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Evolving ecosystems: ecological data from an Iron Age small mammal accumulation at Alorda Park (Catalonia, Spain)

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ABSTRACT

Small mammals are considered to be good indicators of ancient environments. One particular layer in a fortification tower of a Mediterranean Iberian village, Alorda Park (4th century BC), provided a large amount of well-preserved small mammal bones (about 19,200 remains) probably accumulated by barn owls (*Tyto alba*). Such an accumulation is rarely available from the Iron Age. It provides not only palaeoenvironmental data, but also further information about other studies such as morphometrics, ancient DNA and zoogeography. This article focuses on the ecological data, and attempts to develop an accurate taphonomic study to assess the reliability and statistical significance of this archaeological sample.

The species encountered include the short-tailed mouse (*Mus spretus*), the Cabrera vole (*Microtus cabrerae*), the lesser white-toothed shrew (*Crocidura suaveolens*), the white-toothed shrew (*Crocidura russula*), the field mouse (*Apodemus sylvaticus*), and the garden dormouse (*Eliomys quercinus*). The presence of the commensal house mouse (*Mus musculus domesticus*) is suspected. In addition, the absence of black rat (*Rattus rattus*) suggests that this species had not yet colonised the Iberian coast at that time.

1. Introduction

Small mammals can provide useful palaeoecological and zoogeographical information. The introduction of exotic species can change the balance in the receiving ecosystems, which may result in a new faunal spectrum. As these species come with humans, they can also provide evidence for human movements and cultural exchanges.

The East coast of the Iberian Peninsula experienced many social and economical transformations during the Iron Age. These are principally due to Mediterranean trade and the influence of Phoenician and Greek culture (Bosch Gimpera, 1932; Ruiz and Molinos, 1993; Sanmartí and Santacana, 2005). The consequences of this increase in long distance exchanges on the local ecosystems have yet to be documented. A recent zooarchaeological revision of house mouse (*Mus musculus domesticus*) expansion throughout the Mediterranean basin concludes that this species did not colonise the Iberian Peninsula before the first millennium BC (Cucchi, 2005; Cucchi et al., 2005). Another commensal species, the black rat (*Rattus rattus*), is thought to have been introduced into this area between the 4th and the 2nd centuries BC (Audoin-Rouzeau and Vigne, 1994, 1997; Vigne and Valladas, 1996). The black rat was the main transmitter of the epidemic plague known as "The Black Death" in Europe during the Middle Age, which had catastrophic consequences. Assessing the arrival and the relative abundance of the house mouse and the black rat is consequently of great importance to understand the ecological and environmental conditions of the commensal species in Europe and their interactions with humans.

One of the archaeological layers at Alorda Park provided a substantial amount of small mammal bones (about 19,200), and therefore an excellent opportunity to test current hypotheses concerning the first arrival of both the black rat and the house mouse. Such an accumulation, well preserved and accurately dated,

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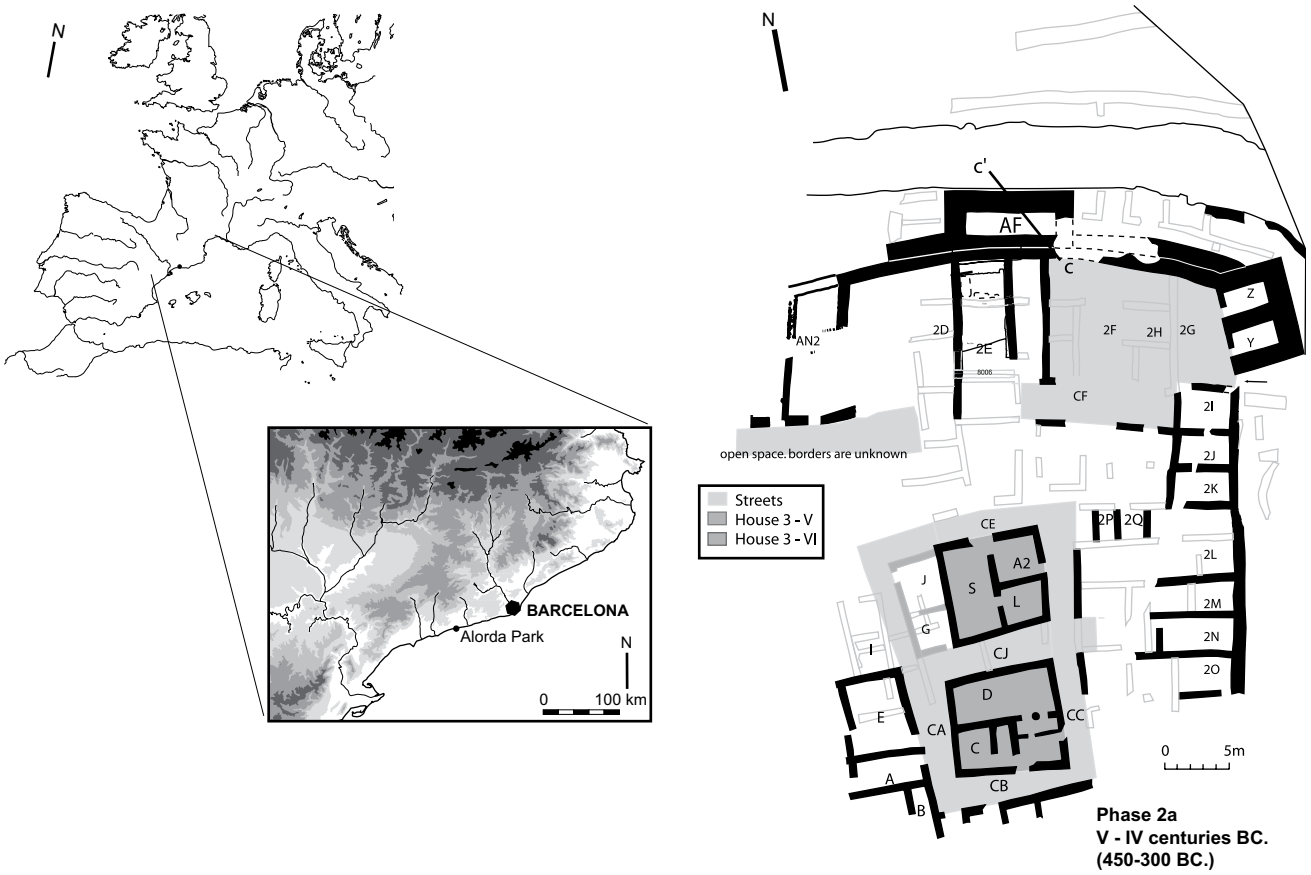

Fig. 1. Location of Alorda Park in the Iberian Peninsula and map of the site during the 4th century B.C., according to Sanmartí and Santacana (1992). The small mammal bone assemblage comes from the tower noted "AF", at the northern edge of the site, and the straight line (C–C′) in this AF tower represents the location of the section of Fig. 2.

is rare in the Iron Age. This article focuses on the ecological data and develops an accurate taphonomic study in order to understand the reliability and the statistical significance of this archaeological sample.

Alorda Park is an Iberian Iron Age site located on the Central Coast of Catalonia (Calafell, Spain), 66 km south of Barcelona (Fig. 1). Intensive surveys of the territory around the site and later excavations directed by Sanmartí and Santacana (1992) indicate that, during the Iberian period (6th–2nd centuries BC), this village was one of the main settlements in the Eastern part of the Cosetania (Asensio et al., 2003). It disappeared in the first half of the 2nd century BC, during the Roman period. The site is a 1800 m^2 fortified village, built in the 6th century BC on a small promontory (192 m a.s.l.), 300 m from the present-day coastline. One of the fortified towers (AF tower), built during the first half of the 5th century BC, was filled with a nearly undisturbed 90 cm thick deposit (Fig. 2). One of the Stratigraphic Units (SU 7019) was a brown sandy sediment especially rich in small vertebrate bones. The extension of this level was limited to a few square meters in the southeast corner of the tower and its thickness decreased towards the centre of the enclosure (Fig. 2). The chrono-stratigraphic reliability of SU 7019 was very good, since it was sealed between two floors. The lowest one (SU 7083) is dated between 550 and 450 BC, according to the presence of a base of a pseudo-jonic kylix, a fragment of an attic black glazed kylix, some fragments of Iberian amphorae and some fragments of Iberian hand-made pottery. The upper-most level (SU 7011) is dated between 230 and 190 BC, by some Campanian A bowls (Lamboglia 27 and Lamboglia 33b), Greek amphora (Kos) and Graeco-Italic amphorae bottoms among other ceramics (J. Sanmartí, pers. comm.). The layer containing the small mammal bones is dated to the 4th century BC, according to the ceramics and a ^{14}C date (Poznan Laboratory, sample Poz-18818: 2190 ± 30BP).

As many authors (Andrews, 1990; Denys et al., 1995; Vigne and Valladas, 1996; O'Connor, 2000) have suggested, the biogeographical and ecological significance of small mammal assemblages depends very much on the way they were accumulated and what happened to them after burial. Therefore, we undertook a taphonomic study before making ecological reconstructions.

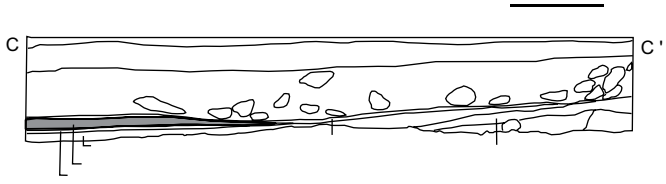

Fig. 2. North–South stratigraphical sections of the AF tower (see location on Fig. 1). Drawing from GRACPE team.

2. Materials and methods

Given the abundance of microfauna (about 19,200 bones[1]), several sediment samples were collected. The sediment was water-hose washed through two superimposed sieves (5 mm and 1 mm

[1] This estimate comes from the 3211 bones obtained in a 25 g sample sorted under a stereomicroscope (see Table 2). Given that the sediment available was about 1.5 kg, we infer that the total number of remains could be six times the number of bones sorted under the stereomicroscope.