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Stratigraphic and technological evidence from the middle palaeolithic-Châtelperronian-Aurignacian record at the Bordes-Fitte rockshelter (Roches d'Abilly site, Central France)

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ABSTRACT

This paper presents a geoarchaeological study of Middle and Upper Palaeolithic (Châtelperronian, Aurignacian and Solutrean) occupations preserved at the Bordes-Fitte rockshelter in Central France. The lithostratigraphic sequence is composed of near-surface sedimentary facies with vertical and lateral variations, in a context dominated by run-off and gravitational sedimentary processes. Field description and micromorphological analysis permit us to reconstruct several episodes of sediment slope-wash and endokarst dynamics, with hiatuses and erosional phases. The archaeostratigraphic succession includes Châtelperronian artefacts, inter-stratified between Middle Palaeolithic and Aurignacian occupations. Systematic refitting and spatial analysis reveal that the Châtelperronian point production and flake blanks retouched into denticulates, all recovered in the same stratigraphic unit, result from distinct and successive occupations and are not a 'transitional' Middle to Upper Palaeolithic assemblage. The ages obtained by ^{14}C place the Châtelperronian occupation in the 41–48 ka cal BP (calibrated thousands of years before present) interval and are consistent with the quartz optically stimulated luminescence age of 39 ± 2 ka and feldspar infra-red stimulated luminescence age of 45 ± 2 ka of the sediments. The Bordes-Fitte rockshelter sequence represents an important contribution to the debate about the characterization and timing of the Châtelperronian, as well as its affinities to earlier and later industries.

Introduction

Until the discovery of the Saint-Césaire Neanderthal human remains in a stratigraphical unit yielding Châtelperronian lithic evidence (Lévêque and Vandermeersch, 1980; Vandermeersch, 1984), the Châtelperronian technocomplex was widely attributed to anatomically modern humans (AMH), based on the Combe-Capelle burial stratigraphical attribution, and considered as the first phase of the Upper Palaeolithic (Peyrony, 1948; Sonneville-Bordes, 1960, 1966; Bordes, 1968).

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Later, the attribution of the teeth found in levels X–VIII of the Grotte du Renne at Arcy-sur-Cure to Neanderthals by Leroi-Gourhan (1958) was based on a clear assessment of the Neanderthal morphological affinities of the teeth and of the temporal bone found in these levels (Hublin et al., 1996; Bailey and Hublin, 2006). Recently, the Combe-Capelle burial was directly dated by ^{14}C AMS to the Mesolithic (Hoffmann et al., 2011). The Neanderthal responsibility for the Châtelperronian culture is now widely accepted, with some notable exceptions (Bar-Yosef and Bordes, 2010). Furthermore, Bailey et al. (2009) suggest that AMH were the makers of all other Early Upper Palaeolithic technocomplexes and that the Châtelperronian is a 'transitional' phase. A direct ancestral relationship has been suggested between the Mousterian of Acheulean Tradition Type B and the Châtelperronian (Bordes, 1958; Harrold, 1989; Pelegrin, 1995; Pelegrin and Soressi, 2007), and the existence of transitional evolutionary phases has been proposed between these two technocomplexes (Lévêque, 1987).

The second main issue and related debate concerns the explanation of the cultural changes occurring in lithic and bone industries during the transition from the Middle to the Upper Paleolithic. In one model, this emergence pre-dated any evidence for the Aurignacian or modern humans in Europe and so the Châtelperronian could only be interpreted as representing the Neanderthals' independent transition to full cultural modernity (Zilhão, 2001, 2006, 2007; d'Errico, 2003). In a second model, the technological cultural changes in Western Eurasia resulted from an interaction between the Neanderthal and AMH (Demars and Hublin, 1989; Harrold, 1989; Mellars, 1989, 1999, 2005; Hublin, 1990; Djindjian et al., 2003). Such a model, based on the contemporaneity of the Châtelperronian with various forms of Aurignacian (Mellars, 2005), and the coincidence between the timing of the AMH dispersal and the technological and cultural changes, relies in large part on the chronological overlap of radiocarbon dates of bones recovered in occupations assigned by lithic evidence to these two groups. However, as noted by Mellars (2005), accuracy and precision of radiocarbon dates in the interval 30 ka BP to 40 ka BP are notoriously problematic (Conard and Bolus, 2003), and highly dependent on the bone pre-treatment protocol (Higham et al., 2006, 2009, 2010). The coexistence model has also been supported by stratigraphical, sedimentological and palynological correlations between cave and rockshelter sequences of Western (Lévêque and Miskovsky, 1987) and Eastern France (Leroyer and Leroi-Gourhan, 1983).

A second line of argument for the coexistence of the Châtelperronian and the Aurignacian in the acculturation model relies on the archaeological evidence of Aurignacian underlying Châtelperronian, observed at the Roc de Combe (Bordes and Labrot, 1967), Le Piage (Champagne and Espitalié, 1967) in Southern France and at El Pendo, in Northern Spain. However, the taphonomic reappraisal of these sequences, using refitting and spatial distribution of diagnostic lithic tool types, shows that the interstratifications do not correspond to an archaeological sequence and may be the result of post-depositional processes (Montes and Sanguino, 2001; Bordes, 2003). Gravina et al. (2005) have accepted the re-interpretation of these sites but have used 12 dates obtained by ultrafiltration protocol on bones from layers B5 to B1–3 of La Grotte des Fées (Châtelperron, Allier), and the typology of lithic and bone tools recovered in that sequence to support the coexistence of the Châtelperronian and Aurignacian (Gravina et al., 2005). Others (Zilhão and d'Errico, 2003; Zilhão et al., 2006) have suggested that all of the Châtelperronian ages younger than 36.5 ^{14}C ka BP obtained by classical AMS protocol are underestimated, and that the inter-stratified Châtelperronian/Aurignacian/Châtelperronian deposits reported by Henri Delporte at the Grotte des Fées are in fact 19th-century backfill and provide no support for interstratification. They consider that the overlap of radiocarbon dates between Châtelperronian and the earliest Aurignacian is a by-product of imprecision and inaccuracy in the stratigraphic evidence and the radiocarbon dating (Zilhão and d'Errico, 2003; Zilhão et al., 2006).

Recent results obtained by palaeo-geneticists based on the analysis of the Neanderthal genome show that they are likely to have had a role in the genetic ancestry of present-day humans outside of Africa and that gene flow occurred between Neanderthals and modern humans (Green et al., 2010). This gene flow is explained by mixing of Neanderthals with early modern humans (ancestral to present-day non-African) in the Middle East prior to their expansion into Eurasia. These results did not bring evidence in favor of any of the two models to explain the cultural changes that have occurred around 40 ka in south-western Eurasia. Such mixing is compatible with the archaeological record, which shows that Neanderthals came into contact with AMH in the Middle-East at least 80 ka ago, whereas Neanderthals continued to exist in the same region after that time, probably until 50 ka (Mercier and Valladas, 1994).

The differences in the interpretation of the archaeological evidence (Gravina et al., 2005; Zilhão et al., 2006) and of the archaeological association of the few human remains available for the 40 ka–30 ka period (Lévêque and Vandermeersch, 1980; Bailey et al., 2009; Bar-Yosef and Bordes, 2010) rely on: (1) different interpretations of the stratigraphic sequences and post-depositional processes; and (2) the dating methods used.

Thus, an improved scrutiny of the sedimentary processes, the systematic evaluation of the post-depositional evolution of human occupation levels (Zilhão et al., 2006, 2009; Texier, 2009; Aubry et al., 2010; Bertran et al., 2010), and more accurate and precise dating of the late Middle to Early Upper Palaeolithic (Higham et al., 2006) are crucial to the debate regarding Neanderthals, modern humans and their lithic and bone technologies. These objectives involve new dating (Higham et al., 2010) and reappraisal of material from old excavations (Bordes, 2003; Soressi, 2010), but new data and more stratified sequences are also necessary. The reconstruction of the sedimentary processes in cave or rockshelter context is a difficult task, particularly near the entrance where endokarstic and slope dynamics interfere. The Bordes-Fitte rockshelter record offers a new opportunity to establish the relationship between the human inputs and the natural processes that have sealed, eroded or altered the original spatial organization of the archaeological remains for the time interval during which the Middle to the Upper Palaeolithic transition took place.

The Roches d'Abilly site

The Roches d'Abilly site is located in Central France, along the Creuse Valley (Fig. 1), on the southern limit of the Touraine region, not far from Les Cottés (Pradel, 1961; Soressi et al., 2010) and La Fontenioux (Pradel, 1952), two sites preserved in caves of the Poitoux-Charentes cluster of the Châtelperronian distribution area (Lévêque, 1987; 1997; Pelegrin and Soressi, 2007; Bar-Yosef and Bordes, 2010). The Creuse Valley contains several Middle and Upper Palaeolithic occupation sequences conserved in caves, rockshelters, and open-air sites (Allain, 1976; Aubry et al., 2007).

The site is a complex of loci situated along a quarried escarpment at the right margin of the Creuse Valley, a cliff with a 300-m-long exposure of carbonate bedrock, in a geomorphological context quite distinct from most of the other sites that preserve the Middle to Upper Palaeolithic transition in south-western Eurasia. The discovery of lithic industries on the surface of the slope drew the attention of Jean-Baptiste Barreau to the site in 1925. In 1949, a collapsed rockshelter at the western end of the quarry (Fig. 2) was excavated and the results summarily published