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Lagomorph predation represented in a middle Palaeolithic level of the Navalmaíllo Rock Shelter site (Pinilla del Valle, Spain), as inferred via a new use of classical taphonomic criteria

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ABSTRACT

Lagomorph remains at Pleistocene sites may accumulate through the action of hominins, raptors or carnivores. Actualistic studies have described reliable taphonomic indicators that allow human and non-human involvement in such accumulations to be distinguished. However, discriminating between possible animal predators is not easy, because the prey remnants they leave may undergo the same kinds of taphonomic transformation. The main aim of the present work was to identify the agent, human or non-human, that accumulated the lagomorph remains at the Navalmaíllo Rock Shelter site (Pinilla del Valle, Madrid). For this, 1) established taphonomic criteria, such as anatomical representation, were taken into account, 2) the presence of infant lagomorphs was examined by determining the age of the individual animals, 3) and coprolite remains adhered to fossils were identified. This new use of the latter two criteria aided in the identification of the predator responsible for the accumulation of remains. The results suggest that this was a small carnivore, probably an Iberian lynx.

1. Introduction

Many predators consume rabbits with great regularity; indeed, the rabbit is a key species of Mediterranean ecosystems. According to Delibes and Hiraldo (1981), and Delibes-Mateos and Gálvez-Bravo (2009), some of its predators are opportunists, such as the ocellated lizard (*Lacerta lepida*) and the wild boar (*Sus scrofa*). However, rabbits are normally taken by carnivores and raptors. Some, such as the Spanish Imperial Eagle (*Aquila adalberti*) and the Iberian Lynx (*Lynx pardinus*), have become super-specialists.

The hominins of Europe consumed lagomorphs throughout the Pleistocene, but few sites dating from before the Upper Palaeolithic reflect such behaviour (Pillard, 1969; Chase, 1986; Blasco Sancho, 1995; Martínez Valle, 1996; Guennouni, 2001; Cochard, 2004; Costamagno and Laroulandie, 2004; Sanchís-Serra and Fernández-Peris, 2008; Cochard et al., 2012; Huguet et al., 2013). Many authors therefore consider the systematic consumption of such small prey to be largely associated with anatomically modern humans (Stiner, 1994; Villaverde et al., 1996; Stiner et al., 1999, 2000; Martínez del Valle, 2001; Aura-Tortosa et al., 2002; Hockett and Haws, 2002; Cochard and Brugal, 2004; Lloveras et al., 2011; Fa et al., 2013; Rodríguez-Hidalgo et al., 2013a). Carnivores and raptors were great hunters of rabbits throughout the Pleistocene, and many sites are home to accumulations of rabbit skeletal remains, some of which show traces of consumption (Pillard, 1972; Desclaux, 1992;

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Stiner, 1994; Blasco-Sancho, 1995; Martínez Valle, 1996; Fernández-Jalvo and Andrews, 2000; Guennouni, 2001; Cochard, 2004, 2007; Sanchís Serra and Fernández-Peris, 2008; Lloveras et al., 2010, 2011). In recent years, much effort has been invested in characterising the accumulations left by these predators, and in finding diagnostic features that might reveal the species responsible (Andrews, 1990; Schmitt and Juell, 1994; Hockett, 1996; Cruz-Uribe and Klein, 1998; Sanchís-Serra, 2000; Cochard, 2004; Yravedra, 2004; Lloveras et al., 2008a, 2008b, 2009a; Sanchís-Serra and Pascual-Benito, 2011; Lloveras et al., 2012a; Álvarez et al., 2012; Rodríguez-Hidalgo et al., 2013b). The majority of these diagnostic features have been obtained via actualistic studies. These are vital in understanding the processes that helped form archaeopalaeontological sites, in comprehending the strategies used in resource procurement by different predators (including hominins, carnivores and raptors), and in unveiling the relationships between species in palaeoecosystems. However, the limitations of this kind of study must be borne in mind: the taphonomic features left by different remain-accumulating agents may be very similar and even overlap. It can be hard to determine whether remains were left by carnivores or raptors since the associated body part frequencies and fragmentation, etc., can be very similar (Lloveras et al., 2011). Diagenetic agents can also distort the original characteristics of skeletal remains (Fernández-Jalvo, 1992), making the predator that discarded them even harder to identify. Thus, actualistic studies are important in coming to a taphonomic understanding, but the different post-depositional histories of modern and fossil remains should be taken into account when interpreting a site.

The main aim of the present work was to determine the predator responsible for the accumulation of lagomorph remains in Level F (middle Palaeolithic) at the Navalmaíllo Rock Shelter (Pinilla del Valle, Madrid, Spain). In its identification, use was made of the taphonomic criteria of Lloveras et al. (2008a, 2008b, 2009a, 2012a), which were obtained from different actualistic studies. In addition, a new use was made of classic taphonomic criteria to determine whether the examined accumulation was left by carnivores or raptors, i.e., establishing the age of the lagomorphs represented in the accumulation, and examining the coprolites present.

2. Navalmaíllo Rock Shelter site

The Calvero de la Higuera site complex in Pinilla del Valle (Madrid, Spain) lies in the upper valley of the River Lozoya located in the Sierra de Guadarrama; it is a NE–SW-aligned mountain range with a general pop-up structure that forms part of the Central System. The archaeological sites are associated with cavities in a gentle slope of Upper Cretaceous karst rock inclined towards the River Lozoya (which runs W–E 200 m to the north) (Pérez-González et al., 2010) (Fig. 1). In 2002, excavations began at four sites: the Camino Cave, Navalmaíllo Rock Shelter, Buena Pinta Cave and Des-Cubierta Cave (Arsuaga et al., 2010, 2011, 2012; Baquedano et al., 2010, 2011/2012; Huguet et al., 2010; Pérez-González et al., 2010).

The Navalmaíllo Rock Shelter (Fig. 2) occupies an area of some 300–400 m^2, of which some 80 m^2 have been excavated. The stratigraphy of the examined sections can be described in synthesis, from the top downwards, as follows:

- Horizon wall A (Level A), 40 cm thick, greyish (10YR 5/2), silty-sandy with dispersed clasts more abundant towards the base. Two coluvionary stages (Levels B and B′) have been identified, both composed of altered, floating carbonate clasts measuring

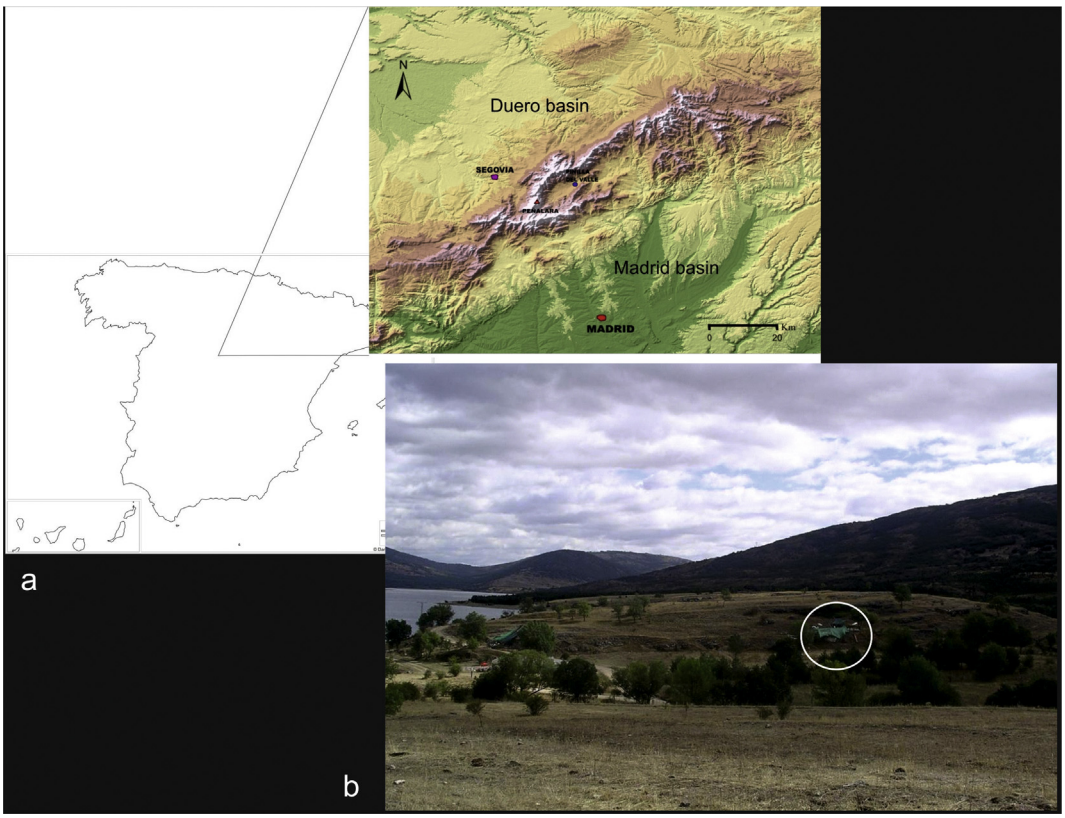

Fig. 1. a) Location of the Pinilla del Valle sites in the high-elevation Lozoya Valley (Sierra de Guadarrama, central Spain) (modified from Pérez-González et al., 2010). b) View of Calvero de la Higuera (Pinilla del Valle). The white circle marks the location of Navalmaíllo Rock-shelter site.

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