



THE PLANT RECORD OF THE DUNAROBBA AND PIETRAFITTA SITES IN THE PLIO-PLEISTOCENE PALAEOENVIRONMENTAL CONTEXT OF CENTRAL ITALY

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ABSTRACT: Dunarobba and Pietrafitta are two outstanding fossil sites, which provide us with a glimpse on central Italian palaeoenvironments during two different time spans. The still poorly dated Dunarobba succession is framed, mainly on the basis of continental mollusc biochronology, within the Piacenzian-Gelasian interval, whereas the Pietrafitta one is reliably dated to the Calabrian thanks to vertebrate biochronology. Here we add several new palaeobotanical data for the two sites and we provide for the first time an overview of the stratigraphic, sedimentological, palaeontological and palaeoenvironmental results so-far obtained. We also review the palaeobotanical evidence concerning the neighbouring sites of Cava Toppetti I/II, Fosso Bianco, Torre Picchio and Villa San Faustino. On the basis of the available datasets we conclude that the Dunarobba Fossil Forest, with several large conifer trunks in upright position, was produced by an ancient swamp vegetation dominated by *Glyptostrobus europaeus*, and including few other woody (*Alnus*, *Cephalanthus*, *Cornus*) and herbaceous (*Carex*, *Cladium*, *Schoenoplectus*) plants. Rich water-transported fruit and seed assemblages and pollen data indicate that the well-drained palaeoenvironments around the Dunarobba palaeo-swamp were covered by a forest having a floristic affinity to the modern Mixed Mesophytic Forests of East Asia, as proved by the occurrence of *Cryptomeria*, *Eurya*, *Sinomenium*, etc. The disappearance of the *Glyptostrobus* swamp forest was due to the establishment of well-drained palaeoenvironmental conditions, testified by a palaeosol profile.

The Pietrafitta site is characterized by a thick lignite seam, which embedded several carcasses of *Mammuthus meridionalis*, cervids, monkeys, rhinoceroses, etc. Sedimentological and palaeontological data indicate a lacustrine environment, as confirmed by newly studied fruit and seed assemblages dominated by such aquatic plants as: *Azolla*, *Najas*, *Nymphaea*, *Potamogeton*, etc. The pollen assemblage, studied in the 1960s-1970s, is still rich in exotic elements, and allows us to reconstruct a humid deciduous broadleaved forest, with a relevant subdivision of a bottom unit rich in *Taxodium* type pollen, and a top unit, lacking this pollen type and including all the lignite seam.

KEYWORDS: palaeobotany, palynology, sedimentology, local palaeovegetation, biochronology, Pliocene, Pleistocene, central Italy.

1. INTRODUCTION

The Pliocene-Early Pleistocene terrestrial palaeoflora of central Italy is documented by both palynomorphs (e.g. Lona & Bertoldi, 1972; Follieri, 1977; Bertini, 2003, 2010, 2013; Sadori et al., 2010; Magri & Palombo, 2013) and macroremains (e.g. Fischer & Butzmann, 2000; Martinetto, 2001; Teodoridis & Gregor, 2001; Girotti et al., 2003) from several fluvial and/or lacustrine sedimentary basins bordered by the Northern Apennine ridges (Fig. 1). The present paper is aimed at providing an updated overview of the palaeofloral data available for plant-bearing sites in the Tiberino Basin (Fig. 1), with special focus on the Dunarobba and Pietrafitta sites. Actually, the deposits of this last site are generally assigned to a minor basin, the Tavernelle-Pietrafitta Basin, that is considered as partly independent from the Tiberino Basin (see below).

The occasion of this paper was suitable for the compilation and critical revision of the most relevant palaeontological, stratigraphic and sedimentological data produced in the last thirty years.

2. GEOLOGICAL SETTING

During the Pliocene and the Pleistocene, central Italy was characterized by NW-SE trending extensional basins, roughly parallel to the uplift of the Apennine chain, which hosted marine and/or continental environments (Fig. 1) (e.g. Barchi et al., 1991; Martini & Sagri, 1993). The area surrounding the town of Perugia mainly coincided with two large structures: the Tiberino Basin to the East, and the South Valdichiana Basin, to the West, respectively associated with two major depositional settings, continental to the East and mainly marine to the West. The array of environments alternating