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Spanish karstic fillings: The key for Pleistocene ursidae knowledge

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RESUM

En aquesta nota es realitza una revisió dels óssos pliocènic, basada en material enpanyol; material que prové, fonamentalment, de dipòsits càrstics. Es fa també una revisió de la filogenia i de la distribució estratigràfica i geogràfica de les diferents espècies.

RESUMEN

En esta nota se realiza una revisión de los osos pleistocenos basada en el material español, que proviene, principalmente, de rellenos kársticos. Se hace una revisión de la filogenia y distribución estratigráfica y geográfica de las diferentes especies.

SUMMARY

This paper deals of a review of Pleistocene bears, based upon Spanish material, which mainly arises from karstic fillings. We make a review of phylogeny, and geographical and stratigraphical distributions of the different species.

Introduction

During the last years, excavations made in Spain have supplied a very rich material of fossil bears from different species and ages, which have produced a great amount of new knowledge on phylogeny and stratigraphical and geographical distribution.

Phylogeny

Ursus etruscus G. CUVIER was the common ancestor of the most successful evolutive trends (speloid and arctoid) of Pleistocene bears in Eurasia.

The speloid evolutive trend is represented by two species which show a more complicated dental morphology, progressive simplified dental formula, and skeleton also progressively more heavily built. The older is *Ursus deningeri* VON REICHENAU, which is substituted at the Riss by the cave bear -*Ursus spelaeus* ROSENMÜLLER-HEINROTH- which disappeared at the end of the Pleistocene times, probably because of paleolithic man and brown bear demographic pressure.

The arctoid evolutive trend is represented in Europa, until the Upper Riss time, by *Ursus prearctos* BOULE, which is not directly connected with the «true» brown bear -*Ursus arctos* LINNEO- representing an species closely related with its direct ancestor *U. etruscus*.

U. prearctos appeared in the Middle Pleistocene, in populations with local differences but its skeleton was more heavily built and the dental morphology was more complicated.

The polar bear -*Ursus maritimus* PHIPPS- which never was found in Spain, can be placed into the arctoid group. It probably was derived from an ancestral population of *U. etruscus* or *U. prearctos* isolated in an indetermined cold period.

The brown bear is a late emigrant which, at the end of the Pleistocene, moved southwards from Asia, colonizing all Europa, the Mediterranean border of Africa and N. America.

Until the Riss, there is an unfrequent bear in the faunal European panorama: *Ursus mediterraneus* F. MAYOR, closely related with *Ursus minimus* DEVEZE&DEBOUILLET.

Geographical and Stratigraphical distribution in Spain (Fig.-2)

The oldest Spanish fossil bear found in a karstic system is *U. minimus* (sin *Ursus arvernensis* CROIZET&JOBERT) from Layna (Guadalajara) of Lower Villafranchian age. No Spanish material of this species, arises from no karstic deposits: Gaville (Italy) and Perpignan (France). The Spanish material could be not of a true cave host, but alloctonous material filling karstic fissures.

At the Middle-Upper Villafranchian a true demographical explosion of Ursidae took place with the apparition of *U. etruscus*. The oldest material has been found at the Lower Villafranchian locality of Villarroya (Logroño), but the boom of the species was at the Middle-Upper Villafranchian Val d'Arno (Italy), Tegelen (Netherland), Saint Vallier (France), all of them non karstics deposits. In Spain, fossil remains of *U. etruscus* have been found at: Villarroya (Logroño), Puebla de Valverde (Teruel), Venta Micena (Granada) and Almenara (Castellón). The last is the only one with a karstic origin.

The first true cave inhabitant has been found at the Gran Dolina (Burgos) of Günz age. Relatively abundant material, comprising adults and cubs bones, have appeared. This bear, a more evolutioned species but closely related with its ancestor *U. etruscus* appeared also in Mollet Racó, Barcelona (Mindel) and Pinilla del Valle, Madrid (Riss).

But in Europa *U. etruscus* evolved mainly in a speloid way enormous increase of teeth size, skull volume (pneumatization) and transversal dimension of postcranial bones. This phenomena was probably related with important changes in feeding habits and behaviour.

The first representant of this evolutive trend is *U. deningeri*

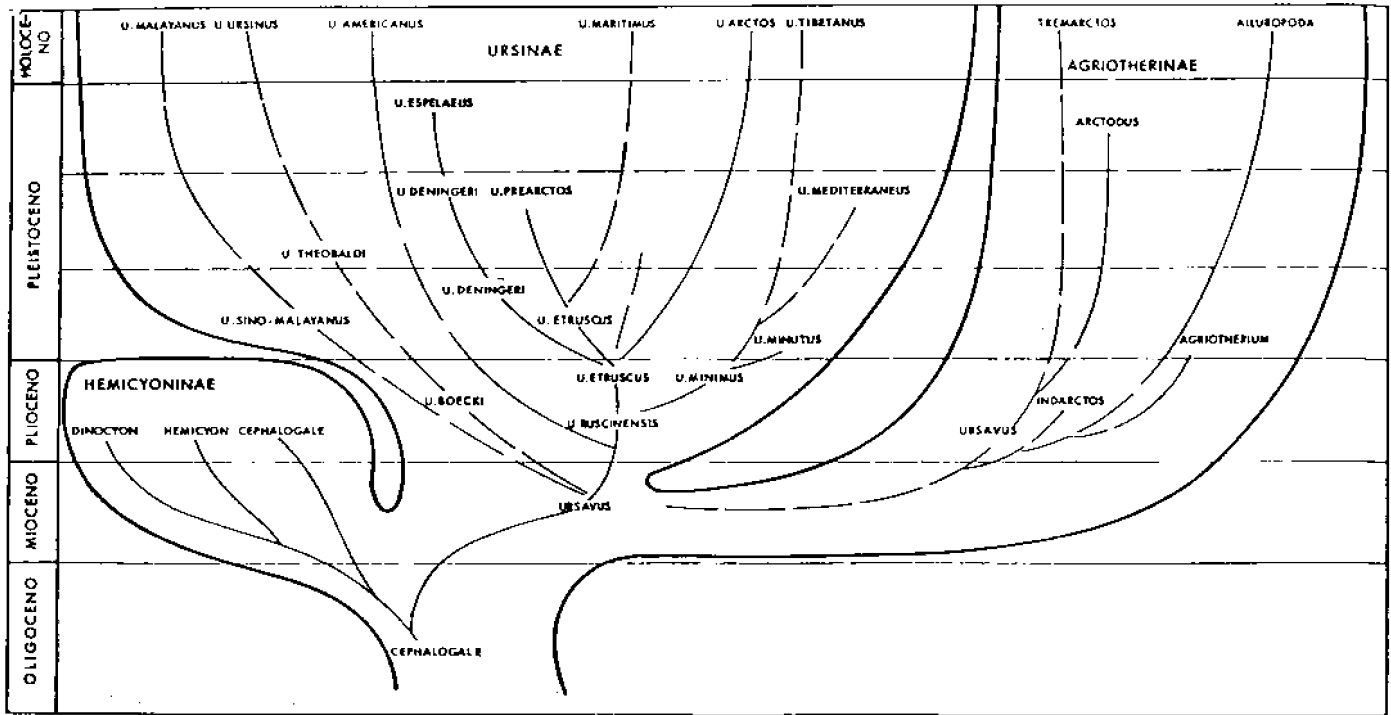


Fig.- 1. Ursidae Phylogeny After Erdbrink (1955) and Torres (1984), modified

which mainly was found in Europa associated with fluvio-lacustrine sediments. But in Spain there appeared exclusively in caves: Lezetxiki (Guipuzcoa), Cueva Nueva I-II (Segovia), Santa Isabel (Vizcaya) and Cueva Mayor (Burgos) –see Fig.-2-. With the exception of Lezetxiki, of probably Riss age, the other ones are of Mindel age.

The more popular and best known cave user is *U. spelaeus* whose remains have been recovered in caves of all European countries, been unfrequents in open air paleontological sites, with the well konwn exceptions of the loess of Krasnodar and the undersea sediments of the Canal. In the author's opinion the cave bear appeared at the Upper Riss. Tres Simas (Burgos), Lezetxiki (Guipuzcoa) and (?) Troskaeta (Guipuzcoa) –see Fig.-3-, where there are small sized animals. This species, reached a true ecological boom at the Lower Wurm. In Spain, despite of the fact that traces of this species appeared in a great number o caves, only five accumulations of cave bear remains can be specified:

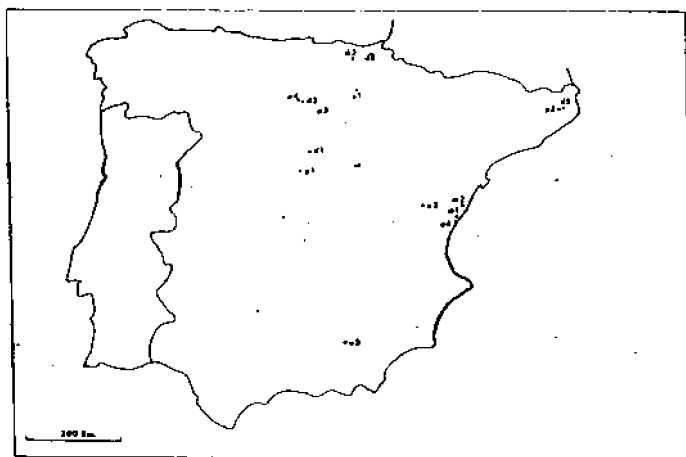


Fig.- 2. Geographical distribution of less common bears species finds
 e-*U. etruscus*: 1 - Villarroja-Logroño (no karstic), 2 - Puebla de Valverde-Teruel (no karstic), 3 - Venta Micena-Granada (no karstic), 4 - Almenara Castellón (karstic)
 r-*U. ruscinensis*: Layna-Guadalajara (karstic) m-*U. mediterraneus*: 1 - Villaviella-Castellón (karstic); 2 - Cau Borrás-Castellón (karstic) d-*U. deningeri*: 1 - Cueva Nueva I-II-Guadalajara (karstic), 2 - Cueva Mayor-Burgos (karstic); 3 - Cueva de Lezetxiki-Guipuzcoa (karstic), 4 - Pardaki-Guipuzcoa (karstic) p-*U. prearctos*: 1 - Pinilla-Madrid (karstic), 2 - Mollet Racó-Gerona (karstic), 3 - Palacios de la Sierra-Burgos (karstic), 4 - Gran Dolina-Burgos (karstic).

Ekain (Deba, Guipuzcoa), El Toll (Moia, Barcelona), El Reguerillo (Torrelaguna, Madrid), Raclau Viver (Bañolas, Gerona) and Arrikruz (Oñate, Guipuzcoa). With the exception of the last one, of Wurm III age, the others are of Wurm I age.

Spanish cave bear populations can be grouped in three geographical areas: Cantabric, Mediterranean and Central.

The first one is the best known and it is evident that the cave bear was a successful inhabitant of this region its remains appeared in many caves, whit the exception of those situated in the mountains.

From this area, this specie moved in two different directions –Fig.-3-: crossing the Cantabrian Cordillera reached the low lands

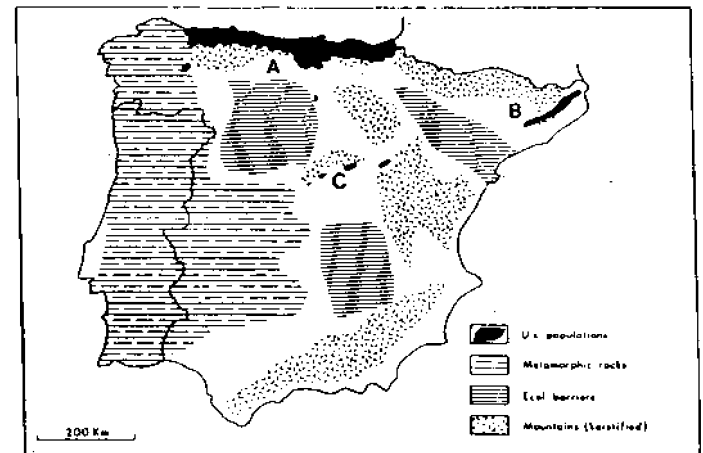


Fig.- 3. Cave bear distribution in the Iberian Peninsula A Cantabric area B Mediterranean Area C Central Area

of Nord Castilla, colonizing some caves of the North of the province of Burgos. Also, moved westwards across non karstifiable areas of Galicia (metamorphic formations) and in a isolated strata intercalated in a metamorphic complex, where some caves were developed, cave bear remains have been found (C. del Purruñal).

The Mediterranean population was not connected with the Cantabrian one, but probably was whit the meridional cave bear populations of France. This group did not move too much southwards, probably because of a kind of ecological barrier

established by the mouth and lower part of the Ebro River, in the province of Castellón where mainly karstifiable rocks outcrop, the cave bear has never found. And this is strange because this species also lived in river mouths and marsh areas of the Netherlands.

The Central population is the most recently discovered, and is represented, almost exclusively, by the Cueva de El Reguerillo population. The cave bear probably moved southwards, from the Cantabric zone, going around the eastern limits of the Northern Meseta, which probably acted as ecological barrier, reaching its southern limit, which coincides with the limit of karstifiable rocks, at the Cordillera Central. And it did not surpass the Southern Meseta, bounded by no karstifiable rocks, towards favourable karstic areas of Andalusia.

In conclusion: the Cantabric area was continually occupied by cave bear population from the Upper Riss (Lezetxiki) until the Upper Würm (arrikut-Würm III), with a vestige population which disappeared at the beginning of Holocene times. Mediterranean and Central population, probably were developed only during the Lower Würm: the time of maximum successful of the specie.

As it has been said before, there is also an arctoid evolutive trend: *U. prearctos*, of large stratigraphical and geographical distribution, probably because very low ecological exigences (as its ancestor *U. etruscus*). This specie probably disappeared under the demographic pressure of the new appeared cave bear populations. It was a true cave dweller and has been located at: Gran Dolina and Palacios de la Sierra (Burgos) of Günz age, Mollet Racó (Gerona) of Mindel age and Pinilla del Valle Madrid of Riss age.

At the lower Würm there is a massive emigration from Asia of the «true» brown bear, *U. arctos*, under the pressure of a drastic climatic changement, colonizing N. America, after crossing the Behring Straits, now frozen, all Europa and the Mediterranean borders of Asia and Africa.

Finally: during the Middle Pleistocene, a small sized species

appeared in the Mediterranean border of Spain *U. mediterraneus*, its remains have been found associated with karstic sediments at Cau Borrás and Villavieja, both of Riss age

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