Quaternary International 445 (2017) 43–49

Contents lists available at ScienceDirect

Quaternary International

journal homepage: www.elsevier.com/locate/quaint

A new primitive elephantid from Turkey

Ebru Albayrak

Maden Tetkik ve Arama Genel Müdürlüğü, Tabiat Tarihi Muzesi, 06800 Ankara, Turkiye

ARTICLE INFO

Article history:
Available online 6 October 2016

Keywords:
Turkey
Elephant
Elephas planifrons
Mammuthus rumanus
Mandible

ABSTRACT

In this study, a complete mandible and a tusk of an elephantid which were found in Büyükyağlı (Kırıkkale, Turkey) are identified and discussed. The mandible bears the left m1 and both left and right m2 and m3. Molars of this specimen have very primitive features, e.g. low plate number and lamellar frequency, and thick enamel, that make it similar to *Elephas planifrons* of the Siwaliks and early *Mammuthus* species, e.g. *M. rumanus* of Europe. According to previous studies, the locality is dated to the early Late Pliocene, i.e. MN16a. As Turkey occupies a very important position for the migration of Elephantidae between Africa, Asia and Europe, the material from Büyükyağlı may be a key to understanding the evolution of early elephantids out of Africa.

1. Introduction

Turkey occupies a key position between Africa, Asia and Europe, and some important elephantid specimens of different evolutionary stages have been found and studied there. Falconer (1857) described the species *Elephas armeniacus* on the basis of molar teeth from Erzurum, although the status of this species is now considered problematic (Adam, 1988; Dayan, 1989; Lister, 1996). Şenyürek (1960, 1961) identified *Archidiskodon planifrons*, *A. meridionalis* and *Elephas trogontherii* from different localities of Turkey, but these records are in need of revision. Becker-Platen and Sickenberg (1968) and Sickenberg et al. (1975) identified *Mammuthus* (*Archidiskodon*) *meridionalis*, *Palaeoloxodon* sp. ex gr. *Palaeoloxodon antiquus* and *A. planifrons* from the Villafranchian locality of Yukarısöğütönü, as well as the gomphothere *Anacus arvernensis*.

Albayrak and Lister (2012) identified and discussed several species of elephantids from different ages and localities. They identified primitive *M. meridionalis* specimens which may provide evidence of transition from *M. rumanus* to *M. meridionalis*. *M. trogontherii* was identified from two localities and was metrically typical for the species. Lastly, they described *E. maximus* remains from Gavur Lake Swamp which were dated to around 3500 BP according to radiocarbon analysis. Boulbes et al. (2014) identified an incomplete M3 of '*Archidiskodon*' (=*Mammuthus*) *meridionalis meridionalis* from the Denizli Basin which has features similar to the type specimens from Upper Valdarno, Italy.

There are uncertainties and questions about the evolution and the distribution of early elephantids, especially on the genus *Mammuthus*. And also disagreements concerning the genus affiliation and the species of early elephants are still continuing (Lister, 1996; Lister and Sher, 2001; Lister and van Essen, 2003; Lister et al., 2005; Markov, 2012; Baygusheva and Titov, 2012; Baigusheva et al., 2016). Even with the small number of studies of elephantids from Turkey, it can be seen that there are important remains that can help solve problems concerning the evolution and migration of the group. In this context although the systematic position of fossil elephants is mainly determined by the features of skull structure and morphometric data of last molars (Maglio, 1973; Baigusheva et al., 2016) the mandibular specimen described here is a potential key to understanding the migration and early evolution of elephantids outside Africa. In the present study, the new remains from Kale Tepe-3 are discussed. Because of the primitive features of the mandible the definite identification is problematic.

2. Locality

The locality, Kale Tepe-3, is in the southwestern part of the Çankırı-Çorum Basin (ÇÇB) (Fig. 1). ÇÇB, is one of the largest basins of Central Anatolia to have developed Oligocene to Quaternary terrestrial environments (Karadenizli, 2011). Kale Tepe-3 stratigraphically fits within the upper levels of the Akkaşdağı Formation. This formation was first defined by Kazancı et al. (2005) and is composed of massive mudstones, gravelly sandstones, bedded

Abbreviations: MTA, The General Directorate of Mineral Research and Exploration; NHM, Natural History Museum, London.

E-mail address: ebrualbayrak@gmail.com.

http://dx.doi.org/10.1016/j.quaint.2016.09.029
1040-6182/

Fig. 1. The locality Kale Tepe-3. Map adapted from Google Earth.

limestones, laminated claystones and tuffs. The mammalian fauna from the Akkaşdağı tuffs is dated to MN12, i.e. latest Late Miocene (Şen et al., 1998; Kazancı et al., 1999; Şen, 2005). The upper levels of the formation yielded a small mammalian fauna at Balışeyh, a locality close to Kale Tepe-3, dated to MN15, i.e. Early Pliocene, which places the formation in the Late Miocene-Early Pliocene (Karadenizli, 2011).

3. Materials and methods

In 2010, during road construction in Büyükyağlı, Kırıkkale, a tusk and a humerus of a proboscidean were found in the new locality called Kale Tepe-3, followed in 2011 by a complete mandible. As these remains were unearthed during road construction, unfortunately some more remains were destroyed by workers unintentionally. Because the humerus is still in plaster jacket, it is not discussed in this paper. As the tusk and the humerus were found very close to the mandible in the very same level and no other remains were found at the same side of the road, it is considered that these remains belong to the same individual.

In addition to elephantid remains, at the opposite side of the road at the same level, other remains such as fragments of an egg, fragments of turtle shell (most probably *Mauremys* sp., Evangelos Vlachos, 2015, pers. comm.), a carnivore canine, a cervid mandible, and other mammalian tooth fragments were found. These remains will be dealt with separately.

Terminology follows Maglio (1973) for molar teeth and Van der Merwe et al. (1995) for the mandible. As all the tooth specimens in this study are lower molars, they are indicated by lower-case letters. Measurements of teeth were taken according to Beden (1979), Maglio (1973) and Lister (2012) and those of the mandible according to Todd (1997). A small plate at the front or back of a tooth that does not extend fully to the crown base but instead attaches to the adjacent plate is indicated with "x". As the teeth are still buried in the jaw, lamellar frequency was taken near the top of the preserved crown, which may slightly underestimate the average value because of plate convergence (Maglio, 1973). And the height could not be measured because of the position of the teeth in the mandible. The X-ray image was taken in the museum with a portable X-ray machine.

4. Description

4.1. Mandible

The mandible is almost complete, lacking the tip of the symphysis (Fig. 2). The symphysis is broken rostrally, but it is clear that it has a long, rostroventrally-oriented symphyseal process. Behind the posterior border of the symphysis, the ventral border of the corpus is slightly concave. The corpus becomes dorsoventrally deeper toward the front of the mandible and is deepest at the level of anteriormost tooth, which is m1 in this specimen.

The coronoid process extends rostrally to the level of the second plate of m3 (Fig. 2a). The dorsal border of the coronoid process is not far from the level of caput and there is only a slight concavity between them. On the lateral side of the ramus, the masseteric fossa is well defined and quite deep, while on the medial side, the pterygoid fossa is gently concave. The mandibular foramen is very large, elliptical in shape, and close to the posterior border of the mandibular ramus. It is a little higher than the level of the occlusal plane.

There are two principal lateral mental foramina, as well as accessory foramina (Fig. 2a). The posterior mental foramen (PMF) is located behind the posterior border of the symphysis, in the middle of the corpus, below the first plate of m2. The anterior mental foramen (AMF) is located in front of the posterior border of the symphysis. The number of accessory foramina differs between the left and right halves of the jaw. On the left side there is one foramen, placed just at the level of the posterior border of the symphysis. On the right side there are two accessory foramina, placed between the anterior and posterior foramina, close to the anterior one. The accessory foramina are close to the dorsal border of the symphysis. There is no coronoid foramen or medial mental foramen. Measurements of the mandible are given in Table 1.

Table 1
Measurements of the mandible from Kale Tepe-3 (MTA Natural History Museum, Ankara no.71KT01). Measurements in round brackets are approximate, because of the broken parts. All measurements are in millimetres.

Width of the whole mandible, anterior to toothrow	168.0
Width of the whole mandible at coronoid process	550.0
Length of the toothrow	
Left	(350,0)
Right	(340.0)
Corpus thickness (medio-lateral width) at anterior of first molar in toothrow	
Left	98.6
Right	89.5
Corpus thickness at the base of coronoid process	
Left	192.9
Right	187.4
Height of corpus at anterior alveolar border of first molar in toothrow	
Left	230.0
Right	243.0
Height of mandible at coronoid process	
Left	345.0
Right	335.0
Antero-posterior width of corpus at coronoid process	
Left	335.0
Right	345.0
Maximum length of mandible	(710.0)