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Continuity of the first human occupation in the Iberian Peninsula: Closing the archaeological gap

*Continuité de la première occupation humaine dans la Péninsule ibérique:
comblement du vide archéologique*

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ABSTRACT

The recent discovery of a site at Vallparadís (Terrassa), dated to the upper boundary of the Jaramillo sub-chron (0.98 Ma), allows us to close the archaeological gap in the Late Lower Pleistocene of the Iberian Peninsula and to propose the hypothesis that western Mediterranean Europe may have been continuously inhabited by humans from 1.4–1.2 Ma until the early Middle Pleistocene. Early hominid groups present in the area were capable of successfully withstanding the changing climatic conditions that they encountered, thanks to their specific adaptive strategies based on a Mode 1 lithic technology, and probably also on well developed social cohesion. These strategies enabled them to obtain meat by gaining primary access to herbivore carcasses and thus to successfully compete with other large carnivores. These first hominids in the western Mediterranean Europe succeeded in raising themselves to the top of the food chain, and in doing so guaranteed the continuity of human settlement.

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R É S U M É

La découverte récente d'un gisement à Vallparadís (Terrassa), daté de la limite supérieure de l'épisode paléomagnétique de Jaramillo (0,98 Ma), permet de combler la lacune archéologique de la fin du Pléistocène inférieur dans la Péninsule ibérique. Elle nous permet aussi de proposer l'hypothèse que l'Europe occidentale méditerranéenne a pu être habitée de manière continue à partir de 1,4 à 1,2 Ma, jusqu'au début du Pléistocène moyen. Les groupes d'hominidés présents dans cette zone ont réussi à survivre malgré les conditions climatiques changeantes, grâce à leur stratégie d'adaptation basée sur la production d'outils lithiques du Mode 1, et probablement aussi sur une bonne cohésion sociale. Ces stratégies leur ont permis d'avoir un accès primaire sur les carcasses des herbivores et de rentrer en compétition avec succès avec d'autres grands carnivores. Les premiers hominidés de l'Europe occidentale méditerranéenne ont réussi à se hisser au sommet de la chaîne alimentaire, et, ainsi, à garantir la continuité du peuplement humain.

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1. Introduction

In recent years, the Iberian Peninsula (Fig. 1) has proven to be a key source of knowledge about the earliest human occupations of Europe. Nevertheless, there has been a troubling chronological and archaeological gap between the records of the sites at Orce (Barranco León and Fuente Nueva 3, dated at 1.4–1.2 Ma; Agustí et al., 2003; Martínez-Navarro et al., 1997; Oms et al., 2000a) on the one hand, and Atapuerca (Sima del Elefante, dated at 1.22 ± 0.16 Ma, and Gran Dolina TD6, dated at 0.78 Ma; Carbonell et al., 1995, 2008a) on the other, that has hindered efforts to determine the complete archaeological sequence of the late Lower Pleistocene. The recent discovery of a site at Vallparadís (Terrassa), dated at 0.83 ± 0.07 Ma by ESR/U-series (Martínez et al., 2010), has enabled us to close this gap and consider the hypothesis that western Mediterranean Europe may have been continuously inhabited by humans from 1.4–1.2 Ma until the early Middle Pleistocene.

Ever since the “Young Europe” versus “Mature Europe” debate was settled (e.g. Carbonell et al., 1995, 1996; Dennell et al., 1996; Roebroeks et al., 1996; Roebroeks et al., 1995), new questions have arisen about the continent’s earliest populations that go beyond the date of first arrival. This article raises the possibility that human beings inhabited the Iberian Peninsula continuously from the time of the earliest archaeological evidence (1.4–1.2 Ma) until the Matuyama–Brunhes boundary. The growing number of well-documented late-Lower-Pleistocene sites that have been discovered in Europe in recent years has cast doubt on the argument that the earliest settlements in Europe were discontinuous and demographically unimportant until the Middle Pleistocene. Our interpretations of the data from Spanish archaeological sites in general and Vallparadís in particular challenge the arguments of those who have doubted the adaptive potential of hominids in European ecosystems, citing the presence of large carnivores and scavengers (Turner, 1992) or asserting that these hominids were limited to certain climatic conditions (Agustí et al., 2009).

2. Chronological occupation data

At the sites at Orce (Barranco León and Fuente Nueva 3), Atapuerca (Sima del Elefante and Gran Dolina TD4–TD6) and Vallparadís, paleomagnetic and biostratigraphic analyses have been carried out and radiometric dating methods have been applied (ESR/U-series and cosmogenic burial dating) to determine the dates of the earliest human occupation of Europe. The Barranco León site contains the following microfauna: *Hystrix* sp., *Allophaiomys* aff. *lavocati*, *Allophaiomys* sp., *Castillomys crusafonti* sp. and *Apodemus* aff. *mystacinus* (Agustí et al., 1987; Agustí et al., 2003). At the Fuente Nueva 3 site, the following species have been identified: *Hystrix* sp., *Allophaiomys* aff. *lavocati*, *Allophaiomys* sp. and *Mimomys savini* (Agustí et al., 1987; Agustí et al., 2003). At both sites, paleomagnetic studies revealed reverse polarity attributed to the middle Matuyama, 1.77–1.07 Ma (Oms et al., 2000a, 2000b).

However, the discovery of the goat-antelope species *Ammotragus europaeus* (Martínez-Navarro et al., 2003) and the microfauna *Allophaiomys lavocati* and *Allophaiomys* aff. *chalinei* (Agustí et al., 2003) pushed the age of both sites back to 1.2 Ma. The available radiometric dates obtained by means of ESR/U-series (Duval, 2008) and the comparison of the tooth crown height in *Allophaiomys lavocati* (Agustí et al., 2003) suggest that the Barranco León site is somewhat older, possibly 1.4–1.2 Ma (Agustí et al., 2003; Martínez-Navarro et al., 1997; Oms et al., 2000a). In any case, this would be the earliest chronology for the first human migration into western Europe.

The micromammals found at Sima del Elefante include the following: *Allophaiomys chalinei*, *Allophaiomys lavocati*, *Iberomys* aff. *nutiensis-thenii-huescarensis*, *Ungaromys nanus*, *Pliomys episcopolis* cf. *Mimomys*, *Castillomys rivas*, *Apodemus* sp., *Glis* sp., *Eliomys* cf. *quercinus*, *Castor fiber* and *Sciurus* sp. (Cuenca-Bescós et al., 2007). These species indicate an age older than the Jaramillo chron (1.07–0.98 Ma). The distribution of the species suggests that they belong to the Waalian pollen episode (Cuenca-Bescós et al., 2004). These data, taken together with paleomagnetic analyses (Parés et al., 2006) and supported by the previously reported cosmogenic burial age (Carbonell et al., 2008a), place the age of the human occupation of Sima del Elefante at 1.22 ± 0.16 Ma. At Vallparadís, an age of 0.83 ± 0.07 Ma has been obtained by applying the combined ESR/U-series method to two horse molars recovered from the tenth archaeological layer.

This date is in line with the results of the paleomagnetic analysis, which indicated that the layer corresponds to a reverse-polarity magnetozone immediately prior to the Matuyama–Brunhes boundary and after the Jaramillo subchron—that is, 0.98–0.78 Ma. The following rodent species have been documented at Vallparadís: *Mimomys savini*, *Ungaromys* sp., *Eliomys quercinus*, *Sciurus* sp. and *Iberomys huescarensis*. This last species, of great biochronological value, has also been found at Sima del Elefante and Gran Dolina TD4–TD3 (Cuenca-Bescós et al., 2010). The morphological similarity of the lower molars to those found at Sima del Elefante and the absence of advanced microtine species (e.g. *Stenocranius gregaloides* or *Terricola arvalidens*) indicate that Vallparadís and Sima del Elefante are of similar age. Moreover, the metric values of the *Iberomys huescarensis* lower molars found at Vallparadís indicate a less derived morphology than that found at TD3, TD4 and TD4B. Therefore, we infer that Vallparadís is older than Gran Dolina TD3–TD4 and younger than Sima del Elefante (Martínez et al., 2010).

The following species have been found at Gran Dolina TD3–TD6: *Eliomys quercinus*, *Allophaiomys chalinei*, *Stenocranius gregaloides*, *Hystrix refossa*, *Terricola arvalidens*, *Microtus seseae*, *Pliomys episcopolis*, *Mimomys savini*, *Iberomys huescarensis*, *Apodemus* sp., *Marmota* sp., *Allocebus bursae* and *Micromys minutus* (Cuenca-Bescós et al., 2007; Cuenca-Bescós et al., 2010). For these layers, the paleomagnetic data (Parés et al., 1995) indicate a reverse-polarity magnetozone belonging to the Matuyama chron; which is in agreement with the ESR/U-series results, indicating an age at the upper boundary of that chron (Falguères et al., 1999).

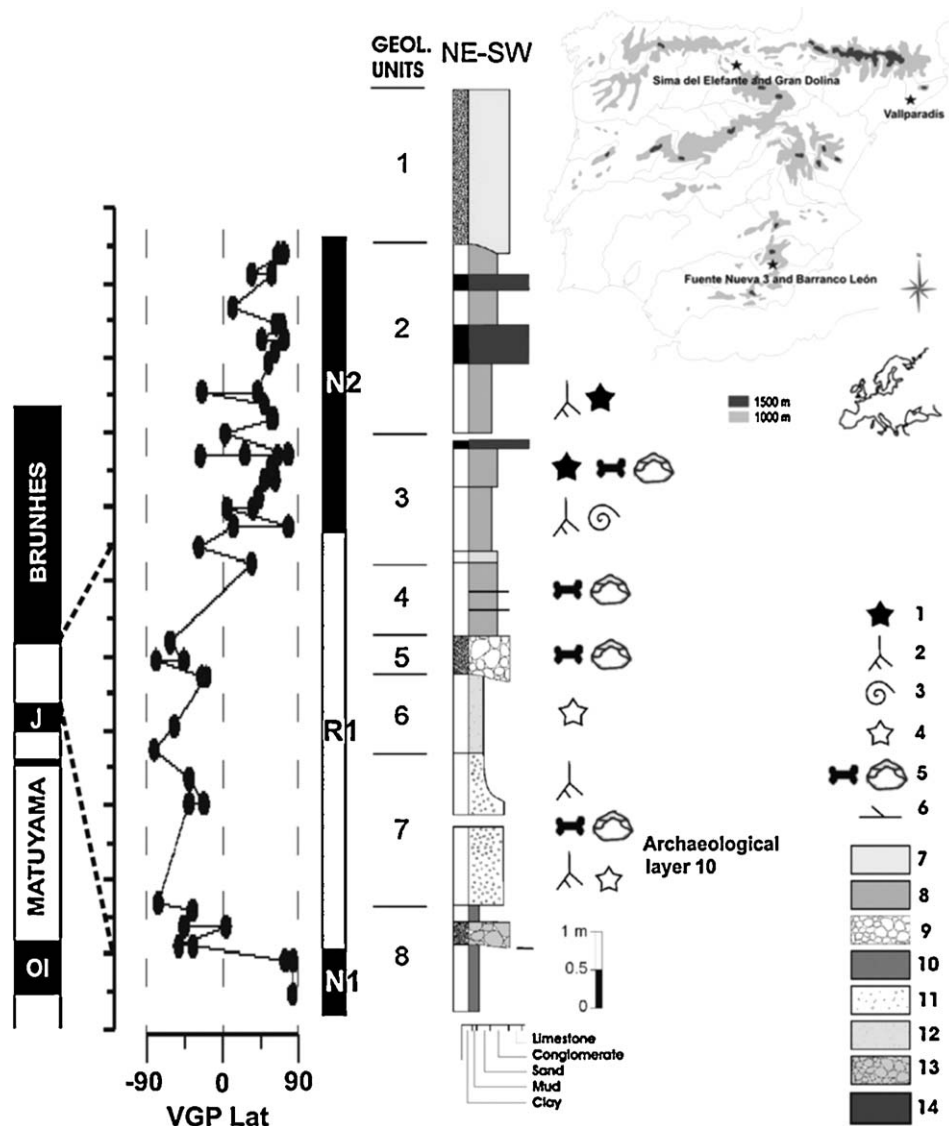


Fig. 1. Geographic location of the Lower Pleistocene archaeological sites of the Iberian Peninsula and summary of the lithostratigraphy and chronology of the Vallparadís site. The synthetic column shows the different stratigraphic units to the right and the magnetostratigraphy column to the left: 1. Organic material and fossil wood remains. 2. Root marks. 3. Gastropod remains. 4. CaCO₃ remains. 5. Units bearing archaeological remains. 6. Cross-lamination. 7. Upper Pleistocene terrace. 8. Clays and muds with gastropods.

Fig. 1. Situation géographique des sites archéologiques du Pléistocène inférieur de la Péninsule ibérique et résumé de la lithostratigraphie et de la chronologie du site de Vallparadís. La colonne synthétique montre, à droite, les différentes unités stratigraphiques et, à gauche, la colonne magnétostratigraphique: 1. Matière organique et restes du bois fossilisé. 2. Traces de racines. 3. Restes de gastéropodes. 4. Traces de CaCO₃. 5. Unités contenant les vestiges archéologiques. 6. Stratification entrecroisée. 7. Terrasse du Pléistocène supérieur. 8. Argiles et boues avec gastéropodes.

3. Faunal and lithic records

A diverse fauna has been documented at the Orce, Atapuerca and Vallparadís sites, with varying degree of anthropogenic signatures on the remains (Espigares et al., 2008; Huguet, 2007; Martínez et al., 2010). At Atapuerca and Vallparadís, it has been demonstrated that hominids had primary access to the carcasses of the animals or, at the very least, were capable of occasionally gaining access to the richest anatomical parts of their prey. This means that the humans acted as predators alongside other large carnivores with a Mode 1 lithic technology.

The fauna discovered at the Barranco León site include the following: *Homotherium* sp., *Pachyrocutea brevirostris*, *Ursus* sp., *Canis mosbachensis*, *Vulpes* sp. (*Vulpes* cf. *praeglacialis*), *Meles* sp., *Mammuthus meridionalis*, *Hippopotamus antiquus*, *Megaceroides* aff. *obscurus*, *Pseudodama* sp., *Bison* sp., *Hemitragus* cf. *albus*, *Equus altidens*, *Equus* sp. (*Equus* cf. *bressanus*) and *Stephanorhinus hundsheimensis* (Martínez-Navarro et al., 2003). Fuente Nueva 3 includes: *Machairodontinae* indet., *Pachyrocutea brevirostris*, *Ursus* sp., *Canis mosbachensis*, *Vulpes* sp. (*Vulpes* cf. *praeglacialis*), *Meles* sp., *Mammuthus meridionalis*, *Hippopotamus antiquus*, *Megaceroides* aff. *obscurus*.

rus, *Pseudodama* sp., *Bison* sp., *Ammotragus europaeus*, *Hemitragus* cf. *albus*, *Equus altidens* and *Stephanorhinus* cf. *hundsheimensis* (Martínez-Navarro et al., 2003; Moullé et al., 2004). Some cut-marks were recently detected on herbivore remains, which may indicate occasional primary access to carcasses (Espigares et al., 2008).

The faunal assemblage at Sima del Elefante is composed of *Cervidae* indet., *Hippopotamus* sp., *Dama "nestii" vallonetensis*, *Stephanorhinus* cf. *etruscus*, *Equus* cf. (*stenonian*), *Eucladoceros giulii*, *Bovidae* indet., *Bison* sp., *Suidae* indet., *Vulpes* cf. *alopeoides*, *Canis* sp. (*C. arnensis/mosbachensis*), *Lynx* cf. *issiodorensis*, *Pannonictis* cf. *nestii*, *Baranogale* aff. *antiqua*, *Ursus* cf. *dolinensis*, *Mustela* cf. *palerminea*, *Lynx* sp., *Panthera gombaszoegensis* and *Canidae* indet. (Carbonell et al., 2008a). In a context of heavy carnivore activity on carcasses, some of the remains show anthropic cut-marks and fractures, which also indicate occasional primary access (Huguet, 2007).

At the Vallparadís site, the following have been identified: *Pseudodama vallonetensis*, *Sus* cf. *scrofa*, *Equus altidens*, *Praemegaceros verticornis*, *Bison* sp., *Stephanorhinus hundsheimensis*, *Hippopotamus antiquus*, *Elephas antiquus*, *Lynx* sp., *Canis mosbachensis*, *Ursus deningeri*, *Panthera gombaszoegensis*, *Pachycrocuta brevirostris* (Martínez et al., 2010) and *Macaca sylvanus* cf. *florentina* (Alba et al., 2008). Cut-marks were identified on 12 elements (1.6%), while anthropic fractures were found in 0.6% of cases, including the remains of *Hippopotamidae* and *Rhinocerotidae*. Of these cut-marks, 11 corresponded to defleshing actions and one was a result of dismembering (Martínez et al., 2010). The percentage of remains showing evidence of anthropic intervention is somewhat higher than those in other open-air sites from the same period, such as Orce, Dmanisi and Ubeidiya (Gaudzinski, 2004; Huguet, 2007; Lordkipanidze et al., 2007). In any event, 42.7% of the bone remains at the site show evidence of hyena bites, which suggests competition between carnivores and humans for the same resources. In fact, half of the remains affected by cut-marks also show evidence of bites, but for now it is impossible to determine which came first.

The fauna of Gran Dolina TD3-TD6 is composed of *Dama "nestii" vallonetensis*, *Stephanorhinus etruscus*, *Equus (stenonian)*, *Eucladoceros giulii*, *Bovidae* indet., *Bison* cf. *voigtstedtensis*, *Cervus* cf. *elaphus acoronatus*, *Sus scrofa*, *Mammuthus* sp., *Ursus* sp., *Meles* sp., *Homotherium* cf. *latidens*, *Felis* sp., *Canis mosbachensis*, *Vulpes praeglacialis*, *Crocuta crocuta*, *Panthera gombaszoegensis*, *Mustela palerminea*, *Lynx* sp. and *Ursus dolinensis* (Carbonell et al., 1995). There is evidence of a high degree of anthropogenic modifications (cut-marks and fractures) on the herbivore bones (Huguet, 2007), including the remains of *Homo antecessor* (Carbonell et al., 1995), which indicates systematic primary access to animals, especially those of small or medium size.

The lithic industry recovered at all of these sites has been classified as Oldowan, or Mode 1 (Carbonell et al., 2008b). Its fundamental characteristics are the use of local raw materials, simple *chaînes opératoires*, anvil-based orthogonal knapping methods, the production of a few large tools such as choppers, and objects retouched into denticulates and notches. There are, however, a few differences that

could be attributed to the technological variability, such as the absence of retouching in the lithic assemblages at Orce and Sima del Elefante, which contrasts with the assemblages at Vallparadís, where it is common to find denticulates, notches and more specific instruments such as becs.

In any event, the archaeological records of these sites share certain general characteristics that suggest that they correspond to human groups with the same technology and the same adaptive strategies. No disruptions are seen within the chronological range in question (1.4–1.2/0.78 Ma); the only possibility of gradual changes, which has yet to be studied, is at Gran Dolina TD6. At this layer, a higher percentage of cut-marks has been found than at the older sites. This higher percentage (25%) may be due to the fact that the human settlements are located inside a cave, where other carnivores and scavengers would have had a lesser effect on carcasses than at the open-air settlements. Nevertheless, we cannot rule out the possibility that the higher percentage of the cut-marks could be due to an increase in the carnivorous behavior of these groups. In addition, the TD6 lithic assemblage has characteristics that may indicate evolution within the general patterns of the oldest European Mode 1 industries. At TD6, in contrast to Orce and Vallparadís, researchers have documented knapping sequences that generated larger flakes, an increased presence of centripetal knapping methods (involving either cores or flakes resulting from operations of this sort), and cores and flakes resulting from longer *chaînes opératoires*. Likewise, objects appear to have been standardized by means of continuous retouching, such as side-scrapers (Carbonell et al., 1999).

Until the early Middle Pleistocene there are no novelties that would justify identifying this moment as a break in the archaeological record. At units 3 and 4 at Vallparadís, where magnetostratigraphic analysis has located the Matuyama-Brunhes boundary (0.78 Ma), significant differences have been documented in the oldest archaeological layer (layer 10). For example, pollen analysis indicates a cool climate (semi-cold and semi-humid) and a wooded landscape dominated by conifers (*Pinus* and *Juniperus*) and deciduous trees (*Quercus*). In this new landscape, herbivore species that have not previously been present, such as *Cervus elaphus*, became abundant. Although it comprises just 15 objects, the existing lithic record shows notable differences in the Mode 1 characteristics of layer 10, such as: 1) larger flakes; 2) longer reduction sequences, featuring flakes without cortex on the dorsal surface and multiple previous interventions; and 3) freehand knapping methods resulting in bifacial cores. Nevertheless, there are also some instances of continuity, such as objects retouched into denticulates and large cores reduced using anvil-based bipolar orthogonal methods. These differences may be related to the emergence of the Acheulean industry in Europe, as seen in layers P of the archaeological site of the Arago Cave (Tautavel, France; Barsky and de Lumley, 2010) or Cova Negra (Valencia) and Solana del Zamborino (Granada), both in Spain (Scott et Gibert, 2009), which are home to the oldest known occurrence of Acheulean tools.

4. Conclusion

Thanks to new data provided by the Vallparadís site, the archaeological sequence for the Iberian Peninsula is now complete from 1.4–1.2 Ma to the Matuyama-Brunhes boundary. The date of 1.4–1.2 Ma (Agustí et al., 2003; Martínez-Navarro et al., 1997; Oms et al., 2000a), obtained at the Orce sites by means of paleomagnetic and biostratigraphic analysis and ESR/U-series dating, corresponds to the earliest known record of human settlement in western Europe. At Sima del Elefante, a human jawbone (*Homo antecessor*) was found in association with lithic artifacts and the remains of fauna bearing anthropogenic modifications at 1.22 ± 0.16 Ma (Carbonell et al., 2008a). At Gran Dolina TD6, researchers have discovered an extensive lithic and faunal record dating from 0.78 Ma, with numerous cannibalized remains of *Homo antecessor* (Carbonell et al., 1995). This sequence has been completed by the substantial record uncovered at the Vallparadís site, which, by means of paleomagnetic and biostratigraphic analysis and ESR/U-series dating, was found to date to the upper boundary of the Jaramillo sub-chron (0.98 Ma).

These findings suggest that the Iberian Peninsula was home to a stable human settlement throughout the time range in question. This hypothesis would seem to be supported by the number of sites already discovered, their chronology, their ecosystem diversity and, especially, the similar technological and adaptive characteristics they represent. It has been suggested that this settlement was interrupted by changes in the Peninsula's climate about 1 million years ago. Nevertheless, the archaeological gap between Orce and Sima del Elefante, on the one hand, and TD6, on the other—which had previously been explained by the colder conditions related to MIS 22 that were detected at the Cal Guardiola paleontological site (Berástegui et al., 2000)—has now been closed by Vallparadís. Separated by just 100 m, Cal Guardiola and Vallparadís are, in fact, two parts of the same site, and the available data indicate that they are of very similar age.

The cold conditions attributed to Cal Guardiola by an analysis of herpetofauna (Agustí et al., 2009) are not consistent with the palynological data (Martínez et al., 2010). The same paleoclimatic disagreement has been observed in the sequence of the Gran Dolina site (Blain, 2009). Both analyses appear to indicate that conditions were more humid around 1 million years ago. In any event, these contradictory results—which are most likely due to differences in geographical and temporal resolution in the two kinds of analysis—suggest ongoing and probably abrupt changes in climate during the period in question. Taking into account that the lithic technology, adaptive strategies and even biological characteristics of the hominids (in the case of Atapuerca) have certain characteristics in common at Sima del Elefante, Orce, Vallparadís and TD6, we infer that the first groups of hominids in Europe were capable of successfully withstanding the different climatic conditions that they encountered, thereby ensuring the continuity of human settlement in Europe throughout the Lower Pleistocene. They were able to do this thanks to certain adaptive strategies, based on a Mode 1 technological capacity and group social cohesion. These strategies

enabled them to eat meat by gaining primary access to herbivore carcasses and successfully compete with large carnivores (e.g. *Panthera gombaszoegensis* and *Pachycrocuta brevirostris* at Vallparadís). These first hominids succeeded in raising themselves to the top of the food chain, and in doing so guaranteed the continuity of human settlement.

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