

Neolithic landscape management at Cova de l'Or (Alicante, Spain)

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Summary: *Cova de l'Or is an important site for the Neolithic of the western Mediterranean. A complete cultural and environmental sequence for the Early and Middle Neolithic allows studying the management of forest resources since the arrival of the first farmers and until the intensification of herding activities that took place a few centuries later. Our research focuses on the analysis of wood charcoals recovered from the dung levels in trench K-34, which we compare with the available relevant data from trench J-4.*

Key words: *Neolithic, charcoal, Alicante, landscape, fodder.*

INTRODUCTION

Neolithic communities used the woodland that existed within their catchment in many different ways. Agricultural practices and herding activities required open space for fields and pastureland respectively. Moreover, since Neolithic times the relation between natural space and man-made landscapes became largely diversified due to differences in the management of forest resources that different farming practices demanded. Environmental archaeology and in part the “5th International meeting of charcoal analysis. The charcoal as cultural and biological heritage” aim at recording the history of those agricultural and/or pastoral landscapes that first appeared in the Neolithic.

In this paper we present new wood charcoal results from Cova de l'Or, namely from sector K where a sequence of the so-called “*niveaux bergerie*” (Beeching and Moulin, 1983) has been documented. Pollen and sedimentological analyses were carried out in trench K-34 (Martí *et al.*, 1983; Fumanal, 1986; Dupré, 1988), while wood charcoal remains were analyzed from trench J-4 (Martí *et al.*, 1980; Badal *et al.*, 1994). We compare the two sequences aiming to evaluate the management of the woodland from the middle of the 6th to the 5th millennium BC, when intensification of pastoral activities took place and would correspond to the partially burnt dung levels presented in this paper.

THE SITE

Cova de l'Or is located on the eastern foothills of the Benicadell mountain range (38°50'40.71" N - 0°21'50.32" W) at 650 m asl (Fig. 1). Although a dissymmetry in temperature and precipitation is characteristic of the slopes of this mountain range, the southern being warmer and drier, the prevalent conditions overall are of the mesomediterranean type. The flora of the northern slopes is more humid (*Quercus faginea*, *Q. rotundifolia*, *Fraxinus ornus*, *Viburnum tinus*, etc.) while drought-resistant plants grow on the southern slopes (*Olea europaea* var. *sylvestris*, *Q. coccifera*, *Pinus halepensis*, *Rosmarinus officinalis*, *Erica multiflora*, etc.). The cave is oriented

to the south and offers good conditions for habitation. Wood charcoal analysis of the archaeological deposits of trench J-4 was part of an earlier study while the materials here presented originate from trench K-34. Both trenches were located close to the cave entrance.



FIGURE 1. Cova de l'Or of Beniarrés (Alicant). Field work at 1955. Archive SIP

MATERIAL AND METHODS

The 2 m long sequence of trench K-34 includes 4 successive dung burnt levels within the upper 120 cm. Wood charcoal was scattered throughout the excavated deposits. We have analyzed material from layers between 260 and 320 cm depth, in which the fire levels were separated by habitation deposits. 900 wood charcoal fragments recovered from spits 15 to 10 (approximately 10 cm thick each) were processed for wood charcoal analysis. For the taxonomic identification of the specimens we used a Nikon Optiphot-100 dark/bright field incident light microscope with 50-500x magnifications, specialized plant anatomy bibliography and the reference collection of modern charred woods of the Laboratory of the Dept. of Prehistory and Archaeology, University of Valencia, Spain.

RESULTS

The wood charcoal assemblages of the 6 spits from trench K-34 comprise the same woody plants.

Differences concerning the presence of taxa are few and probably random. However, significant changes are observed in the frequency of occurrence of the taxa in consecutive layers, which may be attributed to environmental change or to human activities. In the two lowermost spits (levels 15 and 14) the percentages of evergreen and deciduous oak and riverside taxa account for more than 50% of the carbonized remains. Thermophilous flora is represented by *Olea europaea* (30%). *Pinus halepensis* and matorral plants are scarce (Fig. 2).

The archaeological finds and the radiocarbon dates place the beginning of these fire levels to the epicardial pottery phase, during the last centuries of the 6th millennium BC, and they provide evidence for a mixed economy (agriculture and herding). The results of wood charcoal analysis suggest the management and use of oaks. Mean annual temperatures of 13-17 °C and a precipitation regime of the sub-humid type (mean annual 500-800 mm) would have prevailed.

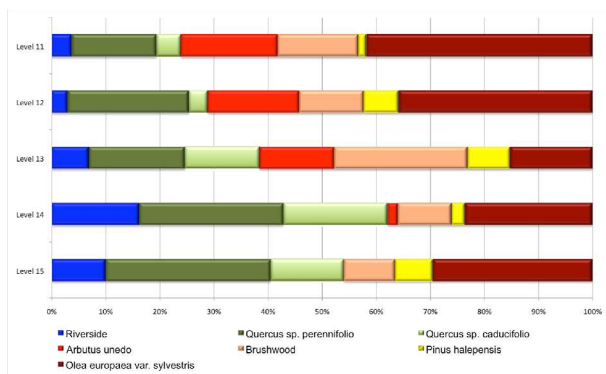


FIGURE 2. Synthetic charcoal analysis diagram of K-34 from Cova de l'Or.

From level 13 and up to level 10 *Arbutus unedo*, *Olea* and the *matorral* plants increase significantly while those taxa that require more humid conditions (riverside and *Quercus*) decrease. *Pinus halepensis* remains stable. The change observed in these assemblages is associated to the two lowermost dung levels in trench K-34 that date to the 5th millennium BC and may have been the result of a change in the management of the woodland oriented now towards stockbreeding.

High frequency of *Olea* wood charcoal is reported from other caves in the area where livestock levels have been identified (Badal 1999) and it has been interpreted as the result of the provisioning of leaf and branch fodder; in the sclerophyllous forest *Olea* is the most appropriate species for feeding livestock. In more humid regions relevant evidence from various sites documents the use of ash and other deciduous species for animal fodder (Carrion, 2002; Thiébault, 2005; Delhon *et al.*, 2008).

In the southern part of the Valencian territory during the course of the Neolithic and in particular during the Middle and Final Neolithic, a tendency is

observed towards the specialization of the productive activities. Certain areas become pastoral, especially the foothills of mountain ranges where most caves are located, while settlements established in low-land valleys are multi-purpose or clearly agricultural. Such evidence is available from the valleys of the Serpis and Albaida Rivers that delimit to the south and north the mountain range where Cova de l'Or is located. The important presence of trees managed for fodder, as it is the case of the oleaster, provides evidence for the pastoral practices in the caves of the Alicante region.

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