

## Lower Miocene Amphibians and Reptiles from Oschiri (Sardinia, Italy)

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The Lower Miocene (MN 1-5) Oschiri vertebrate locality is situated near the locality of Oschiri, Northern Sardinia, Italy. The oryctocenosis with vertebrates was bedded in a lignitic clay deposit (Bruijn & Rümke, 1974). After the above authors the fossil mammalian assemblage among others enclosed ctenodactylids, gliroids, talpids and soricids; except gliroids all the above forms are known exclusively from Oschiri only. Beside mammals the fossil locality yielded a considerable number of amphibian and reptile specimens including cranial bones, vertebrae, osetoderms, and parts of the appendicular skeleton. From the herpetofauna up to present the caudate *Salamandrina* sp., and the discoglossid anuran *Discoglossus* sp. have been listed only (Martín & Sanchiz, 1987; Sanchiz, 1998).

Here we (1) report briefly on the available remains of amphibians and reptiles, (2) discuss the paleogeographical and paleoecological implications, and age of the fossil assemblage.

The anurans are represented by a *Discoglossus* species, which seems different from all the extant ones, including *D. montalentii* (which is the sister group of all the others). Subtle proportional differences are apparent in maxillae, scapulae and ilia, and the atlas cotylar relation is Lynch's type III (narrow coalescence between both cotyles). Whether or not the Oschiri *Discoglossus* can be identified as *D. troschelii* is not known because of lack of preparation and articulated preservation of the latter. The Oschiri discoglossid probably represents a new species, but we are reluctant to name it because most skull bones are not known and because the extreme morphological similarity among all *Discoglossus* species.

The only Caudata is a *Salamandrina* species. Taxonomically it should remain as *Salamandrina* sp. It shows all the peculiar vertebral features of the genus, including a well developed zygosphenes-zygantrum articulation. The Oschiri specimens may represent the oldest record of this genus.

The gekkonids (Gekkonidae) are documented by a fragmentary frontal in which the descending processes are in contact below the olfactory tract; the

Meckel's groove in the dentary is closed, while the teeth have monocuspid tips; the vertebrae are small-sized with amphicoelous centra.

The scincids (Scincidae) were rather uncommon (documented only by three specimens representing a maxilla and two dentaries). The teeth are conical of moderate height and provided with monocuspid tips, with or without apical striation. One may assume that the material may have belonged to two different forms.

The lacertids (Lacertidae) were represented by medium sized specimens who could have belonged to more than a single taxon. The frontal is not fused approaching in morphology those of the genus *Lacerta* s. l. The pterygoid remains are toothed and bear a single row of pterygoid teeth. The maxillary teeth are distinctly bicuspid and slightly curved posteriorly. The lingual surface near the tip of the teeth is finely striated. The morphology of the dentary in the Oschiri lacertid approaches that of *Lacerta* sp., known from the early Miocene of Dolnice (MN 4b), Czech Republic (see Roček, 1984, Pl. 4: 1-3), that of the lacertid from Béon 1 (MN 4), France (see Rage & Bailon, 2005, Fig 3: F), and in a lesser extent that of *Lacerta filholi*, known from the Oligocene of France (Auge, 1988). Based on the above features, one may assume that the Oschiri specimens already belonged to an advanced stock of lacertids, with some morphological affinity to recent lacertids from the western Mediterranean region and Canary Islands. Several slender dentaries with relatively narrow Meckel's groove and their weakly arched ventral margin are reminiscent of *Miolacerta*, and *Edlartetia*, known from a number of Miocene localities (Roček, 1984; Augé & Rage, 2000).

According to criteria discussed by Böhme (2002) the anguid remains from Oschiri have been assigned to *Ophisaurus* cf. *fejfar*. In the latter the maxillary teeth are caniniform and recurved with a low cutting edge on their anterior surface and with fine striation at the tooth-base. In the dentary fragments the subdental shelf is reduced and the dentition is of pleurodont type with caniniform teeth. The tooth-base is dilated

labiolingually, and the teeth are positioned close to each other. Near the apex the shape of the teeth is conical and slightly compressed, bearing a distinct cutting edge on the anterolingual and posterolabial surface. There is no striation in the apical region of the lingual side. The vertebrae belonged to various sized individuals, few of them representing large-sized specimens. The ventral surface of the centrum is flattened or slightly convex; in ventral view the lateral margins of the posterior part of the centrum are slightly divergent anteriorly. The osteoderms are relatively thin, elongated or rectangular in shape. The overwhelming majority of specimens bear on their outer surface a distinct medial ridge. In both sides of the latter a series of bifurcating and confluent tubercles are present. However, several smaller specimens lack a medial ridge, and the tubercles on their outer surface are uniformly distributed.

The amphisbaenians from Oschiri are represented by *Blanus gracilis* (Roček, 1984) (11 dentaries, 1 pre-maxilla, and 600 vertebrae). The morphology of the dentary in Oschiri specimens differs markedly from that of *Palaeoblanus*, provided with a distinctly larger first tooth (Schleich, 1988; Böhme, 1999), but closely resembles that of the genus *Blanus*. Roček (1984), based on dentaries and vertebrae from Dolnice, Czech Republik (MN 4), described a new fossil species under the name *Omoiotyphlops gracilis*. The specimens figured and the diagnosis given by Roček (1984) for *O. gracilis* is in agreement with that of the genus *Blanus* (thus *Omoiotyphlops* is considered here a synonym of *Blanus*).

The aniliid snake *Eoanilius oligocenicus* (Aniliidae) is represented by 2 middle trunk vertebrae. The Oschiri aniliid closely resemble *Eoanilius oligocenicus* by having a well-defined haemal keel, a three-lobed zygosphenon, and by having relatively large paradiapophyses (Szyndlar, 1994).

The only colubrid snake from Oschiri is a Natricinae indet., documented by 1 fragmentary praesacral vertebra and, 7 caudal vertebrae. The former has a well-defined hypapophysis, connected to a prominent anterior hypapophyseal keel, while the parapophysis projects anteriorly; the prezygapophyseal processes are dorso-ventrally flattened.

Presence of viperid snakes (*Vipera* sp.) is based on 2 fragmentary presacral vertebrae and 2 venom fangs. The size and morphology of vertebrae point to those of European vipers from the *Vipera aspis* complex (Szyndlar 1988, Szyndlar & Rage 1999).

Taken as a whole, the herpetofauna of Oschiri was rather diversified which included representatives

from at least ten different families of amphibians and reptiles (Salamandridae, Discoglossidae, Geckonidae, Scincidae, Lacertidae, Anguillidae, Amphisbenidae, Aniliidae, Colubridae, Viperidae). This combination suggests important palaeobiogeographic connections with the European and perhaps African mainland contrasting in this respect with the mammalian fauna which consisted in mainly endemic taxa (Bruijn & Rümke, 1974). Apparently the fossil herpetofaunal assemblage of Oschiri resulted in part from autochthonous representatives, which survived since the Late Oligocene separation (*Salamandrina*, *Discoglossus*, amphisbaenids, some lizards and aniliid snakes). Starting from the early Miocene to this putatively native fauna directed from Europe or eventually from Africa new immigrants were added (some lizards, colubrids and viperid snakes). At the same time it is worth to mention, that no taxa involved in the migration events related to the so called Miocene Climatic Optimum (Böhme, 2003) (e.g. *Varanus*, *Iberovarus*, *Palaeocordylus*, chamaeleonids, *Diplocynodon*, 'oriental vipers' group of the genus *Vipera*, a.o.) could be reported from Oschiri (Fig. 1).

Considering the above facts one may assume that the accumulation of vertebrate remains in Oschiri must probably took place during the early Miocene, at least before the peak of European Miocene Climatic Optimum (MN 1-3).

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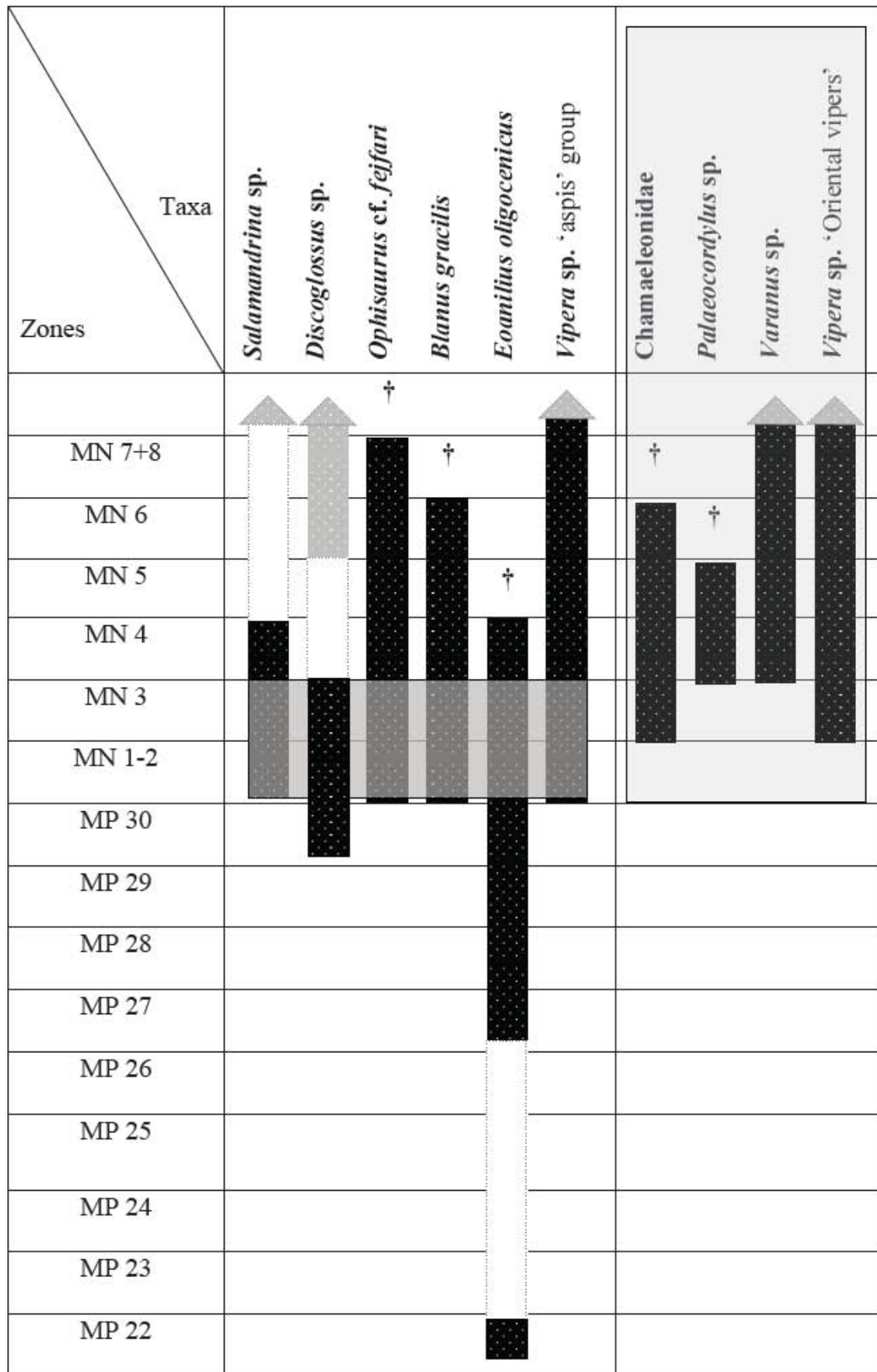


Fig. 1 — Biostratigraphic range of relevant taxa from the early Miocene of Oschiri, and taxa related to the Miocene Climatic Optimum (in grey square - after Böhme 2003).

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