



Study discovers species that lived 233 million years ago in Rio Grande do Sul – Brazil

Oberdan Rodrigo Schumann / 25 de abril de 2023

Paleontology | Fossils of *Santagnathus mariensis* were found in the city of Santa Maria and identified by researchers from the Graduate Program (PPG) in Geosciences at UFRGS

*Por Oberdan Rodrigo Schumann

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*Picture: Gustavo Diehl/UFRGS

Rio Grande do Sul is an important place for paleontological research, being the only Brazilian state where fossils from the Triassic period [between 251.9 and 201.3 million years ago] have been found. In at least part of that period, the map of the Earth was still formed by the supercontinent Pangea, and the territory of Rio Grande do Sul was part of an immense desert next to what we know today as the African continent. Some of the most abundant animals inhabiting the planet were the cynodonts, a large group that later gave rise to mammals.

Research by the [UFRGS Vertebrate Paleontology Laboratory](#), led by Maurício Rodrigo Schmitt, a PhD student at the Graduate Program in Geosciences (PPGGEO) from UFRGS, indicates the discovery of a new species of traversodontid cynodont (*Clade Traversodontidae*) in the Brazilian Triassic. This is the *Santagnathus mariensis*, an animal that lived 233 million years ago in Rio Grande do Sul. The identification was based on fossils found in the city of Santa Maria, donated to the University by a resident.

Published at the end of May in the [journal *The Anatomical Record*](#), the article also proposes, based on a set of characters, the validation of an Argentinian species of traversodontid, *Proxaeretodon vincei*. The study had the collaboration of Cesar Leandro Schultz, coordinator of the Laboratory, and of researchers from the Museo Argentino de Ciencias Naturales Bernardino Rivadavia and from the National Museum of the Federal University of Rio de Janeiro (UFRJ).

The right fossils for the right person

UFRGS, through the Institute of Geosciences, is one of the major paleontology research centers in Rio Grande do Sul and has a wide variety of fossils available in its [Museum](#) and, above all, in its Research Laboratories. These remains of living beings arrive at the University not only from field activities but also through donations, exactly what happened to the material that resulted in the discovery of the new species.

As he had already worked with traversodontids during his master's training, Maurício says that the fossils "fell into his lap" due to the quality of the materials and the fact that the animal's skeleton was found in practically its entirety. "The donor was a paleontology enthusiast. It's an incredible project, very good material. We didn't have to do anything physical on the fossil, just comparisons," he points out.

The *Santagnathus mariensis* fossils were collected by a Santa Maria resident in 2003 and donated to the Paleovertebrates Laboratory shortly afterwards. According to Maurício, cases of research with ancient materials are quite common. "We've had periods of great field activities in which a lot of material was collected, and some of that material ends up being left behind. There are some things (in the Laboratory) that nobody has touched, and this is one of the cases," he explains. The researcher goes on to give the example of one of his current studies, which analyzes fossils from the 1940s that have not yet been described.

In order to identify a new species, different characteristics are observed, mainly by looking at the skull. Knowledge of the species already researched in the region and in the type of rock in which the fossils were found allows researchers to make morphological comparisons and phylogenetic analyses. "If we determine that [the fossils] have sufficiently distinct characteristics, we can describe a new species," says Maurício.



Maurício Rodrigo Schmitt, a PhD student at the UFRGS Geosciences Program, is leading the research that identified the new species (Photo: Gustavo Diehl)

Validation of Argentine species

The analysis of the *Santagnathus mariensis* skull also led the researchers to propose the validation of the Argentinian species of traversodontid *Proxaeretodon vincei*. According to Maurício, this species has been known since the 1970s: "It was characteristic because it didn't have a 'ball' under the eye area, which we know as the 'jugal process', whereas the *Exaeretodon* has this well-developed process." Years after its discovery, however, *Proxaeretodon* was considered analogous to the *Exaeretodon* sp., and their difference was considered to be just a variation within the same species.

In 2019, a new species of *Siriugnathus*, another type of traversodontid, was described at the Paleontological Research Support Center of the Federal University of Santa Maria (CAPP), and one that had the same absence of this 'ball'. Finally, the new species described at UFRGS also has this absence, which drew attention during the study. "We realized that there was already a greater diversity of species with this characteristic. So, we revised the *Proxaeretodon* and, based on the analysis, we proposed that it really was a valid species."

Animals still poorly understood

Defining the forms or behavior of traversodontids is no easy task for paleontologists. At the end of the Triassic period, it is estimated that the beginning of the separation of the continents caused not only an increase in volcanic eruption, but mainly a process of extreme climate change, resulting in mass extinction. Among the cynodonts, only the *Proainognathia* group – a clade that includes the ancestors of mammals – made up of small animals, survived.

No living animal that we know of, therefore, is directly related to the *Traversodontidae* clade. One of the only certainties we have about the species is related to its diet, based on the morphology of its teeth, which might indicate a herbivorous diet. Not even the form of reproduction can be confirmed. "The most accepted thing so far is that they laid eggs. The oldest mammals we know, like the platypus, lay eggs. So, we can assume that the animals that came before them also reproduced in this way," says Maurício.

According to Maurício, the animal would have been between 1.2 and 1.5 meters long – an unofficial measurement – and had an estimated mass of between 9 and 16 kilos. The *Santagnathus mariensis* fossils found in Santa Maria account for four individuals, identified from the jaws, two of which were larger and two smaller. "We can try to assume that these four individuals may have been together, that they were father and mother. So maybe they were in small groups. But it's very difficult behavior to infer from fossil records," says the researcher.



Ribs of *Santagnathus mariensis*, part of the fossils collected in 2003 by a local resident and later donated to the Vertebrate Paleontology Laboratory at UFRGS (Photo: Gustavo Diehl)

Translated into English by **Luana Santos**, undergraduate student enrolled in the course "Supervised Translation Training II (English)" of the Undergraduate Program in Language and Literature, under the supervision and translation revision of Professor Elizamarli R. Becker (P.h.D.) – IL/UFRGS.

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