

## Iberian snake fauna of the early / middle Miocene transition

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**Abstract:** The paper reviews ophidian taxa of the Iberian Peninsula during the “MN4-event” at the end of the early Miocene, when the “ancient” snake fauna was replaced, in a rather rapid way, by “modern” one. The replacement was a part of a vast process, occurring simultaneously throughout Europe. Both the “ancient” and “modern” Iberian faunas are closely related to the contemporary faunas inhabiting France and Germany. The following snake taxa, coming from four Spanish and Portuguese localities (Agramón: MN3 or MN3-4, Córcoles: MN4, Quinta das Pedreiras: MN4, and Amor: MN5) were described in brief: *Scolecophidia* indet., *Eoanilius* sp., cf. *Bavarioboa* sp., cf. *Falseryx* sp., *Eryx* sp., cf. *Eryx* sp., *Booidea* indet., *Natricinae* indet., cf. “*Coluber*” *cadurci*, cf. *Coluber* sp., non-natricine *Colubridae* indet., *Naja* sp., *Vipera* sp. (“*aspis*” complex), *Vipera* sp. (“Oriental viper”).

**Key words:** Early / middle Miocene transition, Iberian Peninsula, serpentes.

**Resumen: La fauna de serpientes ibéricas en la transición Mioceno inferior / Mioceno medio.** – Se revisan los taxones de ofidios presentes en la Península Ibérica durante el “evento MN4” al final del Mioceno inferior, cuando la “antigua” fauna de serpientes fue reemplazada, de forma bastante rápida, por otra “moderna”. Este reemplazo fue parte de un amplio proceso ocurrido simultáneamente en toda Europa y ambas faunas ibéricas, “antigua” y “moderna”, se encuentran estrechamente relacionadas con las propias de Francia y Alemania. Se describen los siguientes taxones de serpientes: *Scolecophidia* indet., *Eoanilius* sp., cf. *Bavarioboa* sp., cf. *Falseryx* sp., *Eryx* sp., cf. *Eryx* sp., *Booidea* indet., *Natricinae* indet., cf. “*Coluber*” *cadurci*, cf. *Coluber* sp., *Colubridae* indet. no natricina, *Naja* sp., *Vipera* sp. (“*aspis*” complex), *Vipera* sp. (“Oriental viper”), procedentes de cuatro localidades españolas y portuguesas (Agramón: MN3 ó MN3-4, Córcoles: MN4, Quinta das Pedreiras: MN4 y Amor: MN5).

**Palabras clave:** Península Ibérica, serpientes, transición Mioceno inferior / Mioceno medio.

### INTRODUCTION

The oldest snakes known from the Iberian Peninsula, represented by poorly preserved fossils, are of Cretaceous age (SAUVAGE, 1896; RAGE, 1981, 1999). The only Paleogene snakes ever reported from Iberia come from the early Eocene of Portugal (RAGE & AUGÉ, 2003) and late Eocene of Spain (SZYNDLAR & SCHLEICH, 1994). There is a long gap in our knowledge on Iberian ophidian faunas,

ranging from the late Eocene to the beginning of the Miocene. The oldest Neogene snake fauna known from Iberia is that reported from the Spanish locality of Bardenas Reales de Navarra (biozone MN2b-3; for the definition of MN biozones see STEININGER, 1999) by MURELAGA *et al.* (2002). The fauna described by MURELAGA *et al.* (2002) consists of poorly preserved remains identified as “*?Eryx*” (p. 358, Fig. 9.2) and “*Colubridae* indéterminés” (p. 359, Fig. 9.3). Another uni-

identified colubrid snake (“«Colubriné» à vertèbres relativement allongées”) was mentioned from the Portuguese site of Universidade Católica (MN3) by ANTUNES & RAGE (1974; p. 52). The snake fossils coming from the above two localities have not been examined by the authors of the present paper.

Compared with the older fossils, the snake fauna inhabiting the Iberian Peninsula at the end of the early Miocene, i.e. around the biozone MN4 (between ca. 18 and 17 mya), is rich enough and fairly well documented. This period is of special interest in the history of European snakes, because it was just the early / middle Miocene transition when an ancient ophidian fauna, largely consisting of extinct genera of primitive ophidians, was replaced suddenly by modern immigrants from the East (these newcomers will be termed “MN4-wave” in the farther text). Most of the latter snakes do not differ much, at least at the generic level, from those inhabiting recently the West Palaearctic (but not necessarily Europe). Thus far, most data on the ophidians representing the “MN4-wave” in the Iberian Peninsula were dispersed in literature and in most cases they were restricted to short mentions only or remained unpublished. In the present paper we make an attempt to gather the entire available information and to review briefly what we currently know about the snakes living in Iberia, immediately before and during the time of the great invasion.

### MATERIALS

The fossil remains examined in this study come from the following four localities (the ages of the faunas follow the references given in parentheses): Agramón (Albacete, Spain), MN3-4 (BÖHME & ILG, 2003) or MN3 (A.J. van der Meulen, unpublished data); Córcoles

(Guadalajara, Spain), MN4b (ALFÉREZ *et al.* 1982); Quinta das Pedreiras (Lisboa, Portugal), MN4 (ANTUNES, 2000); and Amor (Lisboa, Portugal), MN5 (ANTUNES, 2000).

The fossil materials belong to the collections housed in the Universidad Complutense in Madrid (UCM), Museo Nacional de Ciencias Naturales in Madrid (MNCN / CSIC), and Universidade Nova in Lisboa (UNL) (Table 1).

The present paper is based in part on previously reported remains as well as on those undescribed yet. Table 1 (below) summarizes the entire published (descriptions, faunistic lists or short mentions) and unpublished fossil record.

### REVIEW OF SNAKE TAXA

#### *Scolecophidia* indet.

The oldest scolecophidians appeared in Europe in the early Eocene (GODINOT, *et al.* 1978) and disappeared prior to the “Grande Coupure” events at the Eocene / Oligocene boundary (e.g. RAGE, 1974, 1978).

There is no fossil record of scolecophidians from the European Oligocene and the beginning of the Miocene. These snakes re-appeared in Spain (the locality of Córcoles) (ALFÉREZ & BREA, 1981) and Czechia (SZYNDLAR, 1987) at the end of the early Miocene, perhaps as members of the “MN4-wave” coming from the East. Scolecophidians survived in southeastern Europe until now. They inhabited Spain until at least the end of the Miocene (SZYNDLAR & SCHLEICH, 1994).

The most probable generic allocation of the European fossil scolecophidians is in the genus *Typhlops* (family Typhlopidae), the only living representative of this group in the European continent. Unfortunately, because of the very simple vertebral morphology of these snakes, it is impossible to identify their

