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Trampling experiments at Cova Gran de Santa Linya, Pre-Pyrenees, Spain: their relevance for archaeological fabrics of the Upper–Middle Paleolithic assemblages

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ABSTRACT

The study of fabrics, that is, the analysis of the orientation and slope of archaeological and sedimentary materials associated with the Middle Palaeolithic/Upper Palaeolithic (MP/UP) transition at Cova Gran shows substantial differences. Archaeological assemblages are characterised by greater isotropy in the fabrics than the sedimentary levels within which they are located, indicating that these differences may be generated by anthropic processes. One of the anthropogenic processes associated with horizontal and vertical displacement of archaeological artefacts is trampling and circulation caused by later occupations. In order to evaluate the effect of movement on materials, we undertook experiments simulating geological and archaeological conditions at Cova Gran. The results show that human trampling does not cause major isotropy in fabrics, but arranges archaeological assemblages towards planar or linear materials according to surface geometry. We were not able to replicate the fabric pattern of materials from the archaeological levels of Cova Gran, suggesting that they must be associated with the activities of human occupation at each level.

1. Introduction

Determination of the degree of modification of the archaeological record is key to understanding post-depositional and site formation processes. Such processes modify spatial patterns generated by anthropic activities and create arbitrary associations (Butzer, 1982; Schiffer, 1983, 1987). Therefore, an understanding of these dynamics is fundamental in order to interpret the integrity of anthropic occupations (Villa, 2004; Bailey, 2007). At Cova Gran de Santa Linya (Pre-Pyrenees, Iberian Peninsula), this matter is particularly relevant in establishing the degree of homogeneity and contextual resolution. The latter constitutes the basic attributes when addressing the concept of techno-typological change in the Middle/Upper Palaeolithic transition levels (Martínez-Moreno et al., 2010, submitted for publication; Mora et al., 2011).

Analysis of fabrics in archaeology, that is, analysis of the slope and orientation of archaeological elements, has proven to be a useful method in interpreting the formation of archaeological assemblages (Lenoble and Bertran, 2004; McPherron, 2005; Benito-Calvo et al., 2009; Benito-Calvo and de la Torre, 2011). For many years this technique has been applied in sedimentology (Mills, 1983; Benn, 1994; Bertran et al., 1997; Benn and Ringrose, 2001), based on the application of statistical methods to orientation and slope data. In this manner, one can analyse the presence of preferential directions and their relationship with syn/post-depositional geometry, or the possible action of dynamic forces. A widely used technique is the analysis of the fabric shape, which is closely related to formation processes. This technique is calculated from three eigenvectors derived from orientation and slope data (Woodcock, 1977; Woodcock and Naylor, 1983; Vollmer, 1989; Benn, 1994).

At Cova Gran, fabric analysis was applied separately to archaeological artefacts and sedimentary clasts, producing patterns that enabled the differentiation of human activity from geological processes at the same level. In this way, fabrics from archaeological levels showed a pattern that was more isotropic and less affected by terrain slope than its sedimentary corresponding layer (Benito-Calvo et al., 2009).

We suspect that a potential activity that might cause such major isotropy in fabric is trampling over exposed or semi-exposed materials, which could cause the displacement of archaeological accumulations by later occupations. Trampling is a cause of post-depositional alteration, particularly in rock shelters and caves that have been reoccupied frequently (Hughes and Lampert, 1977).

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Since Stockton's pioneering study (1973), various attempts have been made to determine the incidence of trampling on the archaeological record, from ethnoarchaeology (Gifford and Behrensmeyer, 1977) to experimental archaeology (Courtin and Villa, 1982; Villa and Courtin, 1983; Gifford-Gonzalez et al., 1985; Nielsen, 1991; see Eren et al., 2010 for additional references). These trampling experiments concentrated on the analysis of variables such as horizontal and vertical displacement of objects resulting from anthropic or animal activity, and alterations produced on the surface of lithic and bone objects. Intense trampling action can generate vertical displacement producing mixing, and also patterns in the horizontal position of materials. Such patterns identify types of circulation in the settlement (traffic zones and marginal zones), showing that large and medium sized objects tend to be displaced towards marginal zones while small objects remain in the traffic zone (Theunissen et al., 1998; Nielsen, 1991).

Nevertheless, the effect of trampling on the fabric of archaeological assemblages, that is variation in orientation and slope of archaeological pieces, is an important question which has received little attention until now. In order to evaluate this effect, in the present study we undertook experiments based on the sedimentary conditions of Cova Gran. We created two experimental areas, with physical substrates similar to the sedimentary levels of Cova Gran, in which we deposited experimental accumulations. These assemblages were placed in the zones and measured before and after being subjected to human trampling processes. We analysed the effect on fabric shape and compared it with the excavated levels of Cova Gran.

2. Cova Gran site

Cova Gran de Santa Linya (318541, 4643877, Zone 31, ETRS89) is situated in the outer marginal sierras of the southern slopes of the Eastern Pre-Pyrenees, close to their junction with the Tertiary Ebro Depression, in the province of Lleida (Catalunya, Spain) (Fig. 1). The Cova Gran site consists of a south-facing rock shelter covering an area of 92 m × 83 m which developed on the concave side of an incised meander at the bottom of the Sant Miquel ravine. The bedrock of the rock shelter consists of limestones of the Bona Formation (Late Cretaceous).

2.1. Geoarchaeological sequence

Excavations at the Cova Gran site which began in 2004 and are still ongoing have been conducted in three areas: Ramp, Transition and Platform Sectors (Figs. 1 and 2), where a sedimentary infill

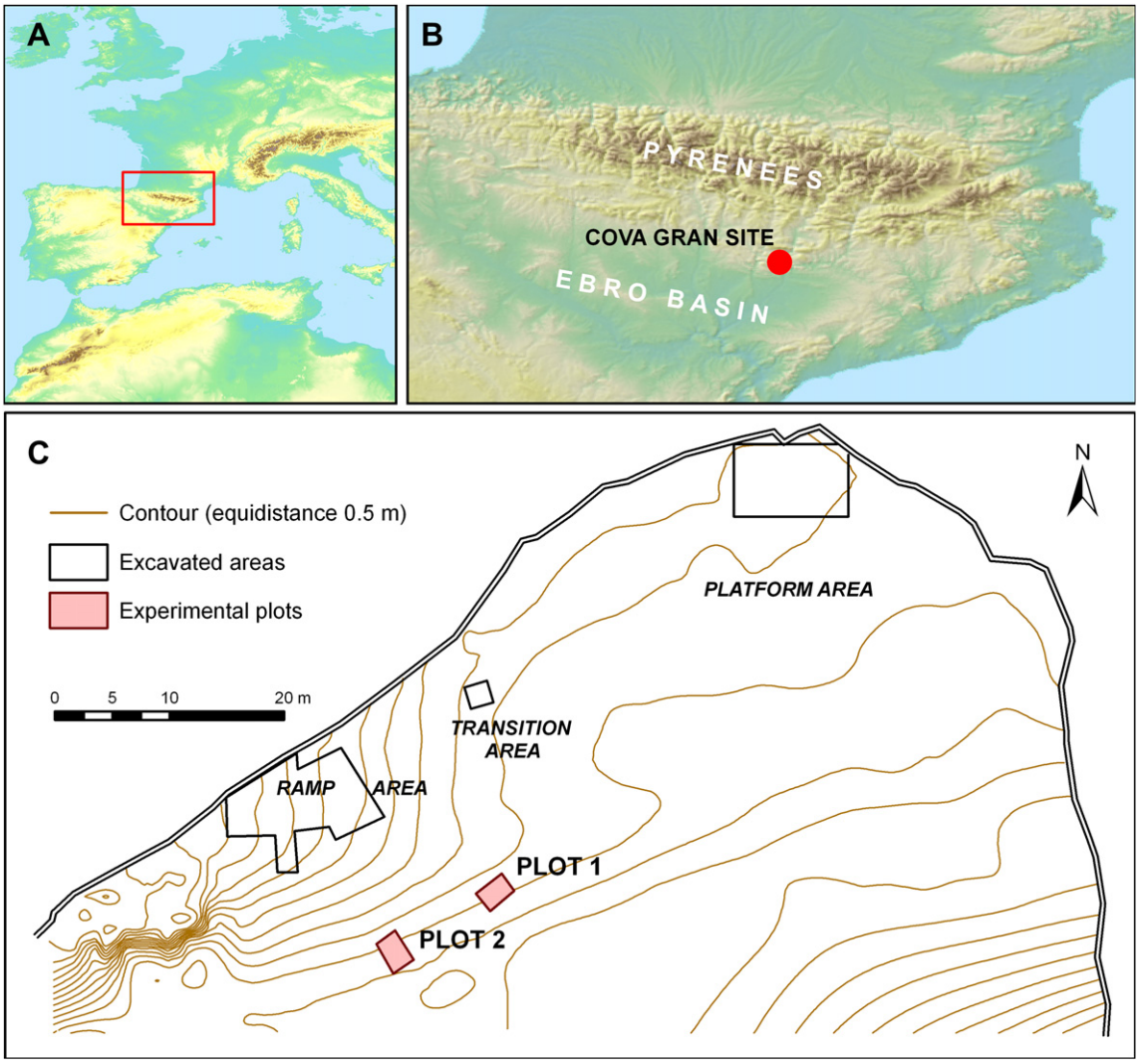

Fig. 1. Location of the Cova Gran site and position of the experimental areas.