

A toothy grin only a palaeontologist could love

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(PhysOrg.com) -- McGill and University of Sao Paulo researchers identify new species of 70-million-year-old crocodile - with really big teeth and dog-shaped head.

To McGill [palaeontology](#) professor Hans Larsson, his graduate student Felipe Montefeltro and Professor Max Langer of the University of Sao Paulo, a recently discovered crocodile fossil head looks like a dog. To the rest of us - as well as croc's prey of the day - it looks like a ferocious toothy nightmare.

Named *Pissarrachampsia sera*, the fossil was discovered by a municipal worker in 70-million-year-old Cretaceous sediments in a small town in Minas Gerais, Brazil. Sent to check it out by the Society of Paleontology in Brazil, Langer and Montefeltro realized they had something very special. The three collaborators have documented their observations in

the July 2011 issue of *PLoS One*.

Familiar with Hans Larsson's work on [crocodiles](#) and dinosaurs, Montefeltro got a study grant from the Brazilian government and brought the fossil to Larsson's lab at McGill's Redpath Museum, where they have been studying the head and finding that this remarkable terrestrial crocodile reveals almost as much as it conceals.

"Whereas modern-day amphibious crocodiles have low and flat heads, this new find gives us one of the first detailed insights into the head anatomy of this weird group of extinct crocs called *Baurusuchia* that feature tall, dog-like skulls with enlarged canines, and long-limbed body proportions," said Larsson.

Their ecology was probably similar to that of wild dogs living today. Given the number and size of their [teeth](#), the researchers believe these carnivorous crocs fed on animals of the same 15- to 20-foot size range - that is dinosaurs and fellow crocs from the region. They would have used relatively stereoscopic vision to track [prey](#) and, rather than scramble like the crocs we see today, they galloped on elongated limbs.

A sketch by Larsson imagines how this newly discovered species would have appeared in predatory motion. Though the body might seem more dinosaur in shape than today's crocodile, the fossil head carries the definitive characteristics of crocodiles from that era, including a well-developed secondary palate, socketed teeth, advanced cranial air spaces, roughened bone surfaces, plated armour, and massive attachments for jaw closing muscles.

Recent CT scans are offering more fascinating aspects of the fossil, such as its brain size and shape and hearing abilities. Baurusuchian crocs are characterized by a significant number of unique anatomical features such as low tooth counts, tall, thin skulls, forward facing nostrils, and

derived jaw-closing muscle attachments. After comparing the new species to other Baurusuchids and their relatives, the researchers noticed large gaps on either side of the fossil's morphology.

"We are dealing with an exceptionally divergent lineage of extinct crocodile diversity. There are many fossils that still need to be found to link this crocodile to those who came before and after," said Montefeltro.

Montefeltro explained that the name of this new member of the croc family pays homage to the location of the fossil's discovery. Piçarra is a regional word for sandstone and Champsa is a Latinization of the Greek word for crocodile. Sera, is Latin for late - which refers to both the circumstances in which the fossil was found, that is, it was almost left behind in a 2008 expedition because of a tight schedule and, the Minas Gerais state flag that quotes Virgil "Libertas Quæ Sera Tamen" meaning "Freedom, Albeit Late."

Though their importance for crocodyliform evolution is widely recognized, there are still a lot of questions about the internal relationships of the group not yet studied, but which all three researchers plan to explore. A digital reconstruction of the fossil's brain cavity is in the works and will be presented later this fall at the Society of Vertebrate Paleontology's annual meeting.

More information: www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0021916

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