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Assessing bone and antler exploitation at Riparo Mochi (Balzi Rossi, Italy): implications for the characterization of the Aurignacian in South-western Europe

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ABSTRACT

The Aurignacian typo-technological tradition has long been considered linked with the dispersal of anatomically Modern Humans over western Eurasia at the onset of the Upper Palaeolithic. In Europe it is commonly divided into two main phases, the Proto-Aurignacian and the Early Aurignacian whose definitions is based on the typo-technological features of lithics and some osseous "markers" like the split-based points. The osseous industry has recurrently been cited as a major innovation signaling the transition from Middle to Early Upper Palaeolithic. Nevertheless, recent studies strongly suggest that the real innovation is antler working, as bone working has been found to be similar in the Mousterian and the Early Upper Palaeolithic. Riparo Mochi is among the key Western European sites for assessing the nature of shifts and continuities between the Proto- and Early Aurignacian phases of the technocomplex. These data are significant for the study of the distribution of the first anatomically Modern Humans in Eurasia owing to several factors: (1) preservation of the Proto- and Early Aurignacian levels; (2) their location along the likely southern dispersal route of the Aurignacian; (3) the richness of archaeological evidence; and (4) recent re-evaluation of their chrono-stratigraphy. The study of worked osseous remains allows us to establish the comparative characteristics of animal raw material exploitation within the Riparo Mochi Aurignacian. Results demonstrate that animal raw material exploitation increases from the bottom to the top of the archaeological sequence at this site. Hunting weapons, as well as personal ornaments other than those made on shells, are only present in Early Aurignacian layers. Antler working is not documented in the Proto-Aurignacian, which is consistent with the hypothesis of the appearance of antler hunting weapons only after the Heinrich Stadial 4 and Campanian Ignimbrite climatic events.

1. Introduction

The nature, paths, and timing of anatomically Modern Humans (hereafter AMH) dispersal in Eurasia remains one of the most debated topics in Prehistory. According to the widely accepted "Out of Africa" model, early African AMH population/s dispersed through the Near East after 55 Ka years ago (Hershkovitz et al., 2015) reaching Europe, at around 40 Ka, where they replaced the local Neanderthals perhaps with a certain degree of genetic transfer (Green et al., 2010; Fu et al., 2014). In this context, the Aurignacian technocomplex is considered to be the starting point of the so-called European Upper Palaeolithic linked with the dispersal of AMH (e.g. Bar-Yosef and Belfer-Cohen, 2013; Hublin, 2014; Mellars, 2006, 2011). In Europe, the initial phase of the Aurignacian is commonly divided into the Proto-Aurignacian (mainly related to the Mediterranean area) and the Early Aurignacian (mainly found in central and western Europe); these definitions are owing to differences in the archaeological evidence such as lithic typological/technological features as well as the presence/absence of some osseous "markers" such as split-based points (Bon, 2002, 2005; Bon

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et al., 2002; Bordes, 2006; Normand and Turq, 2005; Liolios, 1999, 2006; Maíllo, 2003; Teyssandier, 2007; Teyssandier and Liolios, 2003; Tsanova, 2006).

Along with studies that focus on lithic, faunal, chronological, and other aspects of Palaeolithic assemblages, techno-functional analysis of osseous tools – namely, bone, antler and other hard animal tissues – can serve as a valuable complementary approach for the interpretation of the emergence of the Upper Palaeolithic.

Regarding the transition from Middle to Upper Palaeolithic in Eurasia, although the osseous industry has been recurrently cited as a major innovation that occurred at this period (Mellars, 1989; Mellars and Stringer, 1989; White, 1992; Klein, 1995), recent studies strongly suggest that osseous working should no more be considered as a real cultural marker between the Middle and the Upper Palaeolithic; rather, a distinction should be made only when antler working is considered (Tejero, 2014). There is a coincidence of the appearance of complexity in animal raw material exploitation technology with certain important climatic events: the Heinrich Stadial 4 event (HS4) and the Campanian Ignimbrite (CI). This synchronism suggests that, among others, one of the major drivers of this innovative behaviour may be related to the environmental consequences of these climatic events (Tejero, 2014).

We aim to assess the nature and the chrono-cultural framework of animal raw material exploitation during the Proto-Aurignacian and Early Aurignacian of Riparo Mochi in the context of climatic and environmental changes. In particular, the goals of this work are 1) To determine if both bone and antler were worked by Proto-Aurignacian and early Aurignacian inhabitants of the site; 2) To establish whether a similar or different degree of complexity was applied to the exploitation of each raw material in both Aurignacian phases by a technological comparative study of bone and antler evidence following several parameters (raw material supply; blanks production; manufacture process) and; 3) To discuss the chronological framework of the emergence of antler working and ornaments on osseous raw material and their implications for the definition of Proto- and Early Aurignacian typo-technological traditions.

1.1. The Riparo Mochi site

The Riparo Mochi sequence is today a reference for describing the appearance and evolution of the Aurignacian and Gravettian technocomplexes along the northern Mediterranean coast. The site is part of the Grimaldi sites in the Balzi Rossi area (northwestern Italy), one of the most important Palaeolithic site complexes in Europe, with over 15 caves, rockshelters and open-air sites.

Riparo Mochi (43°47′3.66″N, 7°32′4.18″E) is located in the so-called Liguro-Provençal Arc, a narrow littoral corridor, 400 km long and a few km wide, delimited by the Apennines and the Western Alps to the North, and the Tyrrhenian Sea to the South, linking Central Tyrrhenian Italy to the Rhône Valley (Fig. 1). During OIS 3, the landscape of the Liguro-Provençal Arc was not very different from today's (Watts et al., 2000; Arobba and Caramiello, 2009; Pons-Branchu et al., 2010). This region was a narrow corridor even during glacial times according to the bathymetry of the sea bottom (IBCM, 2014). Consequently, from an archaeological perspective, the Liguro-Provençal Arc should have been a natural axis channelling the circulation of both humans and animals between central Italy and Southern France (Porraz et al., 2010).

Riparo Mochi was discovered by A.C. Blanc and L. Cardini, of the Istituto Italiano di Paleontologia Umana (Blanc, 1938) who excavated a four square meter trench (the so called “Central trench”) from 1938 to 1949. The 1949 east section of the Central trench was then recorded by the IIPU geologist A. Segre and this, along with

Fig. 1. Location of Riparo Mochi site and other Aurignacian sites cited in the paper. Topographic and hydrographic map by Eric Gaba (Wikimedia commons user: Sting). Topography: NASA SRTMBO. Bathymetry: NGDC ETOPO1. Additional data: NGDC World Data Bank II. Europe map by mapsof.net.