



A new age within MIS 7 for the *Homo neanderthalensis* of Saccopastore in the glacio-eustatically forced sedimentary successions of the Aniene River Valley, Rome



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ABSTRACT

Field observations as well as borehole, sedimentological and geochronologic data allow us to reconstruct the geologic setting of the Aniene River Valley in northern Rome, framing it within the recently recognized picture of temporally constrained, glacio-eustatically forced aggradational successions of this region. The sedimentary successions cropping out in this area include those described in the literature of the early 20th century in Saccopastore, where two skulls of *Homo neanderthalensis* were recovered. Based on the geometry, elevation and sedimentologic features of the investigated sedimentary deposits, the stratigraphic record of Saccopastore is correlated with the aggradational succession deposited in response to sea-level rise during glacial termination III at the onset of MIS 7 (i.e. ~250 ka), corresponding to the local Vitinia Formation, as opposed to previous correlation with the MIS 5 interglacial and a locally defined "Tyrrhenian" stage (~130 ka). This previous attribution was based on the interpretation of the sedimentary succession of Saccopastore, occurring between 15 and 21 m a.s.l., as a fluvial terrace formed around 130 ka during the Riss-Würm interglacial, ca. 6 m above the present-day alluvial plain of the Aniene River. In contrast to this interpretation, a ⁴⁰Ar/³⁹Ar age of 129 ± 2 ka determined for this study on a pyroclastic-flow deposit intercalated in a fluvial-lacustrine sequence forming a terrace ~37 m a.s.l. near the coast of Rome constrains the aggradational succession in this area to MIS 5, precluding the occurrence of an equivalent fluvial terrace at lower elevation in the inland sector of Saccopastore. We therefore interpret the stratigraphic record of Saccopastore as the basal portion of the aggradational succession deposited in response to sea-level rise during MIS 7, whose equivalent fluvial terrace occurs around 55 m a.s.l. in this region. We also review the published paleontological and paleoethnological records recovered in Saccopastore and demonstrate their compatibility with the faunal assemblages and lithic industries occurring in the sedimentary deposits of the Vitinia Formation, while we show the lack of any unequivocal Late Pleistocene (MIS 5) affinity. We therefore propose that the chronostratigraphic position of the Saccopastore deposits containing the two skulls should be around 250,000 years, as opposed to a previously preferred age of 130,000 years. The revised age makes these skulls the oldest Italian occurrences of *H. neanderthalensis* and provides evidence for a substantially coeval appearance and evolutionary path with respect to central-northern Europe.

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1. Introduction

Two human skulls attributed to *Homo neanderthalensis* were recovered, successively, in the years 1929 and 1935, within gravel beds exposed by quarrying along the Aniene River Valley north of

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Rome, at a site called Saccopastore (Sergi, 1929; Breuil and Blanc, 1935a) (Fig. 1a). The deposits hosting the human remains were attributed to the “Tyrrhenian” stage (~130 ka) (Blanc, 1939a; Segre, 1948a, 1948b) based on the geomorphologic classification of the outcrop in which they occurred, forming a small hill with top about five meters above the adjacent alluvial plain of the Aniene River (Fig. 1b). This attribution was based on identification in this sector of the Aniene River Valley of two (Blanc GA, 1935; Breuil and Blanc, 1935b, 1936) and then three terrace complexes, correlated with the Günz-Mindel, the Mindel-Riss, and the Riss-Würm interglacials (~600–130 ka) (Blanc, 1946, 1948; Segre, 1948a, 1948b), following the geomorphologic and geochronologic criteria of the times in which the discovery was made, which relied on the studies of the Alpine glaciations (Penk and Brückner, 1909). The Saccopastore deposits were identified as part of the lowest terrace above the present-day alluvial plain of the Aniene River, therefore correlated to the Last Interglacial (Riss-Würm). Indeed, the marine deposits correlated with this interglacial gave rise to the new definition of Tyrrhenian Stage (Issel, 1914), and the name was then informally extended to the continental Saccopastore deposits to indicate the coeval age of the fluvial terrace.

A number of studies on the human remains at Saccopastore have been published (Bruner and Manzi, 2006, and references therein) in which the attribution of the deposits to the last interglacial was assumed as established. None of them questioned the actual age of the skulls, representing the earliest documented evidence of *H. neanderthalensis* in Italy, until recent work proposed an

age as old as 170,000 yr for the Neanderthal skull of Altamura (Lari et al., 2015). Several authors have tentatively correlated the fluvial-lacustrine succession of Saccopastore with two consecutive temperate and humid-temperate climatic oscillations within Marine Isotopic Stage 5, either 5.5–5.3 or 5.3–5.1 (e.g., Caloi and Palombo, 1986, 1994a, 1994b; Caloi et al., 1989; Manzi et al., 2001; Palombo, 2004), dating between 123,000 and 82,000 yr BP, although there is no geochronologic evidence supporting this correlation, which is based on paleoclimatic considerations.

Numerous studies conducted in the last 20 years have framed the geology around Rome within a detailed, geochronologically constrained picture in which a strict link between glacio-eustasy and sedimentation has been evidenced, and a series of “aggradational successions” correlating with the different Marine Isotope Stages (MIS) in the last 900 kyr has been recognized (Alvarez et al., 1996; Karner and Renne, 1998; Karner and Marra, 1998; Marra et al., 1998; Karner et al., 2001a; Florindo et al., 2007; Marra et al., 2008; Marra and Florindo, 2014). Moreover, six glacio-eustatic cycles are now recognized from 600 ka to preceding the Würmian-Holocene (i.e.: MIS 16–15, 14–13, 12–11, 10–9, 8–7, 6–5; Huybers and Wunsch, 2004, and references therein), instead of the three known at the time of the discovery in Saccopastore. Nevertheless, the traditional attribution to the last interglacial Riss-Würm, although variously renamed (e.g., Late Pleistocene *pro parte*, Saccopastore Formation SKP, Melpignano Faunal Unit), was never questioned (e.g., Palombo et al., 2004; Funicello et al., 2008; Kotsakis and Barisone, 2008; Petronio et al., 2011; Fabbri et al.,

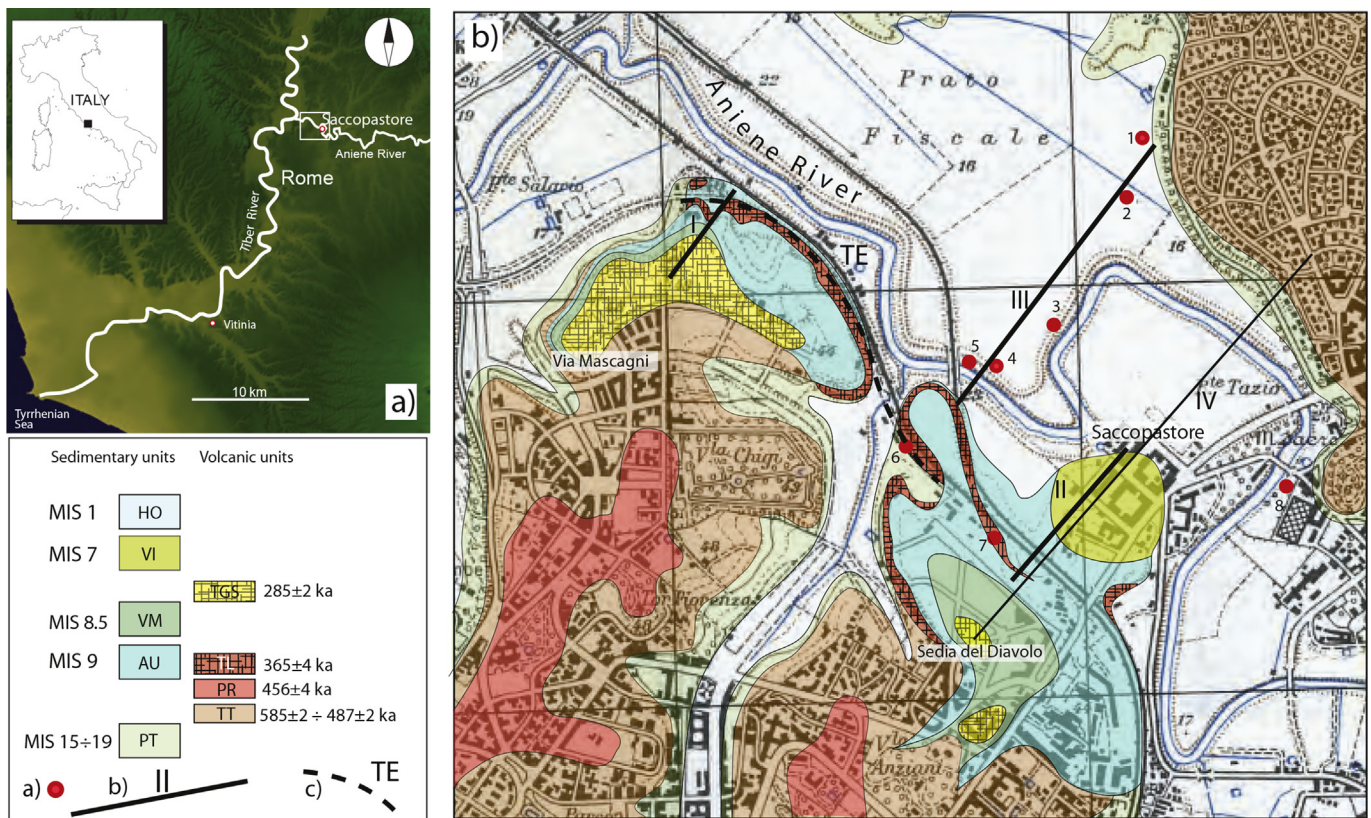


Fig. 1. Geologic map of the Aniene River valley north of Rome, drawn by integrating literature data (Verri, 1915; Servizio Geologico d'Italia, 1967; Marra and Rosa, 1995) with new field data collected during construction of the Tangenziale Est road, and borehole data. Sedimentary deposits are correlated to marine isotopic stages (MIS) following criteria and nomenclature established in Karner and Marra, 1998. HO: Recent alluvial deposits (Upper Pleistocene–Holocene); VI: Vitinia Formation (Conato et al., 1980); VM: Via Mascagni succession (Marra et al., 2014a); AU: Aurelia Formation (Conato et al., 1980); PT: Paleo-Tiber units 2, 3, 4 (Marra and Florindo, 2014); TGS: Tufo Giallo di Sacrofano (Karner et al., 2001b; Sottili et al., 2010); TL: Tufo Lionato (Marra et al., 2009); PR: Pozzolane Rosse (Marra et al., 2009); TT: pyroclastic products of the Early Tuscolano artemisio phase (Marra et al., 2009) and Monti Sabatini volcanic district (Marra et al., 2014b). a) borehole location; b) I–II–III trace of composite cross-section shown in Fig. 2b, IV trace of cross-section by Segre (1948) shown in Fig. 2d; c) Tangenziale Est road cut.

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