

BRAINCASE ANATOMY OF *ARARIPESUCHUS GOMESII* PRICE, 1959 (CROCODYLIFORMES, NOTOSUCHIA) AND THE EVOLUTION OF BRAINCASE PNEUMATICITY IN CROCODYLIFORMS

J. M. LEARDI^{1,2*}, D. POL^{3*}, A. H. TURNER⁴, AND A. W. A. KELLNER⁵

¹Instituto de Estudios Andinos “Don Pablo Groeber” (IDEAN, Universidad de Buenos Aires-CONICET), Departamento de Ciencias Geológicas, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires. Intendente Güiraldes 2160, C1428EGA Ciudad Autónoma de Buenos Aires, Argentina. jmleardi@gl.fcen.uba.ar

²Departamento de Biodiversidad y Biología Experimental, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires. Intendente Güiraldes 2160, C1428EGA Ciudad Autónoma de Buenos Aires, Argentina.

³Museo Paleontológico Egidio Feruglio, CONICET. Av. Fontana 140, 9100 Trelew, Chubut, Argentina. dpol@mef.org.ar

⁴Department of Anatomical Sciences, Stony Brook University. 101 Nicolls Road, NY 11794-8434, Stony Brook, New York, United States of America. alan.turner@stonybrook.edu

⁵Laboratório de Sistemática e Tafonomia de Vertebrados Fósseis, Departamento de Geologia e Paleontologia, Museu Nacional – Universidade Federal do Rio de Janeiro. Quinta da Boa Vista s/n, 20940-040 São Cristóvão, Rio de Janeiro, Brasil. kellner@mn.ufrj.br

Recent high-resolution CT-scans of the referred specimen of *Araripesuchus gomesii* (AMNH-FR 24450; housed at the American Museum of Natural History, New York, USA) from the Santana Formation (Albian; NW Brazil) allowed a detailed study of its skull. Given the pristine preservation of the specimen, the delicate structures of its internal anatomy are preserved. Additionally, given the recent increase of CT data on fossil crocodyliforms, we evaluated the distribution and relative development of the braincase pneumaticity in the group. The braincase of *A. gomesii* is invaded by several pneumatic recesses that are highly interconnected among them, in many cases being separated by thin bony struts. This condition contrasts with that observed in non-crocodyliform crocodylomorphs (e.g., *Almadasuchus*, *Dibothrosuchus*), where these cavities are completely surrounded by their respective hosting bones. In particular, the ventral pneumatic (rostral, pre- and postcarotid, and basioccipital) recesses of *A. gomesii* are fused between them, forming an almost continuous cavity that extends from the rostrum of the basisphenoid to the level of the otic capsule. As in basal crocodyliforms like *Protosuchus haughtoni*, the eustachian foramina open directly into a large ventral recess and are not extended internally forming bony tubes that divide internally into canals (anterior and posterior communicating canals), as observed in extant crocodylians, thalattosuchians and *Rhabdognathus*. Posterodorsally, the mastoid antrum is large and is also interconnected with other dorsal pneumatizations of the skull (intertympanic, posterior tympanic and trigeminal recesses) through large foramina that are bounded by thin struts. *Araripesuchus gomesii* bears a rare condition among crocodylomorphs as some of its dermal bones (parietal and squamosal) are invaded by pneumatic cavities. These pneumatic recesses can be interpreted as an anterodorsal expansion of the mastoid antrum and intertympanic recess, as the recess on the squamosal is connected with the former and the recess on the parietal is connected with the latter. The parietal pneumatization seems to be an exclusive feature of crocodyliforms, as *Protosuchus richardsoni* and *Campinasuchus dinszi* also bear a pneumatic recess in this bone. It is important to mention that neosuchians (including thalattosuchians) lack any parietal recess, which can be interpreted as a secondary reduction in the clade considering the available information. On the other hand, squamosal pneumatizations have only been reported in some notosuchians (e.g., *Notosuchus terrestris*) and might represent an additional unique feature of the clade, even though it is not present ubiquitously among members of Notosuchia. The presence of additional cavities also shows that the degree of pneumatization was a dynamic feature among crocodyliforms. Finally, our study reports the presence of recesses (e.g., rostral and trigeminal recesses) in crocodyliforms that were previously reported only in non-crocodyliform crocodylomorphs, expanding their distribution in the clade.

*Financial support: ANPCyT PICT 2016-0265, 2018-0605.

PALEONEUROLOGY OF *ARARIPESUCHUS GOMESII* (CROCODYLIFORMES, NOTOSUCHIA, URUGUAYSUCHIDAE)

M. N. NIETO¹, F. J. DEGRANGE¹, D. POL², AND J. M. LEARDI^{3,4}

¹Centro de Investigaciones en Ciencias de la Tierra (CICTERRA), Universidad Nacional de Córdoba, CONICET. Avenida Vélez Sársfield 1611, X5016GCA Córdoba, Córdoba, Argentina. mnicolasnieto@hotmail.com; fjdino@gmail.com

²Museo Paleontológico Egidio Feruglio-CONICET. Av. Fontana 140, U9100GYO Trelew, Chubut, Argentina. dpol@mef.org.ar

³Instituto de Estudios Andinos “Don Pablo Groeber” (IDEAN), CONICET, Departamento de Ciencias Geológicas, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires. Intendente Güiraldes 2160, Ciudad Universitaria, Pabellón 2, C1428EGBA Ciudad Autónoma de Buenos Aires, Argentina. jmleardi@gl.fcen.uba.ar

⁴Departamento de Biodiversidad y Biología Experimental, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires. Intendente Güiraldes 2160, Ciudad Universitaria, Pabellón 2, C1428EGBA Ciudad Autónoma de Buenos Aires, Argentina.

Using CT-scans and 3D-modelling, the endocranial morphology of the extinct terrestrial crocodyliform *Araripesuchus gomesii*