Study discovers new genus and two new species of lambaris

Called piabinhas-do-cerrado, the species is threatened with extinction. The research is carried out by professor Luiz Malabarba, faculty member of the Department of Zoology at UFRGS, the doctors Guilherme Frainer and Fernando Carvalho, and the post-doctoral fellow Vinícius Bertaco, from UFRGS

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A study published by the British scientific journal *Systematics and Biodiversity* involving four researchers from UFRGS – professor of the Department of Zoology, Luiz Malabarba; PhDs Guilherme Frainer and Fernando Carvalho; and the postdoctoral fellow Vinícius Bertaco, from the Museum of Natural Sciences of Rio Grande do Sul – describes the discovery of a new genus and two new species of piabinhas or lambaris, called piabinhas-do-cerrado. The research also reveals the threat of extinction of these species in the Brazilian cerrado.

Piabinhas-do-cerrado. Photo: Fernando Dagosta

The discovery of the new species of freshwater fish took place after a survey in scientific collections of Natural Science museums in the country was conducted and the level of threat of extinction was measured by applying the internationally accepted criteria proposed by the International Union for Conservation of Nature (IUCN). The article *Museum specimens reveal a rare new characid fish genus, helping to refine the interrelationships of the Probolodini (Characidae: Stethaprioninae)* shows the high risk of extinction of piabinhas-do-cerrado from the municipalities of Cavalcante and Teresina de Goiás, North region of Goiás.

According to Frainer, the study was based on individuals collected in the late 1980s by researchers from the Museum of Zoology at the University of São Paulo (MZUSP), and, due to the low number of specimens for description, a new scientific expedition was carried out in the region to collect more individuals and information on the habitat of these new species. "Although researchers have discovered new species in the region, no individuals of the species under study were found," he says.

Thus, the search for more information about this new *taxon* (named taxonomic unit, by which individuals or groups of species are designated) occurred in material catalogued in other national scientific collections, including the Museum of Natural Sciences of Rio Grande do Sul (MCN) of the extinct

Zoobotany Foundation of Rio Grande do Sul – currently linked to the Secretariat of the Environment and Infrastructure of the State of Rio Grande do Sul (Sema/RS). "In the MCN, surprisingly, a second species of the new genus was found. Both share a unique feature at the base of the anal fin, which may be related to reproduction, but they differ in specializations in the dentition", explains Guilherme Frainer.

Malabarba, Frainer's advisor during his undergraduate studies and one of the authors of the article, explains that taxonomic revision works review and describe species. (Taxonomy is the area of biology responsible for identifying, naming and classifying living beings. The main categories are: kingdom, phylum, class, order, family, genus and species.) "The discovery took place when a review of a subfamily of lambaris that examined the entire geographic distribution of the group was made."

This discovery started in Malabarba's master's research, in 1988, and continued with the Final research paper of Guilherme for his Biological Sciences undergraduate program between 2006 and 2010, also completed at UFRGS, when another species was found. "I have been developing this work since my undergraduate studies and, in the last 10 years, we have had a growing understanding of the kinship relations of this group, which has led me to have to adapt this work several times until now, something that I consider a positive outcome, in the sense that not only did the study mature, but I also grew as a researcher during this journey," says Frainer, now a postdoctoral fellow at the University of Cape Town, in South Africa.

Natural History Museums

Research like this is only possible because there are natural history museums. It is in such spaces that biological samples are stored and preserved so that investigations can be carried out and, as a result, species unknown to science can be discovered.

"Thanks to these preserved samples, we discovered the piabinhas-do-cerrado. Biodiversity description research is almost exclusively carried out in universities and museums. This is basic research, which does not have immediate application, but serves to recognize which species exist in Brazil, as is the case of this one," emphasizes the professor at UFRGS.

To carry out this research, material existing in museums was used, which have infinitely larger collections of what is exposed to visitors. These biodiversity samples are permanently preserved and used by scientists – such as Carvalho and Frainer –for their research. "This research work can only be done because these samples have been preserved at the USP (University of São Paulo) Museum of Zoology, and we have recently discovered more material at the Museum of Natural Sciences (MCN) of the extinct Zoobotanical Foundation of Rio Grande do Sul.

The Museum of Natural Sciences of Rio Grande do Sul has 604 thousand lots/copies distributed in 58 collections, representing the largest available collection on the diversity of the Pampa biome. The fish collection contains more than 20,000 catalogued lots, most of them composed of freshwater fish from Rio Grande do Sul, but also bringing together important material from other regions of Brazil and abroad. This collection comprises the Type Collection, with about 100 lots and more than 300 specimens, which were used in the original description of more than 30 species of fish and, for this reason, have even greater scientific value. "This collection is irreplaceable, as it contains historical records (since the end of the 19th century), including areas modified by human activity, whose original fauna and flora are now extinct," shares Malabarba.

For Frainer, the fact that the two species were found in the collections of national museums (and rare in nature today) highlights the value of these public institutions as historical guardians of biodiversity. "The Museum of Natural Sciences, although linked to Sema/RS, is totally vulnerable to decisions by the government of the State of Rio Grande do Sul, and its fate is still uncertain. The neglect of these institutions is nothing new in Brazil. The lack of constant investment and maintenance has led to irrecoverable losses of scientific and other collections at the Butantã Institute in São Paulo and, more recently, at the National Museum in Rio de Janeiro".

Brazil has the greatest biodiversity on the planet, but most of it is still unknown. This was the case of the two species of lambaris: the piabinhas-do-cerrado. "The research we do is central to any other research that is done on biological diversity; and, for that, we use the existing materials in the museums. Natural history museums are permanent records of past, present and hopefully future biodiversity. These two species are an example of this: their description was based on an analysis of material present in museums, and this happens constantly. These records serve as evidence of species that are Brazilian, collected in the national territory," praises Malabarba.

The biological collections of natural science museums store information about nature in space and time. They are essential, irreplaceable and priceless spaces for understanding the diversity of past and future life on Earth. "Current social and climate changes will only be minimized with the aid of the knowledge we have accumulated throughout history, much of which comes from historical data in museums. The discovery of the piabinhas-do-cerrado shows, once again, that public policies for environmental management in Brazil, as well as the strengthening and maintenance of public institutions dedicated to studying it, must be priorities for decision-makers," reinforces Frainer.

Studies like this contribute to the preservation of species, since it is only possible to preserve what is known. For Malabarba, if society intends to establish programs for the conservation of biological diversity, it is necessary to know the geographic distribution of the species to determine whether there is any kind of threat or not. "The conclusion that what is not seen is not valued is a disturbing one. In Rio Grande do Sul, we have the alarming example of the Museum of Natural Sciences, to which there is no clear direction by the state government – to which this body belongs – about what the future holds both for the museum's collection and the employees responsible for its preservation," says the professor.

Translated into English by Nathália Javier Lucena, under the supervision and translation revision of Elizamari R. Becker (PhD) – IL/UFRGS.