Journal of Human Evolution 65 (2013) 266–281

Contents lists available at SciVerse ScienceDirect

Journal of Human Evolution

journal homepage: www.elsevier.com/locate/jhevol

Origins of the Iberomaurusian in NW Africa: New AMS radiocarbon dating of the Middle and Later Stone Age deposits at Taforalt Cave, Morocco

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ARTICLE INFO

Article history:
Received 5 February 2013
Accepted 1 June 2013
Available online 24 July 2013

Keywords:
Maghreb
North Africa
Microlithic bladelet industry

ABSTRACT

Recent genetic studies based on the distribution of mtDNA of haplogroup U6 have led to subtly different theories regarding the arrival of modern human populations in North Africa. One proposes that groups of the proto-U6 lineage spread from the Near East to North Africa around 40–45 ka (thousands of years ago), followed by some degree of regional continuity. Another envisages a westward human migration from the Near East, followed by further demographic expansion at ~22 ka centred on the Maghreb and associated with a microlithic bladelet culture known as the Iberomaurusian. In evaluating these theories, we report on the results of new work on the Middle (MSA) and Later Stone (LSA) Age deposits at Taforalt Cave in Morocco. We present 54 AMS radiocarbon dates on bone and charcoals from a sequence of late MSA and LSA occupation levels of the cave. Using Bayesian modelling we show that an MSA non-Levallois flake industry was present until ~24.5 ka Cal BP (calibrated years before present), followed by a gap in occupation and the subsequent appearance of an LSA Iberomaurusian industry from at least 21,160 Cal BP. The new dating offers fresh light on theories of continuity versus replacement of populations as presented by the genetic evidence. We examine the implications of these data for interpreting the first appearance of the LSA in the Maghreb and providing comparisons with other dated early blade and bladelet industries in North Africa.

Introduction

Recent phylogenetic studies of mtDNA haplogroups M1 and U6 have proposed that modern human populations in North Africa originated from groups that had migrated into this region from Southwest Asia (Maca-Meyer et al., 2003; Olivieri et al., 2006; Gonzalez et al., 2007). However, the nature, timing, and geographical spread of such a back-migration are still a matter of considerable debate (Pennarun et al., 2012). On the one hand, some studies propose an early dispersal of M1 and U6 lineages into North Africa at ~40–45 ka (thousands of years ago) (Olivieri et al., 2006), while others suggest multiple events with a major expansion of the U6 lineages in the Maghreb ~22 ka (Maca-Meyer et al., 2003; Pereira et al., 2010). Bound up with these models is the proposal that the geographical patterns of the haplogroups can be shown to coincide with major technological shifts in the archaeological record. One of these relates to sub-haplogroup U6a1 and its posterior clade U6a1a, with coalescence ages of ~22 ka, which may be associated with the appearance of a culture known as the Iberomaurusian (Maca-Meyer et al., 2003). This microlithic bladelet industry is significant because it represents potentially the earliest Later Stone Age technology in the Maghreb (Morocco, Algeria, Tunisia). The genetic studies therefore also highlight the issue of whether the Iberomaurusian was a truly indigenous development to the Maghreb or whether it reflects a general spread of people and traditions from Cyrenaica with older roots in Southwest Asia.

While the published genetics research provides useful models for understanding the early peopling of North Africa by modern humans, considerable caution must be exercised in interpreting these data. One issue concerns underlying assumptions regarding the timing of dispersal events that are heavily dependent on the methodology used to estimate molecular divergence values and DNA mutation rates (Endicott et al., 2009; Scally and Durbin, 2012). Indeed there is still a huge disparity between the age of U6 and

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0047-2484/$ – see front matter © 2013 Elsevier Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.jhevol.2013.06.003

some of its individual clades, such that the age of U6a7 is consistently estimated as being older than that of U6 overall (Olivieri et al., 2006; Pereira et al., 2010). A further challenge is to assess whether any of the proposed demographic models can be demonstrated by testing them against empirical evidence in the archaeological and palaeontological records. For example, did the arrival of modern humans in the Maghreb result in abrupt changes in the archaeological record (replacement model) or were changes brought about independently and within the context of long-term population continuity (Debénath et al., 1986; Linstädter et al., 2012)? Until now, it has been difficult to assess such claims, because of the absence of high precision dating records for key regions such as the Maghreb and the scarcity of well-stratified archaeological sequences with associated human fossil remains. A site of major significance that can help remedy this situation is that of Grotte des Pigeons at Taforalt. The cave is located in the Beni-Snassen Mountains, in northeastern Morocco (Fig. 1), and has been the subject of recent excavations that provide a long and largely unbroken sequence of archaeological deposits from ~12 to 110 ka (Bouzouggar et al., 2007; Clark-Balzan et al., 2012), covering the period of the proposed arrival in the region of modern humans. The sediments include both extensive Aterian and Iberomaurusian occupation, with cemetery evidence (Bouzouggar et al., 2006, 2007, 2008; Barton et al., 2007; Taylor et al., 2011; Humphrey et al., 2012). In this paper we report on the upper part of the sequence comprising the terminal Middle (MSA) and Later Stone (LSA) Age deposits of the cave. The 54 AMS (accelerator mass spectrometry) radiocarbon dates provide the first well constrained record for the appearance of the Iberomaurusian in northwest Africa. They also provide a basis for comparing the genetics-derived chronology and enable an independent test of the timing of the transition from the MSA in this region.

Among the most intriguing elements in this research are those that concern the nature and origins of the Iberomaurusian. The techno-complex is found very widely distributed across North Africa and is associated with cemeteries containing skeletal remains of robust modern humans attributed to Mechta-Afalou types (Camps, 1974; Lahr, 1996; Irish, 2000; Humphrey and Bocaege, 2008). The Iberomaurusian is particularly well documented in cave, rock-shelter, and open-air sites in the Mediterranean coastal zone of the Maghreb with a distribution that potentially extends into Cyrenaica (McBurney, 1967; Barker et al., 2008) and Egypt (Phillips, 1972). The Iberomaurusian lithic industry is typified by microlithic backed bladelets and, apart from its geographically wide distribution, is significant because it marks a diagnostically clear change from Middle Palaeolithic/Middle Stone Age technologies in the Maghreb (Lubell, 2001; Bouzouggar et al., 2008). Many specialists assign the Iberomaurusian to the Epipalaeolithic (Roche, 1963; Barton et al., 2007; Olszewski et al., 2011) but, despite the extraordinary wealth and density of findspots in the Maghreb and over a century of research, relatively little is known about how or where it originated.

Various theories have been proposed for the cultural origins of the Iberomaurusian. The term itself derives from the fusion of two words 'Ibero' (meaning Spanish) and 'Maurusian' (referring to Mauretania tingitana, the name first given by the Romans to northern Morocco and western Algeria). The definition was introduced by Pallary, who used it to draw attention to similarities between lithic industries in Spain and Morocco that contained "une profusion de très petites lames à dos retouché et à pointe très aiguë" (Pallary, 1909). The implied link with southern Europe was dismissed by later archaeologists who recognised stronger African affinities and adopted alternative names reflecting regional sources such as 'Oranian' (Gobert and Vaufrey, 1932) and 'Mouillian' (Goetz, 1941) from type locations in Algeria. However, the term Iberomaurusian has always persisted in the literature and, for reasons of taxonomic priority, we shall continue to use it here. Divergent with these views was an idea put forward by McBurney (1967), that the Oranian/Iberomaurusian had arisen out of an 'Upper Palaeolithic' industry known as the Dabban, represented at the Cyrenaican site of Haua Fteah and which may be of Near Eastern origin. But a major anomaly in this scheme was that the Iberomaurusian appeared to be earlier in the Maghreb than for the rest of North Africa (McBurney, 1977; Close, 1986). More recently, it has been suggested that the development of the Iberomaurusian was part of a much wider, pan-regional phenomenon resulting in the appearance of backed bladelet technologies across much of North Africa and the Near East around 20–23 ka BP (Close and Wendorf, 1990; Vermeersch, 1992; Godfrey-Smith et al., 2003; Goring-Morris and Belfer-Cohen, 2003). However, this theory neither adequately addressed the possibility of an early Iberomaurusian in the Maghreb nor inherent differences in the tool typologies at Upper Nile

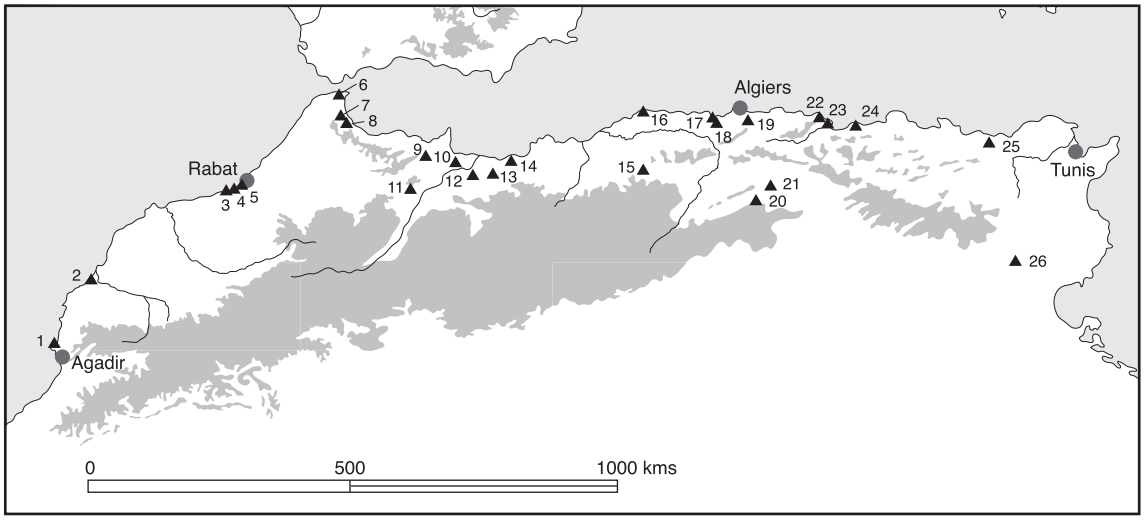

Figure 1. Distribution of Iberomaurusian sites. 1. Cap Rhir, 2. El Khenzira, 3. Contrebandiers, 4. El Harhoura II, 5. Dar es-Soltan I, 6. Ghar Cahal, 7. Kehf El Hammar, 8. Hattab II, 9. Ifri El Baroud, 10. Ifri n'Ammar, 11. Kifan Bel Ghomari, 12. Taforalt, 13. La Mouillah, 14. Rachgoun, 15. Columnata, 16. Cap Ténès, 17. Rolland, 18. Rassel, 19. Oued Kerma, 20. El Hamel, 21. El-Onçor, 22. Afalou Bou Rhummel, 23. Tamar Hat, 24. Taza, 25. Ouchtata localities, 26. Horizon Collignon.