



The technology of the earliest European cave paintings: El Castillo Cave, Spain



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ABSTRACT

The red disks from El Castillo Cave are among the earliest known cave paintings. Here, we combine the morphometric and technological study of red disks from two areas located at the end of the cave with the microscopic, elemental, and mineralogical analysis of the pigment and compare the results obtained with observations derived from experimental replication. Ergonomic constraints imply that a number of disks were made by adults, and the differences in pigment texture and composition suggest that they correspond to an accumulation through time of panels made by different persons who shared neither the same technical know-how nor, very possibly, the same symbolic system.

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A thousand artisans a thousand plans

Chinese proverb

1. Introduction

In the last two decades, a number of discoveries challenged accepted scenarios for the emergence of symbolically mediated behavior. The earliest occurrences of mortuary practices (Grün

et al., 2005; Pettitt, 2011; Rendu et al., 2014), pigment use for symbolic activities (Hovers et al., 2003; d'Errico et al., 2009; Zilhão et al., 2010), manufacture of personal ornaments (Caron et al., 2011; d'Errico et al., 2005, 2009; Vanhaeren et al., 2006; Zilhão et al., 2010), and production of geometric representations (d'Errico et al., 2012; Goren-Inbar, 1990; Henshilwood et al., 2009; Joordens et al., 2015; Rodríguez-Vidal et al., 2014; Texier et al., 2010) contradict the long-held assumption that the production of symbolic material culture was a recent innovation in human history, exclusively associated with anatomically modern humans and the outcome of a stochastic event taking place 40 ka in Europe.

However, the relative simplicity and sparse occurrence of such early symbolic traditions, the absence among them of clear depictional representations, and the astonishing complexity and

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technical mastery of some Early Aurignacian cave and portable imagery persuaded a number of scholars (Bar-Yosef, 2007; Klein, 2009; Higham et al., 2012) that a clear divide could still be perceived, so to speak, between Blombos and Diepkloof, on the one hand (Henshilwood et al., 2009; Texier et al., 2010), and Chauvet and Hohle Fels (de Balbín Behrman, 2014; Clottes, 2001; Conard, 2003), on the other. Such a difference would imply that the origin of “true”, cognitively and technically fully modern “artistic” expressions lies in the Early Aurignacian of Western Europe.

New evidence counters this view. The recent U-series disequilibrium dates of speleothems overlying cave paintings in the Maros karst of Sulawesi, Indonesia, resulted in minimal ages of 39.9 ka and 34.4 ka for a hand stencil and a babirusa, respectively (Aubert et al., 2014). This discovery, which disconnects the emergence of figurative representations from Europe, was interpreted as evidence for either independent invention or an innovation stemming from Africa that *Homo sapiens* would have unknowingly transformed in a signature of its worldwide expansion (Aubert et al., 2014). In Europe itself, U-series dating of calcite deposits overlying art found at El Castillo Cave yielded minimum ages of 40.8 ka, for a red disk, and 37.3 ka, for a hand stencil (García-Diez et al., 2015; Pike et al., 2012). These results show that artistic activity was taking place in caves well before the time of the earliest known figurative representations (e.g., Chauvet, Grande Grotte d'Arcy) (Baffier et al., 1999; Sadier et al., 2012; Valladas et al., 2005) and significantly predates the human and animal carvings from the Swabian Jura (Conard, 2003, 2009; Higham et al., 2012).

A degree of cultural cohesiveness must underpin this early art. Symbolic meaning is expressed by adherence to norms regarding the context and the subject matter of the representations. The cognitive, cultural and social implications of the latter can only be evaluated by understanding the way in which the material expression of symbols was created, assembled, displayed and rejuvenated, who made them, and for how long and by whom they were used. As brilliantly explained by Kandinsky (1947), when resulting from the application of paint on a canvas, a dot of color is a concise but not a simple pictorial expression. Its size, form, color, tonality, location and association with other graphic elements hide unsuspected resonances created by the artist and perceived by the observer.

Most effort has been devoted in the past to the technology of paint preparation and application in remarkable instances of Upper Paleolithic figurative representations, e.g. at Altamira (Martí, 1977), Niaux (Clottes et al., 1990), Arcy-sur-Cure (Baffier et al., 1999), Pech Merle (Lorblanchet, 1991), Ekain (Chalmin et al., 2002), Lascaux (Pomiès et al., 2000; Chalmin et al., 2004; Vignaud et al., 2006), Tito Bustillo (Iriarte et al., 2009), and Arenaza (Gárate et al., 2004). The Gargas hand stencils excepted (Clot et al., 1995; Groenen, 1988; Leroi-Gourhan, 1967), less striking productions have failed to attract similar attention.

In this paper, we aim to redress this imbalance with a technological and chemical study of the El Castillo red disks designed to gain a better understanding of the processes involved in the acquisition, preparation, application, and state of preservation of the pigment.

The disks our samples derive from belong to single or multiple alignments found in panels whose distance to the cave floor has not significantly changed since the Palaeolithic. More importantly, they include one of the early disks covered by a directly dated calcite layer. Our study thus sheds light on the beginnings of painting technology and the role of ergonomic constraints in the production of the disks. We also identify patterns of consistency and variation that we interpret as the outcome of successive uses of the cave by

Palaeolithic artists, revealing a hitherto unsuspected level of behavioral complexity.

2. El Castillo Cave and its Paleolithic art: context and description

2.1. Setting

The cave opens on the side of a mountain of the same name, a conical hill near the village of Puente Viesgo (Cantabria, Spain) that stands out in the landscape and may have represented a visible landmark for prehistoric populations (Fig. 1A). Featuring rich evidence of human occupation since at least 150,000 years ago, El

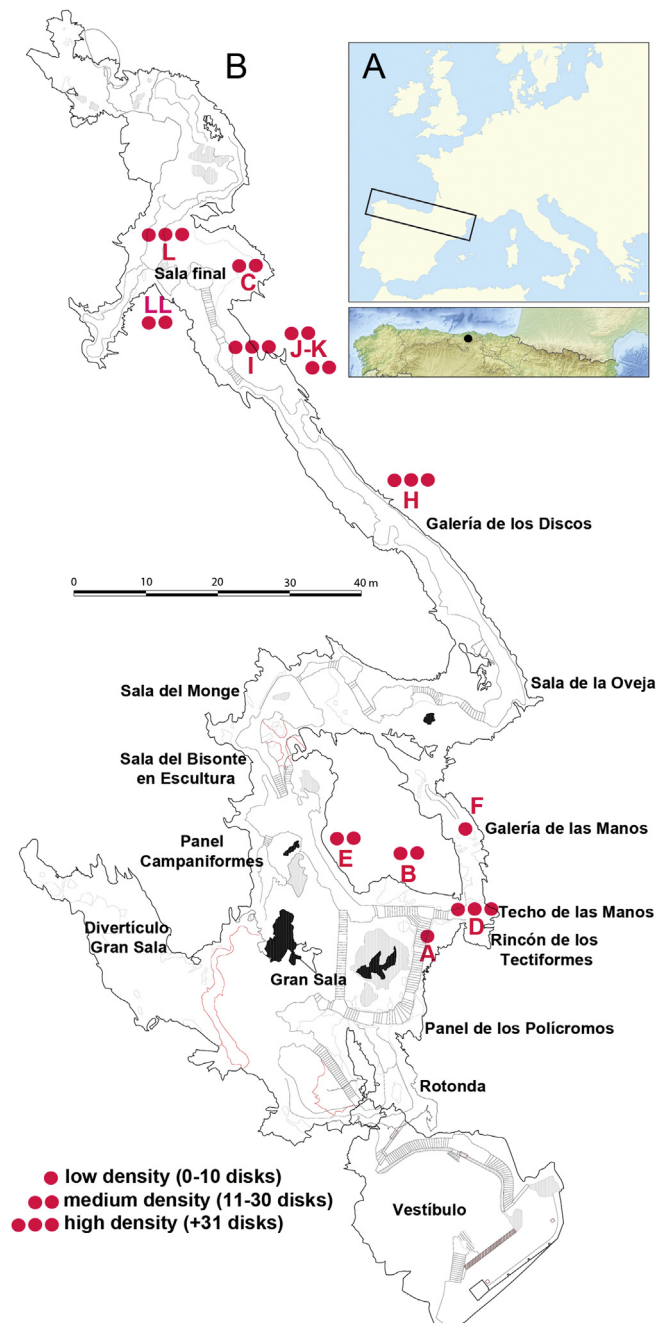


Fig. 1. A: Location of El Castillo cave. B: Plan of the cave indicating the location of panels with red disks.

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