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Woody macroremains from the Acheulian site of Torralba: Occurrence and palaeoecology of *Pinus* cf. *sylvestris* in the Middle Pleistocene of the Iberian Peninsula

Les bois fossiles du gisement acheuléen de Torralba : présence et paléoécologie de Pinus cf. sylvestris dans le Pléistocène moyen de la péninsule Ibérique

José María Postigo-Mijarra*, Fernando Gómez-Manzaneque, Carlos Morla

Departamento de Sistemas y Recursos Naturales, Escuela de Ingeniería de Montes, Forestal y del Medio Natural, Universidad Politécnica de Madrid, 28040 Madrid, Spain

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ABSTRACT

The pieces of wood extracted by the Marquis of Cerralbo at the Acheulian site of Torralba constitute one of the few materials from this famous locality that have not been subjected to detailed study by researchers. Over a century after their extraction, the present paper provides the first anatomical results of these 34 woody remains. The results highlight the presence of the taxon *Pinus sylvestris-nigra* group (*Pinus* cf. *sylvestris*) at the site, thus constituting one of the few and oldest references attributable to the aforementioned taxon for the Iberian Peninsula. The anatomical diagnosis confirms the existence of Middle Pleistocene landscapes with pine woods at elevations at least 200 m lower than at present in the site area. From a taphonomic point of view, the wood samples exhibit the typical morphologies of woody macroremains preserved in continental sedimentary environments, and there was no evidence at all that they had previously been manipulated by man.

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RÉSUMÉ

Les fragments de bois extraits par le marquis de Cerralbo sur le site acheuléen de Torralba constituent l'un des rares matériaux de cette célèbre localité qui n'aient pas fait l'objet d'une étude détaillée par des chercheurs. Celle-ci ayant été réalisée sur un siècle depuis leur extraction, cet article fournit les premiers résultats anatomiques de ces 34 restes de bois. Les résultats soulignent la présence du taxon du groupe *Pinus sylvestris-nigra* (*Pinus* cf. *sylvestris*) sur le site, constituant donc l'une des peu nombreuses et plus anciennes références attribuables au taxon susmentionné pour la péninsule Ibérique. La diagnose anatomique confirme l'existence, au Pléistocène moyen, de paysages de forêts de pins à des altitudes d'au moins 200 m inférieures à ce qui est observé actuellement dans

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* Corresponding author. Departamento de Sistemas y Recursos Naturales, Escuela de Ingeniería de Montes, Forestal y del Medio Natural, Universidad Politécnica de Madrid, 28040 Madrid, Spain.

E-mail address: jm.postigo@upm.es (J.M. Postigo-Mijarra).

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la région du site. D'un point de vue taphonomique, les échantillons de bois montrent les morphologies typiques de macrorestes ligneux conservés dans des environnements sédimentaires continentaux, et il n'y a aucune preuve qu'ils aient été précédemment manipulés par l'homme.

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1. Introduction

The Torralba site (Soria, Spain) constitutes one of Europe's most famous and significant prehistoric sites. Discovered in 1888 when large bones of *Palaeoloxodon* were uncovered during construction of the Madrid-Zaragoza-Barcelona railway line, the first systematic excavation was conducted from 1909 to 1911, and the first published results became internationally relevant (Cerralbo, 1913). The Acheulian lithic industry and the ancient fauna found in the site's sediments attracted the attention of numerous European investigators, and intense research was initiated therein as from the start of the XXth century (Carbonell et al., 1987). Although geomorphological studies have provided relevant data in recent decades (Pérez-González et al., 1997a), the lithic industry and megafauna discovered (e.g., *Elephas (Palaeoloxodon) antiquus*, *Equus caballus torralbae*, *Dicerorhinus hemitoechus* or *Bos cf. primigenius*) have constituted the main object of study in the last century (Carbonell et al., 1987; Villa, 1990). Likewise, there has been heated debate over the possible relationships between man and the genesis of the site. Thus, in contrast with the classical interpretation stating that the site was unequivocally a hunting ground and was used to dismember large mammals (e.g., Biberson, 1968; Cerralbo, 1913; Freeman and Howell, 1982; Howell et al., 1962), more recent research has indicated that other aspects of a taphonomic or paleontological nature should also be considered, like, for instance, hunting of small mammals or scavenging (e.g., Binford, 1987; Klein, 1987; Shipman and Rose, 1983).

Together with the remains of fauna and the lithic industry, Cerralbo also found 34 fragments of wood, which are now included in the Cerralbo collection; referring thereto, he only mentioned that “they were found among the bones of *Elephas meridionalis* and present some signs of having been used by primitive man” (Howell et al., 1962). During the XXth century, there have been ongoing studies at the site. However, although there have been new excavations at Torralba both in the 1960s and 1970s (Howell et al., 1962; Pérez-González et al., 1997b), no data have been published on new woody remains at the site. Therefore, one century after their discovery, we still do not know any specific data on the botanic macroremains found at the site.

The principal aims of the present study are: (I) To perform taxonomic identification of the samples belonging to the Cerralbo collection. (II) To establish a framework for the palaeophytogeographical interpretation of these results. (III) To macroscopically analyse the samples to carry out taphonomic considerations.

2. Material and methods

We analysed 34 fragments of wood from branches or trunk parts, contained in the National Archaeological

Museum (Madrid, Spain). A brief morphological description of these remains had previously been provided by Howell et al. (1962). We obtained the necessary authorisation to perform traditional micrographic analysis. A total of 6 macroremains was selected: n^{os} 2725, 2726, 2744, as well as three that were not numbered (called C1, C2 and C3). Fragments measuring approximately 1 × 1 × 2 cm were processed with a microtome to provide thin sections approximately 20 μm thick. These were placed in a watch glass containing distilled water, stained with safranin, and then washed with distilled water and alcohol. They were then submerged in xylol. Finally, a few drops of a Euquit fixer were added. The taxonomic identifications were made using a transmission light microscope at magnifications of 100×, 200×, and 400×. To identify these wood samples, we used a reference wood collection from the U.D. Botánica, U.D. de Tecnología de la Madera and the U.D. de Anatomía de la Escuela Técnica Superior de Ingenieros de Montes (Botany, Wood Technology and Anatomy Teaching Units of the Higher School of Forestry Engineering) (Madrid, Spain), as well as wood anatomy atlases (Greguss, 1955; Jacquot, 1955; Peraza, 1964; Schweingruber, 1990). The other 28 woody remains (n^{os} 2746, 2729, 2734, 2752, 2738, 2733, 2745, 2747 and 2743, together with another 19 that did not bear an identification number) were studied by means of incident light microscope at magnifications of 100 ×, 200 ×, and 400 ×, and we were able to make some taxonomic appreciations of a more general nature.

Some authors indicate that identification at the species level of wood from montane Iberian pines (including *Pinus sylvestris*, *Pinus nigra* and *P. uncinata*) is highly problematic (Carcaillet and Vernet, 2001; Schweingruber, 1990). However, others indicate the existence of diagnostic features that can be used for this purpose (García and Guindeo, 1988; Greguss, 1955; Jacquot, 1955; Peraza, 1964), especially when the number of macroremains is large and well preserved, and when young wood is avoided (Figueiral and Carcaillet, 2005; Mutz et al., 2004). With these premises in mind, we conducted all the anatomical studies possible in order to provide the highest degree of taxonomic differentiation of the samples. Likewise, the total absence of references by Cerralbo to the precise place and characteristics of wood deposits greatly limits the taphonomic analyses.

3. Geological setting

The Torralba archaeological site is located in the Iberian Range (41° 8'13" N, 2° 30'9" W), specifically in the Masegar river valley, at an altitude of 1113 m asl and approximately 156 km from Madrid; it is named after the nearby village of Torralba del Moral (Falgüeres et al., 2006) (Figs. 1 and 3).

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