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The climate role in the distribution of the terrestrial Cretaceous Crocodylomorpha throughout Gondwanaland

I. de Souza Carvalho ¹, Z. Brandoni de Gasparini ² and L. Salgado ³

¹ Universidade Federal do Rio de Janeiro, Departamento de Geologia, CCMN/IGEO. 21.949-900 Cidade Universitária – Ilha do Fundão. Rio de Janeiro – RJ, Brazil. ismar@geologia.ufrj.br

² Museo de la Plata, Depto. Paleontología de Vertebrados. Paseo del Bosque, La Plata 1900 – Argentina. zgaspari@netverk.com.ar

³ Universidad Nacional del Comahue, Calle Buenos Aires, 1400 Neuquén 8300, Argentina. lsalgado@uncoma.edu.ar

The terrestrial Cretaceous Crocodylomorpha from Gondwana comprises distinct groups as the notosuchians, peirosaurids, baurusuchids and the sphagesaurids. They are found overspread in Brazil, Uruguay, Argentina, Camerum, Niger, Malawi, Madagascar, China and Pakistan, in deposits of fluvial and lake environments (Bonaparte, 1986; Carvalho et al., 2005; Gasparini, 1981; Gomani, 1997; Price, 1959; Sereno et al., 2003). The oldest ones are probably Berriasian (Uiraúna Basin, Brazil), despite their diversification took place during Aptian-Albian in South America, Africa and also China. A peculiar aspect of these terrestrial crocodylomorphs is that some of them are cosmopolitan. Notosuchians are found in Brazil (Uiraúna, Parnaíba, Araripe and Bauru basins), Uruguay (Guichón Formation), Argentina (Neuquén Basin), África (Koum, Tegama and Mahajanga basins) and China (Wulong Formation). The peirosaurids occur in Brazil (Bauru Basin), Argentina (Neuquén Basin) and Madagascar (Mahajanga Basin). The baurusuchids are found in Brazil (Bauru Basin), Argentina (Neuquén Basin) and Pakistan (Pab Formation, Balochistan Province). The sphagesaurids are the unique group still restricted to South America (Bauru Basin, Brazil). According Markwick (1998) living crocodylians are climatically controlled by a mean annual temperature equal or more than 14.2°C, although local hydrological conditions play an important role, providing a buffer effect against temperature extremes. Then the extant crocodylians are limited to tropical and subtropical environments. The analysis of the distribution of terrestrial Crocodylomorpha in the Early and Late Cretaceous palaeogeographic and palaeoclimatic maps (Scotese, 2005) show a spatial distribution similarly to modern crocodylians. It indicates that temperature was the principal influence on their global distribution. Although the continentality, expressed by seasonality and increased aridity is a limiting factor to the distribution of extant crocodylians, the Cretaceous notosuchians, baurusuchids, peirosaurids and sphagesaurids are found distributed in arid climate zones during Early and Late Cretaceous. Probably they developed ecological strategies that allowed them to live in a hot and arid climate. The aridity or maybe a seasonal warm and dry climate alternated with moments of more wet periods, play a role, that have not yet been analyzed, that may justify the domain of bizarre crocodylians in Gondwana during the Cretaceous.

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