

**RCMINS**  
**14<sup>th</sup> CONGRESS**  
Regional Committee on Mediterranean Neogene Stratigraphy  
8-12 September 2013 Istanbul, TURKEY

Neogene to Quaternary  
**Geological Evolution of**  
Mediterranean, Paratethys and Black Sea

**BOOK of ABSTRACTS**



## **Book of Abstracts of the RCMNS 2013**

Publisher : Istanbul Technical University  
ISBN : 978-975-561-438-0  
Editors : Namık ÇAĞATAY  
Cengiz ZABCI  
Printing Layout : Tolga KOÇ  
Cover Design : Ayşenur AYTAÇ  
Composition : ARBER Professional Congress Services / [www.arber.com.tr](http://www.arber.com.tr)

Printed by  
General Directorate of Mineral Research and Exploration (MTA)





# The Italian Late Miocene Continental Vertebrates, a Bridge between Western and Eastern Europe

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The evolution of the paleobiogeography of the central Mediterranean, and of Italy in particular, is presented in a set of time-slices. Landmass movements and the erection of mountain ridges of the Alpine orogenesis explain the isolation, mixture, or extinction of populations through time. In turn, the change of faunal communities yields crucial information for testing geological reconstructions and models.

*Early Oligocene- earliest Miocene:* Subduction processes active during the Oligocene–Miocene caused the opening of the Balearic basin, the Sardinian rift, the Tyrrhenian sea and the formation of the Apennines. During the Rupelian–Chattian transition the Corsica–Sardinia microplate was still connected with the European continent. Anthracotheres reached what would become Calabria. A Sardinian early Miocene herpetofauna includes taxa that dispersed before the separation from the mainland. A set of uplifted, shallow-water carbonate platforms separated by shallow- to deep-marine basins characterized the Apennine domains wedged between the Paleogene Apennine Chain and the Dinarides. The Apulia Platform is the easternmost of these structural highs. It formed a vast land connected, through a trans-Adriatic landbridge, with the Balkan mainland.

During the earliest Miocene Asian ctenodactyls colonized Sardinia. Italy then disappears from the terrestrial fossil records for the whole early-middle Miocene time span.

*Early-middle Miocene:* During the late Burdigalian, the Calabrian and Peloritan Arc started separating from the Corsica–Sardinia microplate. The evolution of the northern Tyrrhenian area created the Tusco–Sardinian paleobioprovince which kept connected with the European mainland to at least the early middle Miocene. Then, it remained isolated until the early Messinian, and its fauna ended. An Albatross comes from the marine sediments accumulated between the Tusco–Sardinian paleobioprovince and the European mainland.

The trans-Adriatic landbridge gradually sank. Through this temporary connection insectivores, and rodents might have reached the Apulia Platform. From around 14.8 Ma this land remained isolated, possibly until the early Tortonian.

*Tortonian:* The Apulia Platform was populated by chelonians and crocodiles (the latter likely from Africa), plus sets of endemic taxa, Hoplitomerycidae, Deinogalerix, a giant bird.

The Tusco–Sardinian paleobioprovince was colonized from Europe, and possibly also from Africa. The Tusco–Sardinian paleobioprovince sustained the rich Oreopithecus Zone Faunas.

Migrating eastward, the Calabrian and Peloritan Arc connected with North Africa and were invaded by bovids, hippopotamids, giraffids, rhinos, and elephantids. Some taxa are in common with the Pikermian biome, while others are typical Afro-Arabian species.

*Messinian:* The Calabrian and Peloritan Arc kept connected with North Africa enabling the colonization by faunas of both African and European origin.

The Tusco–Sardinian paleobioprovince re-connected with the European mainland. Its fauna was renewed by new incomers, i.e., hipparionin equids, tapirs, rhinos, hippopotamids, suids, cervids, giraffids, new bovids, numerous new carnivores, new primates, and small mammals. Piedmont was a cross-road for faunas coming from western and eastern areas of the European continent and directed to the Tusco–Sardinian paleobioprovince, at west, and the Northern Apennine and its outer border, at southeast.

As the Tyrrhenian sea kept opening, the Apennine domain was disrupted. The orogenic wedge stacked over the Adriatic foreland, involving the western margin of the Apulia Platform. The trans-Adriatic connection with the Balkan mainland was temporarily re-established and small mammals added to the faunal communities that were living in the foreland sector of the Abruzzo–Apulian land.

Freshwater and paralic fishes are not uncommon in Messinian deposits of Italy. Few freshwater taxa of Nilotic–Sudanian origin were found in Piedmont, Romagna, Marche and Abruzzo. Salmonids and cyprinids exhibit a clear European affinity.

Remains of many different bird orders are preserved in the typical Messinian laminate deposits of Italy. More than 40 bird taxa come from the Gargano area. Some show a high degree of endemism, while others are of European origin.

## Acknowledgements:

This research was financially supported by PRIN (Research Projects of National Interest) 2009 MIUR (Ministry of Education, University and Research) grants.