



## News and views

## Comments on “Human-climate interaction during the Early Upper Paleolithic: Testing the hypothesis of an adaptive shift between the Proto-Aurignacian and the Early Aurignacian” by William E. Banks, Francesco d’Errico, João Zilhão



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In this brief comment, we intend to reply to issues arising from the recently published article by Banks et al. (2013a). Banks et al.’s paper focuses on the human-climate interaction during the Proto-Aurignacian and the Early Aurignacian and on the technological and tempo-spatial relationship between these two techno-complexes. In addition, they briefly examine the European transitional complexes, and revisit the current debate regarding the authorship of the Châtelperronian and the Uluzzian. In our opinion, Banks et al. (2013a) are selective in their use of stratigraphic (and radiometric) data, and their practice of unjustifiably discarding ‘inconvenient’ data, as Banks et al. (2011) explicitly do, is puzzling.

Here, we are mainly interested in clarifying questions raised about the stratigraphic and chronometric integrity of Grotta del Cavallo (Lecce, Southern Italy). Banks et al. (2013a) define as ‘tentative at best’ the attribution to anatomically modern humans (AMH) of the two deciduous teeth recovered at Grotta del Cavallo

(Benazzi et al., 2011b), suggesting that there are stratigraphic, chronological and definitional issues with the evidence. Surprisingly, they do not elaborate in any detail on these assertions.

The attribution of the Cavallo teeth to AMH had an obvious impact on the debate around Neanderthal ‘modern behaviour,’ which the Uluzzian evidence was used to support previously (e.g., Zilhão, 2007). However, the assumption that the makers of transitional assemblages (or of some of them) were modern humans rather than Neandertals does not automatically mean that ‘complex’ cognitive skills were unique to AMHs. The crux of the matter is that the concept of ‘modernity’ at issue is based on a completely relative and ‘self-referential’ model because ‘modernity’ and its evolutionary degree are exclusively defined on *Homo sapiens* parameters (“This is the ultimate fate of Neandertals: to live on as inexact mirrors of ourselves” from Wynn and Coolidge, 2012: 188).

Before discussing the purported ‘issue’ with the stratigraphy of Grotta del Cavallo, it is worth commenting briefly on the criticism raised by Banks et al. (2013a) on the taxonomic determination of the two deciduous molars from the Uluzzian levels of the site (Cavallo B and Cavallo C). The authors reject the attribution of the teeth to AMH, proposed by Benazzi et al. (2011b), and instead cite a recent publication by Trinkaus and Zilhão (2012). However, Trinkaus and Zilhão (2012: 392), referring to the Cavallo teeth, only state that “...their morphology is insufficient to establish that they are indeed from modern humans instead of Neandertals (cf. Churchill and Smith, 2000; Gambassini et al., 2005; Riel-Salvatore, 2009)”. This is at least circular. Banks et al. (2013a) do not supply any morphological or morphometric evidence to support their claims, the latter are simply based on previous observations by other scholars whose aim had not been to classify the teeth (i.e., Riel-Salvatore, 2009) or who had done so on the basis of insufficiently published data (i.e., Churchill and Smith, 2000; Gambassini et al., 2005). The study by Benazzi et al. (2011b) specifically targeted the taxonomic determination of the deciduous teeth from Grotta

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del Cavallo and did so by using state-of-the-art morphometric methodologies based on microtomographic data and advanced digital methods (see also Benazzi et al., 2011a, 2012; Benazzi, 2012). In addition, Benazzi et al. (2011b) showed that Churchill and Smith (2000): 77 inverted the measurements of the buccolingual and mesiodistal diameters, originally reported by Palma di Cesnola and Messeri (1967), and by doing so their taxonomic observations were wrong. Instead of examining the results of Benazzi et al. (2011b) that were based on advanced digital methods (see also Benazzi et al., 2011a, 2012; Benazzi, 2012) and were specifically adopted to establish the taxonomy of the human teeth in question, Banks et al. (2013a) construct weak arguments based on data obtained using out-dated methodologies, or on studies that lend more weight to observations rather than first-hand data (i.e., Trinkaus and Zilhão, 2012). Here, we confirm once more that the most recent taxonomic attribution of the deciduous teeth from Grotta del Cavallo is correct, i.e., they belong to modern humans rather than Neanderthals, as shown by Benazzi et al. (2011b) and duly discussed therein.

Turning to the stratigraphy criticisms, Banks et al. (2013a) suggest the possibility of post-depositional mixing affecting the Uluzzian sequence of Grotta del Cavallo. They specifically reiterate claims regarding the existence of an Aurignacian occupation at the top of the Cavallo sequence (layer D), which to them would cast doubts on the integrity of the Uluzzian sequence in Cavallo as a whole, and, therefore, its association with modern humans. Banks et al. (2013a) base their claims exclusively on two publications: Gioia (1990) and Mussi et al. (2006) (the latter is only a repetition of the 1990 publication without the addition of new data). Then they extrapolate the claims for layer D to the rest of the Uluzzian sequence where the teeth were found, which is, according to Banks et al. (2013a), potentially mixed. We feel it is important to set the record straight.

The attribution of layer D to the Aurignacian, suggested by Gioia in 1990, was based on typological features analysed with the same methodology (Bordes' typology and cumulative diagram) that had previously led the author to assert that "starting from the analysis of the artefacts and from the observation of the cumulative graphs, it is clear that the Italian Uluzzian is a real Châtelperronian" (Gioia, 1988: 82). This assumption is considered nowadays as obsolete and untenable (see also Palma di Cesnola, 2001, note 15 p. 31). It is widely accepted today that the correct definition and attribution of a lithic assemblage should be based on the study of an entire context, including the technical component, and not just on some so-called 'fossiles directeurs'. Moreover, it is worth noting that the lithic drawings published by Gioia (1990: Fig. 3) and Mussi et al. (2006: Fig. 14) as illustrative of the presumed Aurignacian of Grotta del Cavallo do not correspond in detail to the drawings of the same pieces published by Palma di Cesnola (1966: Figs. 22, 24) nor to the original artefacts. We examined each artefact carefully and it became evident that the 'Aurignacian' character of some pieces was over-emphasised (Fig. 1).

The so-called 'Aurignacian' items from layer D are extremely few in number (in fact only the pieces illustrated by Gioia) while the mass of lithic material fall within the characteristic features of the Uluzzian techno-complex. Technological studies still in progress (F. Rinaldo doctoral research; De Stefani et al., 2012) have highlighted the occurrence of homogeneous production systems throughout the Uluzzian series of Cavallo, including layer D. None of the innovative characteristics typical of the Proto-Aurignacian and/or the Aurignacian have been identified. The Uluzzian and Proto-Aurignacian/Aurignacian techno-complexes differ in both the production systems and the end-products, as well as in the blank transformation phase. The Uluzzian production scheme is characterised by extreme variability both in methods and in products.

Lunates, for instance, always share convex backed deep retouch, although they are obtained from a number of heterogeneous blanks and are dimensionally variable. Conversely, the Proto-Aurignacian/Aurignacian tradition shows a conceptually different approach as production is more systematic and tends to become standardized throughout the manufacturing process. This behaviour may be indicative of different hunting modalities (as attested by use-wear analysis). In our opinion, it is likely that these differences, on the whole, could mirror technological and cultural traditions fundamentally distinct.

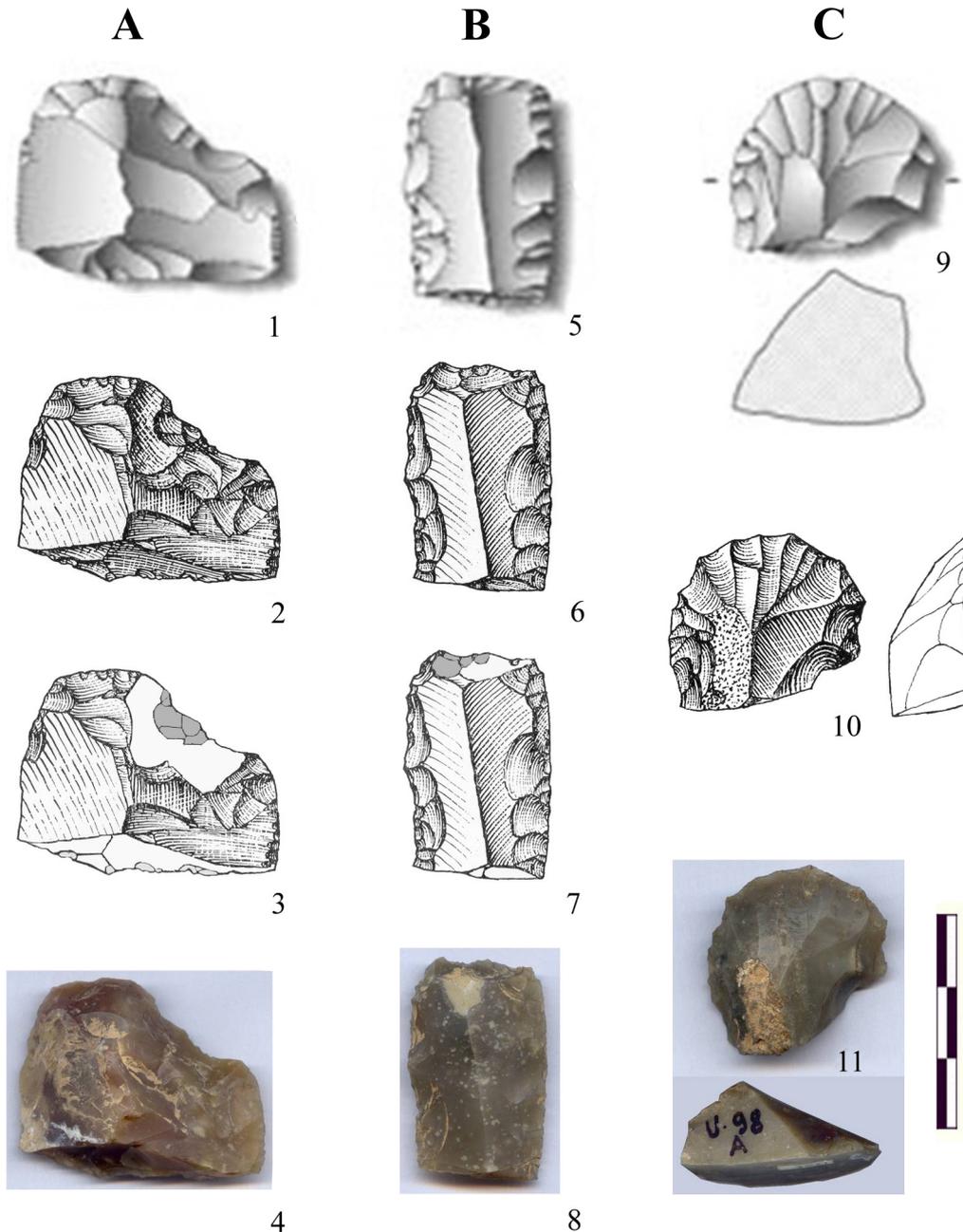
Turning back to Cavallo, the deeply retouched artefacts strongly similar to the layer D 'Aurignacian' implements occur since the Early Uluzzian layers: they seem more different than they actually are because of the different raw material used (calcareous slabs instead of flint) (for information on excavation, stratigraphy and lithic raw material provisioning in Cavallo see Palma di Cesnola, 1963, 1964, 1989; De Stefani et al., 2012).

What is more paradoxical about Gioia's interpretation and its adoption by Banks et al. (2013a) is that the controversial artefacts showing aurignacoid (and not typically Aurignacian) features would support an Early Aurignacian occupation (as suggested by Banks et al.), surely not a Proto-Aurignacian one that might be expected based on the radiocarbon data (see below). The recent attribution of layer C, sealing the Uluzzian series E III–D I, to the Campanian Ignimbrite (Roberto Sulpizio, Personal communication) strongly confirms this chronology, hence contrasting the idea of an Early Aurignacian occupation being beneath it.

Aurignacian-like pieces in layer D ought not to be considered surprising because, as it was already stressed by Palma di Cesnola (1993), they seem to be characteristic of final Uluzzian complexes elsewhere too (e.g., Grotta di Castelcivita excavated by Gambassini between 1975 and 1988; Gambassini, 1997). Such a phenomenon seems to be attested in a number of Châtelperronian complexes as well (see Riel-Salvatore et al., 2013, but also bladelet production from carinated end-scrapers and burins at Quinçay, where no Aurignacian occupation is recorded; Rousset, 2011).

With regards to the recovery of the two deciduous teeth (Cavallo B and C) by Palma di Cesnola in 1964, these were found in the basal part of the Uluzzian series. Cavallo-B "a été recoltée dans le premier foyer uluzzien" (Palma di Cesnola and Messeri, 1967: 251), which refers to the most ancient Uluzzian occupation (layer EIII), 80 cm below the so-called 'Aurignacian' layer of Gioia (1990) and Banks et al. (2013a). Cavallo-C was recovered in layer EII–I, 15–20 cm above. These layers were stratigraphically intact (see Benazzi et al., 2011b: Fig. S1), contained clearly undisturbed hearths and did not yield any lithic material unrelated to the Uluzzian (e.g., Aurignacian or Epigravettian).

Palma di Cesnola would regularly point out any stratigraphic problem affecting the excavated deposit in his publications (Palma di Cesnola, 1963, 1964). In fact, in 1972 he carefully described a large pit starting from the upper late Epigravettian (Romanellian) and reaching the Mousterian deposit. More recent excavations at Grotta del Cavallo (Gambassini, Martini and Sarti) have highlighted that this pit was due to an erosive event (Sarti and Martini, 2008), which completely removed part of the cave deposit down to the Mousterian layer F. As we can deduce from Palma di Cesnola's publication (and from personal communication with P. Gambassini and Sarti's and Martini's description) the pit was easily recognizable. Besides, Palma di Cesnola specifically writes in his field notebooks that he excavated, first of all, the pit content separately, carefully cleaning up the in situ deposit from every trace of reworked sediment, and then he began to excavate the in situ Uluzzian layers. It remains baffling to us how Banks et al. (2013a) discount the basal Uluzzian layers (EIII–EI) as mixed, despite the fact that Gioia's claims (citing Palma di Cesnola, 1963) only referred to the



**Figure 1.** Grotta del Cavallo layer D. Differences between drawings published by [Mussi et al. \(2006\)](#) (ns. 1, 5, 9) on the one hand and drawings published by [Palma di Cesnola \(1966\)](#) (ns. 2, 6, 10) and the original artefacts (ns. 4, 8, 11) on the other hand. A) The original piece, an end-scraper, does not show a real Aurignacian 'nose' nor a retouch at its proximal end as it does in [Mussi et al. \(2006\)](#). In this piece, part of the 'nose' consists of a pre-existing surface, whilst the proximal end displays a large fracture only marginally transformed by sporadic removals (as shown in n. 3: grey = retouch, white = distal pre-existing surface and proximal fracture). B) The original artefact is not an end-scraper because it does not bear any end-scraper-like retouch, as more than half of its distal end is formed by a pre-existing fracture (as shown in n. 7: grey = retouch, white = pre-existing fractures). C) This end-scraper is considerably less thick than the specimen depicted in [Mussi et al.'s](#) figure (as shown by the longitudinal section in n. 10 and by the transversal section in n. 11).

uppermost layer of the sequence (D I), and even there, to some areas of the cave only.

In addition to taxonomy and stratigraphy, [Banks et al. \(2013a\)](#) cast doubt on the radiocarbon results from Cavallo obtained by [Douka \(2011\)](#) and published by [Benazzi et al. \(2011b\)](#). They claim "six out of the seven radiocarbon dates obtained on shell ornaments from the upper part of the Uluzzian sequence (layer D) fall in a time range between the Epigravettian and the Proto-Aurignacian" ([Banks et al., 2013a: 41](#)). In total, ten radiocarbon dates were produced on shell material (seven shell beads and one undiagnostic shell fragment) for the Uluzzian layers EII to D

([Douka, 2011; Benazzi et al., 2011b](#)). Of the seven shell ornaments only one (measured twice as part of internal routine lab check) gave an age much younger than expected, at ~19 ka BP (thousands of years ago before present) and this is obviously not related to the Uluzzian phase at the site, which clearly ends with the deposition of the tephra layer (or before that). The site appears unoccupied until the late Upper Palaeolithic period. The remaining six shell beads were dated between 35 and 40 ka BP (39–44 ka cal BP) and follow a clear trend from younger to older, from the top to the bottom of the Uluzzian sequence. Layer DII–I was dated at around 35–36 ka BP (39–42 ka cal BP), E–D at 38–

39 ka BP (42–43 ka cal BP) and EII–I at ~40 ka BP (43–44 ka cal BP). It is important to note that the uppermost date from layer D (OxA-19254: 35,080 ± 230 BP, 38.9–40.4 ka cal BP, 2σ) agrees exactly with the calendar age for the CI tephra (~39.3 ka, De Vivo et al., 2001) sealing the Uluzzian series. The integrity of the chrono-stratigraphic sequence of Cavallo therefore is far from being ‘tentative at best’ as claimed by Banks et al. (2013a); quite the contrary. Strangely, Banks et al. (2013a) chose to mention in their article only the dates from the uppermost layer D, which is unrelated to the teeth, ignoring the determinations from the lower and more relevant layers (E–D and EII–I; the latter is where Cavallo-C was found). What is more intriguing, is that they place these determinations to the ‘Epigravettian and the Proto-Aurignacian’ but they fail to inform us what is, or better, should be the right time span for the Uluzzian.

In their reply to Higham et al. (2013), Banks et al. (2013b) go on to discard radiocarbon determinations of shell on the argument that fossil shell may have been collected by the Uluzzians, hence the actual ages could not be taken at face value. The chronology of Cavallo is an obvious counterargument: the ages of the shell beads follow closely their stratigraphic position and this is, to us, clear indication that shells used as beads must have been collected alive or shortly after death (the latter most probable). In this respect, the case of the bivalve fragment that gave an older age is all the more important: this particular shell showed evidence of beachwear and surface alteration and the reason it was selected for dating in the first place was the lack of other suitable material from this part of the Uluzzian sequence. Work from other sites, e.g., Mochi where shell and charcoal determinations agree with each other very closely (Douka et al., 2012), also contrasts the claims by Banks et al. (2013b).

On a more general note about the Palaeolithic of Italy, the model proposed by Banks et al. (2013a, 2013b) regarding the distinction between the Proto-Aurignacian and the Early Aurignacian technological production systems does not fit the Italian evidence. According to these authors, Proto-Aurignacian blades and bladelets were always produced only from “unidirectional prismatic cores within a single continuous reduction sequence” (Banks et al., 2013a: 41). Similarly, a very distinctive character of the Early Aurignacian would have been the capacity of producing blades and bladelets separately using different reduction strategies: prismatic cores for blades and core-flakes, such as carinated ‘end scrapers’ and ‘burins’, for bladelets. This scheme cannot be applied to the Italian Proto-Aurignacian where blade-bladelet production is often characterised by distinct operative chains, including the on-flake one (generally carinated end-scrapers and burins) exclusively devoted to bladelets (e.g., Riparo Mochi G, Riparo di Fumane, Grotta La Fabbrica, Grotta di Castecivita – Douka et al., 2012; De Stefani et al., 2012).

Our final comment concerns the peculiar choices on bibliographic references by Banks et al. (2013a): for the Italian sites of Castelcivita and Serino the authors cite a general publication by Mussi (2001), instead of the original works by Gambassini (1997) and Accorsi et al. (1979), respectively, where details on each site are discussed in length.

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