The excavations of the last ten years at Charkadio cave on Tilos Island, Dodekanese, Greece

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SUMMARY: The excavations at Charkadio cave on the island of Tilos have brought to light a very rich fauna of endemic fossil dwarf elephants. The excavations, by the Department of Historical Geology and Palaeontology of University of Athens, started in 1971 and continue until today (Symeonides 1972, Bachmayer *et al.* 1976, 1984, Theodorou 1983, 1984, 1988, Theodorou *et al.* 1997). Recent excavations (July 2000 and July 2001) revealed for first time significant dwarf elephant skeletal remains, such as anterior and posterior legs and vertebrae from different juvenile and adult animals in anatomical position. The findings are presented to the public at the Town Hall of Megalo Chorio on Tilos Island.

1. Introduction

The purpose of this short presentation is to summarize available knowledge on the Tilos elephants, and to briefly mention some of the latest results on their taphonomy from the analysis of hundreds of drawings and pictures taken at different depths and sites in the cave (Theodorou, in prep). During the first 10 years, our efforts were aimed at gathering information on the stratigraphy, from the surface of the sediment up to a depth of 8.5 meters. Slowly it became clear that in order to answer some crucial questions about the cave fauna, research should give special emphasis to the detailed taphonomy. The extinction event of the elephants had to be correlated with Late Quaternary climatic events, volcanic activity or the possible co-occurrence of man and elephant on the Island during the Holocene. We had to deal with absolute dating, fossilization and taphonomy. The occurence of newly born, juvenile, adult and aged animals had to be explained. Morphological and biometrical studies produced significant information (Theodorou 1983) and allowed the recognition of two size groups belonging to males and females. The lack of complete skeletons, significant articulated parts, a complete vertebral column or significant cranial remains prevented us until now from giving a complete presentation and description of the elephants, and provisionally the name "*Palaeoloxodon antiquus falconeri*" was used, though it was clear (Theodorou 1983) that there was no direct contact between the populations of different Mediterranean Islands. We also had to answer some important questions. If deposition of the bones in the sediment was natural, could it be correlated with a catastrophic event, or did humans introduce the fossil bones while residing in the cave? Did people use the elephants for food? Did they transfer elephant body parts into the cave after killing the animals in the open? Did people arrive on the island before or after the extinction of the elephants?

2. Excavations of the Last Decade

During the last 10 years we have begun to collect data that could give answers to the above-mentioned questions. We changed our way of working. Instead of digging deeper, we started to uncover large surfaces, good for taphonomical studies. To do this we had to face many serious technical problems, some still unsolved. Most of the sediment surface of the first cave chamber is covered by rocks col-

Fig.1 - Fossil bones of dwarf elephants at Charkadio cave on Tilos Island. Some of the long bones were found articulated in anatomical position (© G. Theodorou, Excavation July 2000).

lapsed from the roof. The fallen rocks make a layer which in some places is thicker than 1.3 m. Below the collapsed rocks we were lucky enough to uncover after 25 years of excavations fragmented skull remains, that are still being prepared with extreme difficulty. We still lack a skull with both tusks in the alveoli. Slowly during the last 5 years a substantial excavation surface has become available, and provided us for first time with significant taphonomical information documented in hundreds of drawings.

3. Discussion and Conclusions

The taphonomical study allowed us in July 2000 and July 2001 to document the existence of articulated long bones, vertebrae in natural sequence, carpal and tarsal bones etc., all *in situ*. The excavations also revealed also for first time (July 2000) inclined fossiliferous layers dipping toward the southeastern corner of the cave. Skeletal remains have been used for DNA analysis (Poulakakis, in prep.) revealing a relationship to recent Asiatic elephants. Separate studies carried out on the fossilization (Theodorou *et al.* 1985, Stathopoulou 2000) and studies on the micromorphology of tusks and bones (Theodorou *et al,* in prep.) have allowed us better to understand the morphology and evolution of the Tilos elephants, the last European elephants. These studies make up the database necessary to allow the study of elephant remains

Fig.2 - One of the very rare cranial remains of the dwarf elephants of Tilos, belonging to a very young animal. It has been restored from more than 190 fragments. (Max. length 29 cm) (© G. Theodorou).

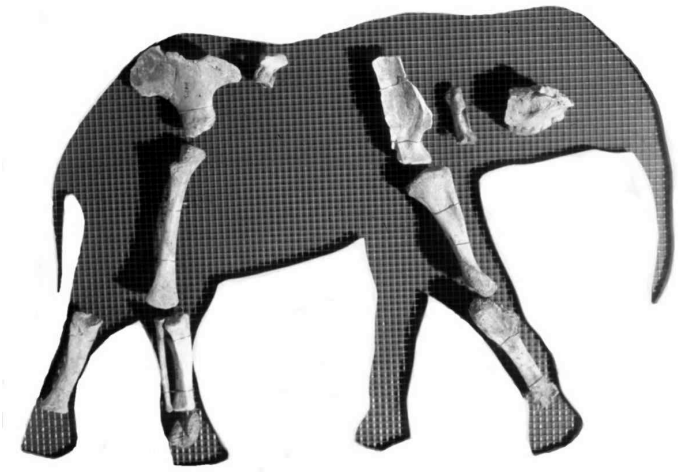

Fig.3 - Biometrical reconstruction of a juvenile skeleton (about 50x70 cm) in the exhibition room of the Town Hall at Megalo Chorio on Tilos Island. (© G. Theodorou).

found in archaeological collections all over Greece and especially on islands with endemic elephants. It is well known that all such remains are usually attributed to trade and not to the collection of fossils by Man. The relation of the Tilos elephants to Man is still unclear. The findings in anatomical position in layers that correspond to the last eustatic minimum cannot be correlated with human activity, making the problematic tusks fragments published long ago the only indication of Man in the cave.

4. Presentation of Scientific Results to the Public

An exhibition about the excavations opened in 1994 at the Town Hall of Tilos, and it will be soon transferred to a new building close to the cave that is being constructed. The small open-air summer theater, which was constructed by

the Municipality of Tilos near Charkadio, and the asphalt road to the cave, have given a new dimension to the fossiliferous locality. All of these have allowed us to bring Vertebrate Palaeontology where it belongs: to the people of Greece and of Europe, who have to understand the very important environmental changes that occurred during Quaternary and the quality and fragility of the fossil treasures from our past that have to be studied, protected and preserved.

5. Acknowledgements

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