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Original article

The most ancient lagomorphs of Sardinia: An overview^{☆,☆☆}



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ABSTRACT

The Capo Mannu D1 local fauna (Early/Late Pliocene boundary) is one of the very rare pre-Pleistocene fossil assemblages of Sardinia; it allows to describe here the most ancient lagomorphs of the island known to date: *Prolagus* aff. *figaro* and Leporidae gen. et sp. indet. *P.* aff. *figaro* shows very slight morphological modifications due to endemism. This evidence strongly suggests that its arrival in Sardinia occurred just before the accumulation of the Capo Mannu D1 sediments, together with other elements of the faunal assemblage (the insectivores and one of the murids). The “pilgrim fathers” probably came from mainland Italy and reached Sardinia at the Early/Late Pliocene transition, taking advantage of an emergent land connection. A cladistic analysis indicates that: (i) the continental ancestor of *P.* aff. *figaro* is *P. sorbinii*, a species of eastern European origin who migrated westwards during the Early Messinian; (ii) *P.* aff. *figaro* is the ancestor of endemic Sardinian species *P. figaro* and *P. sardus*; (iii) *P.* aff. *figaro* and *P. figaro* are not related to *P. depereti* as previously supposed; (iv) an eastern European stock, though to be not strictly related to *P. sorbinii*, is the source of the Gargano insular endemic species *P. apricenicus* and *P. imperialis*; (v) the isolation of central-eastern European populations of *Prolagus* from western ones occurred at least since MN10/11; and (vi) an apparently “autochthonous” branch of western European *Prolagus* was present in Europe during MN13–15. The only, badly preserved remain of a Leporidae gen. et sp. indet. does not allow any inference about its continental ancestor nor about the epoch of its arrival in Sardinia. Neither it is possible to speculate about its relationships with the Monte Tuttavista leporid (Early Pleistocene). Nevertheless, it represents an important finding because it dates back of ~1 myr the presence of leporids in Sardinia.

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1. Introduction

Sardinian Neogene vertebrate assemblages are rare, usually bear scanty remains, and their age attribution is often debatable. Capo Mannu D1 (also known as “Mandriola”; Abbazzi et al., 2008) is one of the key sites for the reconstruction of Sardinian Neogene continental palaeofauna, phylogeny, and palaeobiogeography. Actually, it records the arrival in Sardinia of a new set of vertebrates (Angelone and Kotsakis, 2001; Furió and Angelone, 2010). After a 30-year debate, the data obtained with different criteria (biochronology, biostratigraphy, sedimentology, regional correlations) agree to assign an Early/Late Pliocene boundary age to the Capo Mannu

D1 local fauna (Abbazzi et al., 2008). Thus, Capo Mannu D1 local fauna is the oldest of the “Mandriola” faunal subcomplex (?Early/Late Pliocene) of the “Nesogoral” complex (see the latest biochronological scheme of Sardinian Plio-Pleistocene in Palombo, 2009).

Just after its discovery, the Capo Mannu D1 assemblage was the subject of a preliminary note with the description of a new murid species (*Apodemus mannu* Thaler, 1974; Pecorini et al., 1974). Then some taxa were analysed in detail: glirids (Zammit Maempel and Bruijn, 1982), non-marine molluscs (Esu, 1984), another murid (Angelone and Kotsakis, 2001), and insectivores (Furió and Angelone, 2010). As for lagomorphs, several papers (see synonymy below) reported the presence in Capo Mannu D1 of the ochotonid *Prolagus* Pomel, 1853 with different specific attributions. Nevertheless, the presence of a leporid was never noticed so far.

Aim of this paper, in the framework of the recent studies about Italian and Sardinian lagomorphs (Angelone, 2005a, 2007, 2008; Angelone et al., 2008; Angelone and Rook, 2011, 2012), is to perform a systematic revision of the lagomorphs from Capo Mannu

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D1, the most ancient of Sardinia, in order to clarify their phylogenetic affinities and to add new details to the reconstruction of mammalian colonization of Sardinia.

2. Geographical and geological setting

The Capo Mannu D1 fossiliferous site is located in the southern coast of the Capo Mannu promontory (northern Sinis Peninsula, central-western Sardinian coast, Italy; Fig. 1). The fossil material has been recovered in a silty-clayey lens that appears in the visible section ~10 m wide, with a maximum thickness of ~3 m. The lens lies in the lower portion of the sandy sediments of the Capo Mannu Fm. aeolian complex (Carboni and Lecca, 1995), at the base of the first dune unit (D1) of the Capo Mannu Fm. dunar complex (Abbazzi et al., 2008; Palombo and Rozzi, 2014). Palaeoenvironmental reconstructions interpreted the fossiliferous sediments as accumulated in a coastal lagoon (Esu, 1984) and more recently in a damp or pond deposit at the base of the lee side of a dune (Abbazzi et al., 2008).

3. Taphonomical remarks

The lagomorph fossil remains from Capo Mannu D1 are quite scanty and badly preserved, as they appear broken, cracked, sometimes polished on only one side, sometimes rounded. They show different colours (black, brown, different shades of yellow), different crack systems that sometimes can be observed even in the same specimen (fresh fractures, smoothed fractures, and craquelé networks), and different incrustations (from pyrolusite to calcite). Such different conservation states may indicate a heterogeneous origin of the fossil elements and/or that the timespan of the deposition of the Capo Mannu D1 fossil assemblage may have been relatively large when compared to taphonomically more homogeneous assemblages (one single process and depositional environment). However:

- no pattern has been recognized to divide the specimens in distinct taphonomical groups;
- the depositional facies of the fossiliferous sediments (accumulation in an ephemeral pond at the base of a dune) may explain the wide range of colours, fracture and abrasion types observed on the specimens;
- the type of depositional facies also excludes a long sedimentation timespan;
- all the specimens seem to be compatible from a taxonomical point of view, thus excluding the mixing with older fossils.

As a consequence, the Capo Mannu D1 fossil lagomorph assemblage has been analyzed in its entirety.

4. Material and methods

Abbreviations: AA: partial width; CFUS: Collezione Fondi, Università di Siena; D/d: upper/lower deciduous tooth; ICP: Institut Català de Paleontologia “Miquel Crusafont”; L: length; M/m: upper/lower molar; MFGI: Magyar Földtani és Geofizikai Intézet [Hungarian Institute of Geology and Geophysics]; N: number of specimens; NHMB: Naturhistorisches Museum Basel; NHMW: Naturhistorisches Museum Wien; P/p: upper/lower premolar; PH: hypoflexus depth; sd: standard deviation; SSN: Soprintendenza dei Beni Archeologici per le Provincie di Sassari e Nuoro (sezione di Nuoro); TH: distal hypercone length; UF: Dipartimento di Scienze della Terra, Università di Firenze; W: width.

4.1. Material

The lagomorphs from Capo Mannu D1 were collected during an excavation campaign of “La Sapienza” University of Rome in 1980 and are curated at the Vertebrate Palaeontology Laboratory of the Science Department, Roma Tre University. Specimens DSG/URT-053/53 to 83 pertain to a preliminary picking made just after

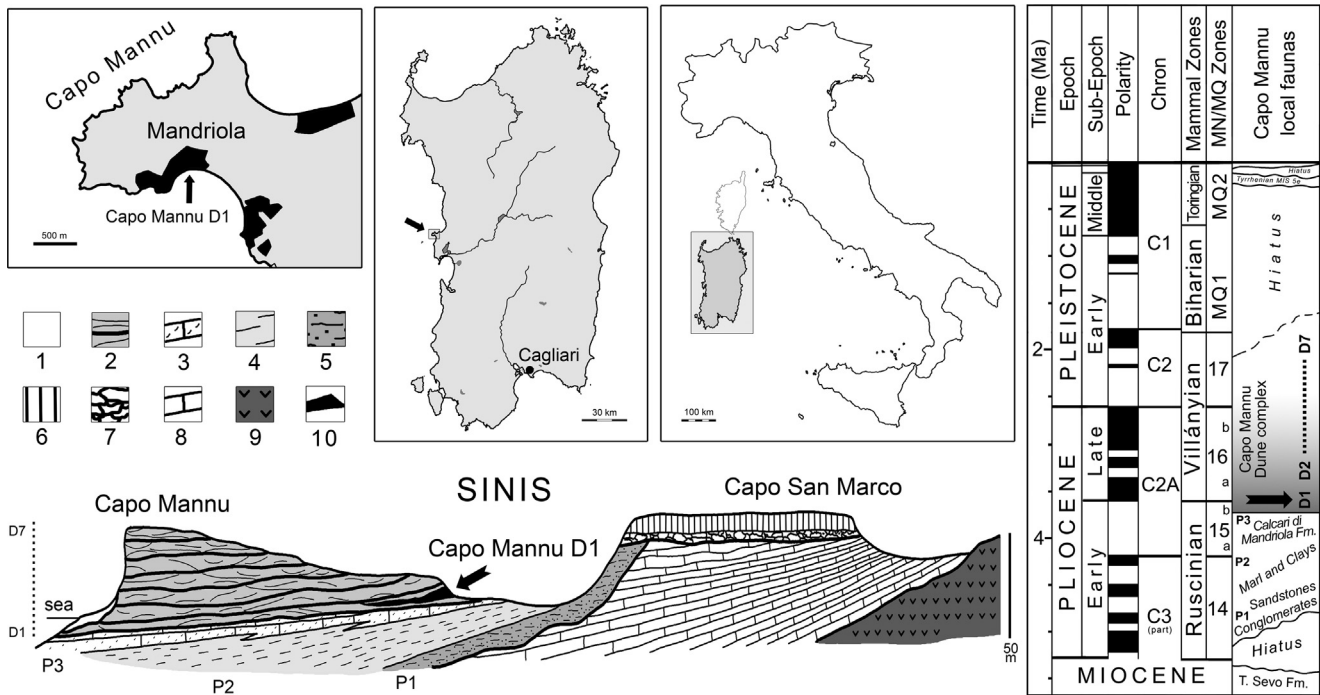


Fig. 1. The Capo Mannu D1 fossiliferous site. Geographical localization and stratigraphical position of the vertebrate deposit (cross-section and stratigraphy modified from Abbazzi et al., 2008 and Palombo and Rozzi, 2014). Legend of lithology/unit symbols: 1: MIS 5–2 coastal marine and continental deposits; 2: Capo Mannu dune complex; 3: P3 (Calcarei di Mandriola Fm.), shoreface grainstones; 4: P2, hemipelagic marl unit; 5: P1 (C. S. Marco unit), transgressive marine unit; 6: Pliocene basaltic lavas; 7: Pliocene pre-basalt continental sandstones and conglomerates; 8: Middle–Upper Miocene marine sequence; 9: Upper Oligocene massive andesites; 10: Capo Mannu D1 vertebrate bearing deposit.

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