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A resilient landscape at Teixoneres Cave (MIS 3; Moià, Barcelona, Spain): The Neanderthals as disrupting agent

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ABSTRACT

The debate over hominid–carnivore interactions during the Pleistocene has been mainly approached from a human perspective, with the aim of contributing to the knowledge of the evolution of human cultural capabilities in the different periods. Regarding the European Middle Palaeolithic, it is most commonly concluded that Neanderthals were clearly superior to carnivores in the context of competitive relationships, with respect to both prey and the occupied space. Therefore, the presence of some human groups in the environments usually inhabited by carnivores could be perceived, from an ecological point of view, as a disturbance in the balance of the ecosystems. In order to assess the ecological impact of these human groups, the present study analyses the Unit III of Teixoneres Cave (MIS 3; Moià, Barcelona, Spain) through a comparison of palaeoecological and archaeological data. The site is located in the highlands between the two main rivers connecting the central region of Catalonia with the Mediterranean coast: the Llobregat and the Ter. Palynological and paleontological data indicate a cold landscape dominated by woodlands and some wet meadows. The high vertebrate diversity recorded in this stratigraphic unit suggests an environment marked by a balanced predator–prey dynamic, which may have been interrupted by the occasional presence of small human groups. According to the archaeological data, these human groups tended to predate the same prey as did carnivores, which may have generated a certain perturbation in the system. However, the small size of the groups and the brevity of their visits to Teixoneres Cave seem to have minimised the perturbation, allowing the environment to recover its original balance.

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1. Introduction

Archaeological assemblages resulting from alternate occupations between hominids and carnivores often lead to interpretative problems arising from their condition as palimpsests. This phenomenon is commonly found in many European Middle and Late Pleistocene caves, and it introduces difficulties into establishing the duration of the respective occupations of carnivores and humans, mainly in archaeological assemblages without evidence of contact between these groups. In these cases, the record is often interpreted as exhibiting coexistence and/or continuous competition, which, in terms of evolutionary ecology, suggests a high degree of predation pressure throughout this period. In view of the high

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degree of competition (both to obtain food and occupy the space), some researchers have proposed the existence of coevolutionary processes, whose origin can be found in the beginning of hominin evolution towards nonprimate behaviour (see a review in Stiner, 2012).

The problem has typically been tackled from a human perspective, according to which human use of the caves, which were frequented by carnivores, was one strategy within a range of possible strategies for occupying territory (see the discussion in Villa and Soressi, 2000). In this respect, an important challenge for the taphonomic discipline is to establish valid criteria for identifying the type or types of carnivores involved in the accumulation in order to infer the forms of competition that took place between hominins and other predators (e.g., Stiner, 1998; Domínguez-Rodrigo, 2001; Villa et al., 2004; Faith et al., 2007; Airvaux et al., 2012). However, there are little data regarding the impact of carnivores on the natural dynamics of the caves, and this phenomenon can therefore be analysed only on the basis of results obtained from palaeoecological predictive models or palaeospecies distribution models (e.g., Lorenzen et al., 2011; Rodríguez-Gómez et al., 2014).

During the Pleistocene, caves were used by several carnivores—to a greater extent by some than by others—in different seasons of the year. Winters seem to have been the season preferred by the majority of bear species, whereas hyenas and other smaller carnivores could take advantage of these refuges during their respective breeding seasons (Torres et al., 2007). The metabolic or behavioural alterations that occurred during these critical moments could have been the main cause of death of most of these animals in the caves, as can be inferred from the integrity of the recovered carcasses and the large number of anatomical connections (Pinto Llona et al., 2005). Thus, the natural deaths of bears (and other carnivores) in the caves could have attracted other scavengers to these sites. According to the actualistic observations carried out by Brain (1981), carcasses in South African caves with stable conditions remain attractors for scavengers for periods of time up to several years. In this respect, many of the carnivore-tooth-marked carcasses, most commonly those of cave bears, seem to indicate passive activities, which could have occurred several days (or months) after their deaths (Domínguez-Rodrigo and Barba, 2006; Arilla et al., 2014). This phenomenon involves a balanced ecological scenario in the caves, characterised by a seasonal alternation between different predators. In this natural dynamic, however, it cannot be ruled out that the presence of other carnivore carcasses is a consequence of more aggressive contacts between predators, such as hunting, possible cannibalistic activities (bears) and siblicide (hyena cubs) (e.g., Pinto Llona and Andrews, 2002, 2004; Pinto Llona et al., 2005; Diedrich, 2012). Taken together, these possibilities introduce an element of complexity into the resulting assemblages, to which, the frequent low sedimentation rates and post-depositional processes (including trampling and geological transports) should be added.

This interpretative complexity increases when the natural balance is perturbed by the arrival of human groups. The human presence in these sites is indicated by some lithic artefacts, isolated hearths and anthropogenic damage on faunal remains (cut marks, burned bones and intentional bone breakage). From an archaeological point of view, the human activities are often consistent with occasional visits (short-term occupations) by small groups, probably unaware of or indifferent to the natural dynamic of the cave. However, recent decades have seen an increase in evidence of carnivores caught by hominins in these kinds of sites (Stiner, 1994; Armand et al., 2003, 2004; Münzel and Conard, 2004; Abrams et al., 2014). Although most of these carcasses seem to correspond to opportunistic exploitation of bears in caves (including scavenging), direct confrontations ensuing from casual encounters and the development of a strategy based on the search for these resources during the European Middle Pleistocene have also been suggested (e.g., Auguste, 1995). Therefore, the European Middle and Later Pleistocene archaeological data suggest a scenario in which hominins and large carnivores coexisted and in which the possible conflicts between them were usually resolved in favour of hominins. The hominins attributed to the Neanderthal deme seem to have played a significant role from an ecological point of view, occupying the top of the trophic pyramid together with the large predators (or even a trophic level higher than that occupied by such predators). Taking this into account, this paper assesses the degree of resilience of these kinds of systems subsequent to the impact of short visits by small human groups. To do so, it compares the palaeoecological and cultural data obtained up until the present at the stratigraphic Unit III of Teixoneres Cave (Moià, Barcelona, Spain), which has been interpreted as a hyena den/bear refuge during MIS 3 in which some short-term occupations by Neanderthals took place (Rosell et al., 2010; Rufà et al., 2014; Sánchez-Hernández et al., 2014).

2. Teixoneres Cave

Teixoneres Cave is one of the two most significant cavities in the Toll Caves karstic system, 4 km to the east of Moià municipality (Barcelona, Spain) (Fig. 1). The karst's coordinates are 2° 09′ 02″ E and 41° 48′ 25″ N, at 760 m a.s.l. From a geomorphological point of view, the region forms part of the highlands located between the two main rivers, the Llobregat to the south and the Ter to the north, that connect the inner area of Northern Catalonia with the Mediterranean Sea. The karst developed in the south slope of a cliff formed by a local Neogene limestone (known as the Collsuspina Formation) in the Mal Torrent Valley, a tributary of the Llobregat River. The caves have a north–south tubular morphology related to the drainage structure of the limestone to the Mal Torrent.

Toll and Teixoneres Caves were discovered as archaeological sites during the 1950s by a local speleological group. In the wake of this discovery, several seasons of archaeological research were carried out at both caves, the most significant of which were conducted during the second half of the 1950s and the first half of the 1970s. Although both caves were interpreted during this period as key sites for understanding the Middle Palaeolithic scenario in the northeast region of the Iberian Peninsula, the research was interrupted until 2003. At this point, the Catalan Institute of Human Palaeoecology and Social Evolution became interested in the caves and initiated the research project of which the current study is a part.

Teixoneres Cave consists of three main rooms, which the first researchers called Chambers X, Y and Z. The main entrance to the cave is in Chamber X, which is the bigger gallery located in the western area. This chamber forms a north–south gallery 30 m long and 5–6 m wide, which is crossed at the inner area by Chamber Y. This gallery is defined by an east–west corridor. In the eastern area, the Chamber turns to the south and, from a small corridor, connects with another small gallery (Chamber Z), which represents the other entrance to the cave, this one from the south. All of these chambers contain archaeological deposits.

The cave is filled by a 6-m-thick sediment package of which nine stratigraphic units have been described and enumerated from top to bottom as Unit I to IX. From a lithostratigraphic point of view, two main sets have been identified. The lower set (stratigraphic layers VIII and IX) is composed of silt and sand related to the fluvial processes inside the cave. In contrast, the middle and upper sets (layers I to VII) are dominated by a matrix of external sandy lutite with limestone blocks coming from the walls and roof. Debris flows seem to be the main origin of the detrital units, which alternate in

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