

LATE PLIOCENE MASTODONS AND RHINOCEROS FROM CERNĂTEȘTI (DOLJ COUNTY, ROMANIA)

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Abstract. The locality Cernătești is iconic for the co-existence of the Pliocene mastodons '*Mammuthus borsoni*' and '*Anancus arvernensis*' in same vertebrate community with the oldest European mammoth, '*Mammuthus rumanus*'. In the decades of the last century, fossils of these large herbivores had been extracted during the mining works related to sand extraction in local quarries, mainly from the one at Dealul Calului, then hosted in a small museum, in the local manor. This paper offer data about the mastodon teeth and an isolate tooth documenting the presence of the rhinoceros belonging to genus '*Stephanorhinus*'. All are important for the Romanian vertebrate paleontology, documenting an environment specific o a late Pliocene (Romanian) alluvial plain in the area, belonging to the Căndești Formation. Their importance is even greater as long as the old quarries vanished after the close of the sand mining.

Keywords: mastodons, rhinoceros, late Pliocene, Dacian basin, Romania.

Rezumat. Mastodonți și rinoceri pliocen superiori de la Cernătești (Județul Dolj, România). Localitatea Cernătești este de referință pentru coexistența mastodonților plioceni '*Mammuthus borsoni*' și '*Anancus arvernensis*' în asociație cu cel mai vechi reprezentant al mamuților din Europa, '*Mammuthus rumanus*'. În deceniile secolului trecut, fosile ale acestor ierbivore de talie mare au fost colectate pe parcursul extragerii nisipului din mici cariere locale, în special cea aflată în Dealul Calului, apoi depuse în micul muzeu adăpostit în cula din localitate. Articolul oferă date referitoare la dinții de mastodonți și la un dinte izolat care dovedește prezența unui rinocer asociat genului '*Stephanorhinus*'. Toate aceste fosile sunt importante pentru paleontologia vertebratelor din România, documentând un mediu asociat unei câmpii aluviale pliocene (romaniene) care revine Formațiunii de Căndești. Importanța este cu atât mai mare cu cât vechile cariere au dispărut complet după încetarea extracției de nisip.

Cuvinte cheie: mastodonți, rinocer, Pliocen Superior, Bazinul Dacic, România.

INTRODUCTION

Pliocene large herbivores are only reported from some regions of Romania where sedimentary sequences of this age are exposed. Most of them are located in the Dacian Basin, especially in its western areas, in Oltenia (e.g., ATHANASIU (1907, 1908), BARBU (1930), MACAROVICI (1978), PETRESCU et al. (1987, 1989), TERZEA (1997, 2004), RĂDULESCU et al. (2003a, b), ANDREESCU et al. (2011, 2013), STIUCĂ et al. (2004), CODREA & DIACONU (2003, 2007, 2010, 2011). In the same basin, other sectors of interest are located in northern - north-eastern and southern Muntenia (ATHANASIU & PREDA, 1928; MOTĂȘ, 1956; MIHĂILĂ, 1971; APOSTOL, 1968; STANCU et al., 1969; TERZEA 1983, 1997, 2005; CODREA et al., 2018a; CODREA & VENCZEL, 2018; CODREA et al., 2018b), but also in southernmost Moldavia (RĂDULESCU & SAMSON, 1995; RĂDULESCU et al., 2003a, b and related references). Another sedimentary basin relevant for Pliocene vertebrates is the Bârsa basin, whose sedimentary fill began to accumulate in the early Pliocene, in Dacian (RĂDULESCU & SAMSON, 1985; ANDREESCU et al., 1987; CODREA et al., 2018b).

In other geological units, the Pliocene rocks are completely missing (SĂNDULESCU, 1984; IONESI, 1994; MUTIHAC et al., 2004). They have either not been deposited or have been destroyed by younger erosional events. Such situations can be noticed in the Moldavian Platform, the Northern Dobrogea orogen, the Dobrogea units of the Moesian Platform or in the Transylvanian Basin.

On the eastern margin of the Pannonian Basin exposed in Romania, Pliocene deposits are probably buried beneath piles of younger Quaternary sedimentary rocks. As the many wells drilled in western Romania have had mainly economic targets (oil, gas, geothermal), the Pliocene stratigraphy from that region remains extremely poorly known as long as only subsurface data are available and the drill cores were extremely rare in these rocks. However, it is known that in the Neogene sub-basins related to the Pannonian basin splitting the western side of the Apuseni Mountains, the Pliocene deposits are missing. An exception once concerned the vertebrate fauna of Derșida (Șimleu sedimentary sub-basin) which was considered as (?)Dacian (PAUCĂ, 1954; TERZEA, 1983) or even younger ('levantine'; MAXIM & GHIURCĂ, 1960), but which is in fact latest Miocene, more precisely Pontian (MACAROVICI & JURCSÁK, 1968; CODREA et al., 2002; CODREA & MARGIN, 2009).

In the Danube Delta sector of the Scythian Platform, the Pliocene deposits do not outcrop, but even if they did, the depositional environments would have not been convenient for the presence of the terrestrial vertebrate fossils, as those areas were immersed throughout the entire Pliocene (IONESI, 1994).

Some of the finds refer to vertebrate localities with poor stratigraphy, or even completely devoid of convenient geological dating (ATHANASIU, 1909; ATHANASIU & PREDA, 1928; APOSTOL, 1968; JURCSÁK, 1973, 1983; CODREA et al., 2005; CODREA & IUGA, 2006).

This paper refers to a sample of fossils unearthed in the late Pliocene sands of Cernătești, Oltenia (Dolj County). The locality is a reference one in Romania and Europe due to the co-existence of the mastodons '*Mammuthus*'

borsoni (HAYS, 1834) and *Anancus arvernensis* (CROIZET & JOBERT, 1828), with the oldest European mammoth (*Mammuthus rumanus*) (STEFANESCU, 1924) (RADULESCU et al. 2003a, LISTER & van ESSEN, 2003, IANUCCI & SARDELLA, 2023).

GEOLOGICAL SETTING AND AGE

Cernătești is situated ca. 30 km north-west from Craiova, on the road DJ 606B that follows in this locality the stream of Cernăteștilor Valley, in southern Romania (Figs. 1 – 1, 1 - 2).

Decades ago, there were working quarries in Cernătești, mining sands needed for various construction works in the area. The most famous one for the fossils originating from it was called Dealul Calului (Horse's Hill). After decades of work this quarry closed and now even its former location can be hardly established in the field without the natives' help. But according to the map published by SCHOVERTH et al. (1963 b), this former quarry was situated on the left bank of the Cernăteștilor Valley (Figs. 1 – 3). The sands from the Dealul Calului quarry were related in 1958 by SCHOVERTH et al. (1963a) to the so called 'psamo-psefitic horizon', which geological age was established to the 'base of Quaternary, respectively of Villafranchian' (p. 74). These geologists also mentioned other 'Villafranchian' deposits (dividing this pile of sedimentary rocks into three 'horizons') in several localities apart Cernătești, as Amărăști, Valea Boului, Urda de Sus, Valea Muierii, Frătoșița, where teeth and mammal bones were collected from a so-called 'lower horizon with fine sands and gravels with lens-like accumulations of boulders, exposing a cross-bedded structure' (SCHOVERTH et al., 1963b; p. 91). They drew up the following list of taxa: '*Elephas (Archidiskodon) meridionalis* Nesti, *Mastodon (Zygodolophon) borsoni* Hays, *Mastodon (Anancus) arvernensis* Croizet et Jobert, *Equus* sp., *Cervus* sp., *Rhinoceros* sp.'.

The Pliocene deposits from Cernătești are now part of the Cârdești Formation, whose age is late Pliocene, MN 16a (late Romanian, Valahian; ANDREESCU et al., 2013).

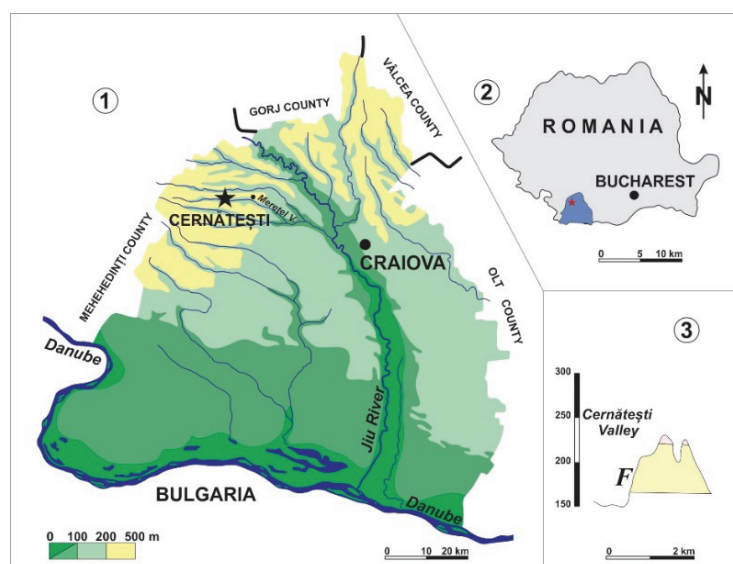


Figure 1. Location of Cernătești locality on: 1 – Dolj County map; 2 – in Romania; 3 – cross section in the area of the former Dealul Calului sand open pit (after SCHOVERTH et al., 1963b).

As nearly all the quarries these vertebrates originated from have closed and the largest part of fossils are seemingly either lost, or scattered, the ones still existing in different local or private collections are very important. Such a collection exists in the local museum housed in the manor of Cernătești. This small museum was founded by Nicolae Pârvolescu in the '70s of the last century inside a fortified tower (these constructions are named in Oltenia '*culă*', corrupted word originating from the Turkish '*kulê*', meaning tower, fortress) with roots in 16th century, when it was erected for defending targets by the boyars of the Cernătești family. As most village museums in Romania, the one of Cernătești is very heteroclite: one can find ethnographic, historical, ecclesiastical and paleontological exhibits inside the collections, whose conservation is frequently, poor. The building was repeatedly renovated, but now needs additional renewal works. In these circumstances, during the performance of works, the collections were moved to Olteniei Museum in Craiova for better conservation and interventions related to restorations. The vertebrate fossils will be reinforced with professional polymers such as mowilith, the ones torn into pieces glued, then studied and assigned to taxa.

This paper focuses on the mastodon and rhinoceros fossils from this collection originating from the former Dealul Calului quarry. The fossils were collected by various workers across several decades of the last century. They represent fortuitous finds and not a result of professional diggings. That explains their fragmentary status, being either carelessly extracted from the rock, or handled in same manner. Even fragmentary, they can be related to the taxa mentioned in the following sections.

MATERIAL AND METHODOLOGY

The fossils from Cernătești exclusively concern fragmented cheek teeth originating from mastodons and a rhinoceros. For instance, they are not reinforced by professional polymers, but some of them will need such interventions.

The nomenclature of the molar cusps from the gomphothere mastodon *Anancus arvernensis* follows TASSY (1986), for the zygodont '*Mammut borsoni*' it follows TOBIEN (1996). For rhinoceros, we followed GUÉRIN (1980). Measurements of teeth follows GÖHLICH (1998). For measurements it was used a caliper (precision 0.1 mm).

Abbreviations. **M** - upper molar; **m** - lower molar; **H** - crown height; **Wa** - width anterior; **Wp** - width posterior; **W I-V** width at the transverse crest I-V; **W max** - maximum width; **MN**, Mammal Neogene Zone; **m.y.** - millions of years; **pr**, pretrite principal tubercle; **pacc**, pretrite anterior central conule.

Institutional abbreviations: CM - Cernătești Museum; OMCNS - Olteniei Museum Craiova, Natural Sciences collection; MBLB - Matei Basarab High School, Bucharest.

SYSTEMATIC PALEONTOLOGY

Order Perissodactyla Owen, 1848
 Family Rhinocerotidae Gray, 1821
 Tribe Rhinocerotini Gray, 1821
 Genus *Stephanorhinus* Kretzoi, 1942
Stephanorhinus sp.

Crown of a right m3 (Pl. I, 1 a, b), marked by water stream transport before burial into the sediment. Consequently, roots were completely lost. Both transverse valleys expose 'V' shaped profiles, with shallow level difference. A lingual discontinuous cingulum can be noticed, visible on the terminations of the transverse ridges. The enamel is relatively smooth, barely wrinkled. Cement is missing on the enamel or inside the transverse valleys.

Measurements (mm). L - (+) 47.6; Wa - 32.5; Wp - 31.2

Differences between different Pliocene species of rhinoceros are extremely difficult to be established based strictly on isolated cheek teeth (GUÉRIN, 1980) and this is even harder if the sample is too scarce, as it happens in this case, with a single tooth available. If one considers the stratigraphy of Cernătești, one may presume that this tooth could belong to *S. etruscus* (FALCONER, 1868), but more data is needed for a clear assignation. SCHOVERTH et al. (1963b) refer simply to '*Rhinoceros* sp.', but later RADULESCU et al. (2003a) probably based on richer samples, reported two rhinoceros' species as coeval in this locality, '*Stephanorhinus elatus*, *S. etruscus* group'. The last one illustrates difficulties in its sharp assignation, probably due to same reasons, scarce and poor diagnostic fossils. Both taxa are markers for the late Pliocene age of the sands from Cernătești, and are frequent enough in the Dacian basin in localities as Covrigi, Mătășari-Brădețu, Groșerea, Tetoiu-Bugiulești: La Pietriș and Valea Grăuceanului (CODREA, 2000, RADULESCU et al., 2003a, b) or Colțești (PANDOLFI et al., 2019).

Order Proboscidea Illiger, 1811
 Family Gomphotheriidae Hay, 1922
Anancus Aymard, 1855
Anancus arvernensis (Croizet & Jobert, 1828)

The tetralophodont upper molar M3 (Pl I., 2) is illustrated in this sample only by a fragment of the mid-portion of a left M3, broken in both mesial and distal portions (CM 8; collected by an anonymous in 1947). It preserves only two complete transverse lophids (II-III) and mainly the posttrite portion of the IV one. The fragment is enough complete to illustrate obvious anancoidy. On the pretrite side, the pacc2 is fused with pr2, while in the following crests this fusion is missing, the pacc3 and pacc4 being separate from the principal tubercles. Before burial, the tooth was carried by the river streams, the hydro-taphonomy marks are clear distinguishable.

Measurement (mm): W max - 82.0 mm.

The value of the maximum width of this tooth is close to several others mentioned by METZ-MULLER (2000) from various Pliocene localities in Europe. The specimen reported from Oradea - Dealul Viilor is by far larger, reaching 93 mm (JURCSÁK, 1973).

From the upper cheek teeth rows, apart from the previous molar, another fragment (Pl. I, 3) could possibly illustrate a portion of the mesial half of crown of M3 (CM 11; collected by an anonymous, in 1942). The fossil was carried by water streams before burial, consequently the roots were lost.

Measurement (mm): W max - 95.62

The lower molars are represented in this sample by some fragments, none of these teeth being complete. Available for study is only a portion of a distal fragment of a right m1 (Pl. I, 4) (CM 14; anonymous collector, 1954). It preserves the last three transverse lophids (II-IV) and a talonid composed of two tubercles. A distal pressure mark at contact with m2 is noticeable. The taphonomy is similar to the previous teeth.

Measurements (mm): W II - + 55.0; W III - 64.0; W IV - 59.5

An overview on the metric data related to this tooth shows high variability in the various European localities (METZ-MULLER, 2000). The tooth from Cernătești is comparable with the ones of Chillac (MN 17; France) and with some of the Dorkovo mastodont community, but there are also wider ones. Close sizes can be found in Astigiano, but in San Paolo Solbrito (MN 16a; Italy) the sizes are somewhat smaller. The European data are illustrative for the obvious variability of this molar.

For comparisons with finds from Romania the find from the Cazacu Creek at Strâmba-Jiu is the most appropriate (PETRESCU et al., 1987). It originated from the Jiu-Motru Formation (between the coal seams XII-XIII) which geological age is Pliocene (late Dacian: Parscovian-Siensian – early Romanian: Pelendavian). Its sizes were smaller compared to the one of Cernătești. This molar is rare in the collections from Romania, as long as, in the monographic paper on this mastodon species ATHANASIU (1908) only mentioned one such fossil, a fragment of mandible preserving the base of the m1 crown, found at Pojarul de Sus (Gorj County). Based on the fossils from Romania, for instance it is unrealistic to define evolutionary stages of this species based on this molar.

Some m3 fragments document the hexalophodont last lower molar of this species, the fragments of this tooth being the most numerous in the sample. The first herein reported is a right m3 distal portion (Pl. I, 5 a, b) (CM 9; collected by an anonymous, in 1950). The crown in this case is associated to the roots, probably the molar being subject of a shorter transport by water before its burial in sediment. The mesial portion of the tooth is broken, probably consequence of careless extraction or handling. The anancoid pattern is obvious, due to the advance forward of the tubercles of the posttrite row. The preserved portion shows a marked tendency of narrowing of the crown from its anterior portion towards the posterior termination, which gives a pronounced triangular elongated contour, also evident from the metric data. The fragment still allows to study only the last three transverse crests (IV-VI). The transverse lophid III is only partly preserved, meaning only the distal walls of both semi-lophids composing this lophid. A distal cingulum is present, extending also on the outer side of the tooth, but there is weakly expressed.

Measurements (mm): W IV – 78.0; W V – 78.0; W VI – 69.0

As the preserved portion of the crown refers just to the last three transverse crests, a discussion about the metric data and comparisons are devoid of interest.

Fragment of a left m3 (Pl. II, 1) (CM 10; anonymous collector, 1950) preserving the crown with the last complete fourth transverse lophids (III-VI) and a posterior fragment of the preceding one (II). It is the most complete preserved tooth in this collection. This last molar is long and narrow. A distal cingulum is noticeable, but less embossed compared with the previous described m3, while the lateral sides are devoid of cingulum. The roots are only partially preserved, covered by arenite limonitic crust, with scattered microconglomerate quartz clasts. As in other cheek teeth from this locality, it is marked by pre-burial water transport. Obviously, in the anterior portion the rupture is recent, as in the previous tooth.

Measurements (mm): W III – 73.0; W IV - 73.5; W V - 65.0; W VI – 51.0

Comparisons are devoid of interest as long as the metric data of the anterior portion is missing.

Although obviously belonging to this mastodon species, other fragments are too small to be useful in outlining conclusions in this study as a relationship between tooth morphology and evolutionary stages of this species. All crown fragments are missing cement in the transverse valleys.

Family Mammutidae Hay, 1922

Genus *Mammut* Blumenbach, 1799

'*Mammut*' *borsoni* (Hays, 1834)

The cheek teeth fragments of this mastodon are less numerous in this collection. It doesn't necessarily illustrate a lesser frequency of this mastodon in the herbivores' community from Cernătești compared to the previous species, it could be just a result of the collecting bias.

The lower molars reported herein, are documented by some crowns found isolate in the Pliocene sands.

The first one concerns the zygodont crown fragment of the trilophodont left m1 (Pl. II, 2). It preserves entirely only the last two transverse lophids (CM 1; anonymous collector, 1942). The first lophid is damaged on both lateral sides. The wear is moderate and advanced progressively mainly on the pretrite half lophids. A small portion preserved on the mesial margin of the crown shows the presence of a cingulum, probably continuous. A continuous stronger distal cingulum can be noticed. On the lateral sides any cingulum cannot be observed. It makes this different from another one found in Oltenia in Gubaucea (OMCNS 29021; unpublished) where a strong labial cingulum can be noticed. The 'V' shaped transverse valleys are not obstructed by any conulid. The cement is missing in these valleys.

Measurements (mm): L - + 84.0; W II - 62.8; W III - 61.0

The tooth is rather similar in size with the more worn one illustrated by ATHANASIU (1907) from Curtea de Argeș (Argeș County), once in MBLB collections that has, however, transverse lophids somewhat smaller than the ones from Cernătești (W III – 58.0). The same author reported lower jaw with m1- m2 from Deșului Creek at Vladimir, Gorj County. This first lower molar in this locality is wider compared the one of Cernătești (W II – 69.0).

The next lower molar m2 is documented by a left fragmentary crown (Pl. II, 3) (CM 3; anonymous collector, 1945). Like the previous tooth, it preserves only the last two complete transverse lophids (II-III). The first one is partly

preserved, but only its posterior portion can be observed. The moderate wear is more advanced on the pretrite half lophids. The cusps of the posttrite half lophids are all worn, but by far lesser. Cement is missing in the transverse valleys. A strong distal cingulum surrounds the distal margin of the crown, extending for a limited portion of the lingual side.

Measurements (mm): W II - 88.0; W III - 95.0; H max. - 42.5

This specimen is comparable in size with the one described by ATHANASIU (1907) from the Upper Pliocene (Romanian) deposits cropping out at Petreștii de Jos (Gorj County). Compared to the *Milia mastodon*, the Romanian one is smaller (TSOUKALA, 2000). The teeth from Kaltensundheim (KOENIGSWALD et al. 2022) have smaller transverse crests.

The last lower molar is documented by a right tetralophodont m3 crown fragment (Pl. II, 4) (CM 2; anonymous collector, 1942). The crown is narrow. It preserves entirely the last three transverse lophids (II-IV). The first lophid (I) is preserved partially on the pretrite portion but heavily damaged. The pretrite tubercles are worn gradually, the wear being more severe in the first lophids. The transverse valleys are not obstructed by any conulid. A distal cingulum is present. On the lateral sides, continuous cingulum is missing but, mainly on the labial side, small interrupted cingulum portions can be noticed at the openings of the transverse valleys. Cement is missing inside the transverse valleys. Before burial, the crown of this molar was subject of severe hydro-taphonomy.

Measurements (mm): W II - 91.8; W III - 77.5; W IV - 61.0; H max - 71.0; L between transverse crests: 44.0

The size of this tooth is smaller compared to other finds in Romania or in Europe (e.g., ATHANASIU 1907, TSOUKALA, 2000, KOENIGSWALD et al. 2022). It is closer in size to the m3 reported from Păgaia (Bihar County) as *Mammuth praetypicum* (SCHLESINGER, 1919). In fact, this crown exposes same simplified pattern as in Păgaia but, the validity of the mentioned species continues to remain unclear (CODREA et al., 2022) as well as the stratigraphy of that locality. There, some exclusively mastodon teeth were found, a situation comparable with the neighbour locality Huta, where only a single isolate partial skeleton of *Anancus arvernensis* was unearthed (JURCSÁK & POPA, 1977).

CONCLUDING REMARKS

The former local sand quarries in Cernătești, in particular the Dealul Calului quarry, have brought to light a number of Pliocene large herbivore teeth, probably because such fossils were easier to observe and collect by the workers. Obviously, the collectors were not qualified professionals, but due to their curiosity we now have this sample in our hands. The teeth in question predominantly belong to mastodons. The single exception concerns a rhinoceros' lower cheek tooth, the only one in the whole sample. The fossilization of the teeth is fair, but one may believe that their present fragmentariness is due to the vicious manipulation over time, either during extraction from the rock or later, perhaps, consequence of the repeated reorganizations of the local museum in the Cernătești manor.

The teeth show clear marks of water streams transport before burial, in many cases leaving only the crowns, devoid of roots. For this reason, we it is worth assuming that sedimentation took place in a fluvial plain environment, crossed by channels. The sands and pebbles that were part of the sedimentary fill of the channels locally accumulated were once mined in Cernătești. The sand, locally indurated, was the main bearing rock of the fossils. Unfortunately, we do not possess sedimentological columns for the quarries in question, especially for the one already mentioned. The once active quarries are today totally covered by recent accumulations of debris, therefore new observations cannot actually be done in the field. However, the pattern of such fluvial plain of the Căndești Formation is credible if we consider other areas where Upper Pliocene (Romanian) deposits outcrop in Oltenia and have been interpreted as such (JIPA & OLARIU, 2009; KRÉZSEK & OLARIU, 2021). According to KRÉZSEK & OLARIU (2021), a Paleo-Danube flowed ca. 4 m.y. ago '100 kilometers north of the present path' and one may presume a whole related tributary river network.

After an extensive flooding phase on the western sector of the Dacian basin during the Early Pliocene (Dacian) with large areas covered by brackish-marine waters, the flooded area gradually retreated in the western sectors of the basin, replaced by fluvial sedimentation (JIPA & OLARIU, 2009; ANDREESCU et al. 2011, 2013). This replacement is recorded since the uppermost Dacian and continued in the late Pliocene (Romanian), when the main depocenters moved eastward far from Cernătești, in the Carpatian bend sector of the basin comprised between Buzău and Focșani, with eastward extensions (JIPA & OLARIU, 2009). There were located the areas of maximal subsidence inside the sedimentary basin (KRÉZSEK & OLARIU, 2021 and references therein).

The replacement of the flooded areas by the dry land crossed by fluvial network may have been a determinant in establishing the migration paths inside the Dacian basin, particularly for *Mammuthus rumanus*, whose first occurrence is noticed at Tulucești (eastern Dacian basin, in the Tulucești Formation; STEFANESCU, 1924) and the somewhat coeval Cernătești (earliest Valahian; ANDREESCU et al, 2013). Probably the mammoth followed the emerged land bordering the Southern Carpathians at the contact of these mountains with the Dacian sedimentary basin. Unlike the primitive mammoth, which remains are relatively poorly documented by fossil finds but whose importance for Eurasian faunas remains essential for understanding the evolution of the Pliocene and Quaternary faunas (LISTER, 1996; LISTER & van ESSEN, 2003; LISTER et al, 2005), the two Pliocene mastodons were already part of the indigenous faunas of the Dacian basin, having been recorded in the western areas of the basin as early as Dacian (ATHANASIU, 1907, 1908; PETRESCU et al., 1989; CODREA & DIACONU, 2007). The systematics of the species *M. rumanus* has been discussed by MARKOV (2012) and for instance we agree this viewpoint. The systematic position of '*M. borsoni*' is still subject of debate, but we agree with MARKOV (2004, 2008) and KOENIGSWALD et al. (2022). On this reason, the genus name was kept in quotation marks.

The fragmentary nature of the material prevents us from establishing evolutionary traits for mastodons, because a richer sampling is required for this, as the one from Cernătești is based on a scarce number of specimens if we compare this locality with other Pliocene localities which are by far richer (mainly Dorkovo for *Anancus arvernensis*; THOMAS et al., 1986; METZ-MULLER, 2000). The geological age of the Cernătești locality, however, could be indicative for evolved mastodons in question.

It is difficult to assume that additional fossils of large Pliocene herbivores could be collected in Cernătești today to complete the sample, as long as quarries have been closed and outcrops are extremely rare and invaded by vegetation. In such a context, the already collected fossils should be properly preserved, the locality being a reference for the coexistence of *A. arvernensis* – '*M*'. *borsoni* - *M. rumanus*. Such localities are rather rare in Europe.

The Cernătești is of main importance for the Romanian paleontology and we considered this restitution important for the future studies on the Pliocene sedimentary sequences of this region, part of the European canvas, although the quality of the fossils could have been be a better one if the manor history wouldn't have been so upset.

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REFERENCES

- ANDREESCU I., RĂDAN S., RĂDAN M. 1987. Magnetobiostratigraphy of the middle-upper Neogene and Pleistocene deposits of Romania. *Annales Institut Geologum Publici Hungariae*. Budapest. **70**: 113-118.
- ANDREESCU I., CODREA V., ENACHE C., LUBENESCU V., MUNTEANU T., PETCULESCU AI., ȘTIUCĂ E., TERZEA E. 2011. Reassessment of the Pliocene/Pleistocene (Neogene/Quaternary) boundary in the Dacian Basin (Eastern Paratethys), Romania. *Oltenia. Studii și comunicări. Științele Naturii*. Muzeul Olteniei Craiova. **27**(1): 197-220.
- ANDREESCU I., CODREA V., LUBENESCU V., MUNTEANU T., PETCULESCU AI., ȘTIUCĂ E., TERZEA E. 2013. New developments in the Upper Pliocene-Pleistocene Stratigraphic Units of the Dacian Basin (Eastern Paratethys), Romania. *Quaternary International*. Elsevier. Amsterdam. **284**: 15-19.
- APOSTOL L. 1968. Particularité morphologiques des molaires de proboscidiens fossiles quaternaires de Roumanie, conservées dans la collection du Musée d'Histoire Naturelle «Grigore Antipa». *Travaux du Muséum d'Histoire Naturelle «Grigore Antipa»*. București. **9**: 581-616.
- ATHANASIU S. 1907. Contribuțiuni la studiul faunei terțiare de mamifere din România. *Anuarul Institutului Geologic al României*. București. **1**(1): 129-214,
- ATHANASIU S. 1908. Contribuțiuni la studiul faunei terțiare de mamifere din România. *Anuarul Institutului Geologic al României*. București. **2**(3): 379-423.
- ATHANASIU S. & PREDA D. M. 1928. Stratigrafia bazinului inferior al Troțușului, II. *Elephas meridionalis* din Pliocenul superior de la Pralea-Căiuți. In: *Anuarul Institutului Geologic al României*. București. **13**: 65-84,
- BARBU I. Z. 1930. Catalogul vertebratelor fosile din România. Academia Română, *Memoriile Secțiunii științifice*, Seria III. Academia Română. București. **7**(2): 7-23.
- CODREA V. 2000. *Rinoceri și tapiri terțiari din România*. Presa Universitară Clujeană. Cuj-Napoca. 174 pp.
- CODREA V., FĂRCAȘ C., SĂSĂRAN E., DICA P. 2002. A Late Miocene mammal fauna from Derșida (Sălaj District) and its related paleoenvironment. *Studia Universitatis Babeș-Bolyai, Special issue*. Cluj-Napoca. **1**: 119-132.
- CODREA V. & DIACONU F. 2003. Plio-Pleistocene large herbivores from Husnicioara (Mehedinți Department). *Studii și cercetări, Geologie-Geografie*. Complexul Muzeal Bistrița-Năsăud. Bistrița. **8**: 73-86.
- CODREA A. V., VENCZEL M., POPA E. 2005. New finding of *Mammot praetypicum* (*Proboscidea*, *Mammalia*), a zygodont mastodon from Păgaia (NW Romania). *Acta Palaeontologica Romaniae*. Societatea Paleontologilor din România. București. **5**: 67-71.
- CODREA V. & IUGA G. 2006. A mastodon (*Proboscidea*, *Mammalia*) finding at Firiteaz (Arad district). *Studii și cercetări. Geology-Geography*. Complexul Muzeal Bistrița-Năsăud. Bistrița. **11**: 17-26.
- CODREA V. & DIACONU F. 2007. *Mammot borsoni* (Hays 1834) from the Early Pliocene of Husnicioara (Mehedinți district, Romania). *Studia Universitatis Babeș-Bolyai, Geologia*. Cluj-Napoca. **52**(2): 73-77.
- CODREA V. & MARGIN C. 2009. The environments of the Uppermost Miocene vertebrates from Derșida (northwestern Rumania, Sălaj district). *Oltenia. Studii și comunicări. Științele Naturii*. Muzeul Olteniei Craiova. **25**: 385-390.
- CODREA A. V. & DIACONU F. 2010. Borson's mastodon (*Mammot borsoni*) find in Hurducești, Mehedinți District. *Drobeta, Seria Științele Naturii*. Muzeul Regiunii Porților de Fier. Drobeta Turnu Severin. **20**: 7-12.
- CODREA V. & DIACONU F. 2011. *Anancus arvernensis* (*Mammalia*: *Proboscidea*) at Fântâna Domnească (Mehedinți District). *Drobeta. Seria Științele Naturii*. Muzeul Regiunii Porților de Fier. Drobeta Turnu Severin. **21**: 7-12.
- CODREA A. V., TRIF N., VENCZEL M., GRECU C. E. 2018a. Mastodon teeth in Câmpulung Muscel Museum collections. *Argessis. Studii și comunicări. Seria Științele Naturii*. Muzeul Județean Argeș. Pitești. **26**: 13-25.

- CODREA A. V., TRIF N., TOTH L. 2018b. First report of a Pliocene pike (Esocidae: *Esox*) in Transylvania, Romania. *Geological Quarterly*. Polish Geological Institute. Warszawa. **62**(3): 644-652.
- CODREA V. & VENCZEL M. 2018. A Pliocene mastodon at Berbești (Vâlcea District). *Argessis. Studii și comunicări. Seria Științele Naturii*. Muzeul Județean Argeș. Pitești. **26**: 27-38.
- GÖHLICH U. B. 1998. Elephantoida (Proboscidea, Mammalia) aus dem Mittel- und Obermiozän der Oberen Süßwassermolasse Süddeutschlands: Odontologie und Osteologie. *Münchner Geowissenschaftliche Abhandlungen*. **A36**:1-245.
- GUÉRIN C. 1980. Les rhinocéros (Mammalia, Perissodactyla) du Miocène terminal au Pléistocène supérieur en Europe Occidentale. Comparaison avec les espèces actuelles. *Documents du Laboratoire Géologique de Lyon*. **79**(1-3): 1-1182.
- IANUCCI A. & SARDELLA R. 2023. What Does the “Elephant-Equus” Event Mean Today? Reflection on Mammal Dispersal Events around the Pliocene-Pleistocene Boundary and the Flexible Ambiguity of Biochronology. *Quaternary*. Multidisciplinary Digital Publishing Institute. Basel. **6**(16): 1-18.
- IONESI L. 1994. *Geologia unităților de platformă și a Orgoneului Nord-Dobrogean*. Edit. Tehnică. București. 280 pp.
- JIPA C. D. & OLARIU C. 2009. *Dacian Basin depositional architecture and sedimentary history of a Paratethys Sea*. Geo-Eco-Marina, Special Publication. Institutul Național de Cercetare-Dezvoltare pentru Geologie și Geoecologie Marină. Constanța. **3**. 264 pp.
- JURCSÁK T. 1973. Răspîndirea mastodonților la vest de Munții Apuseni. *Nymphaea*. Muzeul Țării Crișurilor. Oradea. **1**: 313-341.
- JURCSÁK T. 1983. Răspîndirea proboscidiienilor în nordvestul României. *Nymphaea*. Muzeul Țării Crișurilor. Oradea. **10**: 65-85.
- KOENIGSWALD W. V., JAKUB B., RALF W., GÖHLICH B. U. 2022. A partial skeleton of “*Mammuthus borsoni*” (Proboscidea, Mammalia) from the Pliocene of Kaltensundheim (Germany). *Palaeontologia Electronica*, **25**(1): a10. <https://doi.org/10.26879/1188> (accessed February, 2023).
- KRÉZSEK C. & OLARIU C. 2021. Filling of sedimentary basins and the birth of large rivers: The lower Danube network in the Dacian Basin, Romania. *Global and Planetary Change*. Elsevier. Amsterdam. **197**: 103-391.
- MACAROVICI N. 1978. Sur la faune de mammifères fossiles néozoïques de la Roumanie. *Revue Roumaine de Géologie, Géophysique et Géographie, Géologie*. Académie de la République socialiste de Roumanie. Bucarest. **22**: 71-98.
- MACAROVICI N. & JURCSÁK T. 1968. Asupra unui Hipparion din Pliocenul de la Derșida (Sălaj). *Analele Științifice ale Universității „Al. I. Cuza” Iași*. **2**(14): 101-104.
- LISTER A. M. 1996. Evolution and taxonomy of Eurasian mammoths. In: J. Shoshani, P. Tassy (Eds.), *The Proboscidea. Evolution and Palaeoecology of Elephants and their Relatives*. Oxford University Press: 203-213.
- LISTER A. M. & VAN ESSEN H. 2003. *Mammuthus rumanus* (Ștefănescu), the earliest mammoth in Europe. In: A. Petculescu, E. Știucă (Eds.). *Advances in Vertebrate Paleontology. Hen to Panta*. Romanian Academy. Bucharest: 47-52.
- LISTER A. M., SHER A. V., VAN ESSEN H., WEI G. 2005. The pattern and process of mammoth evolution in Eurasia. *Quaternary International*. Elsevier. Amsterdam. **126-128**: 49-64.
- MAXIM AL. I. & GHIURCA V. 1960. Forme noi de moluște din Pliocenul Superior de la Derșida (Sălaj). *Comunicările Academiei R. P. R. București*. **10**(7): 595-605.
- MARKOV G. N. 2004. The fossil proboscideans of Bulgaria and the importance of some Bulgarian finds – a brief review. *Historia naturalis bulgarica*. Muzeul Național de Istorie Naturală. Sofia. **16**:139-150.
- MARKOV G. N. 2008. The Turolian proboscideans (Mammalia) of Europe: preliminary observations. *Historia naturalis bulgarica*. Muzeul Național de Istorie Naturală. Sofia. **19**: 153-178.
- MARKOV N. G. 2012. *Mammuthus rumanus*, early mammoths, and migration out of Africa: Some interrelated problems. *Quaternary International*. Elsevier. Amsterdam. **276-277**: 23-26.
- METZ-MULLER F. 2000. *La population d'Anancus arvernensis (Proboscidea, Mammalia) du Pliocène de Dorkovo (Bulgarie); étude des modalités évolutives d'Anancus arvernensis et phylogénie du genre Anancus*. Unpublished PhD Thesis. Muséum National d'Histoire Naturelle. Paris; **I**. 306 pp., **II**: 309-460 pp. + 10 Annexes.
- MOTAȘ I. C. 1956. Observațiuni cu privire la sedimentarea Pliocenului din regiunea Pralea. *Dări de Seamă Comitetul Geologic*. București. **40**: 13-20.
- MUTIHAC V., STRATULAT I. M., FECHET R. M. 2004. *Geologia României*. Edit. Didactică și Pedagogică. București. 166 pp.
- PANDOLFI L., CODREA A. V., POPESCU A. 2019. *Stephanorhinus jeanvireti* (Mammalia, Rhinocerotidae) from the early Pleistocene of Colțești (southwestern Romania). *Compte Rendus Palevol*. Elsevier. Amsterdam. **18**: 1041-1056.
- PAUCĂ M. 1954. Două specii de fosile rare din Pliocenul Bazinului Sălaj. *Comunicările Academiei R. P. R. București*. **4**(7-8): 397-400.
- PETRESCU I., CODREA V., PĂTRUȚOIU I., MEILESCU C. 1987. Contributions à la connaissance de la géologie, de la paléontologie, de la palynologie et de la genèse des formations de charbon du Pliocène supérieur (Romanien) de la zone Roșia-Peșteana-Turceni (département de Gorj). *Studia Universitatis Babeș-Bolyai, Geologie-Geografie*. Cluj-Napoca. **32**(2): 11-27.

- PETRESCU I., CERNITA P., MEILESCU C., CODREA V., PASCOVICI N., VĂDAN M., HOSU AL., MANDA S., BENGULESCU L. 1989. Preliminary approaches to the palynology of the Lower Pliocene (Dacian) deposits in the Husnicioara area (Mehedinți County, SW Romania). *Studia Universitatis Babeș-Bolyai, Geologie-Geografie*. Cluj-Napoca. **34**(2): 67-74.
- RĂDULESCU C. & SAMSON P. 1985. Pliocene and Pleistocene Mammalian Biostratigraphy in southeastern Transylvania (Romania). *Travaux de l'Institut de Spéologie «Emile Racovitza»*. București. **24**: 126-143.
- RĂDULESCU C. & SAMSON P. 1995. The mammals of the Dacian. *Chronostratigraphie und Neostratotypen. Pl.1. Dacien*. Edit. Academiei Române. București. **9**: 506-518.
- RĂDULESCU C., SAMSON P., PETCULESCU A., ȘTIUCĂ E. 2003a. Pliocene Large Mammals of Romania. In : López-Martinez, N., Peláez-Campomanes, P. & Hernández Fernández, M. (Eds.): *En torno a Fósiles de Mamíferos: Datación, Evolución y Paleoambiente*. Coloquios de Paleontología. Volumen Extraordinario. Madrid. **1**: 549-558.
- RĂDULESCU C., SAMSON P. M., ȘTIUCĂ E., HOROI V. 2003b. The mammals of the Romanian. In: I. Papaianopol Marinescu Fl., Krstic, Macaleț R. (eds.): *Chronostratigraphie und Neostratotypen, Neogen der Zentrale Paratethys, Pliozan. Romanien*. Edit. Academiei Române. București. Pl. 2. **10**: 481-512.
- SĂNDULESCU M. 1984. *Geotectonica României*. Edit. Tehnică. București. 336 pp.
- SCHOVERTH E., FERU M., ȘERBĂNESCU V., TUDOR R. 1963a. Observații asupra Villafranchianului din bazinul mijlociu al Jiului. *Studii tehnice și economice. Seria E. Hidrogeologie*. Comitetul geologic. Institutul geologic. București. **6**: 71-84.
- SCHOVERTH E., FERU M., ȘERBĂNESCU V., SBENGHE R., CROITORU M., CROITORU E. 1963b. Cercetări geologice în zona centrală din vestul Câmpiei Getice. *Studii tehnice și economice. Seria E. Hidrogeologie*. Comitetul geologic. Institutul geologic. București. **6**: 85-103.
- STANCU R., GAVA R., BĂCANU I. 1969. Noi date paleontologice privind prezența lui *Archidiskodon* și *Rhinoceros* în bazinul mijlociu al Argeșului. *Studii și comunicări*, Muzeul Județean Argeș. Pitești. **2**: 33-45.
- STEFANESCU S. 1924. Sur la presence de l'*Elephas planifrons* et de trois mutations de l'*Elephas antiquus* dans les couches géologiques de Roumanie. *Comptes Rendus Academie Science*. Paris. **179**: 1418-1419.
- ȘTIUCĂ E., PETCULESCU A., ARGHIR R. 2004. Mamiferele mari din Romanianul Bazinului Dacic: implicațiile lor biocronologice. In: Olteanu R. (Ed.). *Romanianul și problemele lui: faună, stratigrafie, sedimentogeneză*. Institutul de Speologie „E. Racovitza”. București: 73-79.
- TASSY P. 1986. Nouveaux Elephantoidea (Mammalia) dans le Miocène du Kenya. *Cahiers de Paléontologie*. Centre National de la Recherche Scientifique. Paris. **10**: 1-135.
- TERZEA ELENA. 1983. Evoluția faunei terestre. In: Badea L. et al. (eds). *Geografia României Vol. 1. Geografia fizică*, Editura Academiei R.S.R. București: 444-450.
- TERZEA ELENA. 1997. Biochronologie du Pliocène du bord méridional du Bassin Dacique. In: Aguilar, Legendre, Michaux (Eds.). *Actes du Congrès Biochrom '97, Mémoires et Travaux de l'E.P.H.E.* Montpellier: 649-660.
- TERZEA ELENA. 2004. Asociații de mamifere din Romanianul de pe țărmul sudic al Bazinului Dacic (România). In: Olteanu R. (Ed.). *Romanianul și problemele lui: faună, stratigrafie, sedimentogeneză*. Institutul de Speologie „E. Racovitza”. București: 57-71.
- TERZEA ELENA. 2005. Ansambluri de mamifere pliocene din Bazinul Dacic (România) și semnificația lor ecologică și paleoclimatică. *Oltenia. Studii și comunicări. Științele Naturii*. Muzeul Olteniei Craiova. **21**: 9-13.
- THOMAS H., SPASSOV N., KODJUMDGIEVA E., POIDEVIN J.-L., POPOV V., SEN S., TASSY P., VISET D. 1986. Résultats préliminaires de la première mission paléontologique franco-bulgare à Dorkovo (arrondissement de Pazardjic, Bulgarie). *Comptes Rendus de l'Académie des Sciences*. Paris. 302. série II. **16**: 1037-1042.
- TOBIEN H. 1996. Evolution of Zygodons with Emphasis on dentition. In: Shoshani J. & Tassy P. (Eds.). *The Proboscidea. Evolution and Palaeoecology of Elephants and Their Relatives*. Oxford Science Publications: 76-85.

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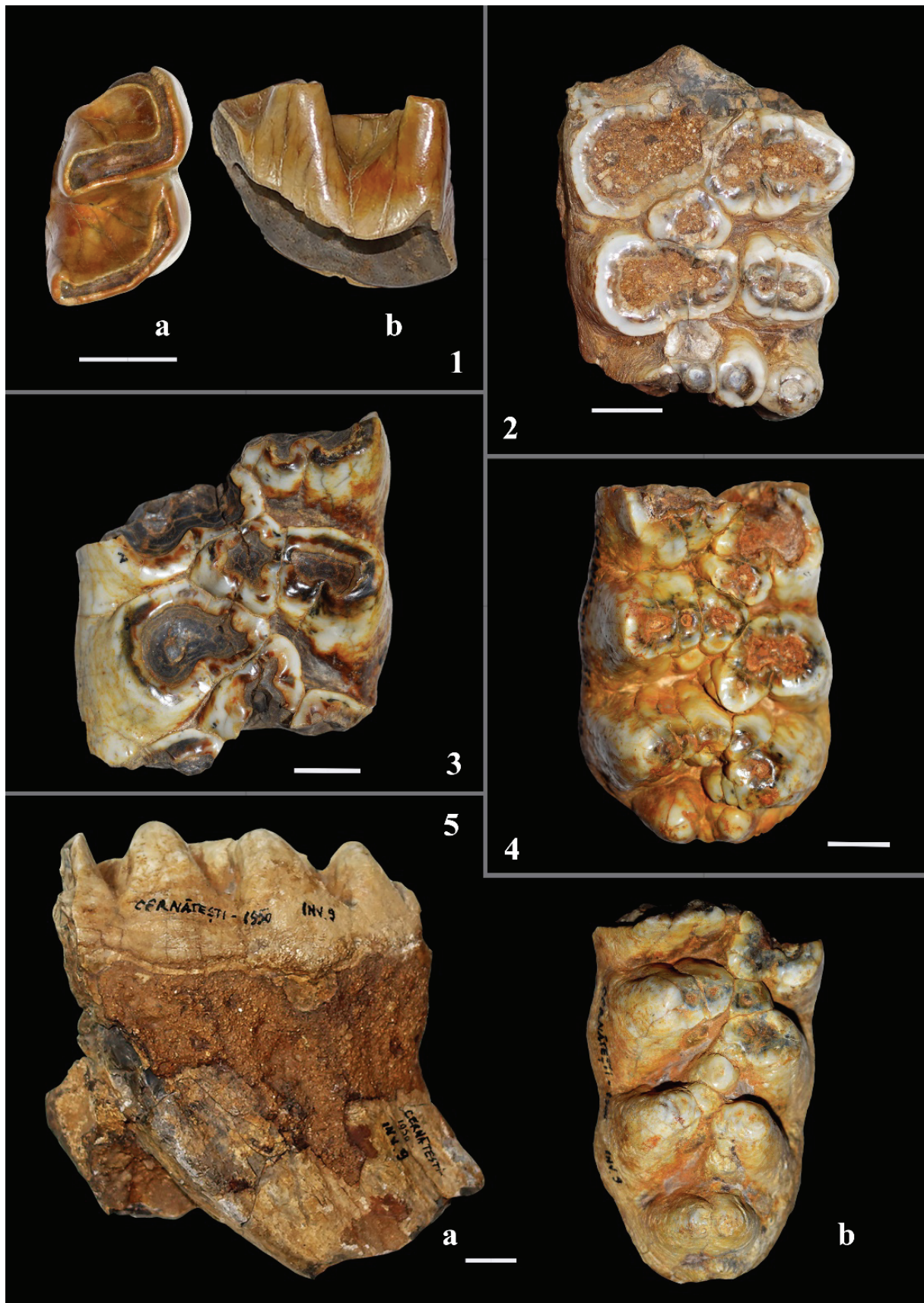
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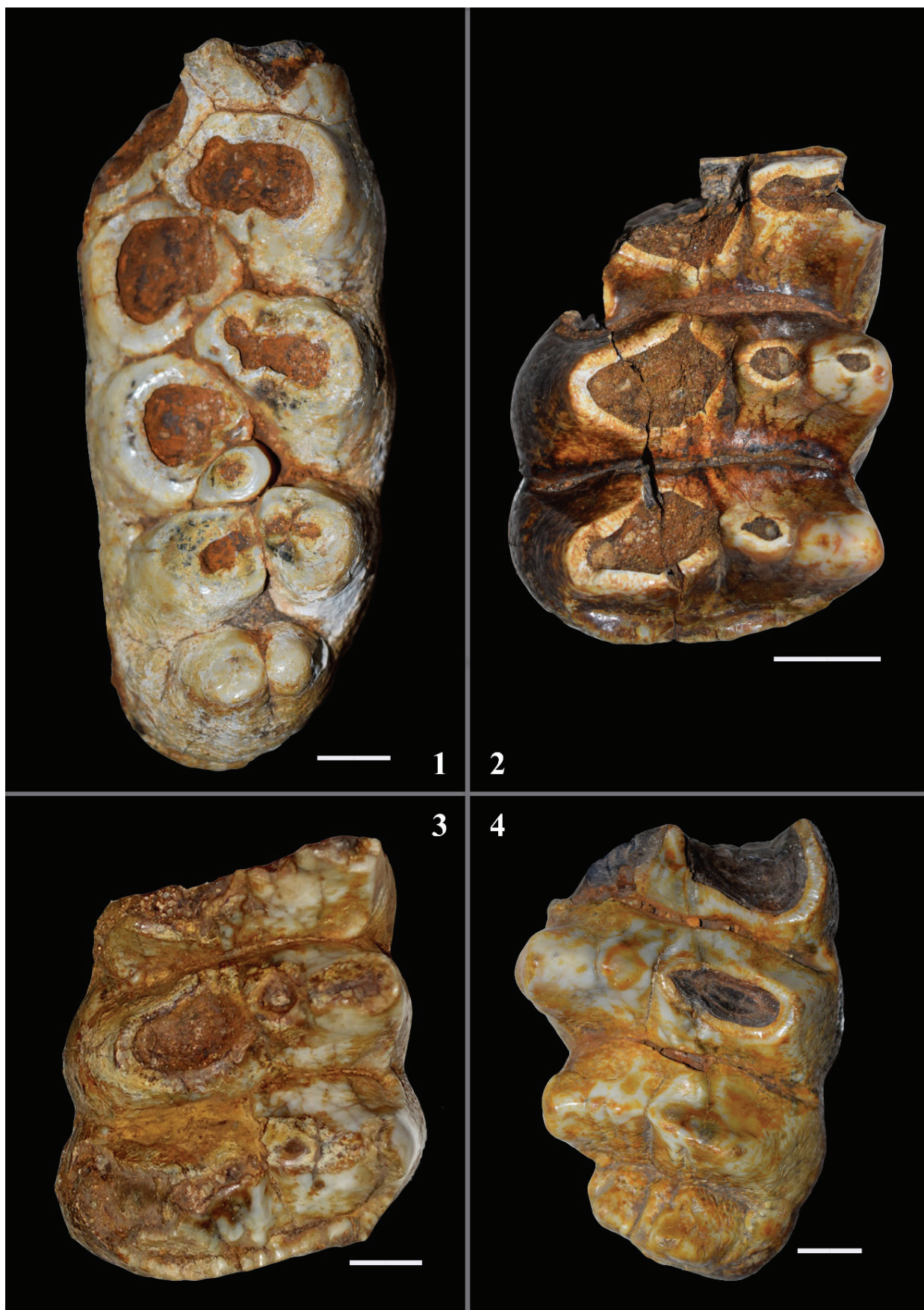
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Plate I



Stephanorhinus sp. – Figures 1a-b: m3 dext. (without inv. no.); *Anancus arvernensis* – Figure 2: M3 sin. (inv. no. CM 8); Figure 3: ?M3 (inv. no. CM 11); Figure 4: m1 dext. (inv. no. CM 14); Figures 5a-b: m3 dext. (inv. no. CM 9).

Plate II



Anancus arvernensis – Figure 1: m3 sin. (inv. no. CM 10); '*Mammut*' *borsoni* - Figure 2: m1 sin. (inv. no. CM 1);
Figure 3: m2 sin. (inv. no. CM 3); Figure 4: m3 dext. (without inv. no.).