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Systematic Palaeontology (Vertebrate Palaeontology)

An early Late Cretaceous lizard from Patagonia, Argentina

Un lézard de la base du Crétacé supérieur de Patagonie, Argentine

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Abstract

Here we report an incomplete lizard frontal from the early Late Cretaceous of Patagonia, Argentina. The frontal is hourglass in shape, indicating iguanian affinities. Additionally, the tubercled ornamentation of the bone surface points to a phylogenetic position within Iguanidae. The specimen here described constitutes the oldest undoubted lizard record from Argentina and contributes to support the presence of iguanids in South America since 'Mid'-Cretaceous times at least. ***To cite this article: S. Apesteguía et al., C. R. Palevol 4 (2005)***.

Résumé

La découverte d'un frontal de lézard à la base du Crétacé supérieur de Patagonie (Argentine) est signalée. La forme en sablier du frontal indique des affinités avec les Iguania. En outre, l'ornementation en tubercules suggère une position phylétique au sein des Iguanidae. Le spécimen décrit représente sans aucun doute le plus ancien lézard d'Argentine et démontre la présence d'Iguanidés en Amérique du Sud, depuis au moins le Crétacé moyen. ***Pour citer cet article : S. Apesteguía et al., C. R. Palevol 4 (2005)***.

Keywords: Late Cretaceous; Lizard; Iguanid; Gondwana; Patagonia

Mots clés : Crétacé supérieur ; Lézard ; Iguanidés ; Gondwana ; Patagonie

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1. Introduction

The South American fossil record of lizards (Reptilia, Squamata) is relatively well represented in Tertiary rocks [1,7,10]. On the contrary, the Mesozoic record is sparse and restricted to some basal taxa of uncertain affinities that share a basal position with respect to other squamatans [5,15]. *Pristiguana brasiliensis*, from the Baurú Group (Santonian–Maastrichtian), originally described as a primitive iguanid [8], was later considered of uncertain phylogenetic position [12].

Albino [2] reported an incomplete squamatan lower jaw from the Anacleto Formation (Early Campanian) at Argentina (Fig. 1). This material was considered as belonging to an indeterminate teiid, but a definitive study is still in progress.

A fused lizard frontal was found at 'La Buitrera' facies of the Cenomanian–Turonian Candeleros Formation, Río Negro Province, Argentina. Here we describe this material and discuss the nature of the South American squamatan assemblages. In this paper, we follow the anatomical terminology of Estes et al. [11].

2. Systematic palaeontology

Squamata Oppel, 1811

Iguania Cope, 1864

?Iguanidae (*sensu* Gao and Norell, 2000)

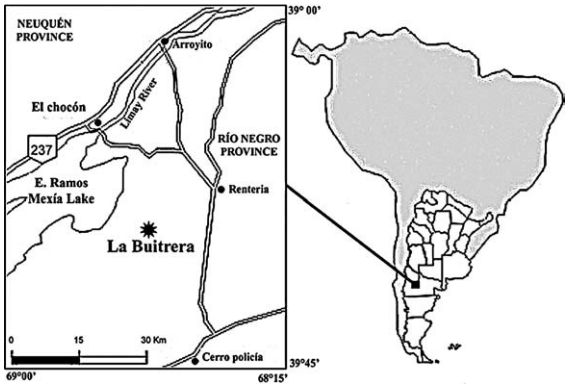

Fig. 1. Map of South America showing the 'La Buitrera' fossil locality.
Carte de l'Amérique du Sud, montrant la localité fossilifère « La Buitrera ».

2.1. Material

MPCA 250 (Museo Provincial 'Carlos Ameghino', Cipolletti, Argentina), consisting of nearly complete fused frontals (Fig. 2).

2.2. Locality and horizon

Upper layers of the Candeleros Formation (Cenomanian–Turonian) at the 'La Buitrera' fossil quarry, Cerro Policía, Río Negro Province, northwestern Patagonia, Argentina (Fig. 1). The specimen was found in fluvial sandstones, in association with sphenodontids, snakes, turtles, crocodyliforms, theropod and sauropod dinosaurs, mammals and dipnoan fishes [3].

3. Description

The frontals, fused as a single bone, are strongly constricted between the orbits, adopting an hourglass shape. There is no trace of the frontal suture. The dorsal surface of the frontal is slightly sculptured anteriorly, but on the posterior part it is deeply ornamented with well spaced tubercles that become thicker and closely packed toward the supraorbital rim. The preserved part of the frontal does not reach the parietal foramen or the suture with the parietal. Also due to the preservation of the bone, we are not allowed to assess whether a postfrontal was present.

The supraorbital rim is prominent and forms an extensive lateral shelf. Ventrally, between the paired *crista cranii*, the bone is extremely narrow. The cristae do not meet each other as in varanids and teiids, but maintain a wide space between them. The only observable olfactory tract is deep and is posteriorly limited by two shallow supraseptal grooves. Both the anterior and posterior portions of the tract show shallow central sulci. The *crista cranii* are relatively thin and smooth along the whole preserved bone.

4. Discussion

The frontal described here exhibits the following derived traits of Iguania (Chamaeleontidae + Agamidae + Iguanidae): (1) frontals fused [6,11,17], (2) frontal strongly constricted between orbits giving a

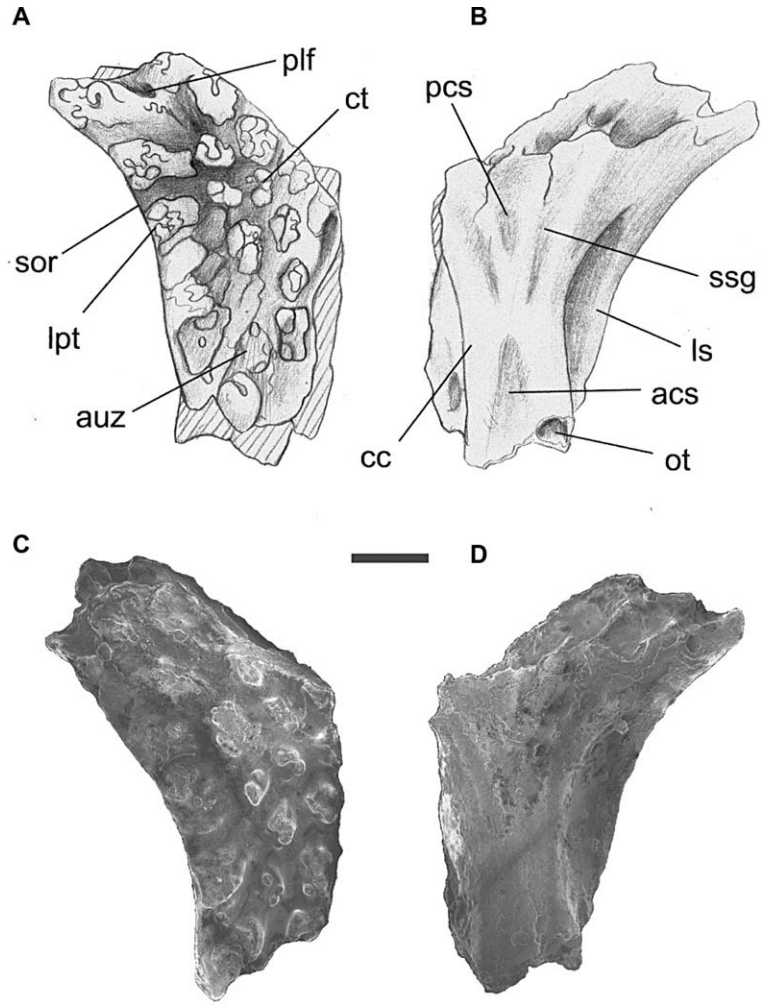

Fig. 2. Frontal of the lizard MPCA 250 in dorsal (**a**) and ventral (**b**) views. Abbreviations are as follows: **acs**, anterior central sulcus; **auz**, anterior unsculptured zone; **cc**, crista cranii; **ct**, central tubercle; **lpt**, lateral packed tubercle; **ls**, lateral shelf; **ot**, preserved portion of olfactory tract; **pcs**, posterior central sulcus; **plf**, posterolateral foramen; **sor**, supraorbital rim; **ssg**, supraseptale groove. Scale bar: 0,5 mm.
Frontal du lézard MPCA 250 en vue dorsale (**a**) et ventrale (**b**). Abréviations : **acs**, sulcus dorsal antérieur ; **auz**, zone antérieure sans sculpture ; **cc**, crista cranii ; **ct**, tubercule central ; **lpt**, tubercule latéral resserré ; **ls**, rebord latéral ; **ot**, portion préservée du tractus olfactif ; **pcs**, sulcus central postérieur ; **plf**, foramen postérolatéral ; **sor**, bord supraorbitaire ; **ssg**, gouttière supraseptale. Échelle : 0,5mm

hourglass shape (reversed in Chamaeleontids [6,11,17]), and (3) frontal with pronounced ornamentation (reversed in most Agamidae [18]).

The combination of the three above-mentioned characters into Iguania only occurs in the extinct Priscagaminae [17] and the Iguanidae. Furthermore, the moderate rugosities exhibited by the frontal resemble those of the living tropidurine genus *Liolaemus* [12].

The characters of fused frontals and hourglass shape are also present in some gekkotans, teioids and xenosaurids. Both in gekkotans and teioids (mainly gymnophtalmids), however, the *crista cranii* are in contact below the olfactory tracts [17] and skull bones are usually unsculptured [14]. Xenosaurids, on the other side, bear very characteristic dermal vermiculate rugosities [17], by far different from those present in MPCA 250.

5. Conclusions

The presence of a possible iguanid in the Cenomanian–Turonian of South America reinforces the diver-

sity knowledge in those poorly known lizard faunas prior to the Campanian faunal interchange between the Americas, as suggested by previous authors [8,9,13]. The discovery of Early Cretaceous basal squamatans in Brazil [5,15], an isolated lower jaw in Early Campanian outcrops of North Patagonia with purported teioid affinities [2], plus the addition of unpublished material from the Jurassic of Chubut province, Argentina [20], constitute a confusing record. However, they prove that different lineages of Gondwanan native lizards lived in South America, at least between the Jurassic and the Late Cretaceous times, sharing restricted adaptive zones with the sphenodontians [3]. Furthermore, the current evidence support the idea proposing that by the time of the Laurasia–Gondwana fragmentation, the first iguanian split, the primitive pleurodont Iguanidae, were already diversified and they remained as part of the Gondwanan squamatan faunas.

As highlighted by Evans [14], there is a disparity in the record of Upper Cretaceous squamatans of South America. The paucity of lizard remains is in sharp contrast with the relatively profuse snake record. This is evident in localities as 'La Buitrera', where lizard remains are scarce, snakes being about thirty times more abundant, and sphenodontids nearly one hundred times [3].

The finding of derived acrodontan iguanians at the Early Jurassic of India (Gondwana) and the Aptian of Mongolia (Laurasia) shows a rather cosmopolitan distribution for the group [16,17] and an early diversification of the iguanians. On the other hand, the Iguanidae (i.e., the purported basal iguanians) were up to now restricted to much younger (Maastrichtian) strata, such as the Brazilian *Pristiguana*, with an uncertain status, some records from the Latest Cretaceous of North America and Europe [19], as well as several Mongolian taxa [17] from Campanian age.

The 'Middle' Cretaceous specimen from 'La Buitrera', although poorly preserved, constitutes the oldest undoubted lizard record from Argentina. Additionally, it suggests that, as Estes and Price [8] proposed, iguanians had an important Gondwanan chapter. The material here described, if properly identified as Iguanid, supports this view.

In this context, considering that iguanids are more abundant today in South America, it is possible to propose this continent as part of their original distribution area (or origin area), as was suggested by previous studies [4]. Furthermore, the possible presence of iguanids in South America previous to the Campanian faunal interchange [10], as well as their pleurodont dental attachment, considered as plesiomorphic for lepidosaurs, is in agreement with an early split of the Iguanidae.

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