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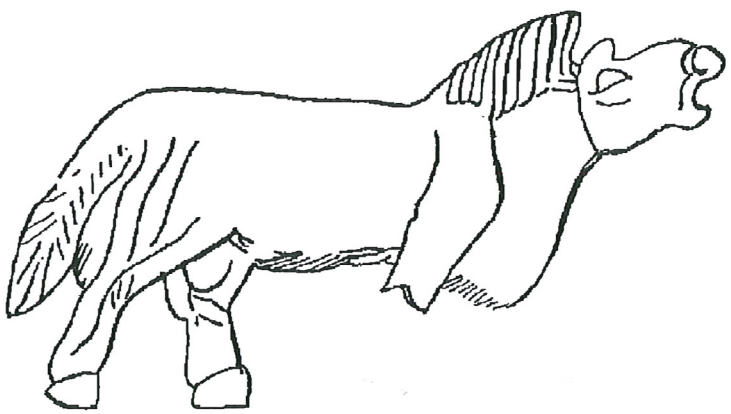

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VOLUME B

THE INTRODUCTION OF ANIMALS BY MAN IN CYPRUS: AN ALTERNATIVE TO THE NOAH'S ARK MODEL

Pierre Ducos[1]

> The first time I went out I presently discovered that there were goats in the island, which was a great satisfaction to me; but then it was attended with this misfortune to me, viz. that they were so shy, so subtile, and so swift of foot, that it was the difficultest thing in the world to come at them.
>
> Daniel Defoe, *The life and strange surprizing adventures of Robinson Crusoe, of York.* London, 1719)

Abstract

It is generally admitted following Payne (1968), that the wild Caprines of the islands of the mediterranian were introducd by man. In this paper it is shown that the osteologic and osteometric features of *Ovis orientalis*, *Capra hircus* and *Sus scrofa* of the Pre-Pottery Neolithic of Khirokitia (Cyprus) do not display any significant differences with specimens found on continental Levantine sites before domestication Moreover, if the introduction of a few couples of one or the other of these species is simulated in a situation without predators, such as Cyprus where they were imported, it becomes evident that the Noah's Ark pattern would lead to an improbable situation. On the contrary, the species under study were imported as wild specimens and released on the Island. Therefore the first sedentary settlements of the Pre-Pottery Neolithic relied locally exploitable animal populations that lived there before their arrival.

Resumé

Il est généralement admis, avec Payne (1968), que les Caprinés sauvages des îles de la Méditerranée y ont été introduits par l'homme. Dans cette communication, il est montré que les caractères ostéologiques et ostéométriques d'*Ovis orientalis*, de *Capra aegagrus* et de *Sus scrofa* du site néolithique précéramique de Khirokitia (Chypre) ne montrent aucune différence significative avec les spécimens des sites du Levant continental antérieurs à la domestication, et que les modalités de leur exploitation par l'Homme ne correspondent pas à une véritable domestication. En outre, par des simulations de situations d'introduction de quelques couples de telle ou telle espèce dans un milieu sans prédateur, comme l'était Chypre au moment de l'introduction de ces espèces, il devient évident que le modèle de "l'Arche de Noé" conduit à une situation d'invraisemblance. Au contraire, les espèces en question ont été introduites *en tant qu'individus sauvages* mis en liberté sur l'île. Le premiers établissements sédentaires du Néolithique précéramique ont ainsi trouvé sur place des populations animales exploitables qui s'y étaient développées avant leur arrivée.

Key Words: Cyprus, Neolithic, Species Introduction, Pre-Domestication

Mots Clés: Chypre, Néolithique, Introduction d'espèces, Pré-domestication

Introduction

It is generally accepted, following Payne (1968) that species in the genera *Bos*, *Ovis*, *Capra*, *Sus* had been introduced by man into the Mediterranean islands, at an incipient stage of their domestication. Groves (1989) provides a bibliography of the taxonomic attribution of the mammals introduced, "during the Holocene", into the Mediterranean islands. He compares the cranial capacity of recent

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specimens of *Capra*, *Ovis* and *Sus* (as well as *Felis*) from the islands to living specimens of wild animals, and concludes that the first two species were introduced at a "very primitive stage" of domestication, while the others were introduced as truely wild animals. My purpose, here, is to provide arguments based not on observations of living animals, but with reference to the fossil specimens as they appeared around the time they were introduced into Cyprus.

This point of view has been developed by Davis (1984, 1989) with regard to *Ovis*, *Capra*, *Sus* and *Dama* whose bone remains from Khirokitia (Prepottery Neolithic) are described by him. When Davis published the animal remains, Khirokitia was the most ancient settlement known in Cyprus, but Shillourokambos, recently excavated by Jean Guilaine, seems to be earlier.

According to Davis (1984), the people who established the PPN village of Khirokitia came from the continent with domestic sheep, goat and pig. Wild species, such as *Dama mesopotamica*, and *Vulpes* sp., were also introduced by man. *Vulpes* was probably imported by accident. The newcomers obtained their food from their domestic animals. The status of *Dama* remains enigmatic (fishing seems not to have been practiced at Khirokitia). This model (as aptly stated in the title of Davis's paper from 1984) is the "Noah's Ark model".

Carrère, according to the preliminary report published on Shillourokambos (Guilaine *et al.* 1995) and Vigne (his lecture given at the Groningen ICAZ meeting in June 1998), appear to adopt this model and add one species, cattle, whose small size seems to confirm their domestic status. Surprisingly, Vigne noticed that the supposedly domestic cattle disappeared when the site was abandonned and are not found again in Cyprus until the Bronze Age.

Without a doubt, ruminants and suidae were introduced to Cyprus quite recently. But in this paper, I would like to present three arguments which suggest that the "Noah's Ark model" is unreliable, and at the same time to suggest another one briefly in the conclusions. I will use Davis' published data and add data from the bone assemblage studied by me from the previous excavations by P. Dikhaios in the 1960s. I was given permission, during the sixties, to make one study of his collection, still unpublished.

Did the introduced species differ from wild continental specimens?

Plates 1 and 2 confirm Davis' opinion that no actual metrical and/or morphological differences exist between specimens of *Ovis* and *Capra* from Khirokitia on the one hand and continental animals on the other. The horn cores from Dikhaios' excavations are very large and are not twisted (*Capra*: 7 specimens, D.max.= 27 to 72 mm; *Ovis*: 18 specimens, D. max.= 52 to 78 mm). Comparisons of size, using a size index (for details on this method see Ducos 1991; Ducos and Horwitz 1997) show, when the whole range of size variation in their populations is considered, that *Capra*, as well as *Ovis*, are of similar size to continental specimens from Prepottery or Natufian settlements, without any visible diminution of size.

In contrast, *Sus* at Khirokitia seems to be smaller than the suidae from Abu Gosh, Aswad, Mureybet and Mallaha, but is similar in this respect to remains from Ramad and Jericho. Nevertheless, this should not be taken as an unrefutable argument of its domestic status as other factors such as climatic variation in mean temperatures also produces significant variation in size among species (Ducos and Horwitz 1997). Isolation is a factor which can diminish size. *Sus* has two specific conditions: competition with dwarf hippos in the same ecological niche and also its faster rate of reproduction compared to *Ovis* or *Capra* (many more offspring, less time between generations as suggested by L. Horwitz personal communication). These could explain why *Sus* is the only genus which underwent a significant reduction in size.

Is the exploitation of *Ovis* and *Capra* by human populations at Khirokitia an indicator of domestication?

I have applied here a new method which will be presented in detail in the publication of the session on Methods given at the ICAZ Conference in Victoria. Briefly, the method entails reconstructing an expected thanatocoenosis (set of complete skeletons which constitute a single population of dead individuals) whose composition in age classes is such that the frequencies of the dental wear stages and states of bone fusion are as close as possible to that observed in the studied bone assemblage itself. The different categories of teeth and all parts of the skeleton are, of course, considered separately and their differential preservation estimated and taken into acount, using a computer program which weights each group (Ducos, in press, Archaeozoologia vol. XI). The question that is then posed is: what kind of exploitation could give rise to such a thanatocoenosis?

Plate 3 shows that no real age selection is evident in the human cull of goats or sheep. No significant "peak" appears in the distribution of the age classes of the thanatocoenosis assemblage. This corresponds to a very clear hunting practice and not to exploitation of domestic animals. In the latter case, peaks corresponding to young and juvenile/sub-adult males are characteristic. Moreover, it does not correspond to a situation of pre-domestication, where juvenile adults dominate (Ducos 1998).

Under what conditions are populations derived from introduced individuals exploited?

A study by Papageorghiou (1974) of Agrimi (*Capra aegagrus cretica*) from Theodoru Island (Crete) provides valuable (by valuable I mean as those coming from other known *C. aegagrus* populations) survival rates which allow us to calculate the increasing number of individuals generated from a few couples imported into an area where no predators exist. If we assume that a high proportion of young males (set randomly at 70%) could be slaughtered without affecting population increase, we can calculate the amount of potential food available for people at any point in time.

We must keep in mind that the aim of this research is to provide some idea of the period immediately following the introduction of a few individuals into the island and the creation/development of an exploitable population. For this purpose, I have used several simple computer programs written in QuickBasic language for simulating under different conditions, a series of "populations", expressed in terms of age classes. In this program the sex ratio has been set at 1 and the fecundity rate at 0.9, while the survivorship rates are those calculated by Papaghorgiou (1974). The program starts with a single "population", and transforms it by applying the survivorship rates to each age class (single month classes), and so on. It is then easy to sum up the age classes of those successive sets of individuals in order to see their numeric increase per month.

One deterministic model (Plate 4a) is obtained using the rates as permanent values from which we can predict the successive number of individuals surviving. But as we are dealing with very small populations, at least in the begining, too many predictions cannot be permitted (see Ricklefs 1989: 364). We must introduce into the program the survival potential for each individual. Then, the program will take the survival rates as probabilities, and will apply those probabilities to each living individual in the population to decide whether it dies or survives for one more month. Fourteen simulations have been carried out: 5 of them exhibit a good population increase, but at different speeds; 1 maintained itself at a very low rate of increase, while 8 lead to extinction. The theoretical curve corresponds, in some way, to the mean result of the simulations.

We can see (Plate 3) that to produce 50 individuals/year for the human group (less than one individual/week), the newly created village would have had theoretically to wait at least 25 years and almost certainly more (equal in the best case to one complete human generation!). Different events can slow down the population increase or completely destroy the population when it results from couples, as shown by different simulations.

During this time, the human group, after having constructed their houses would have to modify their dietary habits, becoming fishermen (not at Khirokitia) or strictly vegetarian and be patient while waiting for their herds to produce again. Obviously, this is totally untenable.

Conclusions

As point 3 shows, the introduction of artiodactyls (except *Hippopotamus*, which already existed on the island), occured a long time before sedentary Prepottery Neolithic human groups arrived on the island. Cyprus was visited by people long time before these settlements, as is now well attested to at Akrotiri (Reese 1996). These people, who could have come for short visits to hunt hippos or fishing or for other currently unknown reasons, and could have deliberately introduced a few couples of wild ruminants and suidae, which were not at this time exploited in the same systematic way as latter populations living in permanent and definitive settlements did. The human groups who came during the 8th or 7th millennium were not herders, but sedentary hunters (gatherers or practising some agriculture). They came from the continent, where there was no domestication of animals known at this time, at least not in the coastal regions.

My conclusions differ from those reached by Groves in that I think that, genera such as *Sus* and *Dama*, *Ovis* and *Capra* were introduced as wild animals. Consequently, they were introduced not at a "primitive" or "incipient" stage of domestication (one cannot clearly define animal/man relationships), but at a stage of pre-domestication, i.e. prior to domestication. "Pre-domestication" is a better name than proto-domestication, because it emphasizes that it entails a rational exploitation of animal populations living in the wild by human groups. The morphometric or genetic particularities of the populations resulting from the introduced species would be caused by isolation, local domestication after they had been introduced, and contacts with domesticated forms introduced later on, even up until recent times.

One consequence of this early introduction is that *Ovis orientalis* in Cyprus is not a feral, but originally a wild animal which subsequently underwent mixing with domestic individuals (in my opinion, not so often as is generally suggested). The same scenario may be considered for Agrimi in Crete and mufflon in Corsica.

Remerciements

Je remercie ici Liora K. Horwitz qui a bien voulu présenter ma communication en session lors de la conférence de l'ASWA à Paris, et a également revu mon texte en anglais. Je la remercie aussi pour les échanges d'idées que nous avons eus en préparant ses deux interventions.

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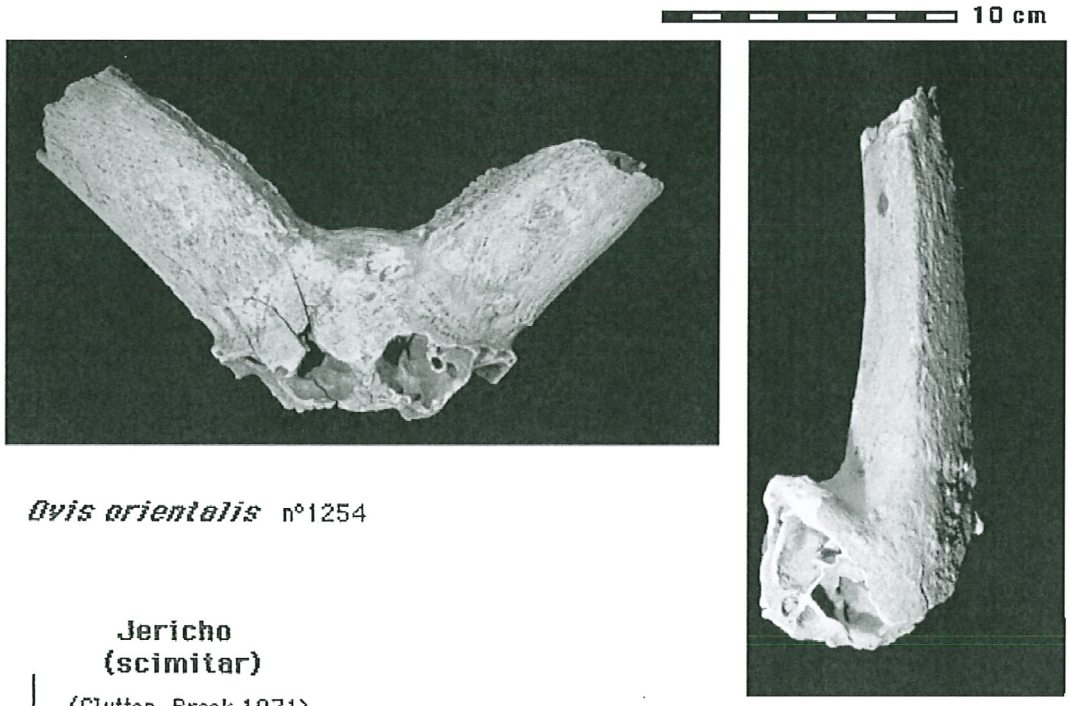
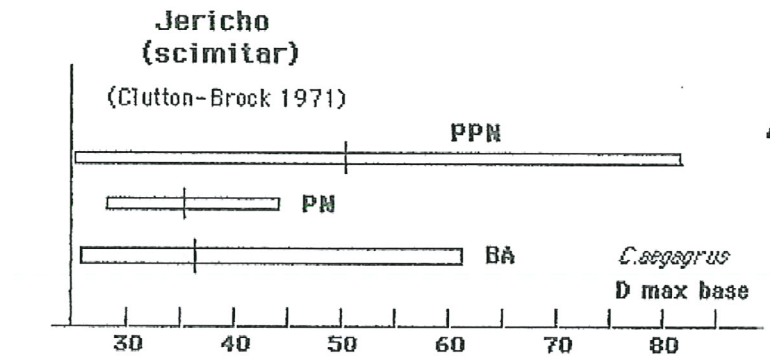
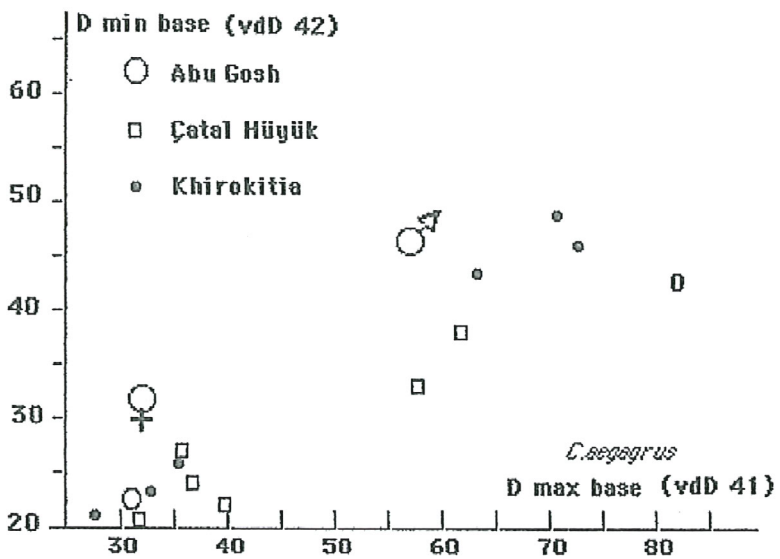






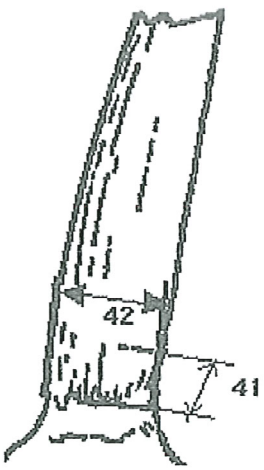


Plate 1. *Ovis* and *Capra*. Khirokitia: horn cores from the old excavations by P. Dikhaios
Measurements after von den Driesch 1976 (vdD)

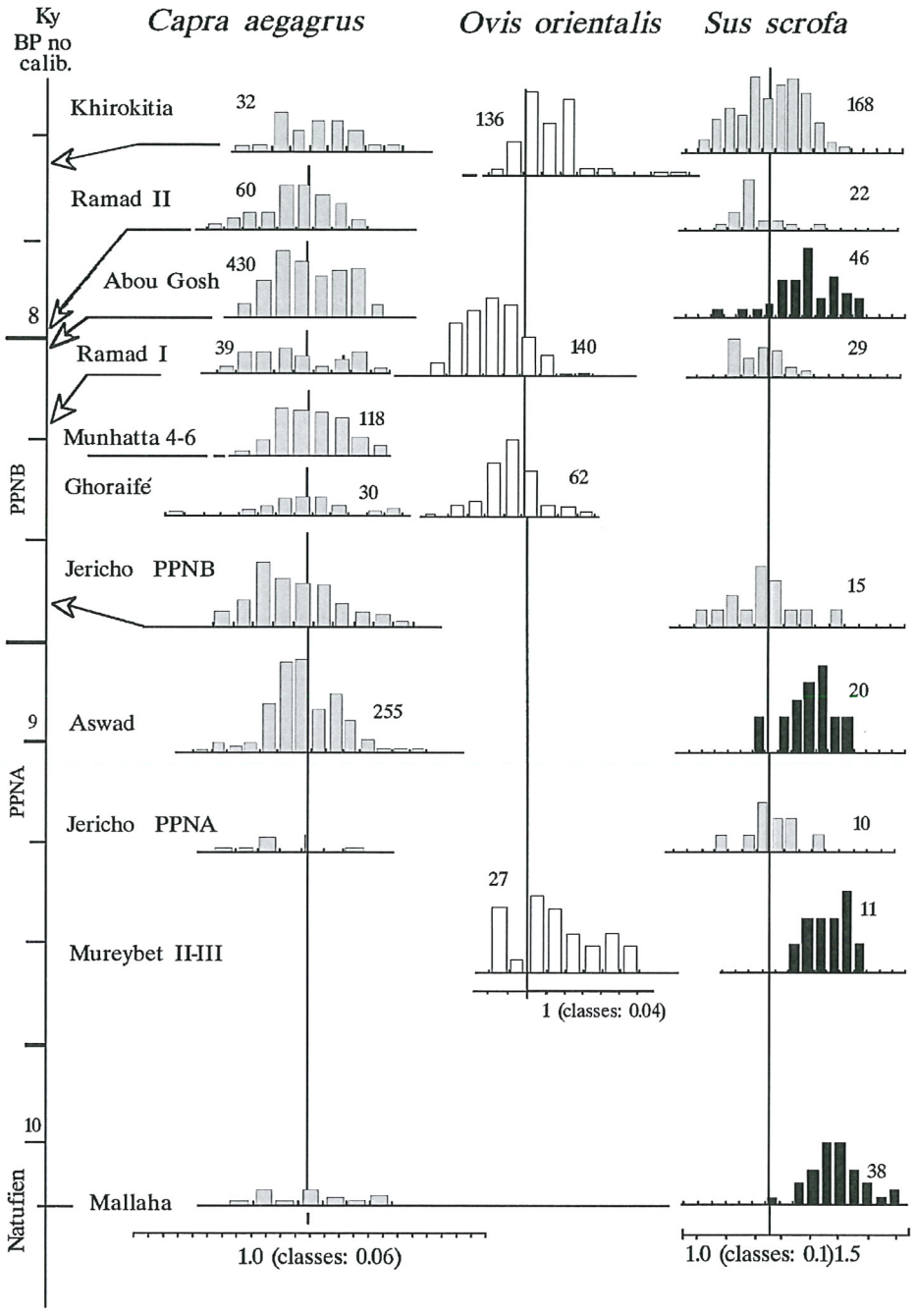


Plate 2. Size index of Khirokitia: *Capra*, *Ovis* and *Sus* compared to data from continental sites, after Ducos and Horwitz 1997

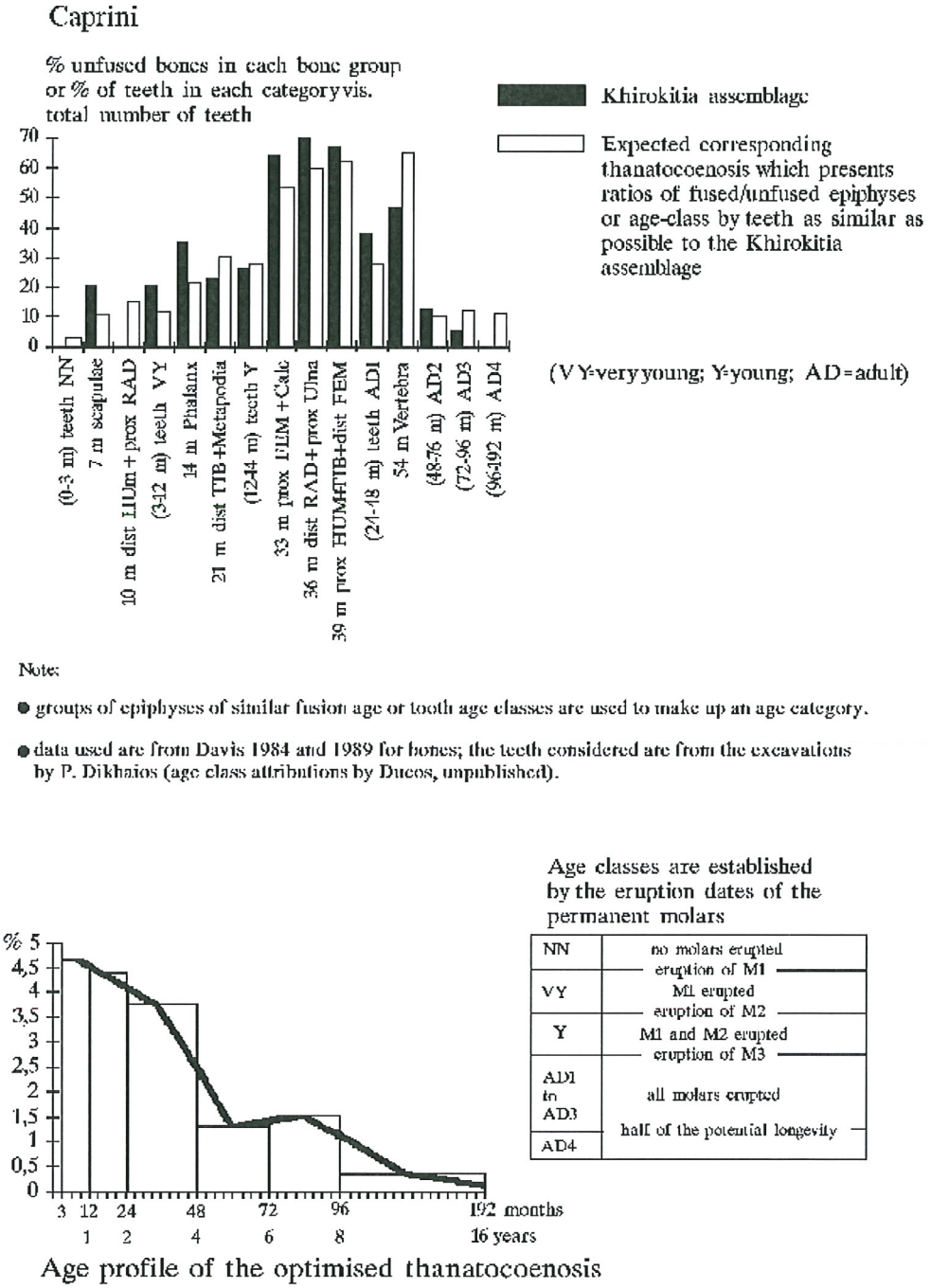
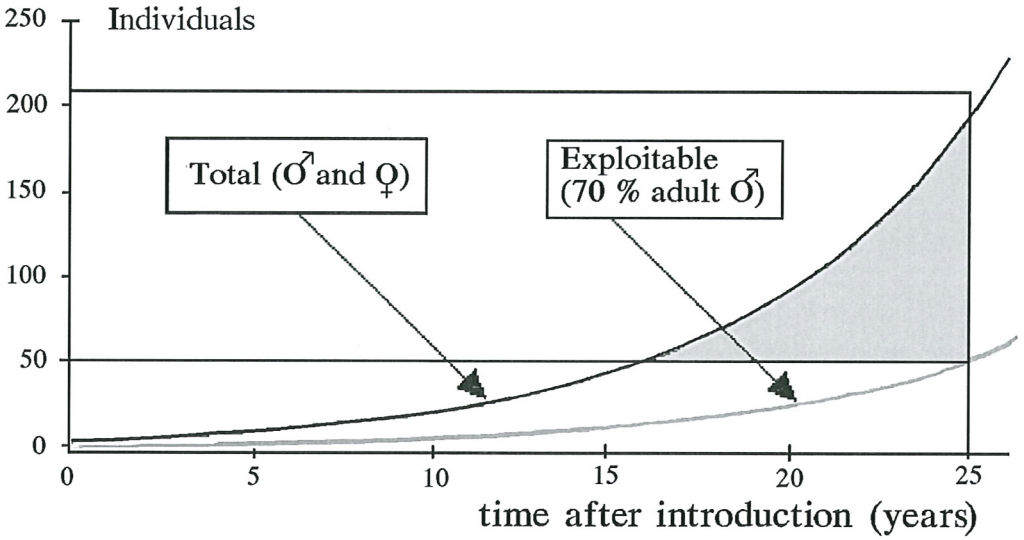
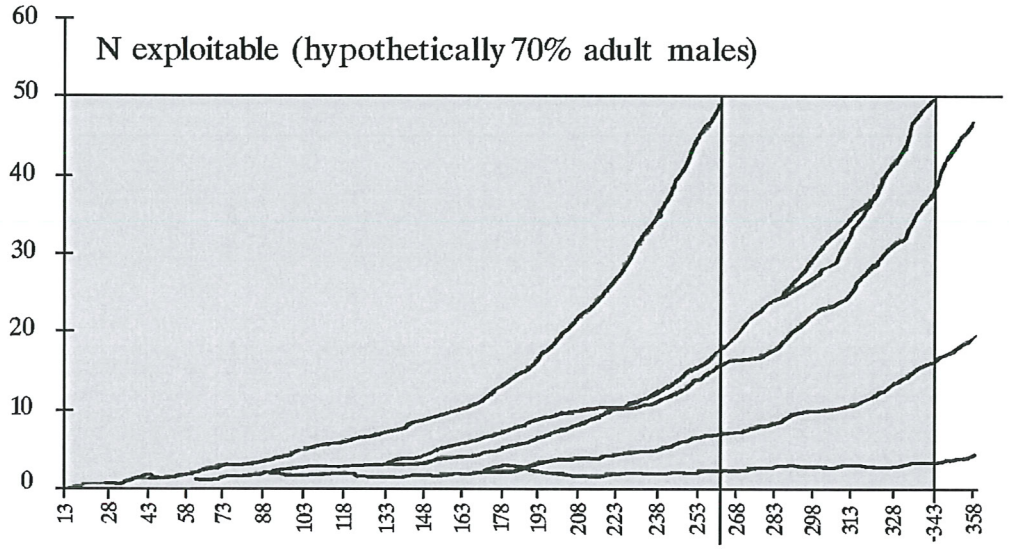


Plate 3. Age profiles of Caprini at Khirokitia



a. deterministic model



b. stochastic model

Plate 4. Evaluation of possible exploitation of populations derived from introduced individuals