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CRETE

Demos Tsantilis

a Continent in an Island

The book with the most complete view on the unique Cretan environment

With more than 350 photos

EDITION 2015

Natural History Museum of Crete

UNIVERSITY OF CRETE

Reptiles and amphibians

Frogs are not found in volcanic islands.

Charles Lyell, *Notebook*, 1856

The Bufo viridis toad a well adapted to the dry climate of Crete.

Pleistocene arrivals

The first large mammals arrived on Crete in the early Pleistocene, and were to all probability the ancestors of the Cretan dwarf hippopotamus and dwarf proboscidean. The ancestor of Hippopotamus creteensis, the dwarf hippopotamus, is considered to be Hippopotamus antiquus, the large-bodied animal living on continental Europe during the Pleistocene. When did it come to Crete? The first hippopotamuses arrived at least 1.3 million years ago. The second colonizer was the dwarf proboscidean. Until recently its precise ancestor remained unknown, it was obviously some large proboscidean, but which one? Two hypotheses had been advanced. "The ancestor of the Cretan dwarf elephant was a large-bodied continental elephant" was one of them, and "the ancestor of the Cretan dwarf elephant was a large-bodied mammoth" was the other. Which of the two theories was correct? In what follows we shall see.

The first elephants appeared in Europe around 700,000 years ago, a good deal later than the moment when the dwarf proboscidean appeared on Crete. So Cretan dwarf elephants are older than European elephants, and thus cannot derive from them. Consequently, the dwarf "elephant C" ancestor was not an elephant. It was probably one of the southern mammoths that roamed the European plains quite some time before the early Pleistocene, and most definitely long before the first elephants. So the dwarf proboscidean does not belong to the genus Elephas, but rather to the genus Mammuthus (Mammuthus creticus). This view was recently confirmed by DNA genetic analyses carried out in the Molecular Systematics and Evolution Laboratory at the Natural History Museum of Crete.

Fig. 3.7., above: Part of a dwarf hippopotamus jaw (in Kathara).

Fig. 3.8., below: Dwarf hippopotamus molar, disengaged recently (in Kathara).

Fig. 3.9. Possible migration routes taken by primitive elephantoids (Mammuthus rhenanus and Elephas antiquus) to colonize Mediterranean islands including Crete, during the Middle and Upper Pleistocene epochs (Kotsakis).

Fig. 3.10., below: Left lower third molar of a dwarf elephant (Elephas creticus) found on Kathara by Yannis Tsiglenos.

The ancestor of the dwarf hippopotamus is considered to be Hippopotamus antiquus, the large-bodied animal living on continental Europe during the Pleistocene.

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In collaboration with its counterpart at Yale University, which showed that the dwarf proboscidean does indeed belong to the genus Mammuthus.

What then of the relationship between dwarf mammoths and dwarf hippopotamuses? Did they coexist? Until recently, available finds did not substantiate such a claim for Crete. So is that the end of the story? Of course not! Finds from the Apokoronas area in Chania prefecture that came to light in 2009 may change the earlier picture, confirming the idea of coexistence.

Shrinking

Could there be some magical power on Crete and the other islands of the Mediterranean that transforms large mammals into miniatures? The answer to yes, there really is a power, though barely magical. In its environmental adaptation via natural selection, in nature, survivors are not always mighty Goliaths, but often better adapted microscopic Davids.

Arriving on an island like Crete, large-bodied, generalist herbivores discovered a country devoid of dangerous carnivores. Their absence seems strange, but the explanation for it is simple: in contrast to elephants, hippopotamuses and deer, carnivorous lions, leopards, wolves and hyenas are poor swimmers.

Free of predators, then, the large herbivores that colonized Crete and other islands were born and multiplied uncontrollably. They thus rapidly discovered the dark side of the island refuge where they were trapped. There was not enough food to go round. Competition over the limited surface area of the island was relentless, and the pressure on vegetation highly intense. Overgrazing and the erosion caused as the ground was pulverized by the hooves of herbivores proliferating at an exponential rate must have limited available food even further.

In these difficult conditions, individuals of smaller dimensions had better chances of surviving and reproducing. Large size was in any case now useless to the herbivores, since it merely offered protection from large carnivores, which, as we have said, did not exist on the islands.