

# FISH COLLECTION

## LIT - ABAM

### The Coleção Ictiológica do Acervo Biológico da Amazônia Meridional, Laboratório de Ictiologia Tropical, Sinop, MT

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A biological collection is a historical-temporal heritage (Rocha *et al.*, 2014). The information contained in the cataloged records becomes more important when linked to correctly indexed and collected data, *e.g.*, location, precise geographic coordinates, and when these are available for analyses by specialists.

In 2008, with the intention of safeguarding northern Mato Grosso State biodiversity, the Acervo Biológico da Amazônia Meridional (ABAM), Sinop Regional Nucleus, was established, initially via a multi-institutional network, including the Instituto Nacional de Pesquisas da Amazônia (INPA), and through several research projects financed by public agencies, such as the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) and the Fundação de Amparo à Pesquisa do Estado de Mato Grosso (FAPEMAT), through the Programa de Pesquisa em Biodiversidade (PPBio). The initial project, entitled “*Biodiversidade em três áreas na Amazônia meridional: integralizando informações para subsidiar planos de conservação*” was based on the Sinop *campus* of the Universidade Federal de Mato Grosso. The ichthyological collection of the Laboratório de Ictiologia Tropical (LIT) were linked to ABAM (as Coleção de Peixes do Acervo Biológico da Amazônia Meridional, ABAM-I). In addition to fish, ABAM houses the herbarium, and collections of mammals, birds, reptiles and amphibians, insects, myriapods, soil invertebrates, and arachnids. Together these collections aim to generate and disseminate collection-linked knowledge as well as

**Figure 1.** a) Aerial view of a section of rapids that disappeared with the filling of the reservoir of the hydroelectric plant of Sinop, MT. b) Team collecting in the stretches of rapids. c) Collection of fish from *Coleção Ictiológica do Acervo Biológico da Amazônia Meridional*. d) Team of the *Laboratório de Ictiologia Tropical*, composed of students and researchers.



to simultaneously expand, integrate and maintain the regional collections (Martins, 1994), thus promoting integration with international collections containing examples of Brazilian biodiversity, as well as providing teaching materials for undergraduate, graduate and research students.

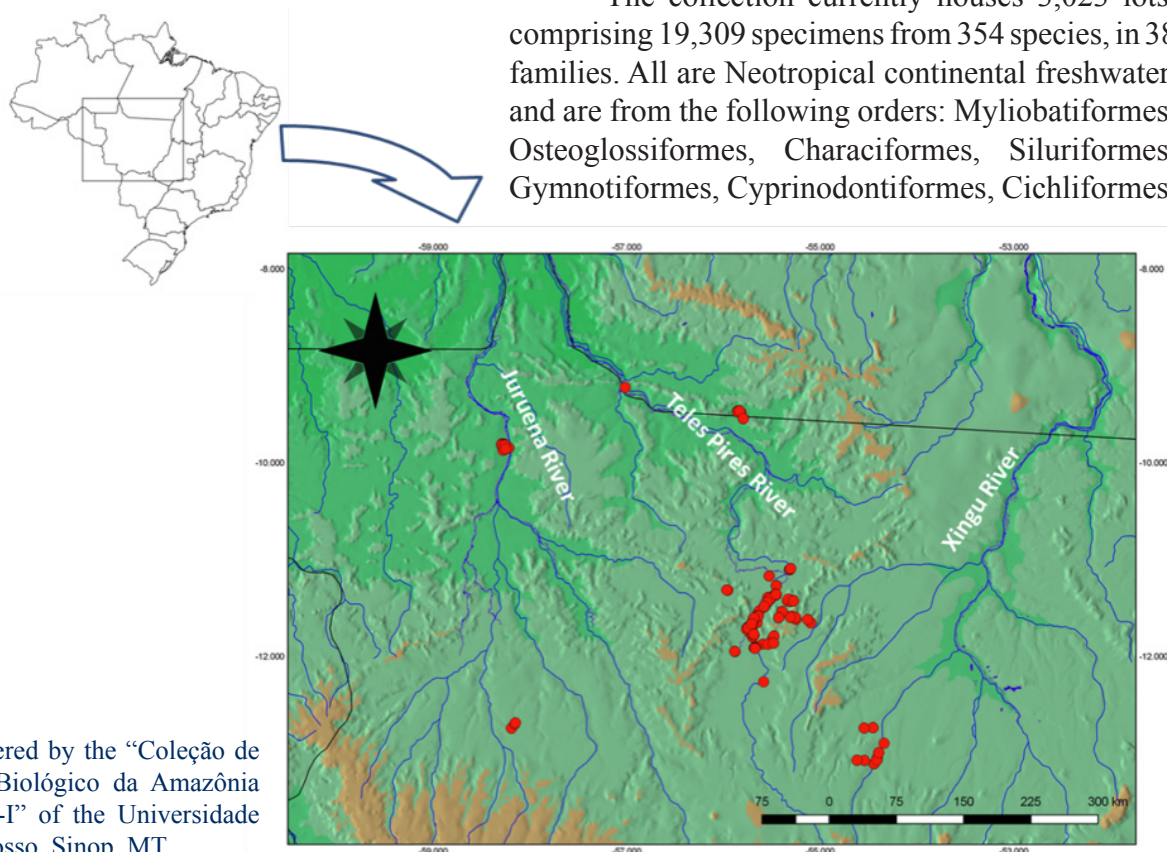
The ABAM fish collection is housed in a new building, the Laboratório de Ictiologia Neotropical (LIT) (Figure 1). The LIT combines studies of general fish biology (diet, behavior, parasitology, reproduction) (*cf.*, Tesk *et al.*, 2014; Cabeceira *et al.*, 2015; Matos *et al.*, 2016a; Matos *et al.*, 2016b; Matos *et al.*, 2017a; Matos *et al.*, 2017b; Matos *et al.*, 2018; Geoffroy *et al.*, 2018) with training of specialized human resources to work with the regional ichthyofauna (Figure 1).

Construction of LIT began in September 2018 with resources from the project: “Monitoramento da Ictiofauna da UHE Sinop”, as part of an agreement signed between the Universidade Federal de Mato Grosso, Sinop Energia and the Uniselva Foundation. Work was completed in April 2019 with approximately 200 m<sup>2</sup>. The LIT has areas for sorting collections, experimental aquaria, and microscopy, as well as housing the Ichthyology Collection. Prior to construction of these dedicated facilities, ichthyological research activities were dispersed throughout the ABAM building, at the UFMT, Sinop *campus*.

The ABAM Ichthyology Collection has as curator Dra. Lucélia Nobre Carvalho, professor at UFMT, who has had the consistent support of Dr. Fernando R. Carvalho, of Universidade Federal de Mato Grosso do Sul (UFMS), a long-term collaborator on projects and publications. Systematics from different specialties and different Brazilian institutions (*e.g.*, INPA, MZUSP, UEM, UFMS, UFPA) also have strong links to the collection. Visits by such specialists guarantees high-quality and accurate identification of taxa in the collection.

The accessions that comprise the collection are derived from field collections in the north of the Brazilian state of Mato Grosso. The focus is the mid-part of the Teles Pires River basin. This is area otherwise rarely collected (SpeciesLink, CRIA 2019), but with a potentially highly unusual diversity pattern due to its location at the interface of the Amazon- Cerrado biomes, and its biogeographically proximity to the headwaters of the Xingu and Tapajós river basins, besides its several tributaries such as Verde, Curupi, Indio Possesso and Roquete rivers, and the Baixada Morena, Selma and Caldeirão igarapés (forest streams). In addition, the collection includes material from the Estação Ecológica do Rio Ronuro, Juruena River, Parque Estadual do Cristalino and from PPBio module collection sites (Figure 2).

The collection currently houses 3,023 lots, comprising 19,309 specimens from 354 species, in 38 families. All are Neotropical continental freshwater, and are from the following orders: Myliobatiformes, Osteoglossiformes, Characiformes, Siluriformes, Gymnotiformes, Cyprinodontiformes, Cichliformes,



**Figure 2.** Area covered by the “Coleção de Peixes do Acervo Biológico da Amazônia Meridional, ABAM-I” of the Universidade Federal de Mato Grosso, Sinop, MT.

Perciformes, and Synbranchiformes. The most well-representative families are Characidae, with 1,094 lots, followed by Loricariidae, with 341 lots and Cichlidae, 227 lots. The collection is organized according to systematic order following CLOFFSCA (Reis *et al.*, 2003).

The species more abundant are: *Moenkhausia phaeonota* Fink, 1979 with 2214 specimens, *Jupiaba acanthogaster* (Eigenmann, 1911), with 1,356 specimens, *Moenkhausia lepidura* (Kner, 1858), with 1,327 specimens, *Pamphorichthys scalpridens* (Garman, 1895), with 834 specimens and *Curculionichthys luteofrenatus* (Britski & Garavello, 2007), with 770 specimens (Fig. 7). There are also fish larvae of: *Acestrorhynchus* sp., *Brycon* sp., *Hydrolycus* sp., and *Sorubim* sp. In addition, there are 1,235 tissue samples from several groups, available for molecular studies. The LIT also has a teaching collection for undergraduate use and outreach projects for visiting primary and secondary schools from the region.

Two new species have already been described from material collected in the region: *Centromochlus meridionalis* Sarmiento-Soares, Cabeceira, Carvalho, Zuanon & Akama, 2013, a small Auchenipteridae sampled from the Teles Pires river affluents, near the cities of Cláudia and Sinop in Mato Grosso State (Sarmiento-Soares *et al.*, 2013), and *Hyphessobrycon pinnistriatus* Carvalho, Cabeceira & Carvalho, 2017, a small tetra (Characidae), collected by the LIT team in the streams in “Parque Estadual do Cristalino” and Teles Pires river tributaries, also near Sinop (Carvalho *et al.*, 2017). Both species inhabit of first and second order streams in the Tapajós-Juruena ecoregion (*sensu* Abell *et al.*, 2008).

Currently, the collection contains no types. All data from the LIT ichthyological collection will soon be made available in via the collections databases (SpeciesLink and SIBBr). This will allow analysis and exchange of the material with specialists, in addition to loan of materials. Loan applications may be made to the curator of LIT.

In summary, the ABAM ichthyological collection (Figure 3) is an important collection of fish from the northern part of Mato Grosso State, with great potential for studies in fish systematics, biology and ecology of the region, and their effective conservation in the wild.

## References

Abell R, Thieme ML, Revenga C, Bryer M, Kottelat M, Bogutskaya N. Freshwater Ecoregions of the World: A New Map of Biogeographic Units for Freshwater Biodiversity

- Conservation. *BioSci J.* 2008; 58(5): 403–14.
- Cabeceira FG, Parisotto DC, Zuanon JAS, Akama A, Carvalho LN. The microhabitat, behavior and diet of *Centromochlus meridionalis*, a small catfish of Amazon streams (Teleostei: Auchenipteridae). *Ichthyol Explor Freshw.* 2015; 26(3): 221–28.
- Carvalho FR, Cabeceira FG, Carvalho LN. New species of *Hyphessobrycon* from the Rio Teles Pires, Rio Tapajós basin, Brazil (Ostariophysi, Characiformes). *J. Fish Biol.* 2017; 91: 750–63.
- CRIA (Centro de Referência e Informação Ambiental). 2019. SpeciesLink. Updated 2019 Apr. Available from: <http://www.splink.org.br/>.
- Fearnside PM, Barbosa RI. Avoided deforestation in Amazonia as a global warming mitigation measure: The case of Mato Grosso. *World Resource Review.* 2003; 15(3): 352–61.
- Geffroy B, Sadoul B, Bouchared A, Prigent S, Bourdineaud JP, Gonzalez-Rey M, De Moraes RN, Mela M, Carvalho LN, Bessa E. Nature-based tourism elicits a phenotypic shift in the coping abilities of fish. *Frontiers in Physiology.* 2018; 9: 1–17.
- Martins UR. Fundamentos práticos de taxonomia zoológica. São Paulo: Editora da UNESP; 1994. Chapter 1, A Coleção Taxonômica; p. 19–43.
- Matos LS, Silva JO, Andrade PS, Carvalho LN. Diet of characin, *Brycon falcatus* (Muller and Troschel, 1844) in the Amazon Basin: a case study on an attractant for fish in the Teles Pires River. *J Appl Ichthyol.* 2016; 32: 1080–85.
- Matos LS, Silva DR, Silva JOS, Andrade RLT, Carvalho LN. Heavy metal bioaccumulation of the characiform *Brycon falcatus* Muller & Troschel, 1844 in the Teles Pires basin, Southern Amazon. *Acta Sci Biol Sci.* 2016; 38(2): 131–38.
- Matos LS, Parisotto D, Carvalho LN. Length-weight relationship and condition factor of the Characidae matrinxã, (Müller & Troschel, 1844), in the Teles Pires River, southern Amazon. *J App Ichthyol.* 2017; 34: 724–28.
- Matos LS, Silva JOS, Beckmann M, Moreira PSA, Oliveira AS, Carvalho LN. Effect of dietary supplement (cevas) on the chemical composition of wild fish *Brycon falcatus* (Müller & Troschel, 1844) in the Teles Pires river basin. *Acta Sci Biol Sci.* 2017; 39(1): 7–12.
- Matos LS, Silva JOS, Kasper D, Carvalho LN. Assessment of mercury contamination in *Brycon falcatus* (Characiformes: Bryconidae) and human health risk by consumption of this fish from the Teles Pires River, Southern Amazonia. *Neotrop Ichthyol.* 2018; 16(1): e160106[1]-e160106[11]
- Reis RE, Kullander SO, Ferraris CJ Jr. Check list of the freshwater fishes of South and Central America. Porto Alegre: Edipucrs; 2003.
- Rocha LA, Aleixo A, Allen G, Almeda F, Baldwin CC, Barclay MVL. Specimen collection: an essential tool. *Science.* 2014; 344(6186): 814–815.
- Sarmiento-Soares LM, Cabeceira FG, Carvalho LN, Zuanon JAS, Akama A. *Centromochlus meridionalis*, a new catfish species from the southern Amazonian limits, Mato Grosso State, Brazil (Siluriformes: Auchenipteridae). *Neotrop Ichthyol.* 2013; 11(4): 797–08.
- Task A, Matos LS, Parisotto DC, Cabeceira FG, Carvalho LN. Dieta do peixe elétrico *Gymnorhamphichthys petiti* Géry & Vu-Tântuê, 1964 (Rhamphichthyidae), em riachos da bacia do rio Teles Pires, Amazônia Meridional. *BioSci J.* 2014; 30(5): 1573–1577.
- Vivo M, Silveira LF, Nascimento FO. Reflexões sobre coleções

zoológicas, sua curadoria e a inserção dos museus na estrutura universitária brasileira. *Arquivos de Zoologia*. 2014; 45:105–13.

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Name and acronym	Coleção de Peixes do Acervo Biológico da Amazônia Meridional, ABAM-I
Institution	Universidade Federal de Mato Grosso, Câmpus Universitário de Sinop
Address	Av. Alexandre Ferronato, 1200, Setor Industrial. Cep: 78557-267. Sinop, Mato Grosso, Brasil.
Curator(s) and contact(s)	Lucélia Nobre Carvalho, carvalholn@yahoo.com.br
Website	<a href="https://www.litufmtnsinop.com/">https://www.litufmtnsinop.com/</a>
Year of foundation	2010
Facilities and area of the collection	Own building, with material preparation area, equipment room with magnifying loupes and microscopes with cameras couplings for high definition imaging and videos. The building is 200m <sup>2</sup> in total area, with 65m <sup>2</sup> devoted to the collection.
Specimens habitat	100% freshwater fishes
Specimens origin	Brazil, Teles Pires river basin
Current cataloging method	Not yet.
Total number of lots and number of lots from Neotropical region	3,023
Total number of specimens and number of specimens from Neotropical region	19,309
Total number of holotypes and number of holotypes from Neotropical region	None yet
Total number of paratypes and number of paratypes from Neotropical region	None yet
Number of tissue samples from Neotropical fishes	1,247
Number of C&S specimens	None yet
Number of dry skeleton specimens	None yet

**Figure 3.** ABAM-I of the Universidade Federal de Mato Grosso, Sinop, MT.

