

Orce and Lucena (Spain)
2009 SEQS Annual Congress
September 28th - October 3th
*The Quaternary of southern Spain:
a bridge between Africa and the Alpine domain*



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**The Quaternary of southern Spain:
a bridge between Africa and the Alpine
domain**

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**ABSTRACT VOLUME
and
FIELDTRIPS GUIDE**

**Edited by:
Bienvenido Martínez-Navarro
Isidro Toro Moyano
Paul Palmqvist
Jordi Agustí**

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BIOSTRATINOMY APPLIED TO THE INTERPRETATION OF THE SCAVENGER ACTIVITY IN PALEOECOSYSTEMS

Eloísa BERNÁLDEZ SÁNCHEZ, Laboratorio de Paleobiología. Instituto Andaluz del Patrimonio Histórico. Consejería de Cultura de la Junta de Andalucía

There is not scientific guarantee that vertebrate remains preserved in archaeological and paleontological sites can be a significant sample of the paleocommunity to which they belonged, or were part of human consumption. Also, we do not know the qualitative and quantitative consequences of pre-depositional processes of trophic activity of human population and of any other scavengers. As a result, we performed a biostratinomic study of the carcass association scattered throughout Doñana Biological Reserve (DBR) to know if there are general patterns that can be applied to the taphonomic study of archaeological sites.

It has been designed a general methodology of study -inferred from the biostratinomic study of macromammals inhabiting in Doñana Biological Reserve (DBR) (Huelva, SW Spain)- which allows to compare pre-depositional characteristics of any anthropological or natural tanathocenosis and taphocenosis. We have observed the accumulation per surface unit and the individual conservation in order to characterize bone deposits and to quantify the loss or gain of biological information from it.

Doñana Biological Reserve has four well-differentiated ecosystems: shrublands (the so-named *Monte*), sand dunes, marshlands and the so-called *Vera* (this is the ecotone between marshlands and shrublands, where the highest faunistic and floristic richness is found). There are 208 bird species, 32 of mammals, 22 of reptiles, 10 of amphibia, and 8 of fish in Doñana, but, in the studied tanathocenosis between 1989 and 1991:

- Only 13 vertebrate species have been found (5% of Doñana species). Then, the terrestrial vertebrate community from DBR is not represented in the tanathocenosis.

- Mammal community is best represented by species with weight greater or equal to 1 kg. Specifically, 6 species of ungulate are present (all with more than 50 kg), 2 carnivorous and 1 lagomorph (European rabbit, with less than 3 kg). All these remains represent a 29% of mammal community in Doñana, while birds and reptiles are represented by 1% and 9% respectively. We did not find remains of small mammals with the methodology of direct observation for sampling.

- The Doñana tanathocenosis is similar to that observed by Behrensmeyer and Boaz (1980) in Amboseli National Park (Kenia). But, with the differences observed between these two natural reserves, we could identify a greater or lesser intensity of the activity of scavengers and carnivores that were part of the community (permanently or seasonally, E.g. scavenging birds). In both ecosystems, Doñana and Amboseli, carcass accumulation follows similar patterns:

a) All the species whose individuals have more than 50 kg are represented in the tanathocenosis.

b) Seasonality and occasionality of some behavioural events (such as ungulate rutting - *ronca* and *berrea*- in red deers and fallow deers), epizootics events (plague during 1988 in wild boars) and climatic events (flooding, sand dunes movements, drought), cause a higher mortality rate in mammal populations (which is registered in the frequency of carcasses and bone remains). E.g. in *Vera* and *Monte* we found 59 carcasses (45.8% from total) and the maximum accumulation of the year (1988-1989) was in November (27 carcasses). 21 of these carcasses were of recently dead animals.

c) The age structure of the mammal community is not represented in the tanathocenosis: young individuals remains appear in low frequency. The higher frequency observed of located young carcasses is in ungulates between October and November, disappearing from the surface in a few months.

d) The distribution of carcasses in the different biotopes is an indicator of habitat preference by species and the abundance of carnivores and scavengers in the area (16 individuals/km² in *Vera*; 5.5 individuals/km² in *Monte*; 8.3 individuals/km² in marshlands and 16.7 individuals/km² in sand dunes).

e) Carcasses density was 10.8 vertebrate individuals/km² (the total number of carcasses was 150), with weights range between 80 g to more than 400 Kg. The 95% of this sample were ungulates (9.5 cadavers/km²).

f) In Doñana the majority of ungulate carcasses were found under cork oaks of *Monte* and *Vera*, which were surrounded by patches of ferns and blackberries over 1 m. In Amboseli, the higher frequency of ungulate carcasses was found in marshlands, areas with vegetation cover less than 50 cm. We deduce that in Amboseli the most carcasses were predation products. In Doñana, however, the distribution of the carcasses response to disease deaths (animals in search of shelter and water).

g) We have confirmed that the aggregation index $F = s^2/x$ (a ratio between variance and mean) of the carcasses of each biotope is higher than 1, which indicates that the probability of finding a carcass is greater where there is another. The largest number of red deer carcasses was found in leafy areas of *Monte* (the preferred habitat for this species). Cows, as well as fallow deers, wild boars, mongooses, foxes and rabbits, also select specific locations to die (all in biotopes of *Vera*).

All these results have shown that paleobiological interpretations need biostratonomical studies to interpret the past, and the present work has presented the analyses of an organic deposit in a determined natural ecosystem. It remains to be known the differences with other ecosystems located in different latitudes to define a general model to explain the formation of bone deposits.

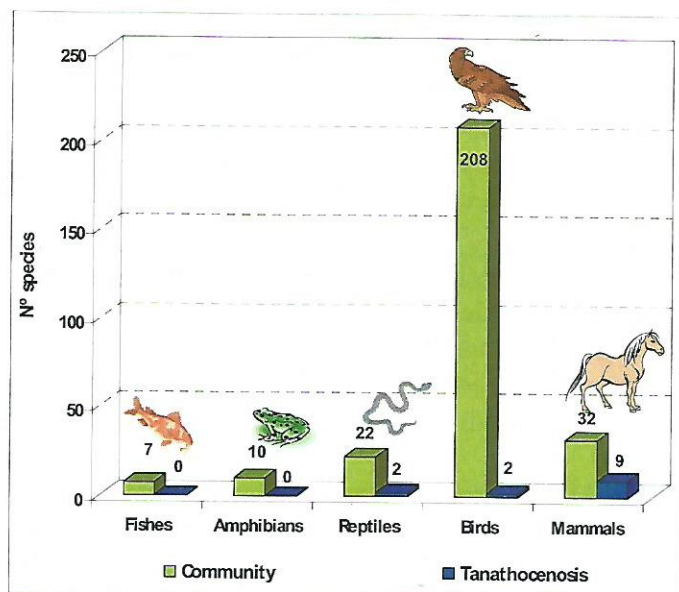


Figure 1: Number of species of the community and of the tanathocenosis in Doñana National Park.