SAGVNTVM

PAPELES DEL LABORATORIO DE ARQUEOLOGÍA
DE VALENCIA
EXTRA-13

WOOD AND CHARCOAL
EVIDENCE FOR HUMAN AND NATURAL HISTORY

ERNESTINA BADAL – YOLANDA CARRIÓN – MIGUEL MACÍAS – MARÍA NTINOU
(COORDINATORS)

VNIVERSITAT DE VALÈNCIA
FACULTAT DE GEOGRAFIA I HISTÒRIA
Departament de Prehistòria i d'Arqueologia

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Forest resource management during Roman and Medieval cave occupations in the Northwest of the Iberian Peninsula: Cova do Xato and Cova Eirós (Galicia, Spain)

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***Summary**: References to the existence of historic remains in NW Iberian caves are frequent. However, archaeological research tends to focus on the search for evidence of older occupations, with little attention given to these historic levels. The aim of this article is to present the results of archaeobotanical analysis (charcoal analysis and carpology) from two caves in the eastern mountains of the province of Lugo – Cova do Xato and Cova Eirós – to determine the management of forest resources by the different communities living in them.*

***Key words**: Forest management, Roman, Medieval cave occupations, charcoal analysis, carpological analysis, Northwest Iberia.*

INTRODUCTION

In recent decades, archaeological surveys carried out in the eastern mountain ranges of NW Iberia (the only area with limestone formations in this region) led to the discovery of several Paleolithic sites. However, late prehistoric and historic levels were also identified, showing the evolution of the role and functionality of the karstic systems for human communities (De Lombera 2011). The present article focuses on the archaeobotanical results obtained from the Roman and Medieval occupations of Cova do Xato (Folgoso do Courel, Lugo) and Cova Eirós (Triacastela, Lugo).

Cova do Xato is located at an altitude of 1080 m a.s.l. in the northwestern sector of the O Courel mountain range (Noceda), part of the Cándama Limestone Geological Formation. The entrance to the cave is 3.5 m wide and 4m high, with the gallery extending back for a distance of 45 m. At the entrance to the cave, a hearth with associated bones (several of them burnt) and potsherds was discovered in Test Pit 2. The presence of a fragment of *Terra Sigillata* enabled the dating of this occupation to the 4th - 5th century AD (Fábregas Valcarce *et al.* 2008). The scarcity of archaeological remains, linked to a single occupation layer, suggests sporadic use of the cave. This could

be related to either the Late Roman settlement in the Courel area associated with auriferous exploitations, or to the activities of hermits in these regions prior to the constitution of monastic communities in the 10th century AD; the latter hypothesis suggested by the isolated location of the site, the scarcity of archaeological remains and the existence of other Galician parallels (Fernández *et al.* 1993).

Cova Eirós, also related to the Cándama Formation, was occupied at a later period. The cave is located on the N-NW slope of Monte Penedo, 780 m a.s.l., and 25 m above a stream. The entrance to the cave is 2m high and 3.5 m wide for the first 18 m, after which it narrows to form a deep gallery. During archaeological fieldwork several anthropic structures were identified in the entrance area (Rodríguez *et al*. 2011) (Fig. 2).

Two pits (UA1, UA2) of 1m diameter and 1.1-1.3m deep were cut into Pleistocene layers, and contained bones, charcoals, seeds and potsherds. The mixing of this assemblage and the lack of stratigraphic coherence suggest that these pits were refilled on a number of occasions after they had fallen out of use. Radiocarbon dating of a nearby hearth (UA 6) produced a date of 1040 ± 30 BP (949-1032 cal. AD -2s- Beta-308578), although morphological analysis of the pottery assemblage suggests a long period of use of the cave, with vessel forms dating from the 10-11th to the 15th centuries AD (FábregasValcarce *et al*. 2009, in press). A cobbled surface, which consisted of limestone blocks and quartzite cobbles, surrounded the pits highlighting the significance of this central space. Among these structures, several domestic faunal remains were recovered (pigs, cows and ovicaprids), some of them with clear cutmarks.

Cova do Xato and Cova Eirós are located in the environs of the O Courel Sierra in the Northwest of the Iberian Peninsula (Fig. 1). The flora shows various phytogeographical characteristics, which reflect the transitional position of this mountain range, between

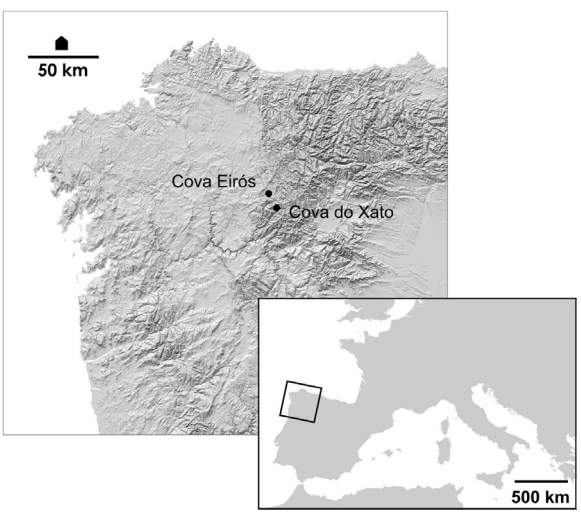

Figure 1. Cova do Xato and Cova Eirós in NW Iberia.

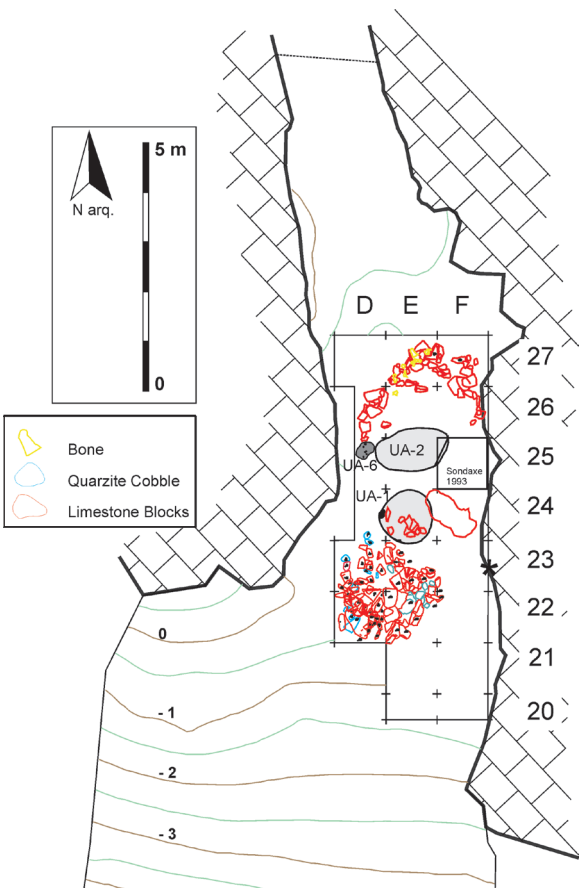

Figure 2. Location of the medieval structures at the entrance of Cova Eirós.

Eurosiberian-type deciduous forests belonging to the phytosociological class *Querco-Fagetea*, as well as Mediterranean-type perennial vegetation composed mainly of *Quercus ilex* (Santos *et al*. 2000). The environmental conditions in this area from the 4th to the 11th centuries AD were conditioned by the *Roman Warm Period* (250 cal. BC-450 cal. AD), followed by a cold episode (450-950 cal. AD) and, finally, by the *Medieval Warm Period* (950-1400 cal. AD) (Desprat *et al*. 2003; Sánchez-Goñi 2006). Recorded in the peat bogs of the Xistral Mountains, several episodes of deforestation took place during the medieval period, dating to between 610-740 AD, 740-1040 AD and 1080-1570 AD (Mighall *et al.* 2006). These episodes were probably related to the opening up of new crop fields, and to the high demand for wood for construction, woodworking, and fuel for artisanal activities.

MATERIALS AND METHODS

A similar sampling strategy was employed at both Cova de Xato and Cova Eirós. The largest pieces of charcoal were collected by hand to avoid fragmentation, while soil samples from the features were processed and floated in the laboratory using 2, 1 and 0.5mm meshes. Fruits and seeds were identified under a stereomicroscope, using an actual reference collection, and were counted, distinguishing between entire plant remains and fragments. Charcoal fragments and seeds were identified under a microscope using various atlases (Schweingruber 1990; Hather 2000; Vernet *et al.* 2001; Schoch *et al.* 2004; Jacomet 2006) and an actual reference collection. Dendrological features were also recorded during the analysis (ring curvature, presence of tyloses, cracks, vitrification, callous, etc.).

At Cova do Xato, 146 fragments from one sample (19.5 l of sediment) recovered from a hearth were analyzed. At Cova Eirós, 5 samples were recovered and 10*l* of soil from pit UA1 were floated, in total 105 fragments analyzed.

COVA DO XATO			
Taxa	MO-10	Total	
		Nb.	%
Quercus sp deciduous	98	98	66.7
Fabaceae	15	15	10.2
Fraxinus sp.	14	14	9.5
Corylus avellana	11	11	7.5
Salix/Populus	2	2	1.4
Rosaceae/Maloideae	2	2	1.4
Prunus sp.	2	2	1.4
Ulmus sp.	1	1	0.7
Arbutus unedo	1	1	0.7
Indeterminable	1	1	0.7
TOTAL TAXA	9	9	100
TOTAL FRAGMENTS	146	146	100

Table 1. Taxa identified during charcoal analysis at Cova do Xato.

DATA AND RESULTS

The results from **Cova do Xato** indicate the presence of 9 different taxa (Table 1). The most significant taxon, according to its percentage representation, is *Quercus* sp. deciduous. Other taxa are present in low percentages, among which Fabaceae, ash (*Fraxinus* sp.) and hazel (*Corylus avellana*) are the most abundant. The identified taxa belong to different biota, indicating the exploitation of different environments. Most of the taxa identified could be related to mixed deciduous forest; this is the case of oak (*Quercus* sp. deciduous), and bushes that grow in the clearings or along the edges of forests, such as hazel tree (*Corylus avellana*), pomes type (Rosaceae/Maloideae) and prunus type (*Prunus* sp.). Strawberry tree (*Arbutus unedo*), a termophillous shrub, was also identified. The scrubland formations are represented by the presence of Fabaceae. Some of the other taxa, such as *Fraxinus* sp., *Salix/Populus* and *Ulmus* sp. with greater water needs, probably grew close to rivers or other water courses.

The results of charcoal analysis are comparable to those obtained from pollen samples collected

from different stratigraphic contexts at Cova de Xato (Expósito *pers. comm*.). Two samples from levels 2b and 2d are contemporary with the Roman occupation. In both samples, arboreal pollen (AP) prevails over non-arboreal (NAP) (between 60-80%). *Corylus avellana* in particular, stands out, accounting for 80% of the total when only the AP is taken into account. It is followed, in lesser proportions, by *Quercus* sp. deciduous*, Betula*, *Quercus ilex/coccifera*, cf. *Juniperus*, *Pinus* sp. and *Alnus*. Cistaceae was the only shrub identified (Expósito *pers. comm.*). The high values of *Corylus avellana* and the negative results of several samples could be related to taphonomic processes affecting the conservation of pollen grains. It is probable that hazel is over-represented in the pollen assemblage of Cova de Xato.

The number of carpological remains identified was restricted, with only 4 individual examples of *Triticum aestivum/durum* found, each of which presented a high degree of degradation of the internal and external surface.

At **Cova Eirós** 11 different taxa were identified (Table 2). The main taxa, in relation to their percentage representation, are *Salix/Populus*, birch (*Betula* sp.), oak (*Quercus* sp. deciduous) and pomes (Rosaceae/Maloideae). Most of the taxa identified such as *Salix/Populus*, *Betula* sp., *Ulmus* sp. and *Fraxinus* sp., are species with high hydric requirements associated with riverine woodlands. In this case, the percentage representation of the mixed deciduous forest is lower than at Cova de Xato. Other taxa identified were oak (*Quercus* sp. deciduous), pomes type (Rosaceae/Maloideae), hazel (*Corylus avellana*) and plum tree/blackthorn (*Prunus domestica/spinosa*). The termophillous shrub, *Arbutus unedo*, was also identified. The presence of chestnut (*Castanea sativa*) probably relates to the cultivation of this tree, which witnessed a great expansion during the medieval period.

The palynological data reveals that forest clearance in the Courel Sierra resulted in an increase of *Betula*, although sites cleared of oak were mostly occupied by grasses and moorland plants (Santos *et al.* 2000: 630). Widespread forest clearance of the area dated to the 10th century was recognised at the Sanabria Marsh (Santos *et al*. 2000).

One of the fire-affected fragments was a handle of a wooden container (Fig. 3), broken and reused as opportunistic firewood. This object was made from carving a trunk of *Betula* sp. While most of the vessels and containers from this period were made of wood, conservation of this kind of wooden object is unusual in this area (Morris 2000).

At both sites the presence of moderately curved rings is predominant in the fragments observed: 44.5% in Cova do Xato and 67.54% in Cova Eirós. Alterations of the anatomical structure of the wood included radial cracks, vitrification and galleries of xylophagous insects. At Cova do Xato radial cracks were identified in fragments of *Quercus* sp. deciduous (19.2%), *Fraxinus* sp. (0.7%), and *Ulmus* sp. (0.7%). Vitrification and galleries of xylophagous insects were only observed occasionally in *Quercus* sp. deciduous. At Cova Eirós galleries of xylophagous insects

COVA EIRÓS				
Taxa	MO-01	MO-08	Total	
			Nb.	%
Salix/Populus		29	29	27.6
Betula sp.	2	20	22	20.9
Quercus sp. deciduous		15	15	14.2
Rosaceae/Maloideae		15	15	14.2
Ulmus sp.		7	7	6.6
Fraxinus sp.		6	6	5.7
Fabaceae	2	2	4	3.8
Castanea sativa		3	3	2.8
Corylus avellana		2	2	1.9
Prunus domestica/spinosa		1	1	0.9
Arbutus unedo	1		1	0.9
TOTAL TAXA	3	10	11	100
TOTAL FRAGMENTS	5	100	105	100

Table 2. Taxa identified during charcoal analysis in Cova Eirós.

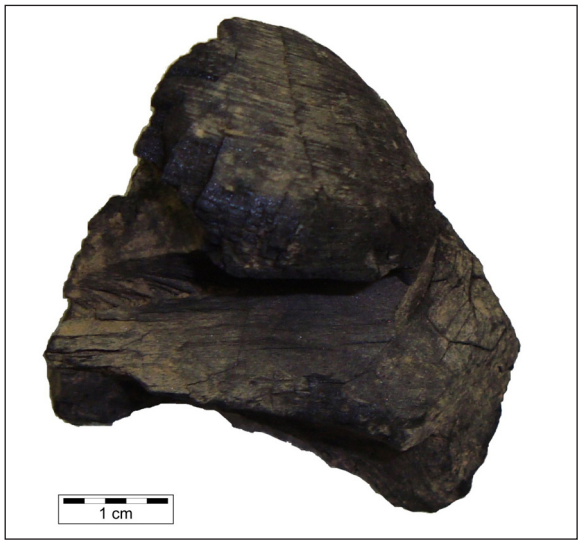

Figure 3. Handle of wooden container (*Betula* sp.).

were identified in 2.9% of the fragments, and affected only *Quercus* sp. deciduous and *Rosaceae/Maloideae*. The presence of radial cracks (5.7%) and vitrification (1.9%) was sporadic, the former affecting *Quercus* sp. deciduous, Rosaceae/Maloideae and *Ulmus* sp., the latter affecting only *Quercus* sp. deciduous.

Carpological analysis of sediment from pit UA1 reveals a combination of cultivation and plant collection strategies (Table 3). The absence of ruderal vegetation and vegetation associated with cultivation indicates the presence of agricultural products free from impurities, arising from the final processing stage prior to consumption. Several cereal taxa stand out, in particular naked wheat (*Triticum aestivum/durum*) and emmer (*Triticum dicoccum)*. According to the measurement of various morphometric indices based on the criteria established by Jacomet (2006), spelt (*Triticum* cf *spelta*) is also possibly identified. Barley (*Hordeum vulgare*) is very rare, with only one seed recovered.

COVA EIRÓS. CARPOLOGY		
Taxa	Nb.	Fragments
Corylus avellana		65
Hordeum vulgare	1	
Linum sp.	30 ml*	
Triticum sp.	25	29
Triticum aestivum/durum	43	5
Triticum dicoccum	34	1
Triticum cf *spelta*	2	
Indeterminate		17
TOTAL	108	130

Table 3. Seeds identified in the medieval settlement at Cova Eirós. (*seeds of *Linum* sp. are aggregated and expressed in terms of volume).

Another identified crop is flax (*Linum* sp), which was usually destined for non-dietary purposes. According to Herbig and Maier (2011) flax seeds of smaller size tend to be used for the extraction of their fibre for textile production, while larger seeds are exploited for their oil. The dimensions of the flax seeds (n=7) from Cova Eirós range from 3.16–3.51 mm in length, and 1.65–1.92 mm in width, which correspond to those of seeds exploited for their fibre.

Among the remains various fragments of *Corylus avellana* were found, indicating a probable seasonal dietary exploitation of this taxon. Refitting of the fragmented achenes was undertaken, although the complexity of the assembly of various fractures and the small size of the fragments made the process difficult. It was only possible to securely refit two pairs of remains, resulting in the identification of 63 minimum number of individuals, which is very close to the total of fragments (n=65). To refine this data only the fragments of the basal part of the pericarp (n=10) were counted (Fig. 4), giving a final maximum number of individuals of 9 hazelnuts.

Indeterminate fragments and those attributed to the genus *Triticum* sp. correspond to very degraded and deformed remains, which made it impossible to assign a more precise determination.

DISCUSSION

The archaeobotanical record reflects the relationship established between communities and their envi-

Figure 4. Fragmented pericarp base of hazelnut (*Corylus avellana*).

ronment, which determined the exploitation of forest resources in the past. This activity was conditioned by such issues as availability and proximity, but also by social and economic factors (settlement type, duration of occupation, group size, technological development, etc.). The occupation of caves was unusual during the Roman and medieval periods. The choice of these places for settlement could have been motivated by different factors: short-term occupations could reflect the use of the cave as a refuge during periods of instability, as a hermitage or, as in the case of Cova Eirós, as a fold for livestock. Diachronic occupation is evidenced at Cova Eirós, where the cave was used for cereal storage inside pits. In both cases the caves were probably occupied by small groups.

The taxa identified show a diversified catchment area, from valley floors, to mountain slopes, to the banks of rivers or other water courses during the Roman occupation of Cova do Xato. During the occupation of Cova Eirós, from the 10th to the 15th century, the presence in charcoal analysis of taxa related to mixed deciduous forest was lesser than in the preceding period. The decrease of these taxa in parallel with the increased presence of riverine woodland taxa could be related to the deforestation of the valleys associated with the opening of new crop fields (Guitián 2001), and the maintenance of trees in the environs of rivers and water courses. The high representation of a pioneer species such as *Betula* also strengthens the hypothesis of forest clearance during this period (Santos *et al.* 2000). Several taxa of cereals and flax identified at Cova Eirós would indicate the economical exploitation of these fields by communities located in the vicinity. The presence of chestnut at Cova Eirós is also interesting, as it could be related to the spread of *Castanea* during the medieval period in the Northwest of the Iberian Peninsula.

CONCLUSIONS

The archaeobotanical analyses of Cova do Xato and Cova Eirós provide data about the management of forest resources related to complementary activities of the rural economic system by small groups. Both caves were occupied during warm periods - Cova do Xato at the end of the *Roman Warm Period* and Cova Eirós at the start of the *Medieval Warm Period*. Charcoal analysis reveals the degradation of forest cover during the medieval period, as shown at Cova Eirós. The presence of *Castanea* is closely tied to human activity. Chestnut cultivation took place in Western Europe from the early medieval period onwards, and flourished in the later medieval period (11th-16th centuries), when it became an essential source of both food and timber in Galicia and Northern Portugal (Conedera *et al*. 2004; Conedera and Krebs 2008).

The extent of the area excavated at **Cova do Xato** was not sufficient to obtain a clear view of the characteristics of the occupation of this site. The presence of charred cereals and *Terra Sigillata* could indicate the existence of stable occupation of this settlement, although the only structure identified was a hearth. The strategy of firewood collection evidenced at this site was influenced primarily by the availability in proximity to the cave, as indicated by the palynological analysis, but also by the properties of the wood. Species such as *Quercus* sp. deciduous or Fabaceae, were selected due to their combustion-resistant characteristics and consequent production of long-lasting embers, and were combined with some faster burning

ones (e.g. *Salix/Populus, Corylus avellana*) to produce abundant flames.

At **Cova Eirós**, as well as at Cova do Xato, firewood was collected in the surroundings of the settlement: near riverbanks, in the valley areas and at the foot of the mountains or scrub areas. It was also an opportunistic consumption of different types of firewood, which could have been collected when fetching water or harvesting wild fruits (hazelnuts). The presence of two pits and the predominance of storage vessels indicate that the medieval occupation was mainly related to the storage of agricultural products rather than to shelter or habitation, though some domestic activities did occur on the site. It can be considered as evidence for the progressive human settlement of the eastern ranges of NW Iberia from the 9th century onwards.

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