

Systematic Palaeontology (Vertebrate Palaeontology) / Paléontologie systématique

The oldest record of *Clelia* (Serpentes – Colubridae) in South America

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Abstract

Trunk vertebrae of a colubrid from the Lower to Middle Pleistocene of the Buenos Aires province, Argentina, are described. They are assigned to the genus *Clelia* on the basis of the following combination of characters: the longitudinal development of the neural spine, the short vertebral body, prezygapophyseal processes robust and laterally oriented. This suggests that the origin of the subfamily Xenodontinae and their later dispersal in South America has occurred at least in or before Pliocene times. **To cite this article:** C.A. Scanferla, C. R. Palevol 5 (2006).

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Résumé

Le plus vieux fossile de *Clelia* en Amérique du Sud. Une vertèbre dorsale d'un colubridé, provenant du Pléistocène inférieur à moyen de la province de Buenos Aires, en Argentine, est décrite. Cette vertèbre est attribuée au genre *Clelia* sur la base des caractères suivants : développement longitudinal de la neurépine, court centrum vertébral, processus prézygapophysaire robuste et orienté latéralement. Ceci suggère que l'apparition de la sous-famille des Xenodontinae et sa dispersion ultérieure en Amérique du Sud devraient se situer au moins au Pliocène ou lors d'une période antérieure. **Pour citer cet article :** C.-A. Scanferla, C. R. Palevol 5 (2006).

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Mots clés : Clelia ; Pléistocène ; Âge Ensenadense ; Amérique du Sud

1. Introduction

The record of colubrid snakes in the Pleistocene of Argentina is restricted to some remains discovered in

the Buenos Aires Province [2,3,5]. This contrasts with the extensive knowledge of the mammalian faunas [1, 13] discovered since the XIXth century. Because of the fragmentary condition of the Quaternary snake material from Argentina, mainly represented by isolated vertebrae, these records can be referred to as unspecified colubrid snakes. Other discoveries documented in the Upper Pleistocene–Holocene beds from the archaeolo-

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gical site ‘Cueva Tixi’ (Buenos Aires Province) can be certainly assigned to *Clelia rustica* and *Philodryas patagoniensis*. The former taxon represents the first fossil record of *Clelia* [5].

The genus *Clelia* is currently represented by nine extant species, distributed from Mexico to Argentina [21]. In the latter country only three species are present (*C. clelia*, *C. bicolor* and *C. rustica*), mainly distributed in central and northern Argentina. *C. rustica* is the only species of this genus present in the Buenos Aires Province [15,20]. The aim of the present contribution is to describe new vertebral material referable to an undetermined species of *Clelia* as well as to show its importance in the poorly known Pleistocene ophidian fauna.

2. Materials and methods

The material used for comparison (temporarily housed in the personal collection of the author) includes the following extant snakes distributed in Argentina [9,19,20]: *Boiruna maculata*, *Clelia rustica*, *Clelia bicolor*, *Phimophis vittatus*, *Helicops leopardinus*, *Liophis miliaris*, *Liophis anomalus*, *Liophis poecilogyrus*, *Lystrophis dorbignyi*, *Oxyrhopus rhombifer*, *Philodryas patagoniensis*, *Philodryas baroni*, *Thamnodynastes hypoconia*, *Bothrops alternatus*, *Bothrops ammodytoides*, *Epicrates cenchria*, *Eunectes notaeus*. Anatomical terminology follows Auffenberg [6], Hoffstetter and Gasc [12], and Thireau [17].

3. Systematic paleontology

Colubridae Oppel, 1811
 Xenodontinae Bonaparte, 1845
 Genus *Clelia* Fitzinger, 1826
Clelia sp.

3.1. Material

MLP (Museo de La Plata) MLP 98-XI-12-1, four complete vertebrae, and fragments of eight other vertebrae and several ribs. This material was found partially articulated within a surface no longer than 30 cm.

3.2. Horizon and locality

The new material was recovered in a quarry from the locality of Gorina (S34°54'06"–W58°01'59", Fig. 1A) at the Northwest of La Plata city. The fossils were found in a clayed paleosol (Fig. 1B) in sandy silt loess (level LL of Bidegain [7]) corresponding to the upper levels of the Ensenada Formation, Early to Middle Pleistocene.

The remains of *Clelia* were excavated 1.5 m below the level in which the paleomagnetic reversion of 0.8 Myr was documented [7]. Other fossil vertebrates collected from overlying and underlying levels include the tremarctine bear *Arctotherium latidens*, the gliptodontid *Doedicurus* sp. and an undetermined species of camelid *Hemiauchenia*. In agreement with these geological data, it must be said that *Arctotherium latidens* is considered as a guide fossil of the Ensenadan age [16].

4. Description

The vertebrae exhibit a marked degree of ossification, suggesting that the specimen corresponds to a mature individual. The morphology of the vertebrae corresponds to the medio-posterior trunk region, since there are no hypapophyses or lymphapophyses, and because the hemal keel is robust (Fig. 2). The vertebra is higher than long (height: 7.2 mm), with the vertebral body short (length: 5.2 mm). It is distinct from *Philodryas* and *Liophis* because these two taxa have more elongate vertebral centra. The cotyle and condyle are circular shaped. A conspicuous lateral foramen is present below the neural arch, as usual in snakes. The paracotylar foramen is present and located lateral to the cotyle. The hemal keel is transversely wide, typical of the medio-posterior trunk region, thus defining two subequal concavities together with the lateral margins (*margo lateralis*). The neural spines in the trunk region of *Clelia* are high and cranio-caudally unexpanded. In contrast to *Philodryas* [5 (Fig. 3)] and *Liophis*, the tip of the neural spine forms both a cranial and caudal prominent expansion, which is distinctive of *Clelia*. The prezygapophyseal processes are robust (‘obtuse shape’ of Auffenberg [6]) and laterally oriented, in contrast to the condition present in various other xenodontines and non-colubrid cenophidian snakes (e.g., *Philodryas*, *Liophis*, *Bothrops*), in which the prezygapophyseal processes are smaller and sharper and laterocaudally oriented (‘acuminate shape’ of Auffenberg [6]). The articular surface of the prezygapophyses is oval-shaped and the zygosphene is crenate-shaped, as in *Clelia rustica*.

The ribs of the MLP 98-XI-12-1 show morphology typical of colubrids, with a conspicuous tuberculiform process and separate articulate facets owing to a groove in the articulate head.

5. Discussion

Because of the lack of a comprehensive survey of vertebral form of South American colubrids, it is a dif-

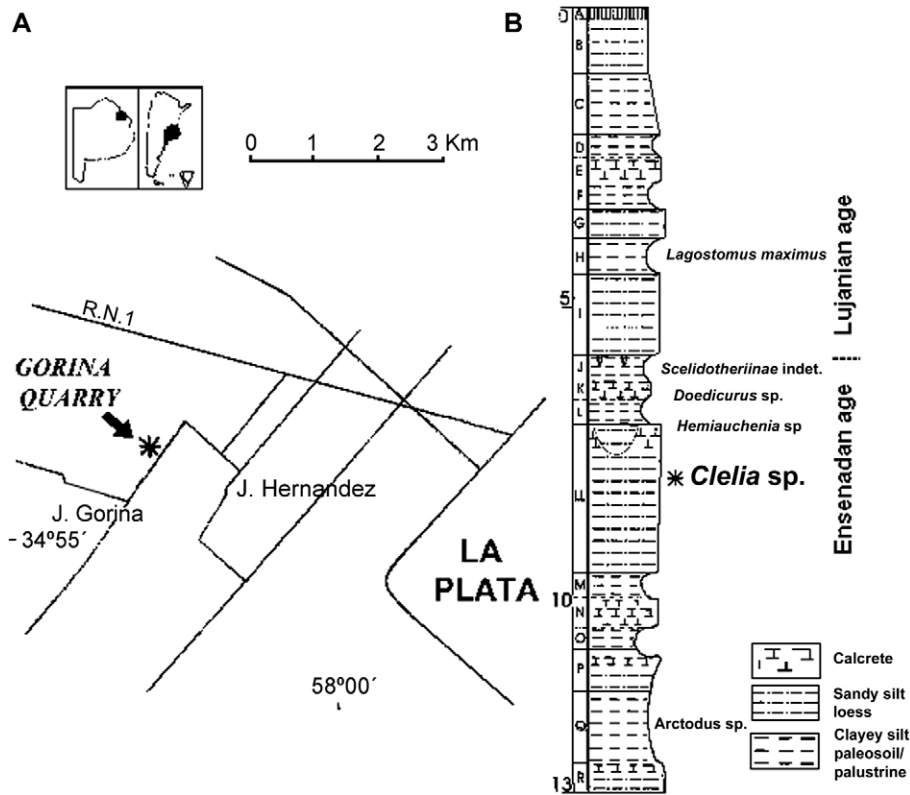


Fig. 1. (A) Location of the Gorina quarry, site of the discovery of the specimen, northwest of La Plata city, Buenos Aires Province, Argentina. (B) Profile of the exposed sediments in the Gorina quarry (modified from [7]). * The asterisk indicates the horizon where the fossil was found.
 Fig. 1. (A) Localisation de la carrière Gorina, site de la découverte du spécimen, au nord-ouest de La Plata, province de Buenos Aires, Argentine. (B) Coupe des sédiments exposés dans la carrière Gorina (modifié à partir de [7]). * L'astérisque indique l'endroit où le fossile a été trouvé.

difficult task to assign isolated fossil vertebrae, even at a generic level.

The extant species of colubrid snakes present in the Buenos Aires province show a strong similarity in the trunk region of the vertebral column, which hinders their identification (e.g., most of the Argentine species of *Liophis* cannot be recognized from their trunk vertebrae). However, some vertebral features exhibit significant differences among South American xenodontines, which allows the taxonomic identification of isolated vertebrae [14]. The craniocaudal development of the neural spine, the short vertebral body, and the robust and laterally oriented prezygapophyseal processes are characters found together in *Clelia rustica*. However, trunk vertebrae are not a reliable basis that would allow specific allocation; thus MLP 98-XI-12-1 is only identified at genus level.

The level in which MLP 98-XI-12-1 was found is interpreted as formed under humid conditions [7]. The Argentine extant species of *Clelia* are distributed in humid environments, which is consistent with the paleoenvironmental inference previously made. The distribu-

tion of fossil material of colubrid snakes throughout the Cenozoic of Argentina is scarce, showing a significant hiatus from the Pliocene to the Upper Pleistocene [4, 10].

The origin of the subfamily Xenodontinae is interpreted as having occurred in Asia–North America, arriving to Central and South America by means of dispersal events [8,18]. However, the age of these events is ignored, just because of the absence of a well-documented fossil record [11]. Thus, the discovery of the genus *Clelia* in the Early to Middle Pleistocene of southern South America suggests that the origin of the subfamily Xenodontinae and their later dispersion toward the rest of America should have taken place by or before the Pliocene period. This hypothesis is in agreement with the recent findings of undetermined Colubridae vertebrae from the Miocene of Patagonia [4].

The present record of an undetermined species of the genus *Clelia* in the Ensenadan age constitutes the oldest xenodontine genus reported up to now in South America. The specimen here described is the first mention of a colubrid snakes for the above mentioned age, repre-

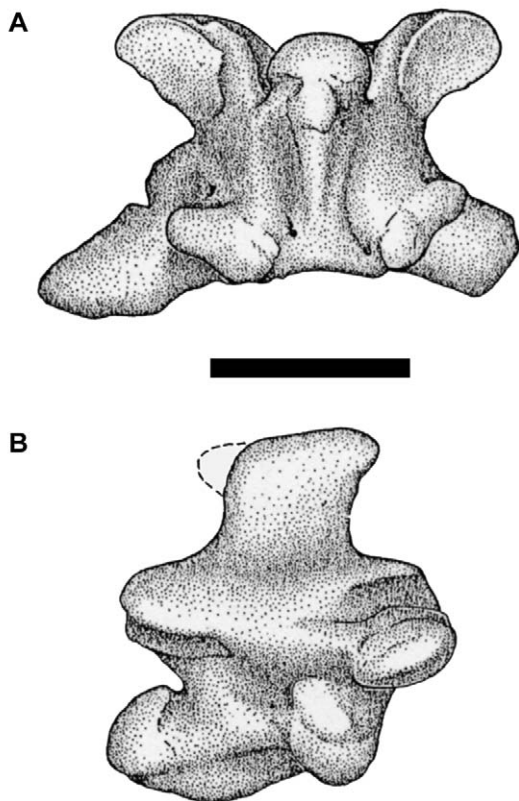


Fig. 2. Vertebra referred to as genus *Clelia*, Museo de La Plata, Departamento de Paleontología de Vertebrados MLP 98-XI-12-1: (A) lateral, (B) ventral. Scale bar = 4 mm.

Fig. 2. Vertèbre rapportée au genre *Clelia*, musée de La Plata, département de paléontologie des Vertébrés MLP 98-XI-12-1: (A) vue latérale, (B) vue ventrale. Barre d'échelle = 4 mm.

senting a significant addition to our knowledge of the Cenozoic fossil snake fauna.

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