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Who eats whom? Taphonomic analysis of the avian record from the Middle Paleolithic site of Teixoneres Cave (Moià, Barcelona, Spain)

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ABSTRACT

Small animal bones, such as those of birds, are commonly found at many archaeological sites framed in the early Late Pleistocene. Teixoneres Cave, on the Iberian Peninsula, is one of these, and includes evidence of Neanderthal activities involving large game and, sporadically, smaller prey such as rabbits. Here, we present data from the avian assemblage recovered from this site, which is mainly comprised of specimens from the Corvidae and Phasianidae families. In order to determine which predators (hominins, mammalian carnivores and/or raptors) contributed to this avian accumulation, the general occupational dynamics within the site must first be understood. To this end, the bird remains obtained from the four main subunits excavated to date (IIa, IIb, IIIa, IIIb) have been analyzed from a taphonomic perspective. Our results show that the birds at the site mainly originated from non-hominin input episodes. While the activity of nocturnal raptors was found throughout the sequence, the activity of mammalian carnivores seems to be more intense in specific archaeological units. We compared the data yielded by our study with other data from the site, reinforcing the general position that hominins made use of the cave during short-term occupations, which alternated with predator use.

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1. Introduction

The presence of small animals in archaeological contexts is commonplace, especially in caves and shelters, which are often inhabited by predators such as birds of prey and mammalian carnivores. In one way or another, these animals carry out their regular activities in these places, often in alternation with the activities of hominins. Small animals can also die by natural causes at the site, giving rise to the mixing of their bones with those resulting from predation processes. The superposition of different events can lead to a combination of elements that are difficult to distinguish when the bones are studied thousands of years later. In this regard, few studies have focused on the taphonomic processes undergone by bird carcasses in order to determine possible accumulation processes. Ericson (1987) attempted an approach which would differentiate natural and cultural accumulations on the basis of anatomical representation of bones. He claimed that anthropogenic accumulations

would be expected to have a higher presence of hind leg bones, while in those produced by natural decomposition, the wings and legs would be equally preserved. Later, Livingston (1989) entered into the discussion, arguing that functional anatomy should be taken into account when estimating anatomical representation. Body parts developed for a specific use have increased bone density and, as a consequence, are better preserved in the archaeological record. This was also supported by Cruz (2005), who went even further and attempted to distinguish three different groups of birds based on their mode of locomotion, which would also have repercussions on their posterior preservation. Other authors have tried to make inferences about skeletal survivorship through birds scavenged by crows, as well as other mammal predators (Oliver and Graham, 1994). The most relevant reference works on predator activities involving avian remains are probably those developed by Laroulandie (2000, 2002), Bochenski (1997, 2005), Bochenski and Tomek (1994, 1997) and Bochenski et al. (1997, 1998, 1999, 2009). They studied how to characterize accumulations produced by different predators, with particular interest in different birds of prey. Moreover, they considered not only anatomical representation as a way to evaluate the agent generating the bone accumulations, but also other points, such as fragmentation and modifications caused by those agents.

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Notwithstanding those positive strides forward in the discipline, few detailed studies have been conducted on mammalian carnivore accumulations, making identifying them as a possible generating agent of avian assemblages complicated (e.g., Laroulandie, 2000; Mallye et al., 2008; Monchot and Gendron, 2013; Rodríguez-Hidalgo et al., this volume). Serjeantson (2009) pointed out that, for mammalian carnivores, birds are less attractive than other mammals due to the scarcity of cancellous tissues and the lower bone-marrow content. However, mammal carnivores can be involved in these accumulations, and the remains they leave should be studied.

The need to assess possible avian accumulators as well as other small prey in archaeological sites has become an important issue in evaluating the occupational patterns within these places, including how they interact with hominins (e.g. Binford, 1981; Stiner, 1994; Blasco Sancho, 1995; Brugal and Fosse, 2004; Domínguez Rodrigo et al., 2007; Rosell and Blasco, 2009; Yravedra, 2011). Bird remains in Pleistocene archaeological sites have typically been associated with non-human predation because it is generally accepted that their contribution to the human diet in early periods was relatively slight. Although it is true that predator activities are the main cause of death of these small fast prey in Pleistocene archaeological contexts, human processing of birds has been documented in Middle Paleolithic deposits, including those of Grotta di Fumane and Grotta del Rio Secco (Italy) (Fiore et al., 2004; Peresani et al., 2011; Romandini et al., 2014), Combe-Grenal, Les Fieux and Mandrin Cave (France) (Morin and Laroulandie, 2012; Romandini et al., 2014), Salzgitter-Lebenstedt (Germany) (Gaudzinski and Niven, 2009), Gorham's, Ibex and Vanguard Caves (Gibraltar) (Finlayson et al., 2012; Blasco et al., 2014), Krapina (Croatia) (Radović et al., 2015), and Bolomor Cave (Spain) (Blasco and Peris, 2009; Blasco and Fernández Peris, 2012a; Blasco and Fernández Peris, 2012b; Blasco et al., 2013), among others.

In spite of their sporadic occurrence, the acquisition of small fast prey by Neanderthals has been demonstrated by the leporids recovered from the Middle Paleolithic site of Teixoneres Cave (Rufà et al., 2014), the core site of our research here. Both hominin and carnivore activity has been documented on larger fauna and leporid remains (Rosell et al., 2008, 2010a, 2010b; Rufà et al., 2014), but no further study has been carried out on the avian specimens to date, even though they are quite numerous and present throughout the excavated sequence. Previous studies done on the leporid remains at Teixoneres record a high incidence of mammalian carnivore and nocturnal raptor activity (Rufà et al., 2014). For this reason, it may be interesting to determine whether these dynamics have continuity in the avian specimens or not. To achieve this objective, all avian remains recovered from the Teixoneres sequence have been considered. Possible differences among species or family groups may also suggest a differential acquisition of prey, which should be demonstrated or refuted through the examination of the bones.

2. Materials and methods

2.1. Teixoneres Cave

Teixoneres Cave is located near the village of Mojà (Barcelona, Spain), in the north-eastern corner of the Iberian Peninsula. It is part of the karst system of Coves del Toll, drained by the Torrent del Mal. It was discovered in the 1940s, from which time it was excavated by different research teams until the 1990s (Rosell et al., 2008). In 2003, a multidisciplinary research team from the Catalan Institute of Human Paleoecology and Social Evolution (IPHES) headed up new excavations, which are still under way.

The cave is composed of three main chambers (X, Y and Z) that together form a U-shape measuring 30 m in diameter. Two access points can be distinguished. The main access point, which the

excavation has focused on over the last few years, is in chamber X. The second, smaller entrance is in chamber Z (Fig. 1). Chamber X is where the most human activity has been documented (Rosell et al., 2010a). However, to date, little information has been documented about the uppermost levels. The upper part of the archaeological sequence was mainly excavated during the 1940s and 1990s, removing a considerable section of level II. The materials recovered during this fieldwork remain unknown.

Ten archaeo-paleontological levels make up the stratigraphy of the site. In turn, they are divided into 15 subunits, including two speleothems (units I and IV). These speleothems have been dated using uranium–thorium techniques to a range of ca.14–16 ka (unit I) to ca. 100 ka (unit IV) (Tissoux et al., 2006). Paleocological data also confirms the dating and delimits the uppermost part of the stratigraphy in a range between MIS 4–MIS 2 (López-García et al., 2012).

Five formation phases can be distinguished in the stratigraphy (Rosell et al., 2010a) at the site. The first is formed by the speleothem of unit I. The second phase is comprised of lutites and limestone blocks forming units II and III (Fig. 1). In spite of the homogeneity of its formation, some differences can be appreciated between the two levels. Unit II consists of lutites with small dispersed limestone blocks. A distinction between two archaeological levels (IIa and IIb) has been drawn due to the presence of large fallen limestone blocks at the base of IIa. In turn, at least two different subunits (IIIa and IIIb) can be appreciated in unit III. They can be distinguished by a) an increased presence of reddish clays in IIIb, b) fallen limestone blocks at the base of IIIa and c) the intensification of archaeological material in IIIb. The sediments forming both levels have clays and silts of allochthonous colluvial origin, which entered into the cave through two points: the main entrance and a chimney located in the northeastern section of the cave. Limestone blocks that fell from the walls and the roof of the cave are present as autochthonous input. No evidence of water streams were detected inasmuch as no rounded-angle gravel accumulations were documented in the cave. The package is closed by the speleothem forming phase 3 (unit IV). Paleocological data from phase 2 indicate a semi-open forest, with colder and drier conditions in unit II and warmer and more humid conditions during the formation of unit III (López-García et al., 2012).

The faunal assemblage in these levels is made up of a wide diversity of species. Both herbivores and carnivores are abundant, with the presence of bear (*Ursus spelaeus*), hyena (*Crocuta crocuta*), wolf (*Canis lupus*), fox (*Vulpes vulpes*), lynx (*Lynx* sp.), badger (*Meles meles*), rhinoceros (*Stephanorhinus hemitoechus*), horse (*Equus ferus*), wild ass (*Equus hydruntinus*), deer (*Cervus elaphus*), roe deer (*Capreolus capreolus*), bovids (*Bos/Bison*) and caprids (Caprini), as well as wild boar (*Sus scrofa*) and small animals such as tortoise (*Testudo hermannii*) and rabbit (*Oryctolagus cuniculus*). Human activity has been confirmed by the presence of cut marks, burning damage and fresh fractures, mainly on ungulates (Rosell et al., 2010a, 2010b). Small prey consumption has also been documented on leporid remains, although their consumption by hominins does not seem to be recurrent in the site (Rufà et al., 2014).

The lithic tools, mainly made of chert and quartz, were produced from different raw materials from local and semi-local outcrops. In unit III (number of lithic remains: 2123), the knapping activity is fragmented, consisting of flakes and final products, with some retouched tools, all of which are typically Mousterian. Cores normally exhibit the final reduction stage, with the presence of Levallois elements. Pseudo-Levallois points also stand out in the assemblage. Unit II (number of lithic remains: 45) has been affected by the loss of materials from former excavations. Most of the elements recovered during the current excavation are small fragments and knapping chips. Only one core has been recovered.

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