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NOTA PALEONTOLÓGICA

A new temnospondyl record from the Upper Triassic of Argentina

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Introduction

The Brachyopoidea is a group of Mesozoic temnospondyls with flat, parabolic skulls that were recently reviewed and considered to include Brachyopoidea and Chigutisauridae (Warren and Marsicano, 2000; Yates and Warren, 2000, Damiani and Kitching, 2003). Brachyopids have been recorded from several different localities both in Gondwana (excluding South America) and Laurasia (Warren and Marsicano, 2000) during the Early-Middle Triassic. After the Middle Triassic, they are absent from the fossil record for several million years until they are recorded in the Middle-Late Jurassic of China (Dong, 1985) and Mongolia (Shishkin, 1991). In contrast, chigutisaurid temnospondyls appear to be restricted to Gondwana. They are known from the Lower Triassic, Lower Jurassic and Lower Cretaceous of Australia (Warren, 1981; Warren and Hutchinson, 1983; Warren et al., 1997), the Upper Triassic of Argentina (Bonaparte, 1975; Marsicano, 1993, 1999) and India (Sengupta, 1995), and from the Upper Triassic and Lower Jurassic of South Africa (Warren and Damiani, 1999).

This paper describes a new temnospondyl specimen consisting of an incomplete left mandible, preserved from the symphysis to the level of the anterior coronoid, found in strata assigned to the Late Triassic Cacheuta Formation at the Potrerillos locality in western Argentina (Marsicano et al., 2000). The mandible is here considered to be a putative brachyopid and, therefore, it would be the first occurrence of this group in South America and the youngest for Gondwana.

Abbreviations-MCNAM-PV, Museo de Ciencias Naturales y Antropológicas Juan Cornelio Moyano of Mendoza (Argentina), paleovertebrados collection; UCMP, University of California Museum of Paleontology, Berkeley (USA).

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Systematic paleontology

TEMNOSPONDYLI Zittel, 1887-1890
BRACHYOPOIDEA Lydekker, 1885, *sensu* Warren and Marsicano, 2000
Brachyopidae? indet.
Figure 1

Material. MCNAM-PV 3195, an incomplete left mandible.

Locality and Horizon. Quebrada de la Mina, Potrerillos locality, western Mendoza, Argentina; Cacheuta Formation, Late Triassic (Morel et al., 2002).

Description. The specimen (MCNACM-PV-3195) corresponds to the anterior part of a left mandible, from the symphysis to the level of the anterior coronoid (figure 1). The fragment is poorly preserved and somewhat distorted although it clearly shows that the mandible was very low anteriorly with the symphysis anteroposteriorly expanded; the outline suggests that it was associated with a parabolic skull. On the labial and ventral surface, a ridge-and-groove sculpture covers the dentary and splenial, which becomes more pitted anteriorly in the symphyseal area. On the dentary, just underneath the tooth row, runs the oral sulcus, one of the two main sensory canals usually found in temnospondyl mandibles (Jupp and Warren, 1986); it finishes at the level where the symphysis becomes anteroposteriorly expanded.

The sutures are quite well preserved so that it was possible to trace them with confidence. The contact between the dentary and splenial is on the ventral surface of the ramus and not visible in labial view. This contact finishes posterior to the symphysis, which is thus only formed by the dentary. Lingually the surface is poorly preserved although the splenial-dentary contact is visible low in the mandible and runs into a longitudinal groove which

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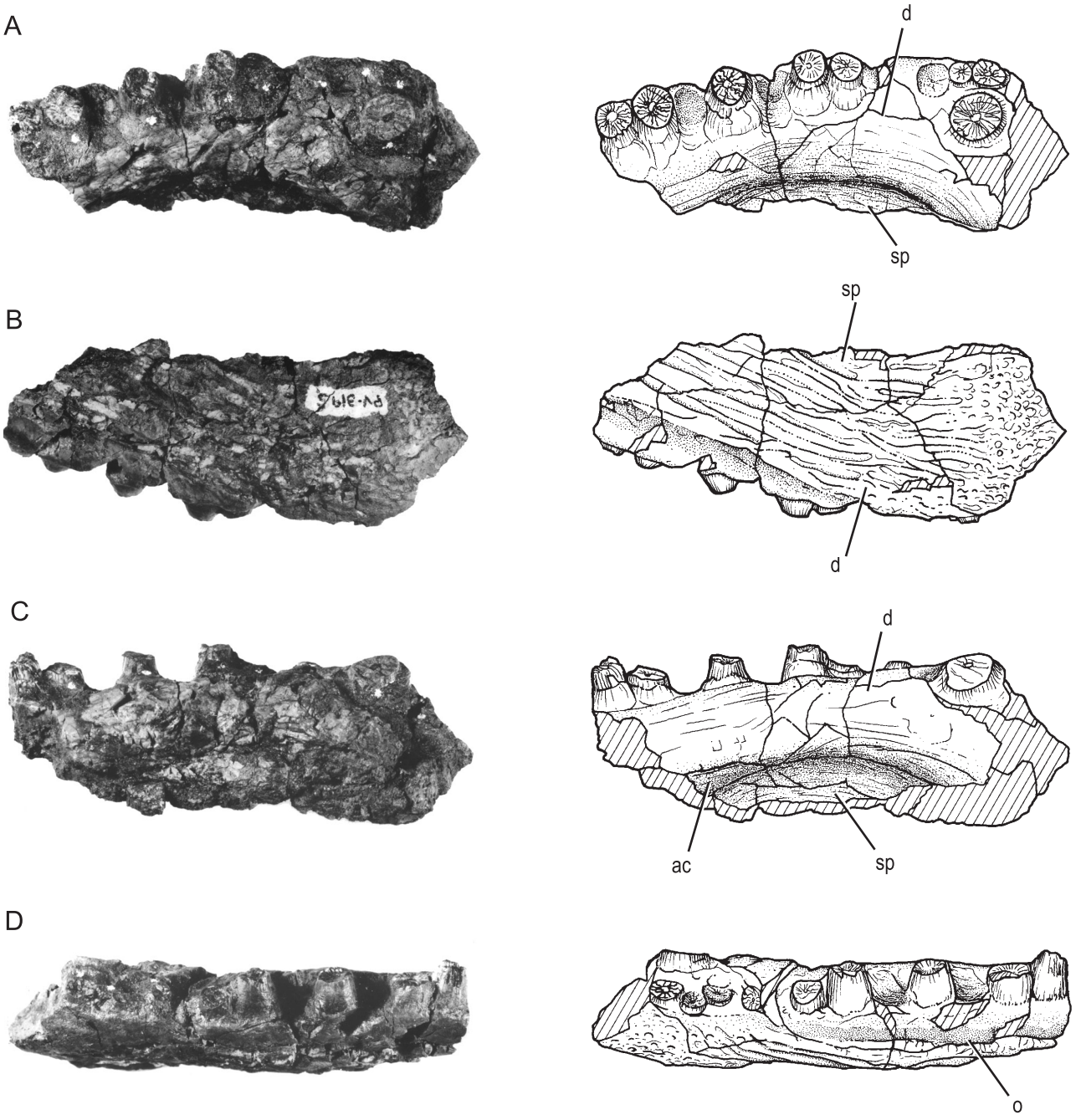

Figure 1. Left mandible MCNAM-PV 3195. A, photograph and drawing in occlusal view; B, photograph and drawing in ventral view; C, photograph and drawing in lingual view; D, photograph and drawing in labial view. Scale bar = 1 cm. Abbreviations: d, dentary; sp, splenial; ac, anterior coronoid; o, oral sulcus / *Mandíbula izquierda MCNAM-PV 3195. A, fotografía y dibujo en vista oclusal; B, fotografía y dibujo en vista ventral; C, fotografía y dibujo en vista lingual; D, fotografía y dibujo en vista labial. Escala = 1 cm. Abreviaciones: d, dentario; sp, esplenial; ac, coronoide anterior; o, surco oral.*

finishes ventral to the symphyseal tusk. Above this groove, the dentary is expanded and forms a rounded shelf just medially to the tooth row. Posteriorly in lingual view, a small part of the anterior coronoid is present and forms a V-shaped wedge between the dentary and the splenial.

In the symphysis, the expanded shelf of the dentary accommodates the symphyseal tusk, which is rounded in cross section at the level of its base. In contrast, the dentary teeth are oval in section close to their bases and become more rounded towards their tips. Eight dentary teeth are preserved and alternate with replacement pits; the teeth decrease in size towards the symphyseal area and the larger ones markedly curved inwards. When compared to the overall size of the mandible, the teeth are relatively large and few in number.

Discussion. Parabolic-shaped jaws have been previ-

ously described in the Mesozoic groups Plagiosauridea and Brachyopoidea. Plagiosaurids are Triassic temnospondyls with parabolic mandibles with a low symphysis. Nevertheless, the absence of symphyseal tusks and the presence of pustular ornament in most plagiosaurids (Jupp and Warren, 1986) precludes the specimen from Potrerillos from belonging to that group.

Within Brachyopoidea, chigutisaurids also have parabolic mandibles and, moreover, they are represented in the same levels and locality by some specimens of size similar to the material described herein (e.g. *P. mendozensis*, see Marsicano, 1999). Nevertheless, known chigutisaurids do not present symphysis comparably low and broad, and teeth as large and few in number as the new specimen from Potrerillos. The only known chigutisaurid where these features are also present is *Koolosuchus* (Warren *et al*., 1997), represented by a very large specimen from the Cretaceous of Australia. The mandibular symphysis in *Koolosuchus*, however, is formed by the dentary and the splenial, thus differing from the condition in the specimen from Mendoza.

With respect to the brachyopids, all described mandibles have a parabolic shape with an expanded and low anterior region (e.g. Warren, 1981; Damiani and Warren, 1996; Damiani and Kitching, 2003), including undescribed mandible fragments assigned to *Batrachosuchus* sp. (UCMP 140589) from South Africa (see Warren and Marsicano, 2000). Brachyopoid mandibles are not particularly abundant in the fossil record and most of the described material comes from the Lower-Middle Triassic of Africa and Australia. Mandibular remains assigned to *Batrachosuchus* sp. (Watson ,1956; Colbert and Cosgriff, 1974; Warren and Marsicano, 2000) and *B. concordi* (Chernin, 1977) were recovered from southern Africa. Additionally, new, fairly complete brachyopid mandibles associated with skull material (*Vanastega plurimidens* Damiani and Kitching, 2003 and *Bathignathus poikilops* Damiani and Jeannot, 2002) were recently described from the same area. The known Australian material includes three rather complete mandibular rami all from the Lower Triassic of Queensland (Warren, 1981; Damiani and Warren, 1996).

The arrangement of the bones in the preserved fragment from Potrerillos is similar to that figured in other brachyopid mandibles. It presents a low contact between the dentary and splenial that is barely visible in labial view as in the South African *Vanastega* (Damiani and Kitching, 2003) and the undescribed Batrachosuchus sp. material (UCMP 140589). Also, as occurs in *Vanastega* and UCMP 140589, the splenial is not included in the symphysis of the Potrerillos specimen, in contrast with some other known brachyopid mandibles as *Bathignathus* (Damiani and Jeannot, 2002) and QMF 14483 (Damiani and Warren, 1996). Moreover, the presence of relatively few large recurved teeth that decrease in size anteriorly is shared by all Gondwanan brachopid mandibles (see Warren, 1981; Damiani and Warren, 1996; Damiani and Jeannot, 2002; Damiani and Kitching, 2003).

In summary, despite the fragmentary nature of the material described herein, the structure of the mandibular symphysis and the size and distribution of the teeth allow us to conclude that it belongs to a brachyopoid, possibly a brachyopid rather than a chigutisaurid.

Paleogeographic significance

The earliest brachyopid records are from the Lower Triassic of Australia: the Arcadia Formation of Queensland, the Knocklofty Formation of Tasmania, the Narrabeen Group of the Sydney Basin, and the Blina Shale of Western Australia (Warren, 1981; Damiani and Warren, 1996; Warren and Marsicano, 1998). In contrast, the lower Middle Triassic record is much more dispersed, including other Gondwanan and Laurasian areas, as the upper Beaufort Group of South Africa (Warren and Marsicano, 2000; Damiani and Jeannot, 2002; Damiani and Kitching, 2003), the Denwa Formation of India (Sengupta, 2003) and the Moenkopi Formation of Arizona (Welles and Estes, 1969; Warren and Marsicano, 2000). The youngest brachyopid records are again more restricted as they are only known from the Asian part of Laurasia (Middle Jurassic of the Sichuan Province, China, and Upper Jurassic of southwestern Mongolia). It is evident that the brachyopid fossil record was hitherto characterized by a noteworthy gap of more than 50 million years, representing most of the Triassic and the Early Jurassic. Recently, a brachyopid phylogenetic hypothesis was combined with the known temporal distribution of the group and remarkable ghost linages were suggested in the resulting calibrated cladogram (Damiani and Kitching, 2003).

Although the new putative brachyopid is too partial to be included in a data matrix, it would constitute the first record of this group of tetrapods in South America. It also would attest to the persistence of brachyopids in Gondwana at least until the end of the Triassic thus filling part of the substantial stratigraphic gap in the fossil record of the group. Even though this new record suggests the presence of a more diverse temnospondyl fauna in this part of Gondwana during the Late Triassic, chigutisaurids are still the main component of the South American temnospondyl faunas.

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