

Late Pleistocene small mammals from Abric Romaní (Barcelona, Spain)

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Abstract

Here we report the results of the small-mammals (Soricomorpha, Chiroptera and Rodentia) association of the Late Pleistocene layers N and O from the Abric Romaní (Capellades, Barcelona). The presence of *Iberomys cabreræ* (Iberian Vole) and *Nyctalus lasiopterus* (Greater Noctule) constitutes the early appearance data in Catalonia and Iberian Peninsula and presents an interest for the knowledge of the paleobiogeographical distribution of these species.

Nous présentons ici les résultats de l'association des micromammifères (Soricomorpha, Chiroptera et Rodentia) du Pléistocène supérieur, niveaux N et O, de l'Abric Romaní. La présence de *Iberomys cabreræ* (Campagnole de Cabrera) et *Nyctalus lasiopterus* (Noctule géante) constitue les plus anciennes mentions en Catalogne et dans la Péninsule Ibérique et présente un intérêt pour la connaissance de la répartition paléobiogéographique de ces espèces.

Keywords: Abric Romaní, Neanderthals, systematic, small mammals, Late Pleistocene.

Introduction

The Abric Romaní is a Neanderthal site in a rock shelter, located in the town of Capellades, some 45 km to northeast of Barcelone. Their geographical references are 1° 41' 30'' longitude east and 41° 32' latitude north, and some 310 meters over the present sea level. Its situation, between the contact of the basin of the river Anoia and the Catalan Pre-littoral Mountain Chain, is a good enclave in the route between the Mediterranean littoral and the river Ebro inner basin (Fig. 1). The shelter is carved in a quaternary travertine, in which Neanderthals should dwelled occasionally as the known Mousterian archaeological succession indicate.

This occupation may took place during the 70-40 ka of the Marine Isotopic Stage 3 (MIS 3) after Carbonell *et al.* (2002).

The composition and structural changes in the vegetal association, derived from the

palinologic studies, has differentiated five palaeoclimatic phases (Burjachs and Julià, 1994).

The levels O and N, objective of this work, are inside phase number three, dated between 56.8 - 49.5 kyr. They are characterized by an alternation between temperate and cold events. By the Uranium series method this package of sediments are dated between 54.9 ±1.7 and 54.1 ±1.6 kyr (Bischoff *et al.*, 1988).

The aim of this paper is the paleontological study and bioclimatic characterization of the small mammals of the levels O and N of the Abric Romaní Neanderthal Rock Shelter.

Systematic Paleontology

In the systematic study we have used the nomenclature and measurements for Arvicolinae (according to van der Meulen, 1974; Cuenca-Bescós *et al.*, 1995; Chaline *et al.*, 1999), Murinae (according to Pasquier, 1974), Gliridae

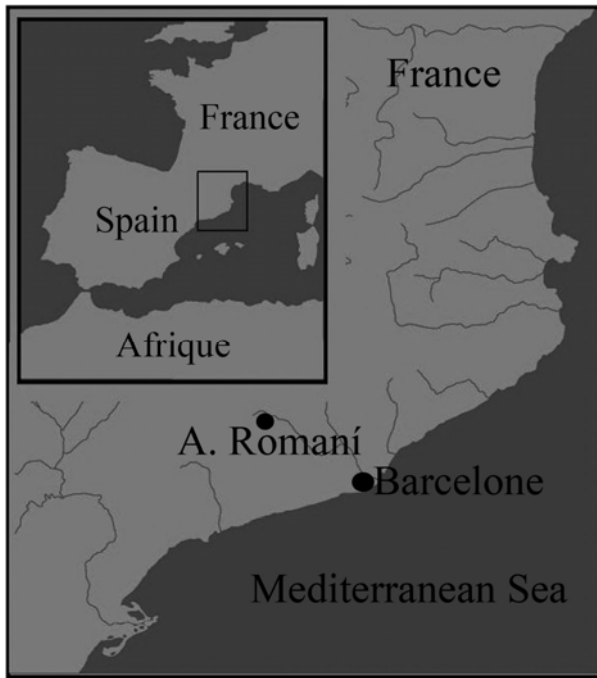


Fig. 1. Location of the Abric Romaní (Capellades, Barcelona, Spain).

(according to Damms, 1981), Soricomorpha (according to Reumer, 1984, Rofes Cuenca-Bescós, 2006), Erinaceomorpha (Rümke, 1985) and Chiroptera (according to Sevilla, 1988). The taxonomic classification of the small-mammals has been made according to Mckena Bell (1997) and the distribution and habitat of the small-mammals has been made according to Palombo Gisbert (2004).

The small-mammals of the Abric Romaní have been obtained through sieve-washing of the sediments excavated in the archeological campaigns using with a water-pump and two different sizes of meshes, 1 mm and 5 mm.

The small fossils were then classified first anatomically and then taxonomically. The diagnostic elements are usually the molars (m for the lowers and M for the uppers) and mandibles and postcranial elements in the case of insectivores (shrews, moles, hedgehogs) and chiropters (bats). Here we analyze 226 fossil remains (Tab. 1) from levels O and N distributed into 210 rodents, 12 insectivores and 4 bats (by counting their minimum number of individuals MNI) from the excavations of the years 2003 to 2006.

SORICOMORPHA Gregory, 1910

Family **SORICIDAE** Fischer von Waldheim, 1817

Subfamily **Crociodurinae** Milne-Edwards, 1872

Crociodura russula (Hermann, 1780)

Material: 2 mandible without teeth, 1 mandible (with m2) from level N, 4 mandible without teeth, 1 first lower molar (m1), 1 mandible (with m1-m3), 1 mandible (with m1-m2) from level O.

Description: the genus *Crociodura* is basically characterized by possessing white teeth, the lower incisor is acuspulate, and the condylar facets are completely united (Reumer, 1984). The robust and right coronoid process, the triangular and smaller (respect to *Crociodura suaveolens*) form of the internal temporal fossa and the more than 90° angle between the coronoid process and the condyle, are morphological characteristics of the species *Crociodura russula*.

Distribution and habitat: *Crociodura russula* is a cosmopolitan species distributed today by the entire European continent. It has an extensive distribution in the Iberian Peninsula, although it prefers Mediterranean and open environments, below the 1200-1600 meters of altitude, with annual precipitation lower than 1000 mm and temperatures upper than 5° C.

Subfamily **Soricinae** Fischer von Waldheim, 1817

Sorex gr. *araneus-coronatus* Linnaeus, 1758-Millet, 1828.

Material: 1 mandible from level O.

Description: the genus *Sorex* is characterized by possessing red teeth, lower incisor multicuspluate (1 to 4 cusplules), and the condyle facets clearly separated. Due to the scarcity of the remains from Abric Romaní we have considered our specimen to be *Sorex* gr. *araneus-coronatus*.

Distribution and habitat: The millet's shrew (*Sorex coronatus*) and the common shrew (*Sorex araneus*) are currently distributed in Western Europe. Today they have a northern distribution in the Iberian Peninsula, not being present in the Mediterranean provinces. They are two shrews with preference to humid habitats in deciduous forests.

Family **TALPIDAE** Fischer von Waldheim, 1817.

Subfamily **Talpinae** Fischer von Waldheim, 1817.

Talpa europaea Linnaeus, 1758.

Material: 2 humerus, 1 mandible (without teeth) from level O.

Description: Two species of moles are represented nowadays at the Iberian Peninsula: *Talpa europea* (Common mole) and *Talpa*

occidentalis (Iberian mole). According to Cleef-Rodgers Hoek Ostende (2001) the diagnostic characters to separate both species are the morphology and measurements in the dentition and mandible and the measurements in the humerus. The measurement of the width of the diaphyse (n=2; 4.35-4.70 mm) in humerus of our specimens falls within the variation of *Talpa europaea*, (n=16; 4.3-4.7 mm, after data in Cleef-Rodgers Hoek Ostende (2001).

Distribution and habitat: the common mole is currently northeastern Iberian Peninsula distribution. It is a mole with preference to open forest and humid meadows, with annual mean precipitation upper than 600 mm, and it is found until 2000 meters high.

CHIROPTERA Blumenbach, 1779

Suborder **MICROCHIROPTERA** Dobson, 1875

Family **Vespertilionidae** Gray, 1821

Miniopterus schreibersi (Khul, 1817)

Material: 1 mandible (without teeth), 1 lower third molar (m3) from level N.

Description: the genus *Miniopterus* is characterized its small size, it is the smallest cave-bats of the Iberian Peninsula. It posses two alveolar holes in the lower third pre-molar (p3), has nyctalodont lower molars, a thick trigonid cingulum and a thin talonid cingulum. The shreiber's bat is the only extant species pertaining to the genus *Miniopterus* in the Iberian Peninsula.

Furthermore, the alveolar morphology of p3 in our mandible, and the measures taken in mm from the third lower molar (n= 1; L= 1.29; w1= 0.85; w2= 0.67) (Fig. 2) are inside of the measures range of extant Iberian specimens (n=8; L: 1.22-1.29; w1: 0.71-0.91; w2: 0.61-0.77, data in Sevilla, 1988).

Distribution and habitat: the shreiber's bat is distributed throughout the Iberian Peninsula, although it shows preferences for southern temperate Mediterranean conditions, with mean annual temperatures around 10° C.

Pipistrellus pipistrellus (Schreber, 1774)

Material: 1 mandible (c-m1) from the level N.

Description: the genus *Pipistrellus* is characterized by its nyctalodont lower molars and a shortly, thick cingulum. The mandible is basically characterized by possessing a right sigmoidea incisure between the coronoid process and the articular process. The mandible morphology and the measures, taken in mm, from

the first lower molar (m1) (n=1; L=1.25; w1= 0.75; w2= 0.96) fall within the variation of the common pipistrelle, *Pipistrellus pipistrellus* (n=12: L: 0.99-1.12; w1: 0.69-0.84; w2: 0.76-0.87).

Distribution and habitat: *Pipistrellus pipistrellus* is distributed throughout North Africa and Europe. The common pipistrelle is found in towns, and flights around the lights of the streets. It is a cosmopolite species, living from the sea level to 2000 meters high, from closed forest to open meadows, Mediterranean and Atlantic conditions.

Nyctalus lasiopus (Schreber, 1780)

Material: 1 mandible (p4-m2) from level O.

Description: the Greater noctule (*Nyctalus lasiopus*) is characterized by possessing, in occlusal view, nyctalodont lower molars, open trigonid, the lingual cusps aligned and a concave-convex entocrestid. In labial view, the paralofid is concave, the p4 cingulum is convex, and the molars cingula are thick and more or less even.

This morphology and the measures, taken in mm, from the first lower molar (m1) (n= 1; L= 2.15; w1= 1.42; w2= 1.60) and from the second lower molar (m2) (n= 1; L= 2.17; w1= 1.39; w2= 1.55) fall within the variations of *Nyctalus lasiopus* (Sevilla, personal communication)

Distribution and habitat: it has an unknown distribution in the Iberian Peninsula with only punctuated, recent quotes in Sevilla, Cadiz, Rioja Navarra and Basque Country. This species is basically associated to deciduous forest.

RODENTIA Griffith, 1827

Family **MURIDAE** Illiger, 1815

Subfamily **Arvicolinae** Gray, 1821

Iberomys cabreræ (Thomas, 1906)

Material: 13 first lower molars (m1) from level N, 39 m1 from, level O.

Description: The *Iberomys* lineage has *Iberomys cabreræ*, the Iberian vole, as its sole extant representative. It is descended from the *Iberomys brecciensis* species, which appears in the Middle Pleistocene. The Iberian vole is characterized by its relatively long and wide lower molar (m1), the reduction of the triangles of the anteroconid complex (ACC), a long and narrow fifth lingual salient angle (LSA5), which is a measure of its latero-medial asymmetry, also known as labio-lingual asymmetry (Cuenca-Bescós *et al.*, 1995), a fourth buccal salient angle (BSA4) with a quadrangular form, and enamel completely covering the labial wall of the ACC

(Ayarzagüena López Martínez, 1976). These characteristics are present in the Abric Romaní specimens (Fig. 2). An analysis of the variability in the size of the m1 of the Abric Romaní specimens (n=12; L: 3.26-3.54 mm; W: 1.17-1.38 mm) in comparison with other specimens from the Holocene (Cova Foradada; Bronze Age) (n=5; L: 3.35-3.54 mm; W: 1.22-1.42 mm) establishes that the size falls within the variation of the extant *Iberomys cabrerae*.

Distribution and habitat: The Iberian vole is an endemic species of the Iberian Peninsula, which nowadays have a restricted and discontinuous geographic range (around the Central System, southern Iberian System, sub-bethics Mountains and several points of the Pyrenees Mts.). At present, the Iberian vole is not found in Catalonia. It is characteristic of a Mediterranean climate, with preference for habitats with perennial vegetation and water streams.

Microtus arvalis (Pallas, 1779)

Material: 21 m1 from level O.

Description: the genus *Microtus* is characterized by the presence of closed triangles (T4-T5) in the occlusal surface of the m1. Moreover, the symmetric and parallel disposition of the triangles T4/T5 and specially T6/T7, which furnished a round morphology of the anteroconid complex (ACC), are the peculiar characteristics of *Microtus arvalis*.

Distribution and habitat: the Common vole (*M. arvalis*) has a southern, temperate Europe distribution. It lives mainly in open and not greatly humid meadows, at 900 to 2000 meters above the sea-level, with a mean annual precipitation > 800 mm. Currently in Catalonia lives in the upper Pyrenees and several places of the northern Pre-Pyrenees.

Microtus agrestis (Linnaeus, 1761)

Material: 7 m1 from level O.

Description: The field vole (*Microtus agrestis*) is somewhat similar to *Microtus arvalis*. It is characterized by the asymmetry and alternation of the triangles T4/T5 and T6/T7.

Distribution and habitat: The field vole is distributed throughout the north of the Iberian Peninsula, and it lacks in the Mediterranean region. It habits open and deciduous forest meadows in river edges until the 1900 m of high.

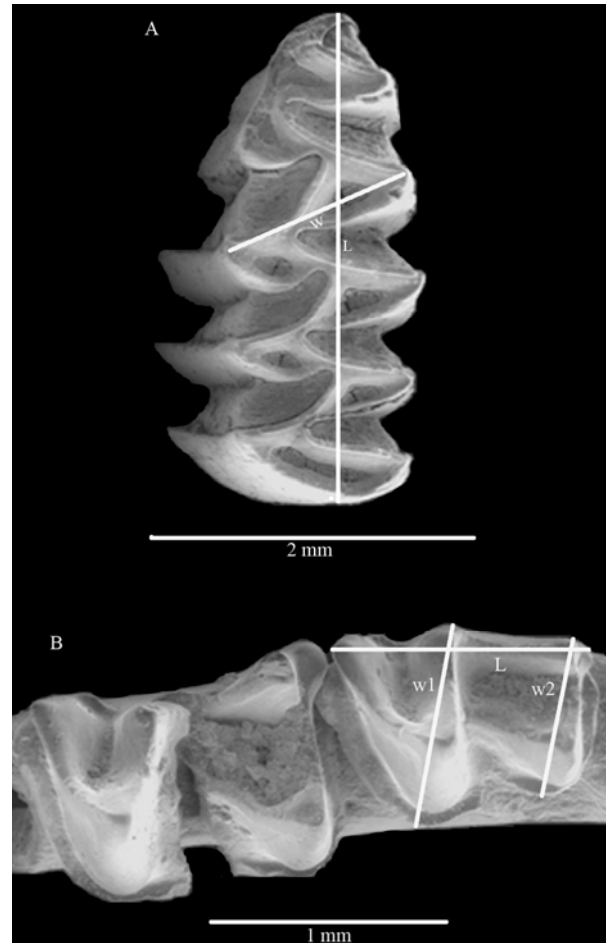


Fig. 2. A: first lower left molar of *Iberomys cabrerae* with measures taken from occlusal view. **B:** second and third lower left molars of *Miniopterus shreibersi* with measures taken from occlusal view.

Terricola duodecimcostatus (de Sélys-Longchamps, 1839)

Material: 1 m1 from level N, 18 m1 from level O.

Description: this genus is characterized by the presence, in the m1, of an open triangle T4, and the T4-T5 forming a pitimian rhombus. The Mediterranean pine vole is characterized by the open and few inclined T6 and a parallel and symmetric disposition of triangles T6/T7.

Distribution and habitat: this is a species distributed in the entire Iberian Peninsula, except at the north-occidental region. *Terricola duodecimcostatus* is a Mediterranean species which habits in open meadows.

Arvicola sapidus Miller, 1908

Material: 4 m1 from level N, 52 m1 from level O.

Description: the genus *Arvicola* is characterized by the presence of a posterior lobe followed by three closed triangles and a wide

anterior cusp (AC) in the m1. The disposition of an acute angle in the lingual side, towards the internal edge of the AC in the first lower molar and, the enamel pattern "Arvicola", thicker in the distal side than the proximal side, are morphological characteristics of the species *Arvicola sapidus*.

Distribution and habitat: the Southern water vole, *A. sapidus*, has a restricted range distribution in Europe, it occurs in greater part of France and the Iberian Peninsula. It prefers permanent water streams, as rivers or irrigation straits with constant levels.

Subfamily Murinae Illiger, 1815

Apodemus sylvaticus (Linnaeus, 1758)

Material: 1 mandible (m1-m2), 1 maxilla (M1-M2), 1 maxilla (without teeth), 4 lower first molars (m1) and 2 lower second molars (m2) from level N, 6 mandible (without teeth), 11 maxilla (without teeth), 17 m1, 4 m2, 2 M1 and 1 M1 from level O.

Description: the genus *Apodemus* is characterized by the presence of a low occlusal surface with six main cusps in the m1. The anterolingual and anterolabial cusps of the m1 are arranged in an X shape. In some specimens, these cusps are separated by a narrow and deep furrow.

The posterior cusp (pc) of the m1 is low, rounded and well developed. In the labial side of the m1 are two or three accessory cusps (c) and one proximal tubercle (tma) (Cuenca-Bescós et al. 1997). Moreover, the conjunction between the tubercles t4 and t7 on the M1 and the development of the tubercle t9 on the M2 (Pasquier, 1974) are the morphologic characteristics that ascribes our material to the *Apodemus sylvaticus* species, the wood mouse.

Distribution and habitat: *A. sylvaticus* has a large range distribution in Western and Eastern Europe. Its presence is continuous throughout the Iberian Peninsula, in Catalonia it occurs from the Pyrenees to the Mediterranean coast. *A.*

sylvaticus is a cosmopolite species which lives in a lot of habitats, although it prefers edge zones in deciduous forest with water streams. It may arrive to 2000 high meters.

Family MYOXIDAE Gray, 1821

Eliomys quercinus (Linnaeus, 1766).

Material: 1 maxilla (without teeth), 2 mandible (without teeth), 1 M2 from level O.

Description: this genus is characterized by possessing simple ornamentation crests united by an endoloph. *Eliomys quercinus* (garden dormouse) is the only species of this genus represented in the Iberian Peninsula. It has concave molars, and the main crests are transverse.

Distribution and habitat: the garden dormouse is a generalist species which prefers open edge forest meadows until 2000 meters of high.

Discussion and conclusions

From a biostratigraphic point of view there are two remarkable species: *Iberomys cabreræ* and *Nyctalus lasiopterus*:

Iberomys cabreræ is an endemic Iberian species which have its first appearance data (FAD) during the beginning of the Upper Pleistocene. *I. cabreræ* from the Abric Romaní (ca. 54.9-54.1 kyr) is the most ancient mention well dated from Catalonia, and one of the most ancient in Pinilla del Valle, Madrid dated around 90 kyr (Laplana Sevilla, 2006).

Nyctalus lasiopterus is a species with a discontinuous range in the Iberian Peninsula, and not currently distributed in Catalonia. *N. lasiopterus* is a strange bat in the Iberian Pleistocene sites, with the solely mention of the late Pleistocene of Cueva del Agua (Sevilla, 1988). This is the second mention of this species during the Pleistocene in Spain.

Acknowledgments

We want to thank all members of the Abric Romaní team, Dr. Paloma Sevilla for her aid with bats identification. Juan Manuel Lòpez-García is the beneficiary of a predoctoral research fellowship from the "Generalitat de Catalunya", aid financed by the European Social Fund. This paper is part of the projects PO BOS 2003-8938, DGI CGL 2006-13532-C03-01-02.

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Novembre 2008