





# SOME SPECIES OF THE SOUTHEASTERN ITALIAN MIOCENE GIANT GALERICINE *DEINOGALERIX* (MAMMALIA, EULIPOTYPHILA) REVISITED, WITH REVIEW OF THE GENUS

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## KEYWORDS:

Deinogalerix;  
Terre Rosse;  
late Miocene;  
Galericini;  
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## BULLET-POINTS ABSTRACT

- Revision of *Deinogalerix* remains from the Terre Rosse of Gargano stored at the University of Florence.
- The material was assigned mainly to *D. freudenthali*, *D. intermedius* and *D. minor*.
- The material improves our knowledge of the small and primitive species *D. freudenthali*.
- The study confirms the validity of the lineages *D. minor*-*D. breviostris* and *D. intermedius*-*D. koenigswaldi*.

## INTRODUCTION

A careful revision of fossil remains from the Terre Rosse of Gargano (Fig. 1A) stored at the Department of Earth Sciences of Florence improved our knowledge of the genus *Deinogalerix* Freudenthal, 1972. The aim of this study is clearing the taxonomic status of the specimens and, at the same time, dealing with several issues connected with the evolutionary relationships between the different species.

Freudenthal (1972) described the extremely derived *Deinogalerix koenigswaldi* Freudenthal, 1972 and Butler (1980) introduced four more species of *Deinogalerix*, namely: *Deinogalerix breviostris* Butler, 1980; *Deinogalerix intermedius* Butler, 1980; *Deinogalerix minor* Butler, 1980; and *Deinogalerix freudenthali* Butler, 1980. Butler (1980) indicated *D. freudenthali*, the smallest species of the genus, as a hypothetical common ancestor of all the other species. He also specified that two lineages emerged from *D. freudenthali*, one passing through the transitional *D. intermedius* and ending to the largest-sized and most-advanced *D. koenigswaldi*; the other passing through *D. minor* and ending up with *D. breviostris* (which is smaller than *D. koenigswaldi* and coeval with it). Decades later, numerous new finds of *Deinogalerix* led to the description of another primitive species, *Deinogalerix masinii* Villier et al., 2013, but also to a questioning of the taxonomic status of *D. minor* and *D. intermedius* (Villier et al., 2013; Villier & Carnevale, 2013).

## MATERIALS AND METHODS

The studied material comes from infillings (“Terre Rosse”) of karstic fissures sampled by the University

of Florence and labelled stratigraphically from the oldest to the youngest: F15, F21c, NBS, P81D, F1, F8 and F9.

## RESULTS

The morpho-dimensional analysis performed in this study permits to assign the material from the old fissure F15 to *D. freudenthali*. The newly described specimens considerably improve our knowledge of the species: *D. freudenthali* shares some primitive traits and small size with the better known *D. masinii* (Villier et al., 2013). Nonetheless, a handful of specimens from F15, whose size and morphologic traits somewhat recall *D. minor* from fissure F9, are more difficult to assign to species and suggest the occurrence of a hitherto undetected form; these have therefore been generically indicated as *Deinogalerix* sp. 1.

P81D produced the richest amount of remains of *Deinogalerix* of the collection of Florence. Alongside a majority of specimens with typical features of *D. intermedius*, P81D also provided evidence of a species with teeth roughly the size of those of *D. intermedius* but with primitive traits reminiscent of *D. freudenthali*. This further species was here called *Deinogalerix* sp. 2.

Fissure F1 and F9 record the occurrence of *D. intermedius*, accompanied by another smaller species; in F1 the latter is attested to only by a fragmental jawbone still preserving p1, approximately the size of the mandibles of *D. minor*. In F9 the smaller species is represented by a fragmental muzzle still preserving many of its teeth (Fig. 1B-E); it has teeth comparatively less advanced than *D. breviostris* and comes from a fissure biochronologically older than those in which *D. brevi-*

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*rostris* is normally retrieved, therefore it is attributed here to *D. minor*. Fissure F8 is virtually coeval with F9; it yielded a single, slender mandible with features compatible with *D. intermedius*.

Fissures NBS and F21c yielded a small number of specimens. Fissure F21c may likely be contaminated, as indicated in previous literature (Savorelli, 2013): the large-sized and morphologically advanced p4 retrieved in this deposit could actually belong to either *D. intermedius* or *D. koenigswaldi* and may have been reworked from a more recent fissure filling. In contrast, the single, large-sized and advanced p4 from NBS may be the earliest occurrence of *D. intermedius* in the collection of Florence.

## DISCUSSIONS AND CONCLUSIONS

The analysis performed here broadly confirms and corroborates the framework depicted by Butler (1980); at the same time it shows that the taxonomic revision proposed by Villier et al. (2013) and Villier & Carnevale (2013), which considered valid species only the primitive *D. freundenthalii* and the most derived *D. koenigswaldi*, is less convincing. Based on the new information, *D. freundenthalii* joins *D. masinii* as one of the most primitive members of the genus. Nonetheless, *D. freundenthalii* is the closest to the hypothetical ancestor of the other species described by Butler (1980). Moreover, in agreement with Butler (1980) and contrary to Villier et al. (2013), the writers find that, similarly to *D. minor* and *D. intermedius*, the divergence between *D.*

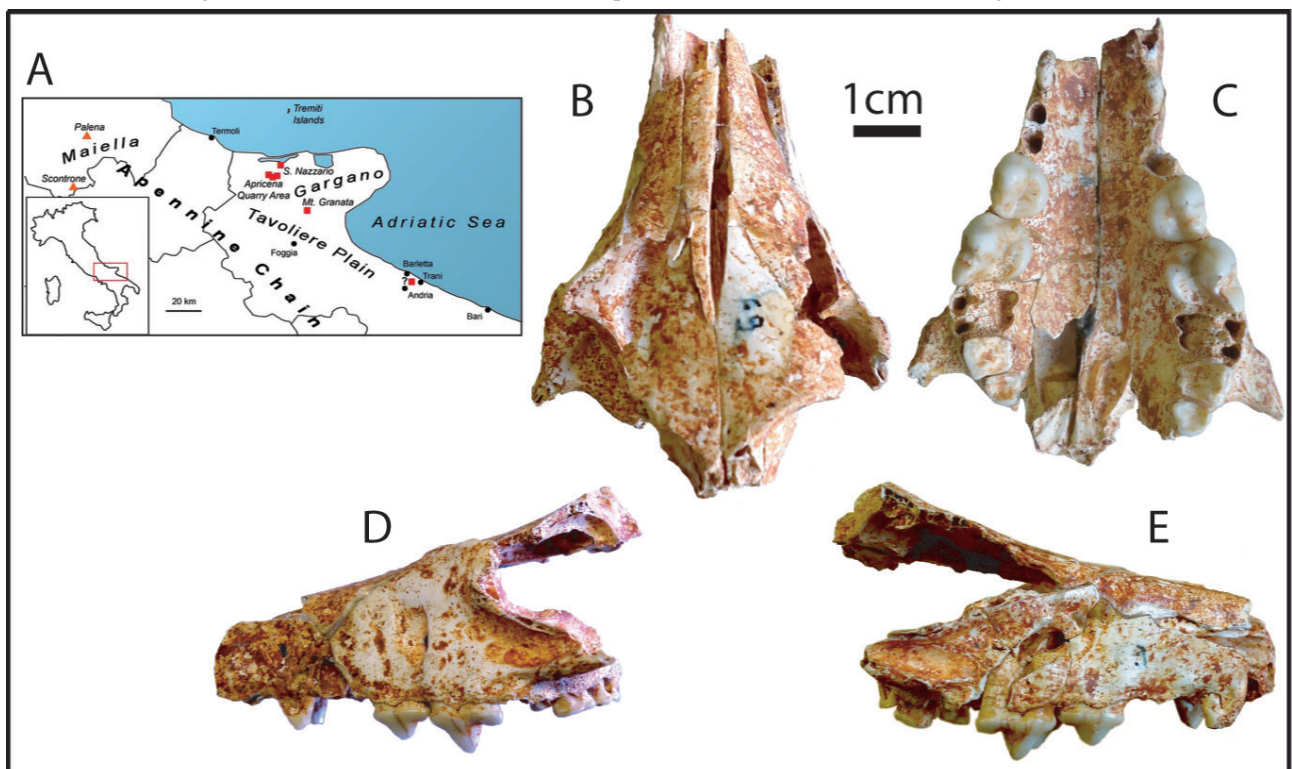
*brevirostris* and *D. koenigswaldi* is well apparent. Consequently, the present study strengthens the validity of *D. minor* and *D. intermedius*, as well as the reliability of the phyletic lineages *D. minor*-*D. brevisrostris* and *D. intermedius*-*D. koenigswaldi*. Members of these two lines co-occur at least in the most recent Terre Rosse fissures. Moreover, the new data, alongside recent literature (Savorelli et al., 2017), suggests that two different species of *Deinogalerix* were constantly present in the faunal assemblages of the Apulia Platform, already since the earliest deposits.

The improved information also complicates the picture: the oldest fissures in fact contain primitive species of unclear taxonomic and phylogenetic status. Indeed, the fossil record of the genus remains imperfect and the many gaps in it do not permit to utter a final word on the origins of the various lines that characterize its evolution. Nonetheless, the remains of *Deinogalerix* preserved in the Department of Earth Sciences of Florence provide substantial insight into the understanding of the most ancient species of the genus, they bridge the gap of knowledge regarding *D. minor*, and contribute to our understanding of the most ancient representatives of *D. intermedius*. All this new information greatly improves our comprehension of the history of the genus *Deinogalerix* and, more in general, of the evolutionary dynamics of insular species.

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**Fig. 1.** A, location map of localities that yielded the fossils of the Apulia Platform Fauna. B-E, *Deinogalerix minor* Butler, 1980 from fissure F9, fragmental skull F9-014; B, dorsal view; C, palatal view; D, left lateral view; E, right lateral view.



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