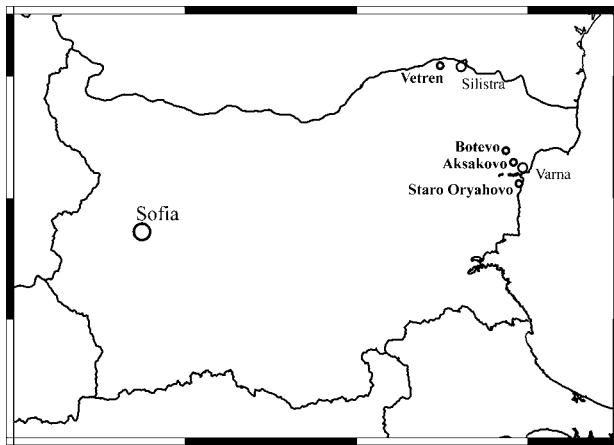


Fig. 1. Map of the localities.

gular shape, dentine is beginning to wear on both lophids. Both roots are broken near the base. Size of the tooth is near the upper limits but within the range of variation for *P. bavaricum* (GRÄF 1957, HUTTUNEN, GÖHLICH 2002). Thus, it can be attributed to *P. bavaricum* s. str. (excluding Orleanian *P. curvieri*: see MARKOV, 2008; VERGIEV, MARKOV, 2010).

VRMH 225, left m1 from Vetren near Silistra (Fig. 3). L: 74; W: 48/49/47. On the buccal as well as the lingual side of the tooth, enamel is damaged. On the occlusal side of the tooth, dentine is exposed on all three lophids (only on the pretrite side for the third). Again, dimensions of the tooth are close to the upper limits of the variation range for *P. bavaricum* but well below those provided by GRÄF (1957) for *D. giganteum*.

VRMH 378, right P4 from Vetren (Fig. 4). L: 54; W: 54/57. Relatively well preserved, the tooth has suffered some damage on the mesial side. Dentine is exposed on both lophids. The specimen is more or less quadrangular, with a weak ectoflexus. Its size and shape (DURANTHON *et al.* 2007) fit with identification as *P. bavaricum*.

P. bavaricum has rarely been found in Bulgaria (MARKOV 2008), and the specimens in the VRMH collection described here nearly double the number of finds attributable to that species.

Deinotherium KAUP, 1829

Deinotherium giganteum KAUP, 1829

VRMH 164 and 166, left and right halves of a mandible with the left p3-m3 and the right m2-m3 from Aksakovo (Fig. 5). Dental measurements are provided in Table 1; for a full description and discussion see VERGIEV, MARKOV (2010).

VRMH 224, left D3 from Vetren (Fig. 6). L: 46;

W: 42.0/42.3. The tooth is in a very good condition, with the entire crown and part of the posterior root preserved. It is bilophodont, with the proto- and metaloph clearly separated. Postparacrista and postmetacrista are well developed. The tooth is at an initial stage of wear, with dentine very moderately exposed on both lophids. Metrically, the specimen is very close to the D3s from the Austrian localities Mannersdorf am Leithagebirge and Hollabrunn referred to *D. giganteum* by HUTTUNEN (2002: p. 270). Its size slightly surpasses that of the Mannersdorf D3 (the collection number of which was inaccurately quoted by Huttunen as 1883/LXXXII/9: it is 1883, a, L, XXXII, 9 in PIA, SICKENBERG, 1934; its current new collection number is NHMW 2012/0102/0001: U. Göhlich, pers. comm. to GM 2012) but is well below values for *D. gigantissimum* (GAREVSKI, MARKOV 2011).

Another rather rare species for the fossil fauna of Bulgaria, *D. giganteum* was known until recently only by two isolated teeth from Yarebichna (specimen lost) and Galata near Varna (MARKOV, 2008; VERGIEV, MARKOV, 2010), the finds from Aksakovo and Vetren being the third and fourth. Interestingly, both come from localities also yielding *P. bavaricum*. Co-occurrence of the two deinotheriid taxa is quite possible (see e.g. DURANTHON *et al.*, 2007) but cannot be proved for these two localities: the *P. bavaricum* and *D. giganteum* finds from Aksakovo are not associated in any way (VERGIEV, MARKOV, 2010), and those from Vetren were apparently found in the Danube and thus could possibly come from layers of different age.

Amebelodontidae BARBOUR, 1927

? *Protanancus* ARAMBOURG, 1945

cf. *Protanancus* sp.

VRMH 158-160, left M2, left and right M3 belonging to the same individual, Vetren (Fig. 7).

Described and discussed in detail by MARKOV, VERGIEV (2010), these three teeth represent the first find from Europe attributable to the amebelodontid genus *Protanancus*, previously known only from Africa and Asia. The Vetren specimens differ from both named species of the genus, *P. macinnesi* and *P. chinjiensis*, and seem to be related to material from the middle Miocene Turkish localities Yürükali, Çandır and Mordoğan. The find adds a new taxon to the fossil fauna of Europe and Bulgaria. Unlike all the other material from Vetren described here,



Fig. 2. *Prodeinotherium bavaricum*, left m2 (VRMH 165) in occlusal view. Vicinities of Varna, precise locality unknown. Scale bar: 5 cm.



Fig. 4. *Prodeinotherium bavaricum*, right P4 (VRMH 378) in occlusal view. Danube near Vetren. Scale bar: 5 cm.



Fig. 3. *Prodeinotherium bavaricum*, left m1 (VRMH 225) in occlusal view. From the Danube near Vetren. Scale bar: 5 cm.

VRMH 158-160 were found on dry land near the village and not the river bed, indicating the presence of middle Miocene fossiliferous deposits near Vetren.

Gomphotheriidae HAY, 1922

? *Gomphotherium* BURMEISTER, 1837

cf. *Gomphotherium angustidens* (CUVIER, 1817)

VRMH 357, left m3 in a mandibular fragment, Vetren (Fig. 8). L: 141.5; W: 55.5/60/59/51.5e/35.5e; H>>34; ET: 4-5. The tooth has five lophids and a very weak posterior cingulum. The fifth lophid is underdeveloped and weak on the posttrite side. Dentine is exposed on the first three lophids. Anterior pretrite conules are present on the first three lophids, becoming progressively weaker from the first to the third. Posterior pretrite conules are well developed, blocking the interlophids. No posttrite ornamentation, main cones and mesoconelets on the first three posttrite semilophids display a mesio-distal compression. Traces of cement are visible in the interlophids. The crown has suffered some damage on the first lophid (on the posttrite side) and the last two lophids (buccally).

Small size and underdeveloped fifth lophid of the tooth make affinities to *Tetralophodon* unlikely. Size and asymmetrical pretrite trefoil set VRMH 357 apart from the amebelodontid *Archaeobelodon filholi* and the gomphotherid *Gomphotherium steinheimense* (TASSY 1985). In its dimensions and morphology, the specimen is closest to *Gomphotherium angustidens* (TASSY 1985 and GÖHLICH 2010), and if found at a locality in Western Europe could have been more or less safely allocated to the latter species (or a closely related member of the *G. 'angustidens* group' sensu TASSY, 1985). The uncertainty in this case is due to TASSY's (1985) observation that some molars of the amebelodontid *Platybelodon danovi* BORISSIAK, 1928 could be indistinguishable from those of *G. angustidens*. In the absence of a lower tusk associated with the mandible fragment, this possibility cannot be ruled out entirely for the Vetren specimen.

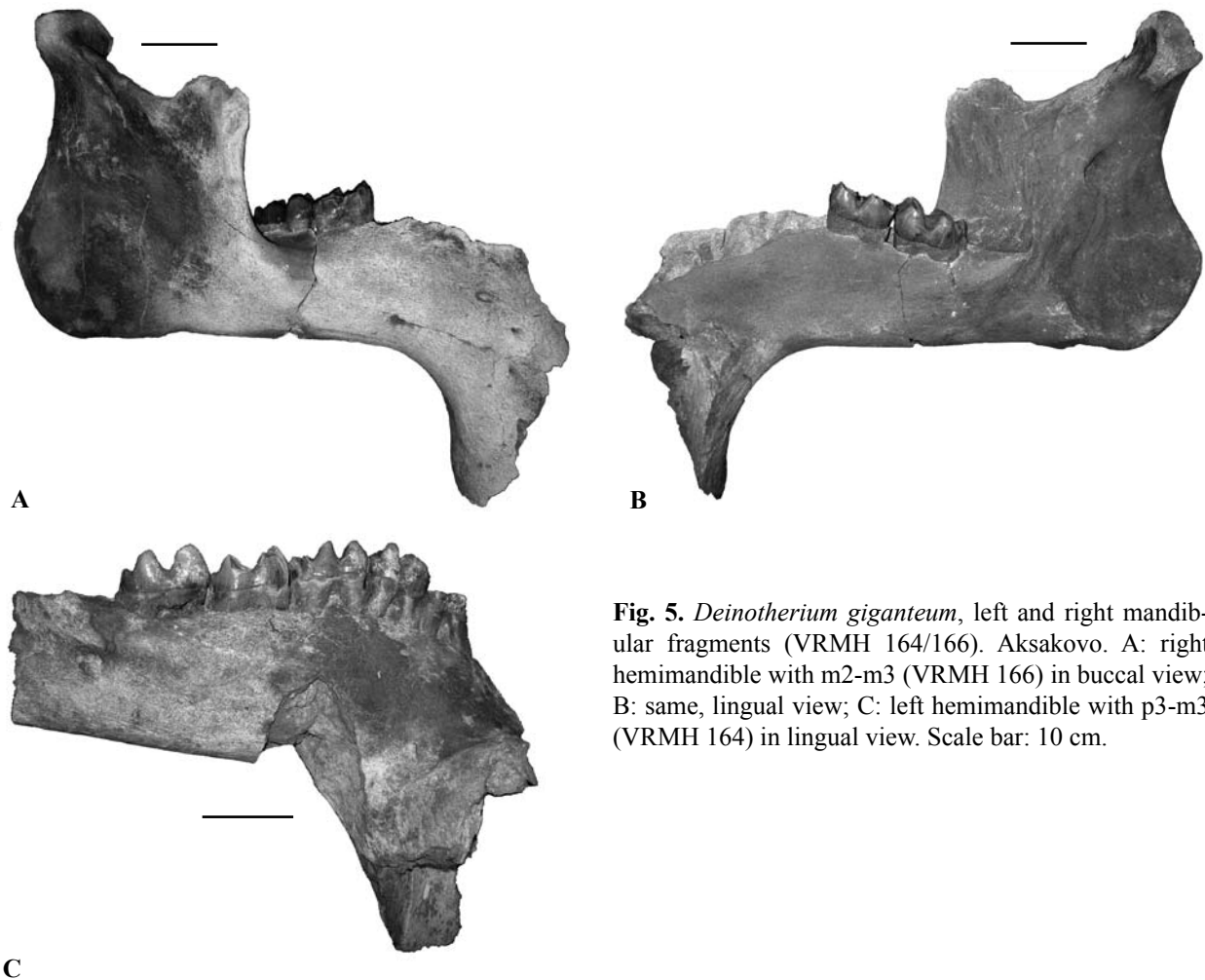


Fig. 5. *Deinotherium giganteum*, left and right mandibular fragments (VRMH 164/166). Aksakovo. A: right hemimandible with m2-m3 (VRMH 166) in buccal view; B: same, lingual view; C: left hemimandible with p3-m3 (VRMH 164) in lingual view. Scale bar: 10 cm.

G. angustidens was hitherto represented in the fossil fauna of Bulgaria by a single find, if at all: MARKOV (2007a) described an isolated m2, presumably from Seltsi (South Bulgaria) and tentatively referred it to *G. angustidens*, expressing doubts on data about the specimen's locality (since the area around Seltsi and Ahmatovo has yielded only Turolian fauna so far). *Platybelodon*, on the other hand, was listed from Pochivka near Varna in a check-list by NIKOLOV (1985; see also discussion by MARKOV 2008). The Pochivka find, a mandible thought to be lost by MARKOV (2008) is actually in a private collection; a cast of the left m3 is curated at the Naturhistorisches Museum, Mainz (M. Pickford, pers. comm. to GM 2009) – apparently presented by I. Nikolov to H. Tobien. The Vetren specimen is more similar in its morphology to *G. angustidens* than to the Pochivka molars (or the m3 from Galata near Varna tentatively referred to *P. cf. danovi* by MARKOV, 2008) but, as said, its attribution to that species cannot be certain.

Tetralophodon FALCONER, 1857

Tetralophodon cf. *T. longirostris* (KAUP, 1832)

VRMH 169, fragment of a left m3 (first three lophids), locality unknown (Fig. 9). Length of the fragment: 144; W: 87/94.5/94; H: >61 (on 3rd posttrite); ET: 5.5 – 7. The morphology of the tooth fits better with *Tetralophodon longirostris* rather than the Turolian species *T. atticus* (see discussion by MARKOV, VERGIEV, 2012). While *T. atticus* is present in several Bulgarian localities, previous reports of *T. longirostris* from the country are based on misidentified material (MARKOV, 2004, 2008). Thus, VRMH 169 is the first (and so far the only) find from Bulgaria that might indeed represent *T. longirostris*, a species erroneously reported for Bulgaria by previous authors.

Elephantoidea indet.

VRMH 379, incomplete left ?m3, Staro Oryahovo near Varna (Fig. 10). Length of the fragment: 109.5; W: 65/66/63/41; H: 54 (on the penultimate pretrite); ET: 6. Four ridges (the first only

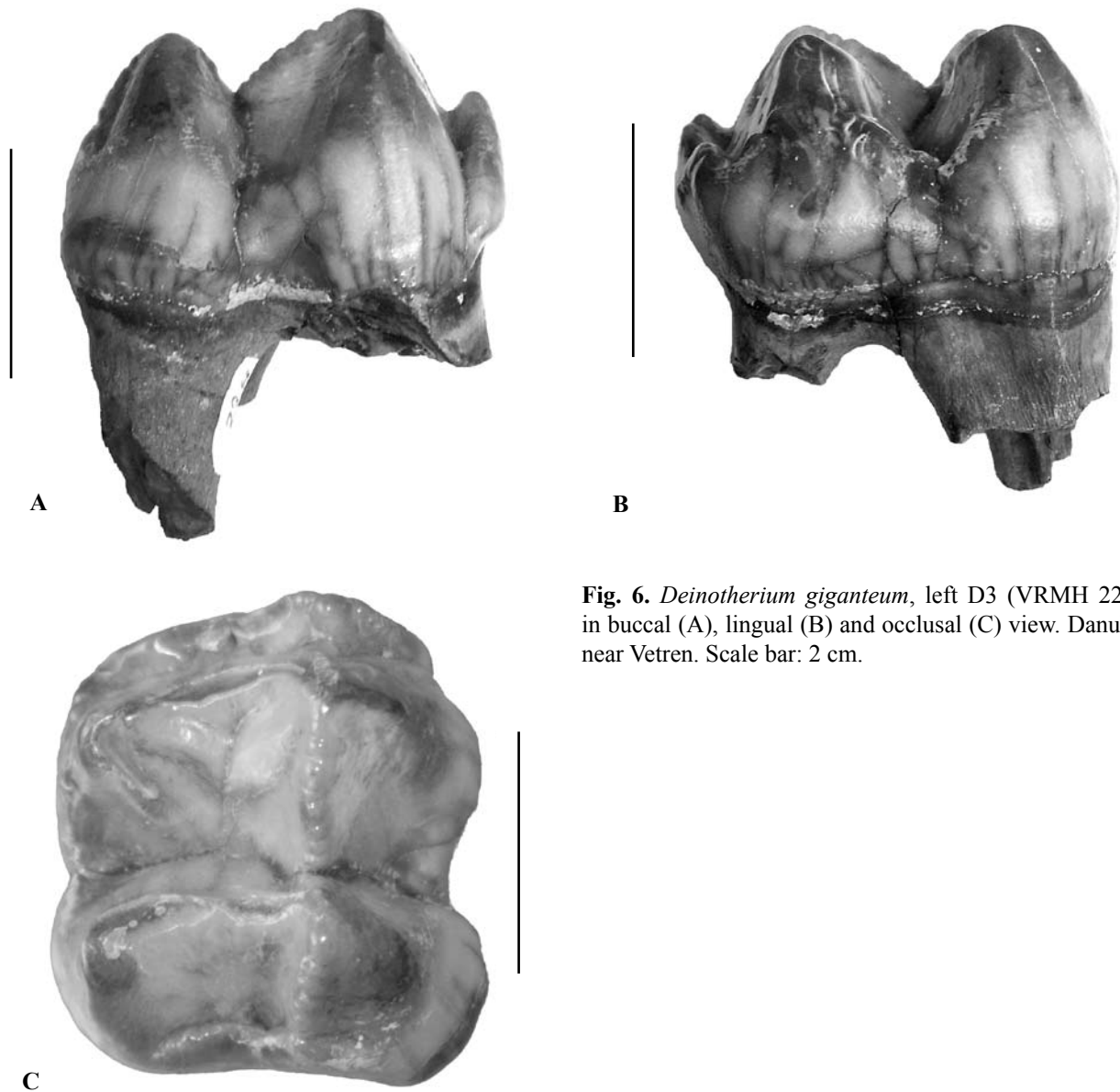


Fig. 6. *Deinotherium giganteum*, left D3 (VRMH 224) in buccal (A), lingual (B) and occlusal (C) view. Danube near Vetren. Scale bar: 2 cm.

partially) and a posterior cingulum are preserved. The narrow elongated shape of the tooth seems to indicate a lower third molar, although a similar shape is observable in some upper molars of *Protanancus macinnesi* (TASSY 1986: Pl. 6, Fig. 1; Pl. 8, Figs. 1, 2). Unfortunately, neither the roots nor the anterior part of the tooth are preserved. Main pretrite and posttrite cones are practically in line on the first three ridges, and only the slight curve of the cervical line (dorsally concave) provides some additional support in identifying the molar as a lower one. On the second preserved lophid, the pretrite trefoil is more or less symmetrical. Mesoconelet and doubled anterior pretrite conule are in line, interlophids are blocked on the pretrite side by contacts involving the anterior

pretrite and the posterior pretrite conules, there is no posttrite ornamentation. Pretrite mesoconelets are displaced and positioned mesially to the main cones, fused with the anterior pretrite conules. Posttrite mesoconelets are doubled on the anterior lophids. Traces of cement are visible in the interlophids.

Presence of pretrite trefoil makes allocation to *Choerolophodon* unlikely, and absence of pronounced pseudo-anancoidy or posttrite ornamentation does not permit a safe allocation to the amebelodontid genus *Protanancus*. It is worth noting, though, that the cf. *Protanancus* sp. recently reported from Bulgaria by MARKOV, VERGIEV (2010) displays some primitive characters, and that the morphology of the lower molars in that species is not known.

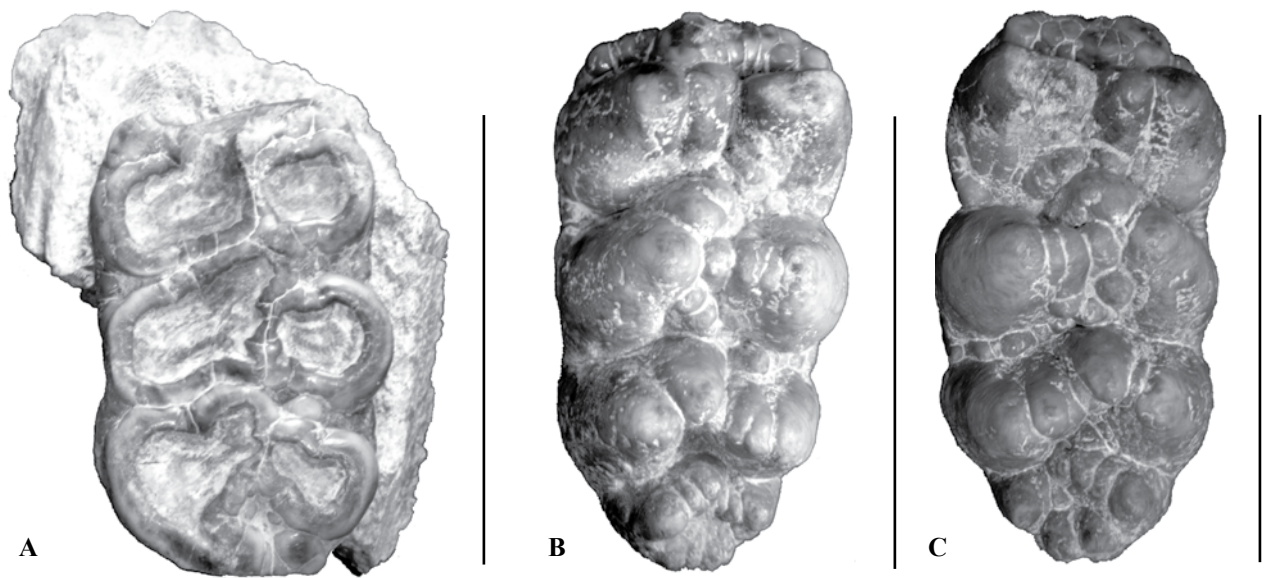


Fig. 7. cf. *Protanancus* sp., left M2 (A), left M3 (B) and right M3 (C) of one individual (VRMH 158-160) in occlusal view. Vetren. Scale bar: 10 cm.

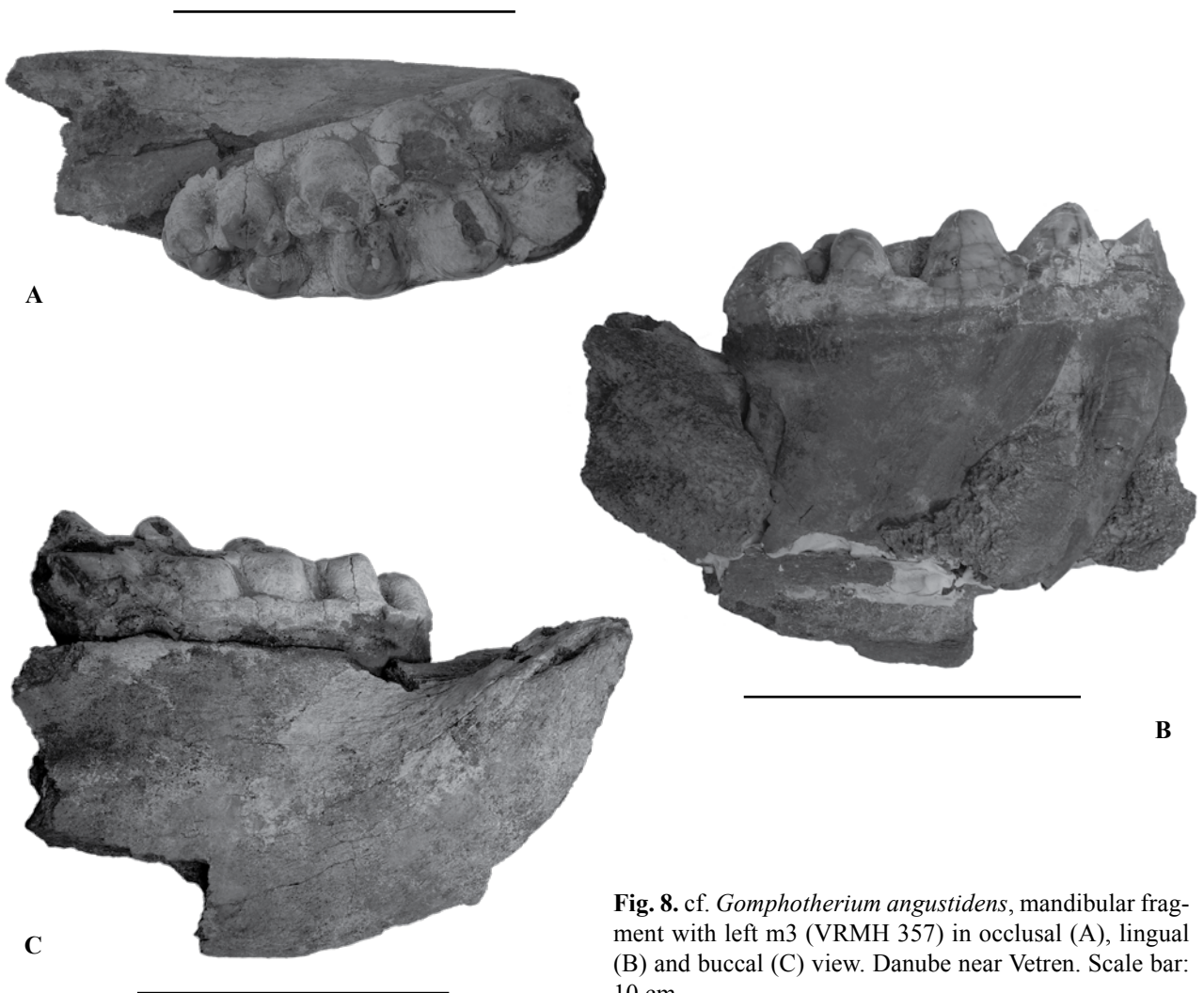


Fig. 8. cf. *Gomphotherium angustidens*, mandibular fragment with left m3 (VRMH 357) in occlusal (A), lingual (B) and buccal (C) view. Danube near Vetren. Scale bar: 10 cm.



Fig. 9. *Tetralophodon* cf. *longirostris*, fragment of a left m3 (VRMH 169) in occlusal view. Unknown locality. Scale bar: 5 cm.



Fig. 10. *Elephantoidea* indet., incomplete left ?m3 (VRMH 379) in occlusal view. Staro Oryahovo. Scale bar: 10 cm.

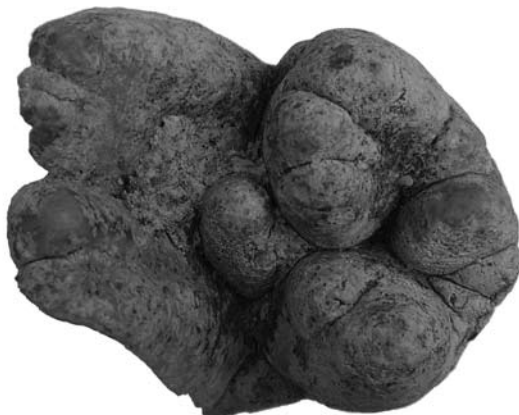


Fig. 11. *Elephantoidea* indet., molar fragment (VRMH 360) in occlusal view. Staro Oryahovo. Scale bar: 5 cm.

VRMH 360, posterior molar fragment, Staro Oryahovo. (Fig. 11) Lfr: 64.4; W: 61/53; H: 56; ET: 4. The fragment consists of the last two ridges (the anterior is preserved only partially) and the posterior cingulum. There are slight traces of wear on the first preserved ridge, the rest of the fragment is un-

worn. The interlophid space is blocked by a large cusp situated on the longitudinal axis of the tooth (apparently built by the fusion of the anterior pretrite and posttrite conules) which creates a cross-contact between the lophs not unlike that observed in VRMH 158, the cf. *Protanancus* sp. left M2 from Vetren (Fig. 7). A similarly sized cusp is positioned behind the last ridge, on the posterior cingulum; it is significantly larger than the cingulum's remaining three cusps.

Staro Oryahovo is a new addition to the list of Bulgarian fossiliferous localities and the two fragmentary elephantoid molars found there, while not positively identifiable, seem to indicate a pre-Turolian, possibly middle Miocene, age.

Elephantidae GRAY, 1821

Mammuthus BROOKES, 1828

Mammuthus spp.

The elephantid teeth at the VRMH collection are isolated finds of unknown stratigraphy and age. None of the finds preserves the full plate number, permitting no definite identification at the species level. Nevertheless, even the fragmentary remains display characters that are too derived for *Mammuthus meridionalis* (NESTI, 1825), thus limiting the possibilities to the two species *Mammuthus trogontherii* (POHLIG, 1885) and *Mammuthus primigenius* (BLUMENBACH, 1799).

VRMH 168 (Fig. 12) is a left m1 found near Vetren by Silistra. According to an inscription on the specimen, it was found in the Danube (unlike VRMH 158-160, the middle Miocene amebelodontid described above). The tooth has -12x plates, with probably only the anterior talonid abraded, i.e. the full plate number was possibly x12x. Occlusion on the entire crown except the last plate. L: 148; W: 60; H: >80; ET: 2.0-2.5; LF: 8.5. The plate number is above the values observed in *M. meridionalis* and corresponds to *M. trogontherii* (if 12) or to *M. primigenius* (12 or more: MAGLIO 1973). Length of the tooth is slightly above values provided for *M. primigenius* by MAGLIO (1973) and lamellar frequency is slightly above values for *M. trogontherii*, so a precise identification at the species level is not possible. Two upper molars from Vetren published by BAKALOV, NIKOLOV (1964, Pl. 19) as *M. primigenius* were referred to *M. trogontherii* by MARKOV (2004) but this does not necessary influence the identification of VRMH 168: it is possible that fossils of

different age (and, potentially, species) have been collected from the Danube near Vetren – as, for example, at Ryahovo (MARKOV 2004, 2007b).

Three more finds from Vetren were recently added to the VRMH collection (Fig. 13):

VRMH 230, partially preserved left m3, -10x plates. Lfr: 148; W: >76; H: 121; ET: 1.5; LF: ca. 8.

VRMH 231, partially preserved right m3, -14-(-13x?) plates. Lfr: 182; W: 81; H: 119.5; ET: 1.5 – 2.0; LF: 8.

VRMH 232, a deformed partially preserved molar with -12x plates. Lfr: 157; H: >191 (on the second preserved plate); W: 85; LF: ca. 7; ET: 1.5.

VRMH 230 and 231 have a lamellar frequency higher than the values provided for *M. trogontherii* by MAGLIO (1973) but this alone is not a good enough reason to allocate the specimens to *M. primigenius*, especially since these are lower teeth (on which see ALBAYRAK, LISTER, 2012).

VRMH 171 (Fig. 14) is a partially preserved (-19-) M3 from Botevo. L: 220; W: 103; H: >185; ET: 2.5; LF: 7.5. With the full plate number unknown, all other parameters except the enamel thickness are within the observed ranges for both *M. trogontherii* and *M. primigenius* according to MAGLIO (1973); the ET (2.5 mm) is slightly above the upper value provided by that author for *M. primigenius* but this is insufficient for a safe allocation to *M. trogontherii*. In any case, the find adds Botevo to the list of Bulgarian localities of fossil proboscideans and permits a broad estimation of its age as middle to late Pleistocene.

VRMH 167 (Fig. 15) is a right M3 with the anterior end missing (-17x). Locality unknown. Length of the preserved part: 217.5; W: 85.5; H: > 138; ET: 2; LF: 8.75. Narrowing posterior part of the crown, parallel posterior plates and torsion of the crown indicate a right upper third molar. Enamel irregularly wrinkled, dentine exposed on all plates except the last two and the posterior talon. With full plate number and age unknown, precise determination is impossible. LF surpasses values for *M. trogontherii* provided by MAGLIO (1973), this character, however, is not entirely reliable (see LISTER, JOYSEY, 1992). ET of 2 mm is the maximum value for *M. primigenius* and within the range for *M. trogontherii* (MAGLIO, 1973). Thus, VRMH 167 can be determined as *Mammuthus* sp.: probably *M. primigenius* but an alternative identification as *M. trogontherii* cannot be entirely ruled out.

VRMH 162 and 163 (Fig. 16) are two fragments of a left (162) and right (163) third upper molars. Localities unknown. Possibly found together, although there is no indication to support this. Both finds have apparently been found in a river, possibly the Danube. VRMH 162 has 12 preserved plates with the anterior as well as the posterior end missing. Length of the preserved part is 166; W: 94; H: >217; LF: 7.75; ET: 2. Height of the crown is close to the

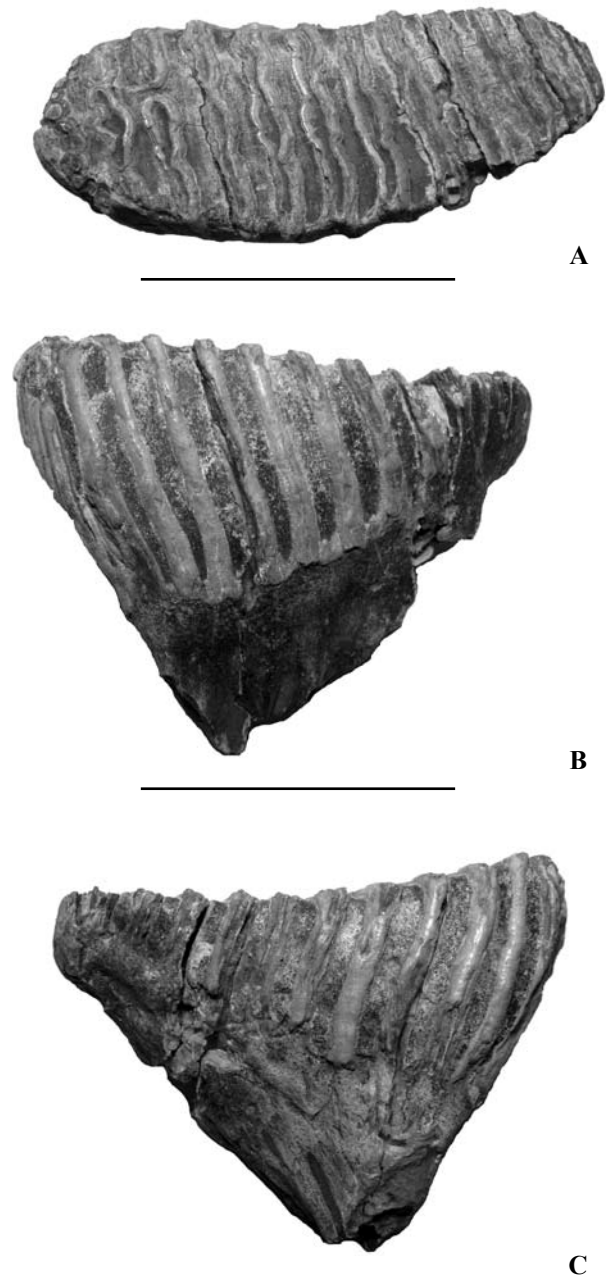


Fig. 12. *Mammuthus* sp., left m1 (VRMH 168) in occlusal (A), lingual (B) and buccal (C) views. Danube near Vetren. Scale bar: 10 cm.

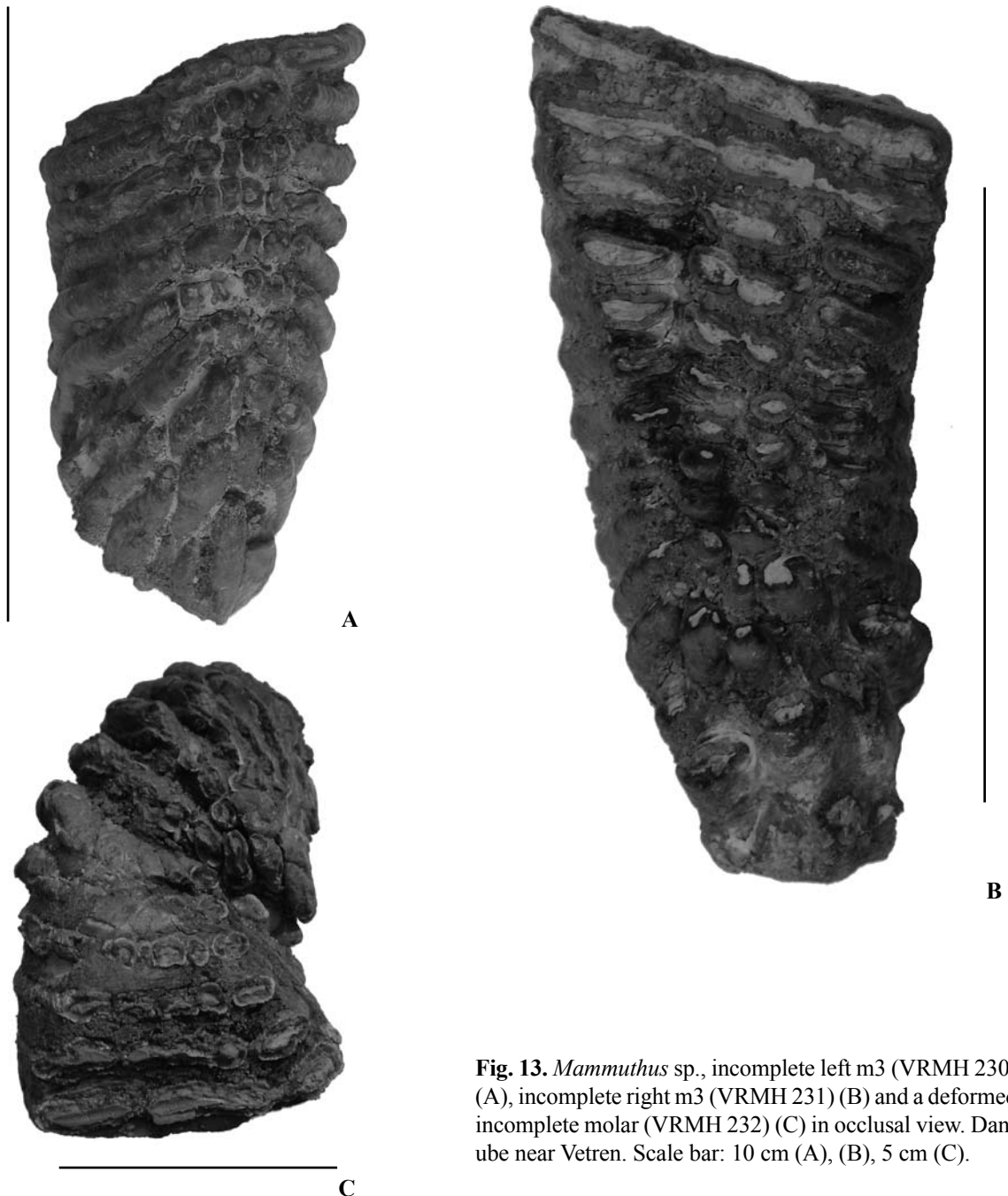


Fig. 13. *Mammuthus* sp., incomplete left m3 (VRMH 230) (A), incomplete right m3 (VRMH 231) (B) and a deformed incomplete molar (VRMH 232) (C) in occlusal view. Danube near Vetren. Scale bar: 10 cm (A), (B), 5 cm (C).

upper limit of *M. trogontherii* provided by MAGLIO (1973) but the hypsodonty index (height/width index), even considering the imperfect condition of the material, is rather high for that species (see LISTER, SHER, 2001). VRMH 163 has 11 preserved plates, length of the preserved fragment is 160, W: 99 (on first preserved), H: >175; LF: 7.75.

VRMH 161 (Fig. 17) is a cast of a right m3 with the anterior end missing (-12x). Locality unknown. L>225, W: 95, H>>109; ET: 2.5; LF: 6.5. Identification of this specimen is even more doubtful than the rest. Despite some similarity with *Elephas antiquus* (a “dot-dash-dot” pattern on one of the

worn plates and medial extensions on the anterior ones), the tooth is too wide for that species (even considering its abnormal shape), and is referred to *Mammuthus* sp. (? *M. trogontherii*).

Summary and conclusions

Fossil proboscideans from the VRMH collection range from the middle Miocene to the late Pleistocene. Although far from numerous, specimens at the VRMH include the first European finds attributable to the amebelodontid genus *Protanancus*, half of Bulgaria’s pre-Turolian deinotheres (includ-

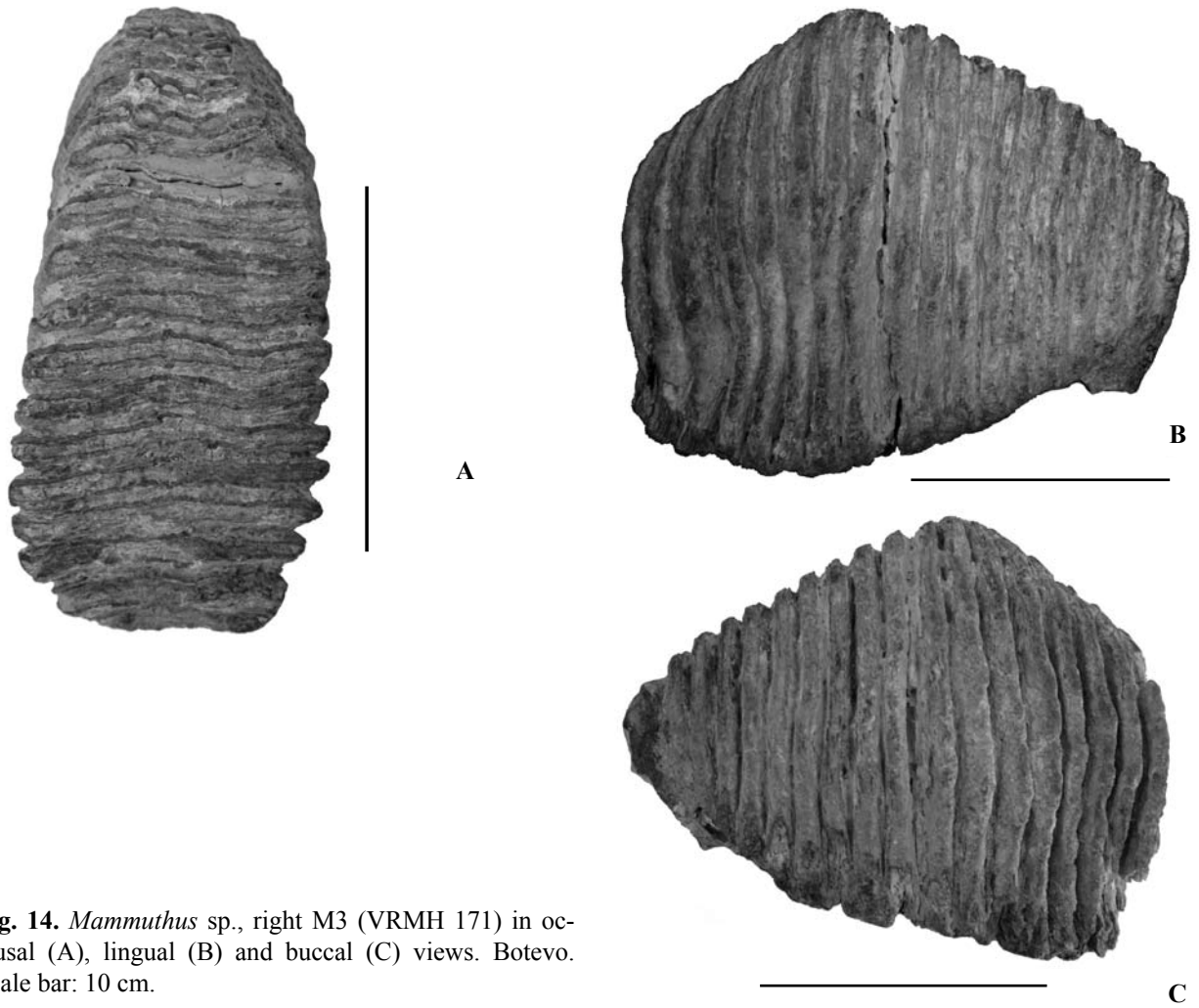


Fig. 14. *Mammuthus* sp., right M3 (VRMH 171) in occlusal (A), lingual (B) and buccal (C) views. Botevo. Scale bar: 10 cm.

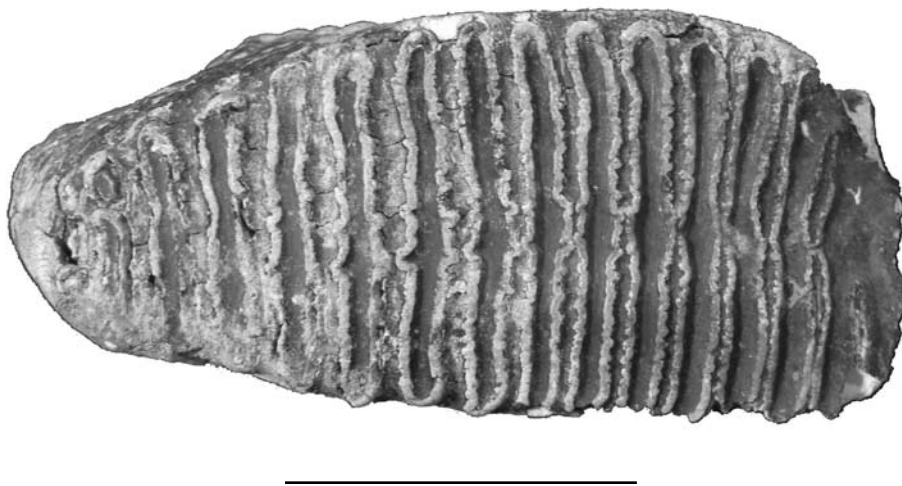


Fig. 15. *Mammuthus* sp., right M3 (VRMH 167) in occlusal view. Unknown locality. Scale bar: 10 cm.

ing the first *D. giganteum* mandible from the country), a find that might be the first *Tetralophodon longirostris* from Bulgaria, and a pre-Turolian (?middle Miocene) elephantoid close in its morphology to *Gomphotherium angustidens*. Staro Oryahovo

(unidentified elephantoids of apparent pre-Turolian age) and Botevo (*Mammuthus*) are new additions to the list of Bulgarian fossiliferous localities. Vetren (*Prodeinotherium bavaricum*, *Deinotherium giganteum*, cf. *Protanancus* sp., cf. *Gomphotherium*

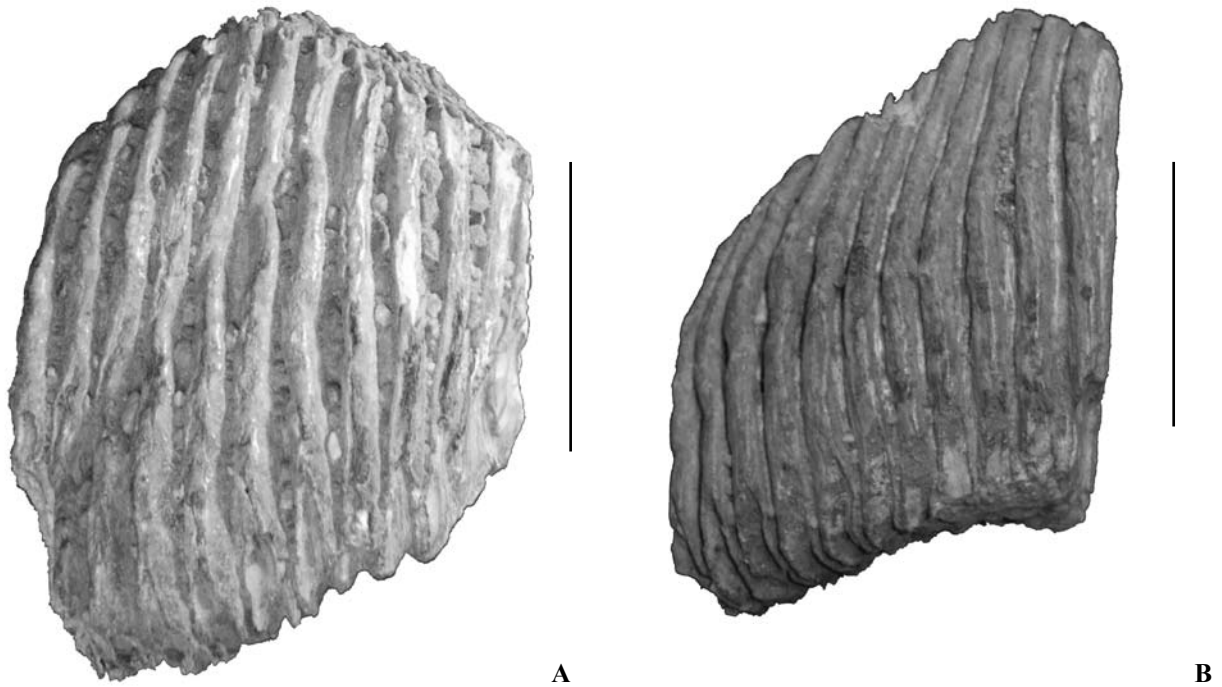


Fig. 16. *Mammuthus* sp., fragments of a left and right upper third molars. A: VRMH 162, left M3 in buccal view; B: VRMH 163, right M3 in lingual view. Unknown locality. Scale bar: 10 cm.



Fig. 17. *Mammuthus* sp., cast of right m3 (VRMH 161) in occlusal view. Unknown locality. Scale bar: 10 cm.

angustidens and *Mammuthus*) was known until recently only as a locality yielding Pleistocene mammoths. (Note that the three molars referred to cf. *Protanancus* sp. were found on the land near Vetren, while the rest of the material comes from the Danube. Obviously, there are at least two layers, a middle Miocene and a late Pleistocene one, near that village). Thus, the collection demonstrates the high potential interest of the areas around Varna and Silistra in NE Bulgaria, which have yielded most of the pre-Turolian proboscideans from the coun-

Table 1. Dental measurements (in mm), VRMH 164/166, *Deinotherium giganteum*, Aksakovo.

	L	W
p3 sin	> 55 (60e)	45
p4 sin	66	55/55.5
m1 sin	80.5	53.5/57/57e
m2 sin	80	69/70
m3 sin	86	76.5/69
m2 dext	80	70/70
m3 dext	88	77/72

try. Further research on the fossiliferous localities near Varna and Silistra would doubtlessly contribute to the understanding of proboscidean evolution on the territory of present-day Bulgaria, and Europe in general.

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