



SCIENTIFIC ANNALS of the School of Geology,
Aristotle University of Thessaloniki

SPECIAL VOLUME 102



ABSTRACT BOOK

Editors:

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THESSALONIKI, MAY 2014

Excavations in the Early Villafranchian site Milia-5 (Grevena, Greece): a multidisciplinary approach

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Milia (Grevena, W. Macedonia), an Early Villafranchian fossiliferous locality is systematically excavated since 1996. Eleven different fossil spots have been located till nowadays with most characteristic findings that of incomplete Borson's mastodon partial skeletons including two pairs of the longest tusks in the world (4.39 m and 5.02 m). The Milia preliminarily faunal list includes the following species: *Mammot borsoni*, *Anancus arvernensis*, *Hipparion crassum* s.l., *Tapirus arvernensis arvernensis*, *Dicerorhinus jeanvireti*, *Sus arvernensis arvernensis*, *Gazella borbonica*, *Croizetoceros ramosus*, large bovid, *Homotherium crenatidens*, *Agriotherium* sp., *Ursus etruscus*, *Hystrix* cf. *refossa* and turtles (Tsoukala 2000; Tsoukala et al., 2010; Guerin and Tsoukala, 2013).

Among several fossil spots discovered, Milia-5 is of particular interest because:

1. Its stratigraphic position is less than two meters below an overlying lacustrine formation/horizon bearing plant and mollusk remains.
2. The fossil material includes specimens of *M. borsoni*, large bovid, and *Agriotherium*, verifying the co-occurrence of these taxa.
3. It can be correlated stratigraphically with the site of Priporos (included in the Milia fossil spots) with *Dicerorhinus jeanvireti* finds.

In August 2007, sediment samples, plant remains and mollusks as well as detailed taphonomical field notes were collected during the excavation of Milia-5 site. The analysis of these samples and data is presented in this study in order to provide a multidisciplinary interpretation for the paleoecology, taphonomy, sedimentology and stratigraphy of the locality.

Fossil plants of Milia-5 include the following nine species: *Acer pseudoplatanus* L. foss., *A. campestre* L. foss., *Carya denticulata* (C.O. Weber) Iljinsk., *Fagus sylvatica* L. foss., *Potamogeton natans* L. foss., *Pterocarya paradisiaca* (Unger) Iljinsk., *Quercus mediterranea* Unger, *Q. pseudocastanea* Goeppert, *Zelkova carpinifolia* (Pall.) K. Koch foss. Most of them are similar or identical to modern species common in Europe, apart from the Middle Oligocene - Upper Pliocene species *Carya denticulata*, allowing Milia flora to be dated close to the Pliocene/Pleistocene boundary. Due to relative abundance of mesoxerophytic species imprints, and mesophytic species representation by only one or two specimens, it is suggested that the vegetation has evolved under the influence of subarid climatic phase (Palamarev, 2004). This vegetation is represented by mesoxerophytic oak forests interspersed with wood species of mesophytic character. Moreover, the presence of hydrophytic and hygromesophytic species is related to the water basin, wherein the plant material was deposited.

Each sedimentary layer of the Milia-5 excavation site was sampled for detailed textural and lithological characterization; in total 12 sediment samples were

collected. The majority of the sediment samples were classified as mud and silt, while the fossils are scattered in sand to muddy sand deposits.

Taphonomical analysis includes the spatial and directional distribution of the Milia-5 fossil finds and the fracture modification of the mastodon remains. Bone's transverse fractures are dominating. Many of them are complete segmental while other are oblique. Radiating fractures found to the flat ends of the bones, at the surface on which it was lying on the sediment. This may be a criterion in cases of re-deposition of fossils. The conditions that influenced the placement of the bones in their final deposition seem to vary from weak shallow current that acted to the anterior part of the skeleton and a stronger current that removed completely the hind leg elements and the pelvis and vertebrae. The tusks are suggested to have been acted as a barrier that blocked the removal of the rest skeleton parts. A river-bank is suggested as death site of the mastodon. An E-W to NE-SW direction of paleoflow resulted in the entrapment of the fossils in the "shadow" of the tusks; whereas the posterior elements that were located far from the tusks were exposed to stronger flow and they were completely removed.

Biochronology of the Milia localities is compared with other Eurasian Pliocene faunas and found closely associated with Etouaires and Viallette in France, which are dated to MN16a biozone and less close to Kislàng, Hungary of MN16b and younger faunas.

Faunal similarity indices such as Simpson's Index, Pickford Index and a cluster analysis with Bray-Curtis coefficient suggest significant similarity between the Milia faunal assemblage and that of Etouaires confirming previous suggestions about the age of the Milia locality (Guerin and Tsoukala, 2013). Moreover, the composition of the fauna and the significant similarity with Etouaires suggest that the Milia area was a forested landscape underwent warm and humid climate.

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Citation:

Lazaridis, G., Kantiranis, N., Ioakeimidis, I., Bozukov, V., 2014. Excavations in the Early Villafranchian site Milia-5 (Grevena, Greece): a multidisciplinary approach. Abstract Book of the VIth International Conference on Mammoths and their Relatives. S.A.S.G., Special Volume 102: 2.