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USING SMALL MAMMALS TO RECONSTRUCT THE CLIMATIC CONTEXT OF THE LATE PLEISTOCENE LAGAR VELHO ROCKSHELTER (LEIRIA, PORTUGAL).

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Supplementary Appendices and Taxonomy

Supplementary Appendices

Supplementary Figures and Table

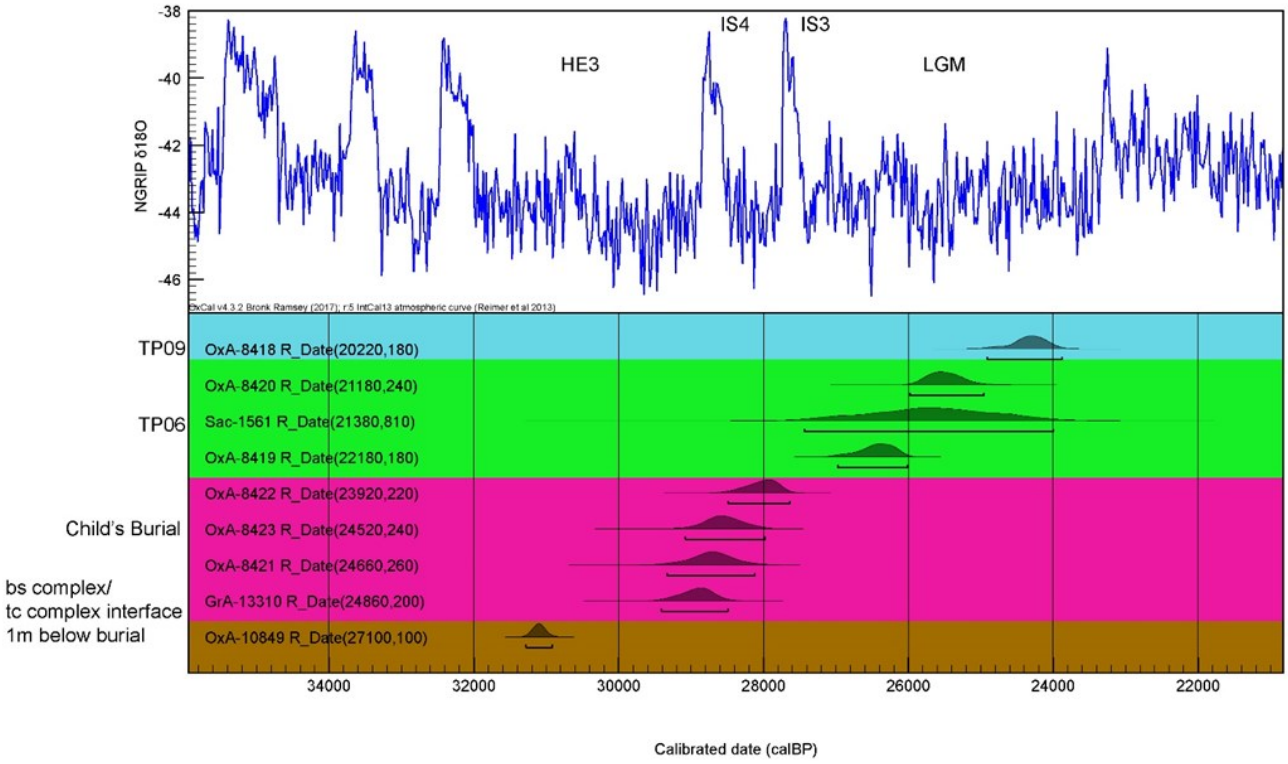


Fig. S1 - Figure S1. Relation of ^{14}C calibrated dates from Lagar Velho rockshelter with the NGRIP ^{18}O isotope curve. Radiocarbon ages have been calibrated using OxCal v. 4.3.2 (Bronk Ramsey, 2009a) and the Intcal13 curve (Reimer et al., 2013).

Climatic Parameters	b	aIV	aVI	aVII	aVIII	r^2	SE
MAT in ºC	26.686	-0.074	-0.135	-0.217	-0.404	0.93	3.637
MTW in ºC	26.219	0.031	-0.113	-0.037	-0.121	0.746	4.754
MTC in ºC	27.538	-0.175	-0.141	-0.418	-0.71	0.932	5.081
MAP in mm	2978.195	-32.648	-5.076	-28.4	-33.109	0.746	470.615

Tab. S1 - Multiple linear regressions for each studied climatic factor as a function of the bioclimatic components from the rodent fauna. b: intercept; aIV-aVIII: slopes of the different bioclimatic components; r2: determination coefficient; SE: standard error of estimate. Modified from Hernández-Fernández (2001b) and Hernández-Fernández & Peláez-Campomanes (2005).

Taxonomy

MAMMALIA Linnaeus, 1758

Order EULIPOTYPHLA Waddell, 1999
Family ERINACEIDAE Fischer, 1814
Subfamily Erinaceinae Fischer, 1814
Genus *Erinaceus* Linnaeus, 1758
Erinaceus sp.

Material: one right mandible (LV/K20/12cribo).
Description: one toothless broken right mandible was recovered from the child burial. It is a robust mandibular fragment, where the alveoli on the occlusal surface are arranged oriented towards the distal part of the mandible, typical of mammals of the order Eulipotyphla; it has lost the ascending mandibular branch. This characteristic allows us to ascribe this mandible to the family Erinaceidae. Two species of hedgehogs now inhabit the Iberian Peninsula, *Erinaceus europaeus* (the European hedgehog) and *Atelerix algirus* (the North African hedgehog). We do not have enough morphological data to ascribe our mandible to one rather than the other species. However, the first evidence in Europe of the introduction of *Atelerix algirus* comes from a Bronze Age site on the island of Menorca (Morales & Rofes, 2008). Moreover, during the late Pleistocene in southern France (Jammot, 1989) and Iberian Peninsula (Laplana et al., 2015) another species diverse of *E. europaeus*, pointed as *Erinaceus* sp., has been reconized. Accordingly, we can cautiously affirm that the specimen analysed probably belongs to the genus *Erinaceus* sp.
Remarks: *Erinaceus europaeus* (the European hedgehog) is the only current representant of this species in Iberia and nowadays is distributed practically throughout the Iberian Peninsula. This species favours a very varied range of habitats, open as well as wooded, preferably in humid areas. Its presence is normally found at altitudes below 1000 metres (Palomo et al., 2007). The species also has a wide distribution in Portugal nowadays, with a higher incidence in the southern half of the country. However, the species is extensively distributed in the centre and north, corroborating the adaptability of this species to various types of habitat and to different environmental conditions (Paupério et al., 2017). The genus *Erinaceus* as *Erinaceus europaeus* has been identified in a variety of Iberian sites in MIS 2, such as l'Arbreda cave (López-García et al., 2015), La Riera (Altuna, 1986), Tito Bustillo (Altuna, 1976), El Pendo (Altuna, 1972), El Juyo (Pokines, 1998), El Rascaño (Altuna, 1981) and Cueva Ambrosio (Sesé & Soto, 1988).

Taxonomy

Family SORICIDAE Fischer, 1817
Subfamily Soricinae Fischer, 1817
Genus *Sorex* Linnaeus, 1758
Sorex sp.

Material: one right mandible (LV/W/9A-6), one left mandible (LV/V/9), one cranium (LV/T/9topo).
Description: two fragmented mandibles and one fragmented cranium from level T09 are ascribed to the genus *Sorex* on the basis of the red pigmentation on the teeth. The degree of fragmentation of the mandible makes it difficult to ascribe the material to any one of the three medium-sized *Sorex* species (*S. araneus*, *S. coronatus* and *S. granarius*). Given these criteria and in the absence of further morphological data, we have decided to ascribe our material to *Sorex* sp.
Remarks: The only *Sorex* medium-size species currently present in Portugal (Paúpeiro et al.,2019) is *Sorex granarius* (the Iberian shrew) is a species endemic to the Iberian Peninsula, typical of humid environments with good herbaceous or shrubby vegetation cover. It is distributed in such environments through the Central System to the mouth of the Tagus and from there to Galicia (Palomo et al., 2007; Paúperio et al., 2019). Owing to the difficulty of morphologically separating this medium-sized species of *Sorex* from the other two species, there are no clear records of the presence of *Sorex granarius* in the late Pleistocene of the Iberian Peninsula (López-García, 2011).

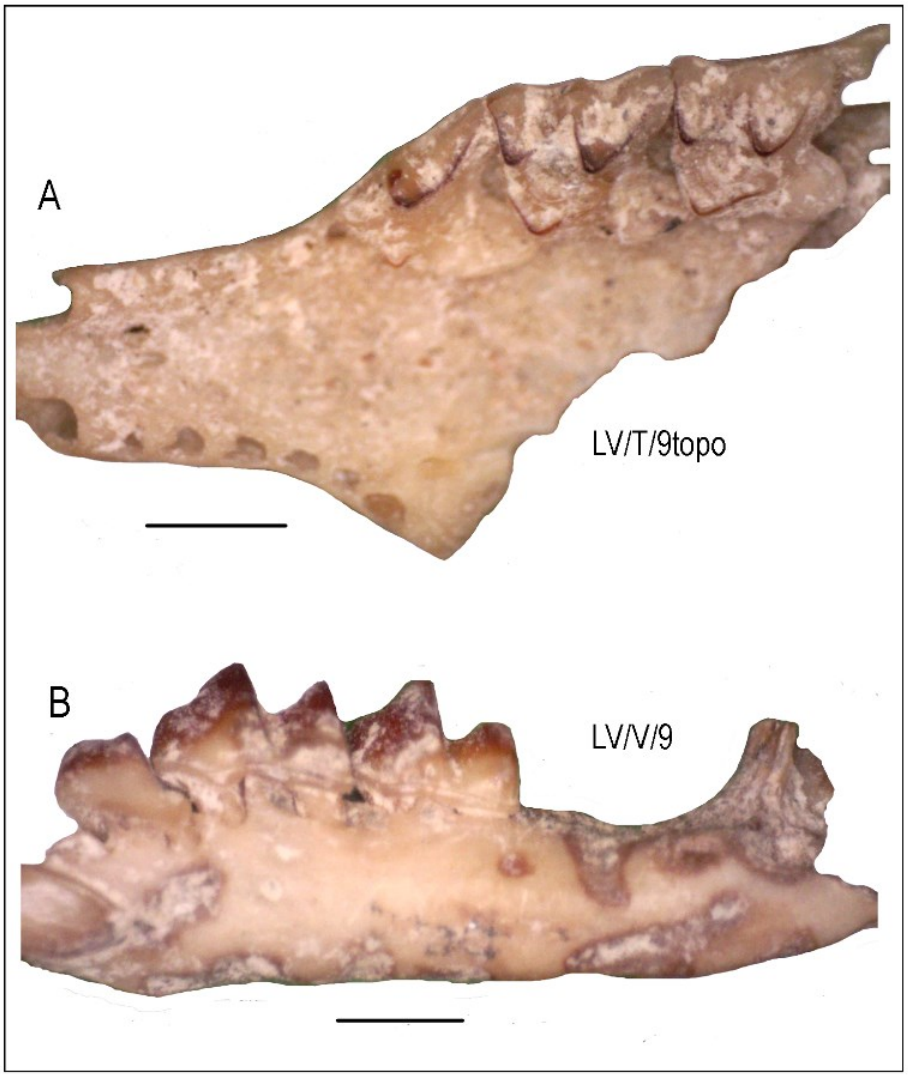


Figure S2. A. cranium *Sorex* sp.; B. left mandible *Sorex* sp. Scales 1 mm.

Taxonomy

Subfamily Crocidurinae Wagler, 1832
Genus *Crocidura* Wagler, 1832
Crocidura cf. *suaveolens* (Pallas, 1811)

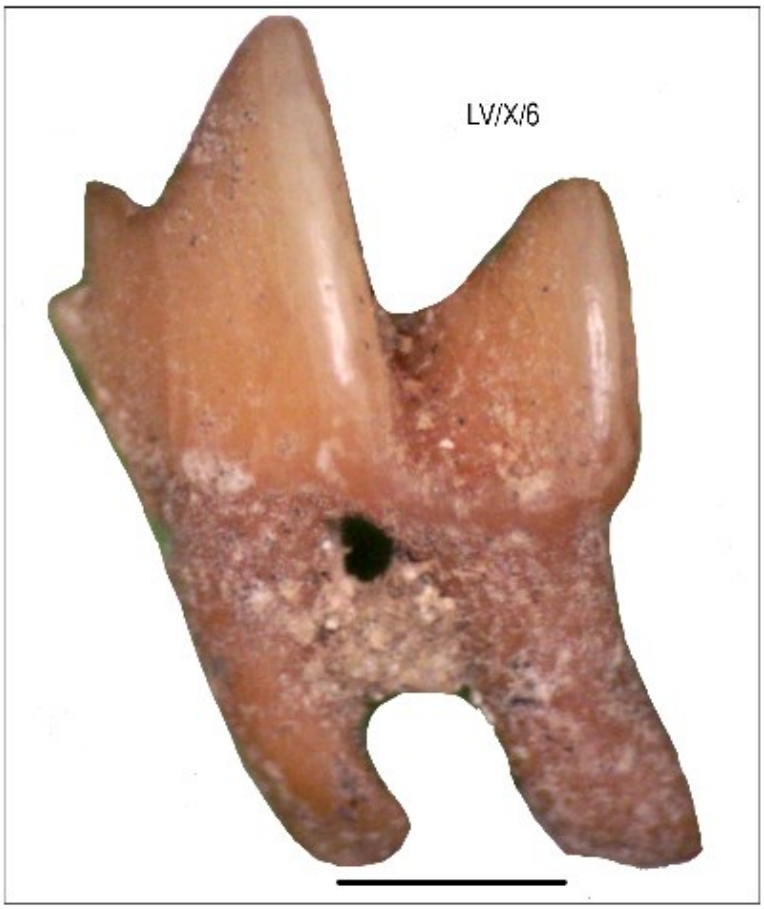
Material: one right (LV/W/9A-6) and one left (LV/V/TP09) mandible from level T09. One left (LV/T/6) mandible from level TP06. One cranium (LV/L20/2criboSE) and one left (LV/L20/2SW) mandible from the child burial.
Description: various fragmented mandibles and one fragmented cranium from the three studied levels belong to the genus *Crocidura*, as indicated by the absence of pigmentation on the teeth. Two species of the genus *Crocidura* now inhabit the Iberian Peninsula: *Crocidura russula* (the greater white-toothed shrew) and *Crocidura suaveolens* (the lesser white-toothed shrew). Both species are also present nowadays in Portugal (Paupério et al.,209). The two species are sometimes difficult to separate morphologically, but in our specimens the absence of constriction in the cingulum of the second lower molars (m2) in buccal view, allow us to ascribe our remains, with a certain degree of caution, to the species *Crocidura* cf. *suaveolens* (in accordance with Poitevin et al.,1986 or López-García, 2011).
Remarks: *Crocidura suaveolens* (the lesser white-toothed shrew) is a species extended in a great variety of habitats throughout the Iberian Peninsula, specially in zones of Atlantic influence, linked in Mediterranean zones to humid environments (Palomo et al., 2007; Paupério et al., 2019). The presence of *C. suaveolens* during the MIS 2 in the Iberian Peninsula is not well documented (see a synthesis in López-García et al.,2011).

Figure S3. Left mandible *Crocidura* cf. *suaveolens*. Scale 1mm.

Taxonomy

Family TALPIDAE Fischer, 1817
Subfamily Talpinae Fischer, 1817
Genus *Talpa* Linnaeus, 1758
Talpa cf. *occidentalis* Cabrera, 1907

Material: one left m1 (LV/T/6), one left m2 (LV/X/6), one right mandible-m2-m3 (LV/A/6na3) and a fragmented humerus (LV/X/6naA5.1) from layer TP06; one right mandible-without teeth (LV/V/9) and one ulna (LV/X/9) from layer TP09.
Description: According to Nicolas et al. (2016) and Wilson & Mittermeier (2018) two species of the genus *Talpa* currently inhabit the Iberian Peninsula: *Talpa aquitania* (the Aquitanian mole) and *Talpa occidentalis* (the Iberian mole). The morphology of the two species is very similar, *T. occidentalis* tend to be smaller than *T. aquitania*. The second lower molars (m2) measured in our specimens provide an average length of 2.4 mm, i.e. within the range established for *T. occidentalis* (m2= 2.25-2.50 mm). Then, if we consider that previously fossil identified material as *T. europaea*, pertains probably to the recent recognized species *T. aquitania*, the measurement, for example, of m2 in the late Pleistocene site of the Abric Romaní and El Portalón cave ranges between 2.77-3.05 mm (according to López-García, 2011). Also, the difference in the size of the humerus is more useful than the dentition for distinguishing between *Talpa* species. However, it was not possible to measure the identified humerus because it is broken, but in general terms it is small in size. These criteria, together with the fact that in present-day Portugal the only *Talpa* species represented is *T. occidentalis* (Paupério et al., 2019), lead us cautiously to believe that the material from the studied layers of Lagar Velho belongs to *Talpa* cf. *occidentalis*.
Remarks: *Talpa occidentalis* (the Iberian mole) is a species endemic to the Iberian Peninsula, which is distributed more or less continuously throughout the northwestern part of the peninsula, is absent in the Pyrenees and the Ebro Basin, and which mainly inhabits soft soils abundant in prey (Palomo et al., 2007; Paupério et al., 2019). Most likely due to the difficulty of distinguishing between the two species, the presence of *T. occidentalis* in MIS 2 and in general in the late Pleistocene is low, although it has been identified in a few sites, such as El Rascaño (Altuna, 1981), Gorham's cave (López-García et al., 2011a) and Valdavara-1 (López-García et al., 2011b).



Taxonomy

Figure S4. Left m2 *Talpa* cf. *occidentalis*. Scale 1 mm.

Order RODENTIA Bowdich, 1821
Family CRICETIDAE Fisher, 1817
Subfamily Arvicolinae Gray, 1821
Genus *Arvicola* Lacépède, 1799
Arvicola sapidus Miller, 1908

Material: four left first lower molars (m1) (LV/T/9topo, LV/A/9na1, LV/V/9, LV/X/7(9)) and two right m1 (LV/X/9, LV/V/9) from level TP09; four left m1 (LV/X/6-1, LV/X/6-2, LV/Z/6, LV/B/6na3) and three right m1 (LV/X/6-3, LV/V/6, LV/I/6este) from level TP06; one left mandible (LV/L20/8), one left m1 (LV99/K20/13) and five right mandibles (LV99/K20/9, LV/L20/13, LV98/L20/2NE-1, LV98/L20/2NE-2, LV/L20/6) from the child burial.
Description: the large size of the molars identified in our material, especially m1, as well as the alternation of five triangles in m1 and the generally thick enamel, is what leads us to assign our specimens to the genus *Arvicola*. In accordance with López-García (2011), the differentiated "*Mimomys*"-type enamel, which is thicker in the distal part of the triangles than in the proximal part, and the sharp angulation in the lingual part of the internal border of the anterior cusp, allow us to assign our specimens to the species *Arvicola sapidus* (the southern water vole), thus differentiating it from the other species of this genus present in the Iberian Peninsula, *Arvicola amphibius* (the European water vole).
Remarks: *Arvicola sapidus* (the southern water vole) is a Gallo-Iberian endemism, which is distributed throughout the Iberian Peninsula and much of France. It is a semi-aquatic rodent that lives in association with stable courses or bodies of water with abundant herbaceous vegetation on their banks (Palomo et al., 2007; Paupério et al., 2017). During MIS 2 *Arvicola sapidus* is found widely distributed geographically at various Iberian sites, such as l'Arbreda cave (López-García et al., 2015), Toll cave (Fernández-García and López-García, 2013), El Portalón (López-García et al., 2010), Valdavara-1 cave (López-García et al., 2011), Maltravieso-Chimeneas (Bañuls-Cardona et al., 2012), Gorham's cave (López-García et al., 2011), Las Caldas (Laplana et al., 2006) and Caldeirão cave (López-García et al., 2020).

Figure S5. Right m1 *Arvicola sapidus*. Scale 1 mm.

Taxonomy

Genus *Microtus* Schrank, 1798
Microtus (Agricola) agrestis (Linnaeus, 1761)

Material: 12 left m1 (LV/W/9A(6), LV/T/9topo-1, LV/T/9topo-2, LV/T/9topo-3, LV/T/9topo-4, LV/T/9-1, LV/T/9-2, LV/V/9-1, LV/V/9-2, LV/X/9-1, LV/X/9-2, LV/T/9base) and nine right m1 (LV/X/9, LV/T/9topo-1, LV/T/9topo-2, LV/V/9-1, LV/V/9-2, LV/V/9-3, LV/V/9-4, LV/V/9-5, LV/X/7(9)) from level TP09; four left m1 (LV/Z/6-1, LV/Z/6-2, LV/X/6naA5.1, LV/W/6) and seven right m1 (LV/Z/6-1, LV/Z/6-2, LV/V/6-1, LV/V/6-2, LV/V/6-3, LV/V/6-4, LV/Z (w)/6na2) from level TP06; one left mandible (LV99/K20/9) and one right m1 (LV/L20/10) from the child burial.
Description: the first lower molars (m1) identified are characterized by having three closed triangles (T) in the trigonid-talonid complex (TTC) and four triangles that are closed or with a minimum confluence in the anteroconid complex (ACC). The teeth are also characterized by an asymmetry and an alternation of the triangles T4/T5 and T6/T7, as well as a strong alternation in the re-entrant angles. These morphological characters lead us to ascribe these specimens to *Microtus agrestis*.
Remarks: *Microtus agrestis* (the field vole) is a species that in the Iberian Peninsula is concentrated in the northern third, in a strip that ranges from the Pyrenees to Galicia, including northern Portugal; it is lacking in the Mediterranean region. It lives in open places and near deciduous forests, in places that are humid and with abundant grass such as ponds and river edges, at altitudes of up to 1900 metres (Palomo et al., 2007; Paupério et al., 2017). The field vole was abundant in the Iberian Peninsula during MIS 2, being represented in sites such as l'Arbreda cave (López-García et al., 2015), Toll cave (Fernández-García & López-García, 2013), El Portalón (López-García et al., 2010), Valdavara-1 cave (López-García et al., 2011), Maltravieso-Chimeneas (Bañuls-Cardona et al., 2012), Galls Carboners (López-García et al., 2014), Caldeirão cave (López-García et al., 2020), El Mirón (Cuenca-Bescós et al.,2008), Las Caldas (Laplana et al.,2006) or Amalda cave (Péman, 1990).

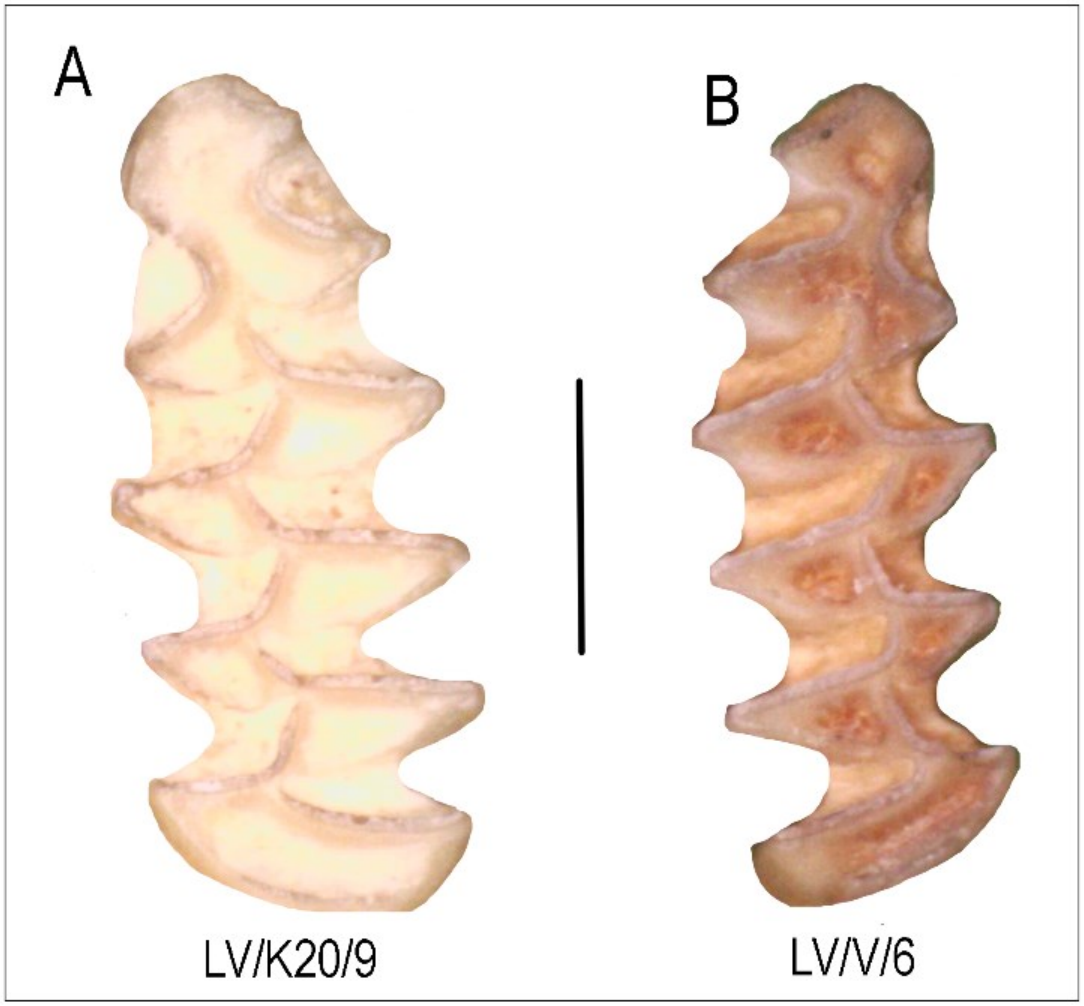


Figure S6. A. left m1 *Microtus agrestis*; B. right m1 *Microtus agrestis*. Scale 1 mm.

Microtus (*Microtus*) *arvalis* (Pallas, 1779)

Material: three left m1 (LV/X/7(9)-1, LV/X/7(9)-2, LV/V/9) and one right m1 (LV/X/7(9)-3) from level TP09, and one left (LV99/K20/1criboNW) and one right (LV/L20/10) mandible from the child burial.
Description: the first lower molars (m1) identified are characterized by having an almost symmetrical and parallel arrangement of the triangles T4/T5 (which are closed) and especially T6/T7, as well as the corresponding re-entrant angles, giving a rounded shape to the anterior cap (AC). These morphological characters prompt us to ascribe these specimens to *Microtus arvalis*.
Remarks: *Microtus arvalis* (the common vole) has a geographical distribution like that of the field vole, although it is a more generalist species, with a more widespread distribution. In the Iberian Peninsula it extends further south and can be found in a multitude of areas, from pastures to deciduous and coniferous forests. In Portugal it has recently been found in the northeast. Its most frequent habitat is subalpine and alpine meadows, i.e. open, not very humid spaces without high vegetation; it does not enter closed forests and it avoids flooded areas (Palomo et al., 2007; Paupério et al., 2017). Like the field vole, moreover, the common vole was an abundant species in the Iberian Peninsula during MIS 2, it being represented in sites such as l'Arbreda cave (López-García et al., 2015), Toll cave (Fernández-García & López-García, 2013), El Portalón (López-García et al., 2010), Valdavara-1 cave (López-García et al., al., 2012), Galls Carboners (López-García et al., 2014), Caldeirão cave (López-García et al., 2020), Les Cendres (Guillem-Calatayud, 2001), El Mirón (Cuenca-Bescós et al.,2008), Las Caldas (Laplana et al.,2006) or Amalda cave (Péman, 1990).

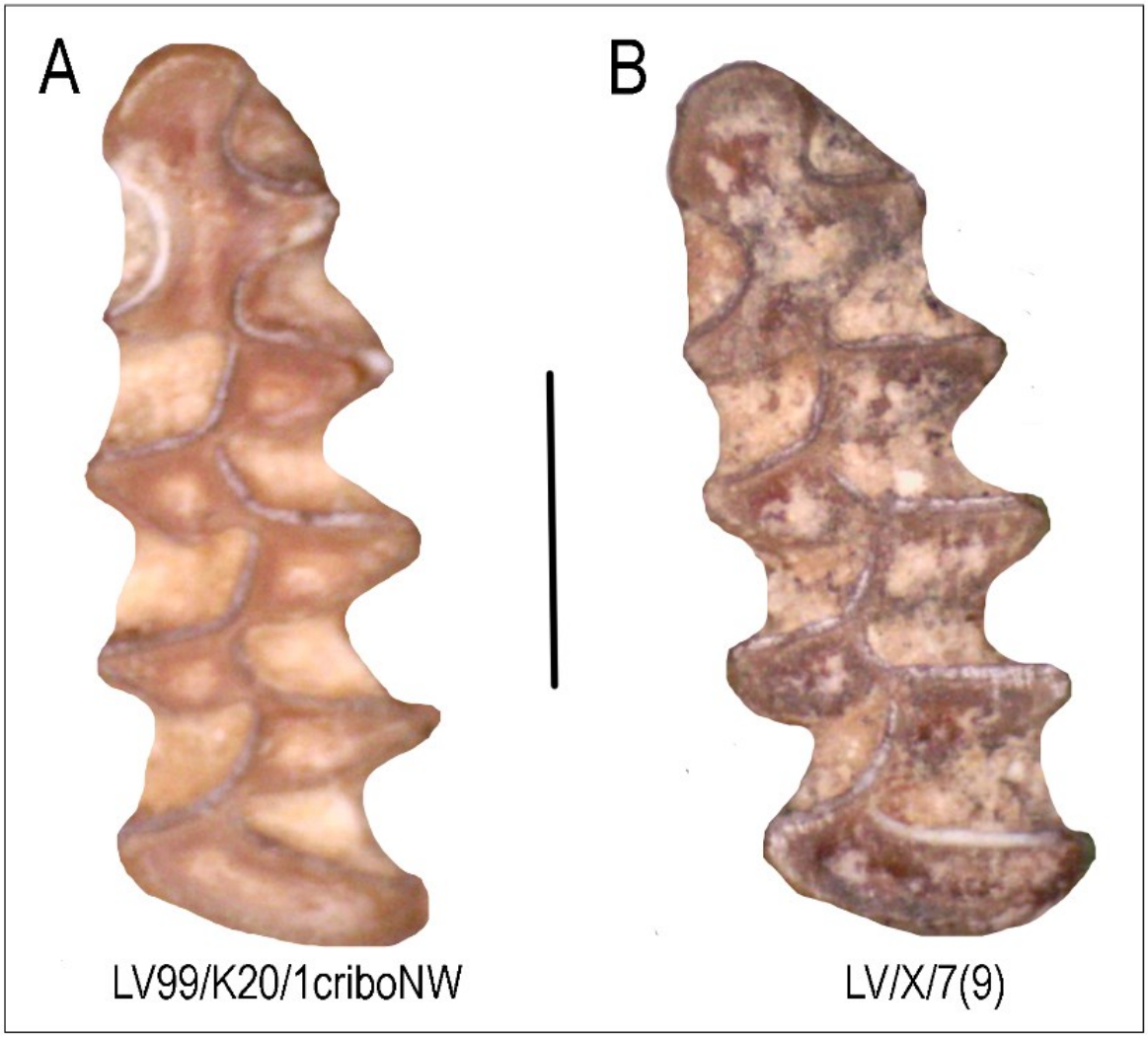


Figure S7. A and B. left m1 *Microtus arvalis*. Scale 1 mm.

Microtus arvalis-agrestis: one left juvenile tooth (LV/C/6na2), °
Subgenus *Iberomys* Chaline, 1972 *Microtus* (*Iberomys*) *cabrerae* (Thomas, 1906)

°) not well developed, from layer TP06, has been assigned to this group.

Material: one right m1 (LV/T/9topo) and one left mandible (LV/W/9A(6)) from level TP09; one right m1 (LV/W/6) from level TP06; and one right m1 (LV/L20/2SW) from the child burial.
Description: in terms of the description by Chaline (1972), modified by Ayarzagüena & López-Martínez (1976) and Cuenca-Bescós et al. (2014), the first lower molars (m1) recovered from Lagar Velho are characterized by clear labio-lingual asymmetry, which is more pronounced than in other microtines; on the labial side of m1 there are only three re-entrants filled with cement; in some specimens there is a fourth, greatly reduced re-entrant (BRA4), allowing these specimens to be distinguished from other species of the genus *Microtus* and subgenus *Terricola*. Moreover, all the identified teeth are large and feature the following: very marked labio-lingual asymmetry (mainly observed between triangles T4 and T5); a labial re-entrant angle 5 (LRA5); a scarcely to very pronounced angle between triangle T7 and the anterior cusp (AC); and a non-visible to well-developed double angle in triangle T6. All these morphological features lead us to ascribe our material to the species *M.* (*I.*) *cabrerae*.
Remarks: *M.* (*I.*) *cabrerae* (Cabrera's vole) is currently endemic to the Iberian Peninsula, where it is widely distributed, with well-documented populations in the foothills of the Pyrenees, the southern Iberian System, the Baetic Sierras and the Central System, also extending the length of Portugal from SW to NE in a limited and patchy manner (Palomo et al., 2007; Paupério et al., 2017). It exclusively inhabits areas with a Mediterranean climate, a high water table, and all-year-round herbaceous cover (Pita et al., 2017). During MIS 2, *M.* (*I.*) *cabrerae* is represented in some sites inside and outside its current range, such as Gorham's cave (López-García et al., 2011a), El Portalón (López-García et al.,2010a), Cova del Toll (Fernández-García & López-García, 2013), Valdavara-1 (López-García et al., 2011b), Cova Colomera (López-García et al., 2010b), l'Arbreda cave (López-García et al., 2015), Maltravieso-Chimeneas (Bañuls-Cardona et al., 2012), Caldeirão cave (López-García et al., 2020), les Cendres (Guillem-Calatayud, 2001), Cueva de Nerja (Arribas, 2004) or Baños de Mula (Agustí et al.1990).

Taxonomy

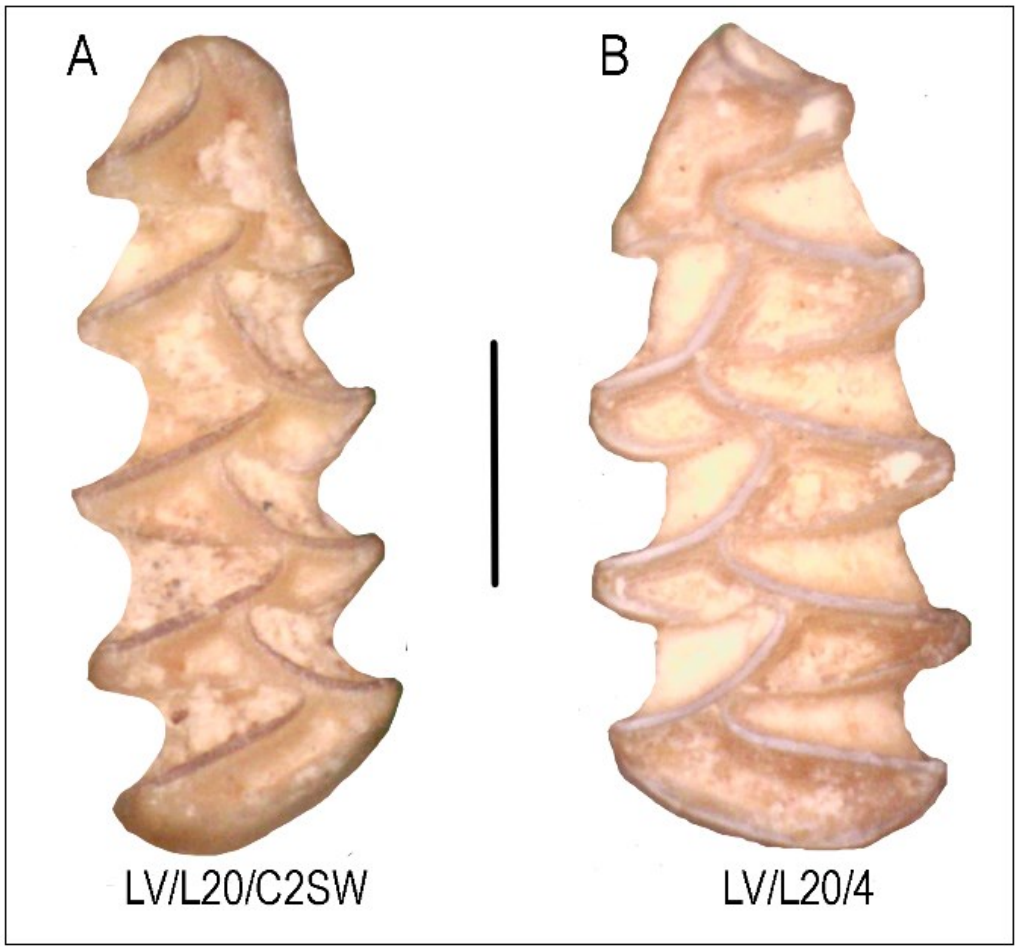


Figure S8. A. right m1; B. left m1 *Microtus (Iberomys) cabrerae*. Scale 1 mm.

Subgenus *Terricola* Fatio, 1867
Microtus (*Terricola*) *lusitanicus* (Gerbe, 1879)

Material: five right m1 (LV/V/9-1, LV/V/9-2, LV/W/9, LV/X/7(9)-1, LV/X/7(9)-2), and three left m1 (LV/W/9A(6)-1, LV/W/9A(6)-2, LV/X/9) from level TP09; five left m1 (LV/X/6-1, LV/X/6-2, LV/V/6-1, LV/V/6-2, LV/Z/6) and one left mandible (LV/V/6-3) and seven right m1 (LV/Z/6-1, LV/Z/6-2, LV/Z/6-3, LV/Z/6-4, LV/X/6, LV/T/6, LV/W/6) and one right mandible (LV/Z/6-5) from level TP06.
Description: the first lower molars (m1) identified are characterized by having triangle T4 open, and T4 and T5 widely confluent, forming what is known as the pitymyan rhombus, leading us to ascribe our specimens to the subgenus *Terricola*. Moreover, triangle T6 is open and there is an almost symmetrical and parallel arrangement of

the T6/T7 triangles, forming a second pitymyan rhombus. Two current Iberian species, *M.* (*T.*) *duodecimcostatus* and *M.* (*T.*) *lusitanicus*, present these characters and are difficult to distinguish morphologically. However, according to López-García (2011), the width of the neck formed by the T6-T7 triangles with AC has been shown to be a useful tool in separating the two species, generally being lower than 0.3 mm in *M.* (*T.*) *lusitanicus* (n=12; López-García 2011) and higher than 0.3 mm in *M.* (*T.*) *duodecimcostatus* (n=49; López-García 2011). Our specimens present a mean neck width of 0.26 mm, allowing us cautiously to ascribe them to the species *M.* (*T.*) *lusitanicus*.
Remarks: *Microtus* (*Terricola*) *lusitanicus* (the Lusitanian pine vole) is a species endemic to the Iberian Peninsula, which is distributed through the northwestern quadrant of the peninsula from Navarra to Galicia, and is also widely distributed in Portugal. This species is represented in very diverse habitats and its presence is conditioned by the existence of soft, humid soils and dense vegetation cover (Palomo et al., 2007; Paupério et al., 2017). Because it is difficult to separate morphologically from *M.* (*T.*) *duodecimcostatus*, not many citations of this species are found in MIS 2, but we find it in Las Caldas (Laplana et al., 2006), Valdavara-1 (López-García et al., 2011), Amalda cave (Peman, 1990), El Juyo (Pokines, 1998) and Caldeirão cave (López-García et al., 2020).

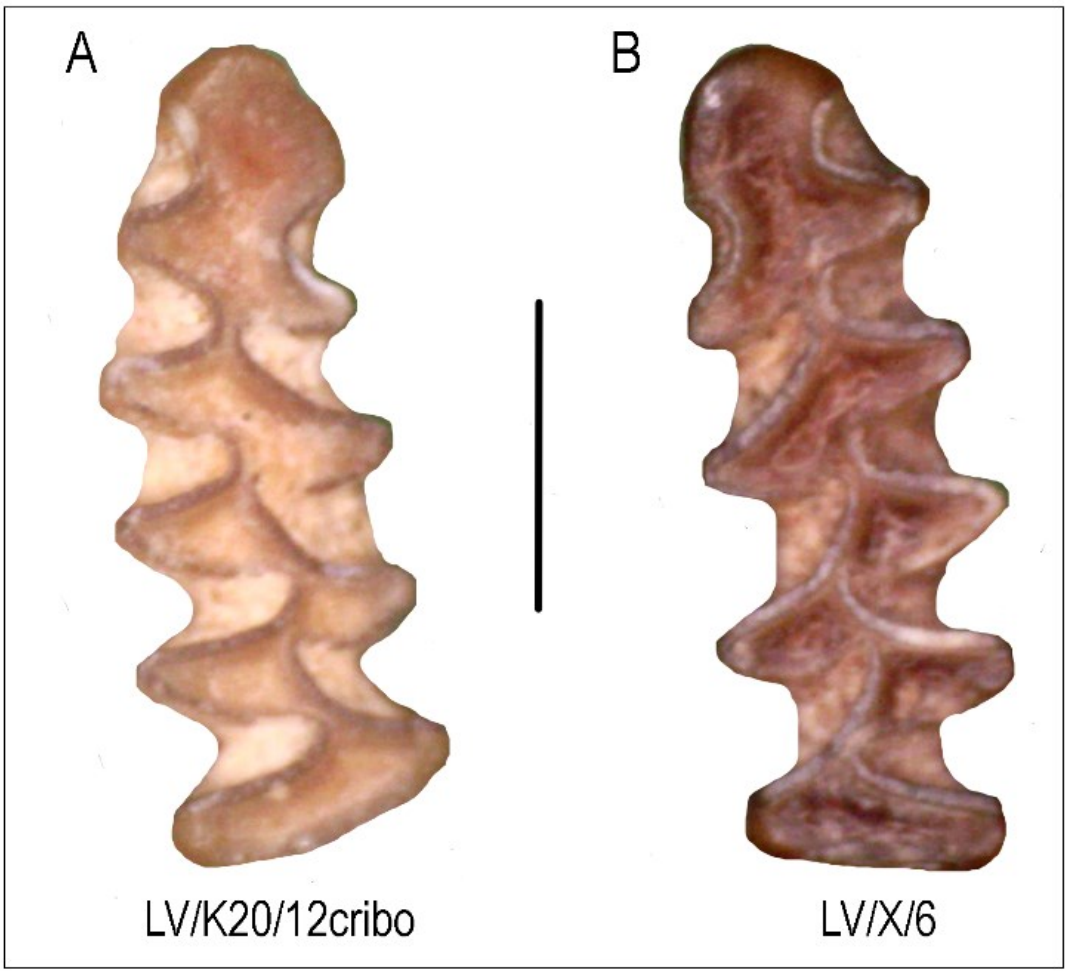


Figure S9. A. right m1; B. left m1 *Microtus (Terricola) lusitanicus*. Scale 1 mm.

Family MURIDAE Illiger, 1811
Subfamily Murinae Illiger, 1811
Genus *Apodemus* Kaup, 1829
Apodemus (*Sylvaemus*) *sylvaticus* (Linnaeus, 1758)

Material: four left mandibles (LV/T/9topo-1, LV/X/9nasA1, LV/V-1, LV/V-2) and six right mandibles (LV/T/9topo-2, LV/T/9topo-3, LV/X/9-1, LV/X/7(9)-1, LV/W/9A6, LV/V-3), and four right maxillae (LV/T/9topo-1, LV/T/9topo-2, LV/X/9-2, LV/X/7(9)-2) from level TP09; two left mandibles and one left m1 (LV/C/6na2, LV/W/6, LV/Z(W)/6) and one right mandible (LV/A/6na3), two left maxillae (LV/W/6, LV/Z(W)/6) and three right maxillae (LV/Z/6-1, LV/Z/6-2, LV/Z/6-3) from level TP06; one left mandible (LV/L20/3NE) and two right mandibles (LV/L21/2NW, LV/L19/12NE)

and one left maxilla (LV/L20/1NW) and one right maxilla (LV/L20/2criboSE) from the child burial.
Description: the first lower molars (m1) identified are characterized by the presence of six main cusps, the antero-lingual and antero-labial cusps conversely forming an "X"; the posterior cusp (cp) is low, well developed and rounded in shape and on the labial side m1 has two secondary cusps (c) and a mesial tubercle (tma), together with a low protrusion of the secondary cusps (c) from the tooth profile. Moreover, in the upper dentition, M1 has the t4 and t7 united, and the t9 in M2 is well developed, characteristics that allow us to ascribe our material to *Apodemus sylvaticus* and differentiate it from *Apodemus flavicollis*.
Remarks: *Apodemus sylvaticus* (the wood mouse) is one of the most abundant micromammals in the Iberian Peninsula, present in the entire territory. The species can be found in most habitats described in the Iberian Peninsula. It preferably occupies areas with good shrubby or arboreal cover, although in areas of homogeneous forest mass it prefers the marginal areas (Palombo et al., 2007, Paupério et al., 2017). The wood mouse is one of the most highly represented species in the Iberian MIS 2, being found at sites such as El Portalón (López-García et al., 2010), El Mirador (Bañuls-Cardona et al., 2017), Gorham's cave (López-García et al., 2011a), Cova del Toll (Fernández-García & López-García, 2013), Valdavara-1 (López-García et al., 2011b), Cova Colomera (López-García et al., 2010b), l'Arbreda cave (López-García et al., 2015), Maltravieso-Chimeneas (Bañuls-Cardona et al., 2012), Galls Carboners (López-García et al., 2014), Caldeirão cave (López-García et al., 2020), El Mirón (Cuenca -Bescós et al.,2008), les Cendres (Guillem-Calatayud, 2001), Amalda cave (Péman, 1990), Aitzbitarte IV (Altuna, 1972), Erralla (Péman, 1985), Tito Bustillo (Altuna, 1976), El Pendo (Altuna, 1972), El Juyo (Pokines, 1998), Laminak II (Péman, 1994), Cueva Ambrosio (Sesé & Soto, 1988) or Cueva de Nerja (Arribas, 2004) .

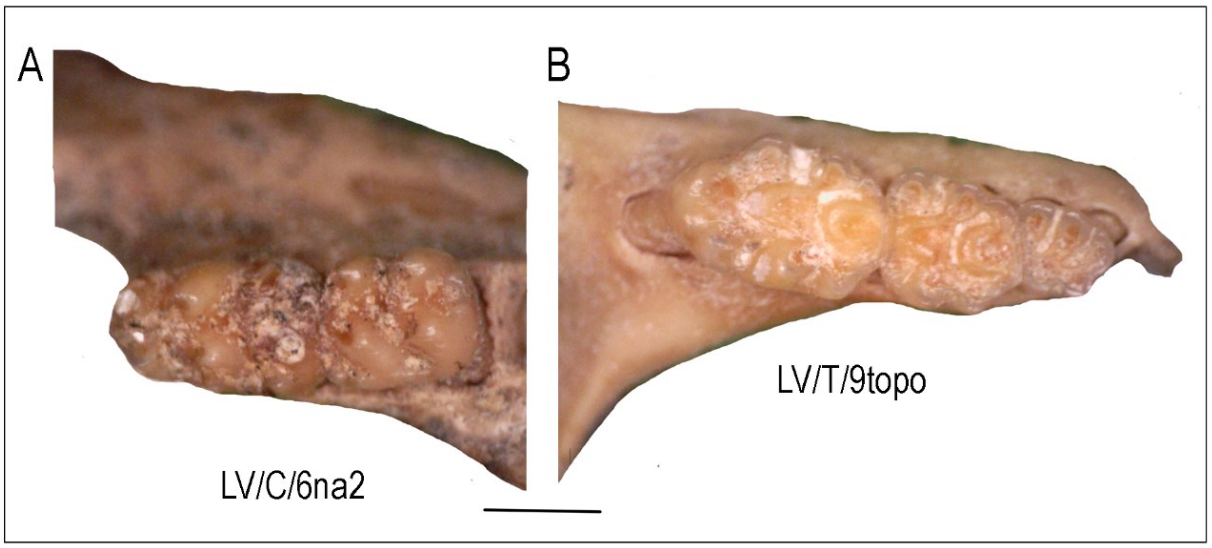


Figure S10. A. left mandible (m1-m2); B. right maxilla (M1-M3) *Apodemus sylvaticus*. Scale 1 mm.

References

Agustí J., Freudenthal M., Lacomba J.I., Martín Suárez E., Nägeli C. (1990) - Primeros micromamíferos del Pleistoceno Superior de la Cuenca de Mula (Murcia, España). Revista Sociedad Geológica España 3 (3-4), 289-293.
Altuna J. (1972) - Fauna de mamíferos de los yacimientos prehistóricos de Guipúzcoa. Con catálogo de los mamíferos Cuaternarios del Cantábrico y del Pirineo Occidental. Munibe 1-4, 464.
Altuna J. (1976) - Los Mamíferos del yacimiento prehistórico de Tito Bustillo (Asturias). In: J. A. Moure, M. Cano. Excavaciones en la cueva de Tito Bustillo (Asturias). Trabajos de 1975. Oviedo, Instituto de Estudios Asturianos 146-194.

Taxonomy

Altuna J. (1981) - Restos óseos del yacimiento prehistórico del Rascaño. In: J. González Echegara, I. Bariandarián El Paleolítico Superior de la cueva de Rascaño (Santander). Altamira, Museo Nacional y Centro de Investigación de Altamira. 3: 221-269.

Altuna J. (1986) - The mammalian faunas from the prehistoric site of La Riera. In: L. G. Straus G., A. Clark. La Riera cave. Stone age hunter-gatherer adaptions in northern Spain. Arizona, Anthropological Research Papers 36, 237-273.

Arribas O. (2004) - Fauna y paisaje de los Pirineos en la Era Glaciar. Barcelona, Lynx, pp. 540.

Ayarzagüena J., López-Martínez N. (1976) - Estudio filogenético y comparativo de *Microtus cabrerae* y *Microtus brecciensis*. Doñana, Acta Vertebrata 3. 181-204.

Bañuls-Cardona S., López-García J.M., Blain H.A., Canals A. (2012) - Climate and landscape during the Last Glacial Maximum in southwestern Iberia: The small vertebrate association from the Sala de las Chimeneas, Maltravieso, Extremadura: Comptes Rendus Palévol 11, 31-40.

Bañuls-Cardona S., López-García J.M., Morales Hidalgo J.I., Cuenca-Bescós G., Vergès, J.M. (2017) - Lateglacial to Late Holocene palaeoclimatic and palaeoenvironmental reconstruction of El Mirador cave (Sierra de Atapuerca, Burgos, Spain) using the small-mammal assemblages. Palaeogeography, Palaeoclimatology, Palaeoecology 471, 71-81.

Chaline J. (1972) - Les rongeurs du Pleistocène moyen et supérieur de France. Cahiers de Paléontologie C.N.R.S., Paris, pp. 410.

Cuenca-Bescós G., López-García J.M., Galindo-Pellicena M.A., García-Perea R. Gisbert J., Rofes J., Ventura J. (2014) - The Pleistocene history of Iberomys, an endangered endemic rodent from South Western Europe. Integrative Zoology 9, 481- 497.

Cuenca-Bescós G., Strauss L.G., Gonzalez-Morales M., García Pimienta J.C. (2008) - Los pequeños mamíferos del final del Cuaternario en Cantábria: la Cueva del Mirón (Ramales de la Victoria). Revista Española de Paleontologia 23, 91-126.

Fernández-García M., López-García J.M. (2013) - Palaeoecology and biochronology based on the rodents analysis from the Late Pleistocene/Holocene of Toll Cave (Moià, Barcelona). Spanish Journal of Paleontology 28, 227-238.

Guillem-Calatayud P.M. (2001) - Los micromamíferos y la secuencia climática del Pleistoceno Medio, Pleistoceno Superior y Holoceno, en la fachada central mediterránea. In: V. Villaverde. De Neandertales a Cromañones. El inicio del poblamiento humano en las tierras valencianas. Valencia, Universidad de Valencia, 57-72.

Jammot D. (1989) - Les Insectivores. In: Campy, M., Chaline, J., Vuillemey, M (eds.). XXVII supplement à Gallia Préhistorie. Le Baume de Gingy, Jura, 111-120.

Laplana C., Sevilla P., Arsuaga J.L., Arriaza M.C., Baquedano E., Pérez-González A., López-Martínez N. (2015) - How far into Europe Did Pikas (Lagormorpha: Ochoronidae) go during the Pleistocene? New evidence from central Iberia. PlosOne 11, e014051.

Laplana C., Sevilla P., López Martínez N., Corchón M.S. (2006) - Primeros datos sobre los micromamíferos (Roedores, Insectívoros, Quirópteros y Lagomorfos) del Solutrense (Pleistoceno Superior final) de la Cueva de Las Caldas (Oviedo, Asturias). In: E. Fernández Martínez. Libro de Resúmenes. XXII Jornadas de Paleontología. León, Universidad de León. 137-139.

López-García J.M. (2011) - Los micromamíferos del Pleistoceno superior de la Península Ibérica. Evolución de la diversidad taxonómica y cambios paleoambientales y paleoclimáticos. Editorial Académica Española, Saarbrücken.

López-García J.M., Blain H.-A., Allué E., Bañuls S., Bargalló A., Martín P., Morales J.I., Pedro M., Rodriguez A., Solé A., Oms F.X. (2010) - First fossil evidence of an “interglacial refugium” in the Pyrenean region. Naturwissenschaften 97, 753-761.

López-García J.M., Blain H.-A., Cuenca-Bescós G., Ruiz-Zapata M.B., Dorado-Valiño M., Gil-García M.J., Valdeolmillos A., Ortega A.I., Carretero J.M., Arsuaga J.L., Bermúdez de Castro J.M., Carbonell E. (2010) - Palaeoenvironmental and palaeoclimatic reconstruction of the Latest Pleistocene of El Portalón Site, Sierra de Atapuerca, northwestern Spain. Palaeogeogr. Palaeoclimatol. Palaeoecol. 292, 453-464.

López-García J.M., Blain H.A., Cuenca-Bescós G., Alonso C., Alonso S., Vaquero M. (2011) - Small vertebrates (Amphibia, Squamata, Mammalia) from the Late Pleistocene-Holocene of the Valdavara-1 cave. Geobios 44, 253-269.

Lopez-García J.M., Cuenca-Bescós G., Finlayson C., Brown K., Pacheco F.G. (2011b) - Palaeoenvironmental and palaeoclimatic proxies of the Gorham’s cave small mammal sequence, Gibraltar, southern Iberia. Quat. Int. 243, 137-142.

López-García J.M., Blain H.-A., Bennàsar M., Alcover J.A., Bañuls-Cardona S., Fernámdez-García M., Fontanals M., Martin P., Morales J.I., Muñoz L., Pedro M., Vergés J.M. (2014) - Climate and landscape during Heinrich Event 3 in south-western Europe: the small-vertebrate association from Galls Carboners cave (Mont-ral, Tarragona, north-eastern Iberia). Journal of Quaternary Science 29, 130-140.

López-García J.M., Soler N., Maroto J., Soler J., Alcalde G., Galobart A., Bennàsar M., Burjachs F. (2015) - Palaeoenvironmental and palaeoclimatic reconstruction of the Latest Pleistocene of L’Arbreda Cave (Serinyà, Girona, northeastern Iberia) inferred from the small-mammal (insectivore and rodent) assemblages. Palaeogeogr. Palaeoclimatol. Palaeoecol. 435, 244-253.