Quaternary International xxx (2016) 1–8

Contents lists available at ScienceDirect

Quaternary International

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

Humans of the Middle Pleistocene: The controversial calvarium from Ceprano (Italy) and its significance for the origin and variability of *Homo heidelbergensis*

Giorgio Manzi

Sapienza Università di Roma, Dipartimento di Biologia Ambientale, Piazzale Aldo Moro 5, 00185 Roma, Italy

ARTICLE INFO

Article history:
Available online xxx

Keywords:
Human evolution
Middle Pleistocene
Homo heidelbergensis
Subspecies
Ceprano

ABSTRACT

The Ceprano calvarium was found 20 years ago (March 1994) in southern Latium, Italy. At that time, a compiled regional stratigraphy suggested an age for the layer were the cranium was found close to 800–900 ka. Thus, for more than a decade, the Italian specimen concurred to the denial of the so-called "short-chronology" for the earliest Europeans. In addition, the archaic features of the calvarium were put in relationship with Mode 1 techno-complexes discovered in sites scattered across the Ceprano basin, albeit Acheulean assemblages are also well known in the same area. In 2001 we approached the field with a multidisciplinary project, aimed to validate the previous geo-chronological model and improve the available paleontological and archaeological records. However, the results we obtained consistently showed that the human calvarium is more recent than previously believed, pointing to a time range close to the beginning of MIS 11, between 430 and 385 ka. Therefore, Ceprano has to be considered among the European fossil record of the Middle Pleistocene, although its peculiar morphology – a unique combination of archaic and derived features –suggests a somewhat puzzling scenario of human evolution in Europe, which could involve the occurrence of a considerable phenetic diversity during part of the Middle Pleistocene. This argument points to the time window between 1.0 and 0.5 Ma, when it is probable that a new kind of humanity emerged and diffused across Africa and Eurasia. Although controversial when viewed as a single species, this humanity may be referred to the polymorphic and widespread taxon *Homo heidelbergensis*. Nevertheless, in the course of the Middle Pleistocene, different lineages of archaic humans possibly belonging to *Homo heidelbergensis* are recognised, suggesting the identification of geographic varieties or subspecies (i.e., potential incipient species). Given such a scenario, Ceprano represents the best candidate available at present (but also the cranial remains from Gombore II, in the Melka Kunture area, Ethiopia, ca. 850 ka, should be taken into account) to describe the cranial morphology of the still largely unknown ancestral variety of the species: i.e., *Homo heidelbergensis heidelbergensis*.

1. A cranium for the earliest Europeans

1.1. Discovery and first studies

The so-called "short chronology" hypothesis was introduced at the beginning of the 1990s, suggesting that there had been no humans in Europe before 500 ka (e.g., Roebroeks and van Kolfschoten, 1994). This conclusion was considered consistent with the chronology of both the oldest human fossil record found in Europe since that time (*e.g.*, Roberts et al., 1994), and the earliest documentation of Acheulean assemblages discovered in various part of the continent (*e.g.*, Piperno et al., 1998). In 1994, however, hominin fossil findings that were claimed to be older than 700–800 ka, from both Italy (near Ceprano, in March; Ascenzi et al., 1996) and Spain (at the Gran Dolina of Atapuerca, in July; Carbonell et al., 1995; Bermúdez de Castro et al., 1997), falsified this hypothesis. As a consequence, for more than a decade the Ceprano calvarium was considered part of the fossil evidence dealing with the human presence in Europe before 500 ka, documenting the adult cranial morphology of the earliest Europeans.

It had been discovered in several fragments in a field known as Campogrande, along the furrow of a new road connecting the small towns of Ceprano and Pofi, in Southern Lazio, less than 100 km

E-mail address: giorgio.manzi@uniroma1.it.

http://dx.doi.org/10.1016/j.quaint.2015.12.047
1040-6182/

southeast of Rome. This discovery might appear occasional, whereas it represents the result of systematic field activities conducted for decades in Southern Lazio by the Italian Institute of Human Palaeontology, and particularly by I. Biddittu. On March 13th 1994, during a survey along the sections created by the excavators working for the new road, Biddittu found dozens of fragments pertaining to a single calvarium. In the following weeks, all the fragments lying in situ were extracted and carefully sieved from the clayey sediments by a team of the Italian Institute of Human Palaeontology. Although a large part of the cranium was preserved, neither pieces belonging to the facial bones nor teeth were found.

The reconstruction of the calvarium from more than 50 pieces required the combined efforts of various experts and, overall, about five years. After a first attempt described by Ascenzi et al. (1996), a more confident one was obtained by R.J. Clarke, M.A. de Lumley and other workers (Fig. 1); this new reconstruction was then evaluated and published at the turn of the century (Ascenzi et al., 2000; Clarke, 2000; Manzi et al., 2001). As for the chronology, the geologist A.G. Segre suggested a synthetic stratigraphic column based on geo-palaeontological data that were available to him at a micro-regional scale (Fig. 2a). This stratigraphy describes two main complexes. The gray clay layer where the human calvarium was found belongs to the lower portion of the upper stratigraphic complex and just below a reddish paleosol, indicating to Segre a tentative age of about 800–900 ka (Ascenzi et al., 1996, 2000). Thus the archaic features of the calvarium were associated to various Mode 1 techno-complexes from sites scattered in the Ceprano basin (Segre and Biddittu, 2009). Nevertheless, a number of Acheulean assemblages are also known in the area of Campogrande and surroundings (Fig. 2b).

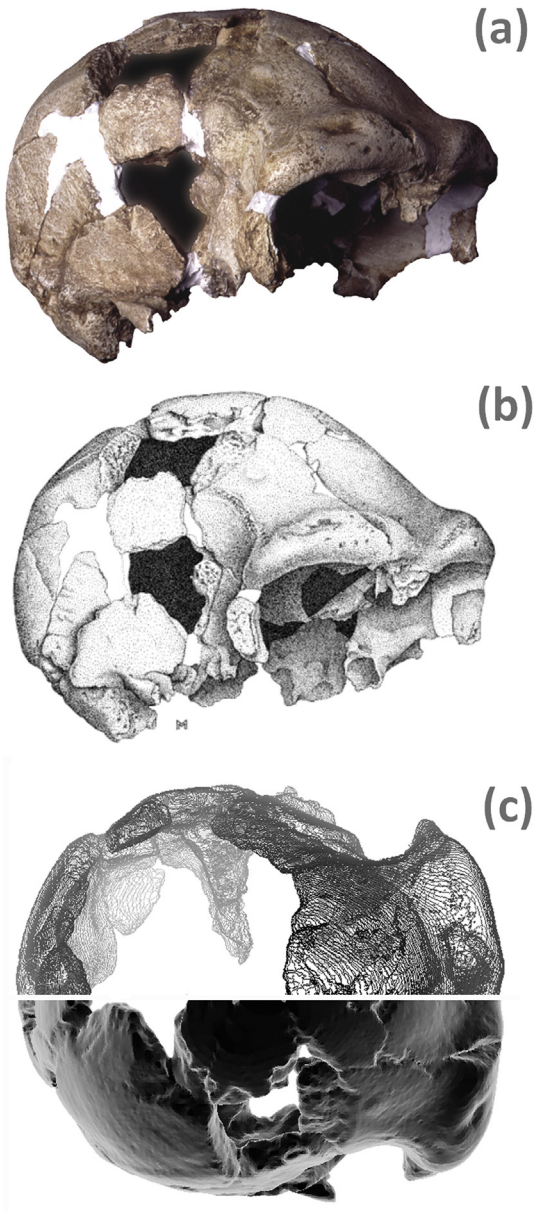

Fig. 1. The Ceprano calvarium: **a)** photo (courtesy of the Soprintendenza Archeologica del Lazio); **b)** drawing (by Maurizio Mei); **c)** ct-scan rendering in vertical view (Bruner and Manzi, 2005).

1.2. A new chronology

In 2001, a project of surveys and excavations was started under the direction of I. Biddittu and myself, with a threefold aim: 1) reach a better comprehension of the Pleistocene stratigraphy of the Ceprano basin; 2) improve the palaeontological and archaeological records; 3) validate the geo-chronological model suggested by A.G. Segre (as reported in Ascenzi et al., 1996, 2000).

Results obtained through a multidisciplinary approach – including geo-stratigraphic and palynological data, combined with sedimentology, geochemistry, soil-micromorphology, taphonomy, and the archaeological evidence – showed that the Ceprano calvarium is actually more recent than was previously believed, pointing to a time range close to 400 ka and, more precisely, to the interval at the beginning of MIS 11, bracketed between 430 and 385 ka (Manzi et al., 2010). This chronology is consistent with the normal geomagnetic polarity recorded in the area of discovery down to a depth of about 50 m, which had suggested a tentative age of about 450 ka for the layer where the cranium was found (Muttoni et al., 2009). In addition, a minimum age for the gray clay layer including the cranium was furnished by the $^{40}Ar/^{39}Ar$ age of 353 ± 4 ka obtained from K-feldspars taken at, "0.3 m above the hominin level, and 1.0–1.2 m from core top" (Nomade et al., 2011). Thus, this k-feldspar sample comes from a layer that is not really the same of the human specimen and probably belongs to the sandy volcaniclastic gravels (Ascenzi et al., 1996) lying just above the reddish paleosol above the clay of the cranium, a few decimetres above its stratigraphic position.

The unexpected new chronology of this puzzling specimen in the mid of the Middle Pleistocene, led us to conclude that, "the morphology of the human calvarium from Ceprano – which lacks Neanderthal traits and does not have a real counterpart among the continental penecontemporaneous fossil record – [points out to] more complex scenarios of human evolution in Europe than previously believed, involving either the occurrence of a considerable intraspecific diversity (with distinct archaeological settlements) or, alternatively, the co-existence of different lineages (with their own respective archaeological traditions) during part of the Middle Pleistocene" (Manzi et al., 2010: p. 584).

1.3. Back to cranial morphology

This new chronology asked also for a taxonomic re-evaluation of the Italian specimen. Originally, Ceprano was considered to be a European representative of "late" *Homo erectus* (Ascenzi et al., 1996) or it was ascribed to *Homo erectus* sensu lato (e.g., Clarke, 2000). By contrast, two papers (Ascenzi et al., 2000; Manzi et al., 2001) had reconsidered such claimed *Homo erectus* affinities, arguing that less than two-thirds of the character states are consistent (and not always unequivocally) with those that are

Please cite this article in press as: Manzi, G., Humans of the Middle Pleistocene: The controversial calvarium from Ceprano (Italy) and its significance for the origin and variability of *Homo heidelbergensis*, Quaternary International (2016), http://dx.doi.org/10.1016/j.quaint.2015.12.047