

# Recent advances and perspectives on South American fossil crocodylians

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**Abstract:** The past decade has seen major discoveries and advances on the fossil crocodylian fauna of South America. The diversity of South American gharials has expanded with the description of *Aktiogavialis caribesi* and *Gryposuchus pachakamue*. In addition, several new caimanine species have been described, with some revealing entirely new evolutionary lineages and others shedding light on the evolution of previously known groups. *Globidentosuchus*, *Gnatusuchus*, *Kuttanacaiman*, and *Caiman wannlangstoni* establish the existence of previously unknown lineages of highly specialized durophagous caimanines. Another new caimanine, medium-sized *Agresuchus pachytemporalis*, was argued to be closely related to giant *Purussaurus*, providing important insights on the evolution of gigantism and skeletal novelty among caimanines. Additionally, the taxonomy, anatomy and feeding habits of the strange caimanine *Mourasuchus* have been extensively revised. A comprehensive revision of alligatoroid phylogeny, focused on South American caimanines, shows that the durophagous ecomorphotype may have arisen up to three times in Caimaninae, although most durophagous taxa belong to a single clade. The analysis reinforces that *Purussaurus* evolved from a modest-sized generalist caimanine and a close relationship between *Agresuchus* and *Caiman*. A better understanding on the evolution of *Mourasuchus*, however, requires further assessment. Biogeographically, all South American alligatoroids included were recovered in Caimaninae; non-South American caimanines include North American *Bottosaurus* and *Tsoabichi*, Central American *Centenariosuchus*, and possibly Asian *Protoalligator*. As such, our knowledge on South American fossil caimanines has advanced significantly in the last decades, but much is yet to be done, especially on the use of most modern techniques on morphological and paleoecological studies.

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