

The fire of Iberian Neanderthals. Wood charcoal from three new Mousterian sites in the Iberian Peninsula

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Summary: Three archaeological sites with Middle Palaeolithic sequences are currently under excavation in the Iberian Peninsula. The stratigraphic deposits in Gruta da Oliveira (35-70 ka BP), Cueva Antón (35-45 ka BP) and Abrigo de la Quebrada (40-50 ka BP) provided the wood charcoal for the analysis, whose first results are presented here. Our work offers a preliminary view of the local flora used by Neanderthals and contemporary climatic conditions in three regions of Iberia.

Key words: wood charcoal, Neanderthal, fire, palaeoecology, Pinus.

INTRODUCTION

In this paper we present preliminary results of wood charcoal analysis from three caves in the Iberian Peninsula, Gruta da Oliveira in Portugal and Cueva Antón and Abrigo de la Quebrada in Spain (Fig. 1A). Our main aim is to provide new information concerning the use of wild plants by the Neanderthals during the Upper Pleistocene. The analyses of wood charcoal should provide a picture of the surrounding flora and the ecological conditions at the time. Moreover, through the analysis of wood charcoal we have tried to understand the importance of post-depositional processes in the palaeoecological interpretation.

Archaeological wood charcoal is a material that provides abundant and variable information: ecological, ethnographic, taxonomic, chronological, etc. Although some of the methods used to obtain this information are destructive, if the sequence of analyses is coordinated in an adequate manner none of the information is lost. The analysis of wood charcoal should follow this sequence: botanical identification should be conducted first and afterwards the material can be sent to the radiocarbon laboratory, where it will be dated and destroyed. Such a procedure, which emphasises the history of species and the detection of taphonomic problems (Carrión *et al.*, 2010), was followed in the Mousterian sites presented here. The radiocarbon dating results obtained are presented in Table 1.

THE SITES

Gruta da Oliveira is located in the Almonda karstic system in central Portugal (39°30'23" N, 08°36'49" W, 115 m asl). The bioclimatic conditions are thermomediterranean and woody flora is dominant. The most abundant species are: *Olea europaea* var. *sylvestris*, *Rhamnus alaternus*, *Pistacia terebinthus*, *Pistacia lentiscus*, *Myrtus communis*, etc. In the areas with deeper soils *Pinus pinaster* and *Quercus* sp. evergreen grow.

The Middle Palaeolithic sequence (layers 7 to 19) is dated to ca. 35-70 ka BP (Angelucci and Zilhão, 2009).

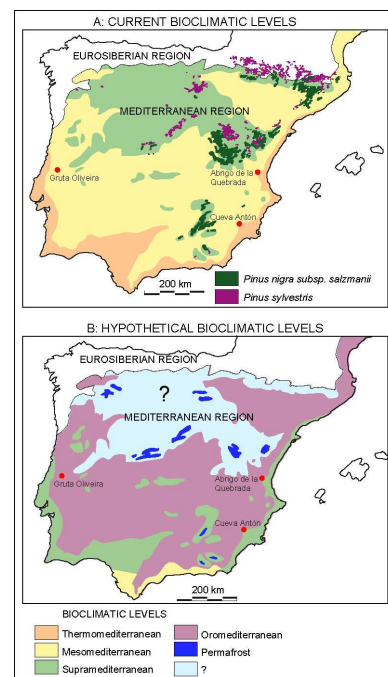


FIGURE 1. Location of the Middle Palaeolithic sites. A) In the current bioclimatic map of Iberia and distribution of *Pinus nigra* and *P. sylvestris*. B) In hypothetical bioclimatic levels during the Middle Palaeolithic.

Cueva Antón is a rockshelter opened into the base of an E-W, 25-30 m high, Eocene limestone escarpment located towards the tail end of the La Cierva reservoir, on the Mula River (01°29'43" W, 38°03'56" N, 380 m asl). The current bioclimatic conditions are thermomediterranean semiarid and the vegetation is xerophytic scrub with xeric grasses as *Stipa tenacissima*, *Lygium spartium* and some scattered *Pinus halepensis*.

Excavations at Cueva Antón have exposed levels of Middle Palaeolithic occupation in the stratigraphic sequence. Abundant artefacts organized around hearth features are present in the lower levels of the sequence,

but occupation remains are scarce toward the top (Zilhão *et al.*, 2010).

The Abrigo de la Quebrada (39°48'25" N, 01°00'49" W, 708 m asl) is located in a narrow canyon where bioclimatic conditions are meso-mediterranean dry. Pine (*Pinus halepensis* and some *P. pinaster*) forests are dominant over most of the area. This large rockshelter presents an important stratigraphy for the regional late Mousterian.

Site	Context	Laboratory	Species	Radiocarbon date (BP) and method
Cueva Antón	I-1	OxA-20115	<i>Pinus halepensis</i>	98±23 (ABOx-SC)
Cueva Antón	I-k/II-d	OxA-20881; OxA-21244	<i>Pinus</i> sp.	31150±170 (ABA); 32890±200 (ABOx-SC)
Cueva Antón	I-k	OxA-20882	<i>Pinus nigra</i>	31070±170 (ABA)
Cueva Antón	II-hi	OxA-18672	<i>Juniperus</i> sp.	39650±550 (ABA)
Gruta da Oliveira	8 (intrusive)	GRA-29384	<i>Olea</i> sp.	6055±45 (ABA)
Gruta da Oliveira	12 (unacceptable)	GRA-24408	<i>Pinus</i> sp.	26940±270-250 (ABA)
Gruta da Oliveira	13	GRA-24410	<i>Erica</i> sp.	39540±490-410 (ABA)
Gruta da Oliveira	14	GRA-22024	<i>Pinus sylvestris</i>	42800±2300-1800 (ABA)
Gruta da Oliveira	14 (unacceptable)	OxA-13137	<i>Pinus sylvestris</i>	27850±550 (ABA)
Gruta da Oliveira	14	Beta-183537	<i>Pinus sylvestris</i>	40900±1100 (ABA)
Gruta da Oliveira	15 (unacceptable)	GRA-24407	<i>Pinus sylvestris</i>	37520±380-330 (ABA)
Abrigo de la Quebrada	C-5	Beta-24402	<i>Pinus nigra/sylvestris</i>	43930±750 (ABA)
Abrigo de la Quebrada	C-5	Beta-24403	<i>Pinus nigra/sylvestris</i>	40500±530 (ABA)

TABLE 1. Radiocarbon dates on wood charcoal from the Middle Palaeolithic sites.

MATERIAL AND METHODS

With variants, subsurface sampling of the sites took place in two phases. At Quebrada, for example, each unit was excavated in 10 cm levels and all sediment was screened through a set of nested dry screens of 5 mm, 2mm, and 1mm in size. Artifacts and charcoal were collected from these screens. Additionally, 2-liter sediment samples were collected from each level of each excavation unit for flotation and water screening to separate the coarse fraction with microartifacts from the fine fraction with organic materials. The average size of the wood charcoal pieces identified is less than 2 mm. Wood charcoal was scattered in variable densities throughout the excavated deposits; only at Gruta Oliveira does part of the charcoal come from hearth features, one in level 14 and another in level 21.

We used a Nikon Optiphot-100 dark/bright field incident light microscope for taxonomic identification of wood charcoal. The specimens were identified with the aid of specialized plant anatomy bibliography and a reference collection of modern charred woods. At this stage of analysis, we only work with the presence of taxa, but in the future we will apply the appropriate statistical calculations. Photographing and detailed observation of microorganisms and minerals was carried out with a Hitachi S-4100 Field Emission Scanning Electron Microscope and the EMIP 3.0 (Electron Microscope Image Processing) software.

RESULTS

The flora used by Neanderthals is characterized by conifers and a few angiosperms. Among the conifers, pine and juniper contributed most of the wood charcoal recovered. Although not all the pines could be identified to species level, of those pieces that could the great majority are *Pinus sylvestris* in Gruta da Oliveira and *P. sylvestris* or *P. nigra* in the other sites.

The pine/juniper-dominated charcoal assemblages reflect a very similar ecological context in all three sites. These trees are well adapted to the dry-cold

climate that prevailed in the Iberian Peninsula at the time. Pines, in particular, can store considerable water in their trunks to help them survive long periods of drought. The driest conditions are denoted at Cueva Antón by the predominance of *Juniperus* sp. associated with *Ephedra* sp. This combination suggests an open, steppic landscape with scattered mountain pine stands.

When we compare the present day distribution of *Pinus nigra* and *Pinus sylvestris* in the Iberian Peninsula with the location of the Mousterian sites we may observe that during the time that the caves were used the sequence of bioclimatic levels would have been displaced approximately 1000 m in altitude and the temperature would have been 10 °C lower (Fig. 1B).

The botanical identification of wood charcoal was followed by the selection of specimens for radiocarbon dating. The explanations for the results falling outside the expected range for the Middle Paleolithic are: (a) the *Olea europaea* var. *sylvestris* from Gruta da Oliveira comes from a burrowed area in the uppermost level of the sequence, and confirm that the taxon should be ascribed to the Holocene flora (Carrion *et al.*, 2010); (b) the *Pinus halepensis* from Cueva Antón dates the inundation silts deposited over the site after construction of the La Cierva dam in the early 20th century; (c) the couple of age determinations for *Pinus sylvestris* from Gruta da Oliveira that are too young reflect incomplete decontamination of very small samples, not intrusion from non-existent Upper Paleolithic levels.

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