

FISH COLLECTION

MBML

The zoological collections at the Instituto Nacional da Mata Atlântica- INMA

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The zoological collections organized under the former Museu de Biologia Professor Mello Leitão, now Instituto Nacional da Mata Atlântica, exist since 1949. Collections of Birds were the first established, followed by Mammals, Reptiles and Amphibians. Otherwise, the fish collections were catalogued in 1987 only, by Rogério L. Teixeira, who organized the first book of records. Such an action formalized the maintenance of specimens already stored in the Museum. The older records of fishes in collections are from 1940 decade, being the ancient specimen record an *Gymnotus pantherinus* (Steindachner, 1908)- MBML 3768 – kept in 1948 by brothers Lauro and Haroldo Travassos. Together with Augusto Ruschi and a team of naturalists of his time, Travassos brothers visited northern Espírito Santo and sampled the rivers and small rivulets within dense ombrophylous forest. Those records are precious, as most of these areas are nowadays deforested, being mainly converted to pastures or large economical crops as *Eucalyptus* (Sarmiento-Soares, Martins-Pinheiro, 2012; 2013). By the end of XX Century, the most important contributors to fish collections were João Luiz Gasparini and Rogério Luiz Teixeira, and several specimens captured by them served as base to marine and freshwater species descriptions respectively (e.g. Zaluar *et al.*, 2004).

In recent years a freshwater fish collection by José Luiz Helmer was permuted with the Marine Biology laboratory at Universidade Federal do Espírito Santo- UFES.

The indexed zoological collections are now composed by vertebrates as fishes, amphibians, reptiles, birds and mammals. The entomological collections are mainly from the Espírito Santo state, composed of about 8,000 catalogued specimens not yet available for electronic consult (Braun *et al.*, 2016). Small collections of crustaceans are under organization. A didactic collection provides support in various educational activities which are already being held at the INMA, and completes the Collections Sector [Setor de Coleções- SeCol] (Tonini *et al.*, 2016).

Institutional dataset and Curatorial maintenance.

The zoological collections, including fishes, receive about ninety visitors per year, mainly from Bahia, Rio de Janeiro and São Paulo. In recent years we observed an increment on loan request. The zoological collections facilities include a guest house, to host students and researchers during their visits, which need to be scheduled in advance. A Leica stereomicroscope coupled to a computer is available for one researcher per time. Two additional stereomicroscopes for students and visitors are also available. A table for specimen photograph reproduction. Camera available for collective use. Visitors count with assistance of our curatorial team. It is important to note that neither Zoological Collections indeed have a Curator. The responsibility on guard of specimens is made by the administrative staff and collaborative researches act in curatorial management. As there is any proper curator, the increment of the fish collections along the last ten years was held by researchers temporarily joined to the institution as volunteer or associate researcher during the development of a project (Fig. 1). After the establishment of the INMA in 2014 it was possible



Figure 1. Team involved in curatorial activities of fish collection. From left to right: Lorena, Juliana, Maridiesse, Luisa, Leydiane and Renan.



Figure 2. Zoological collections presentation at the Symposium and activity interactions of our team.

to include researchers granted by the Programa de Capacitação Institucional – PCI – a partnership between the ministry MCTIC and research council CNPq. These researchers worked in the zoological collections at INMA, improving it during the validity of their respective contracts. Several research and curatorial activities take place for collections (Fig. 2). We joined to produce this presentation for the II Symposium. The formation and interchange of taxonomists advanced as these researchers develop partnerships and collaborations.

The fish collections at the Instituto Nacional da Mata Atlântica are identified under the acronym MBML. The name is kept as historically employed, and in use even after the new denomination of the former Museu de Biologia Prof. Mello Leitão to the Instituto Nacional da Mata Atlântica- INMA. The fish records are available at “SpeciesLink” of Centro de Referência em Informação Ambiental-CRIA database. Available at speciesLink (<http://splink.cria.org.br>). Contact with the staff at the Sistema de Informação sobre a Biodiversidade Brasileira (SiBBR) were not yet effective regarding the availability of on line information, and currently only botanical collections are at this platform.

Mission. Taxonomy, the science of recognizing and delimiting species, adheres to the fundamental principles of documenting natural patterns and processes, and refining existing ideas and descriptions of nature. Discoveries of new organisms together with advances in methodology continue, and the advances on integrative approaches in taxonomy, lead us to

a constant reevaluation of the boundaries between taxonomic entities (Thomson *et al.*, 2018). To attend the tendencies towards integrative taxonomic approaches, the fish collections have nowadays not only alcoholic specimens stored. Cleared and stained (C&S) specimens and frozen tissue samples are available (Fig. 3). The correct identification of a species and mapping its sampled locality is a priority task under elaboration of biological conservation systems.

Storage. Storage of specimens lots is organized numerically, kept in jars disposed on cement shelves. The reason for adoption of cement installations are explained below under Limitations section. The size of each jar is identified by number between jar I (100 ml) to jar VIII (1,500 ml). Large specimens are kept in hermetic tanks (50 l gallon).

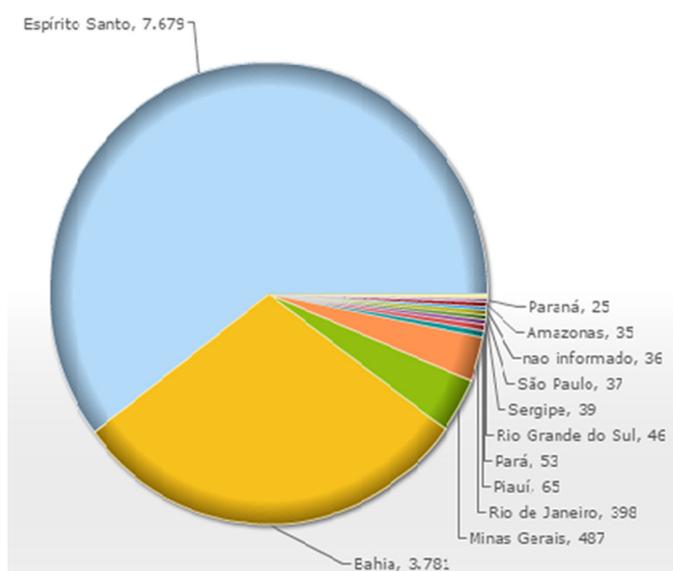
A technical manual in use for instructions, catalog and curatorial management of the fish collection is available for internal use only (Tonini *et al.*, 2015). Database available for collections permit a rapid cataloguing of material, per species, genus, family, river basin and additional metadata information.

Catalog. In June 13th. 2018 the catalogued material under fish collections corresponds to 13.262 lots, conserving 97.475 specimens, distributed in 34 orders, 140 families, 438 genera and 920 species (Fig. 4; Table 1). Among these, 120 lots need further specific identification. Fifty seven specimens correspond to primary and secondary types. Most

Table 2. Fish collections dataset.

	Freshwater	Marine	Neotropical region	Total
Number of lots	86.03%	13.97%	100%	13,262
Number of specimens	92.11%	7.89%	100%	97,475
Number of holotypes	100.00%	0.00%	100%	1
Number of paratypes	82.14%	17.86%	100%	56
Number of tissue samples	99.36%	0.64%	100%	935
Number of C&S specimens	98.84%	1.16%	100%	86
Number of dry skeleton specimens	0.00%	0.00%	0,00%	0

Current cataloging method	Software application in Access data base
Specimens origin (Brazil, Espírito Santo and Bahia)	
Major river basins of most lots (Rio Doce- ES and Rio São Francisco- BA)	


Figure 6. Brazilian states sampled in collections.

In this sense the zoological collections at the INMA remains problematic, as the pavilion with collections stored are victimized by seasonal flood of the nearby rio São Pedro. To minimize damage, cement shelves were constructed after a large flood, that inundated the collection and water destroyed wood furniture in year 2000. We recommend the convenience of immediate transfer of all the collections to a better safe place free of inundations and arranged in larger space, in order to assure its secure increment.

Perspectives. The transformation of a regional collection towards a national representative one is a progressive continued task, needing dedicated and focalized work. Although the fish collections increased in last ten years, it still keeps a strong regional representation (Silva *et al.*, 2015) (Fig. 7). About three quarters of samples in collections come

from the Espírito Santo (Fig. 6).

In the last ten years such an interchange of fishes diversified the collection with representative fishes from Sergipe, Piauí and northwestern Bahia states were most achieved through specimens replacement between collections. Nowadays collections are representative in Mata Atlântica at Rio de Janeiro, Espírito Santo, Bahia and Sergipe, covering mainly the area within ecorregion Northeastern Mata Atlântica. Punctual records from remaining Mata Atlântica states, and also a few records from Amazon and Pantanal. As an example, a single large collecting effort provided by the Ferrovia de Integração Oeste Leste is visualized at map of Fig. 7 in the remote interior of Bahia towards Tocantins State. Such a collection increased the samples from western Bahia, and nowadays the Rio São Francisco valley is well sampled in its stretch along Bahia recorded in our files.

A national representation of fish samples in collections is a matter of importance for preserved areas technicians, specialists and managers in public politics to achieve an integrated reading. Collections serve as filters to identify objects of interest to conservation, recognize indicators of biodiversity, and suggest areas for conservation and other interfaces to be employed while accessing its database.

Species conservation requires a clear understanding of what species are and what distinguishes them from each other (Thomson *et al.* 2018). As libraries of life, the zoological collections are the place we can learn lessons from the past and to be prepared for the future. We need to keep them live as representing a fundamental space of research formation as well as scientific and cultural education.

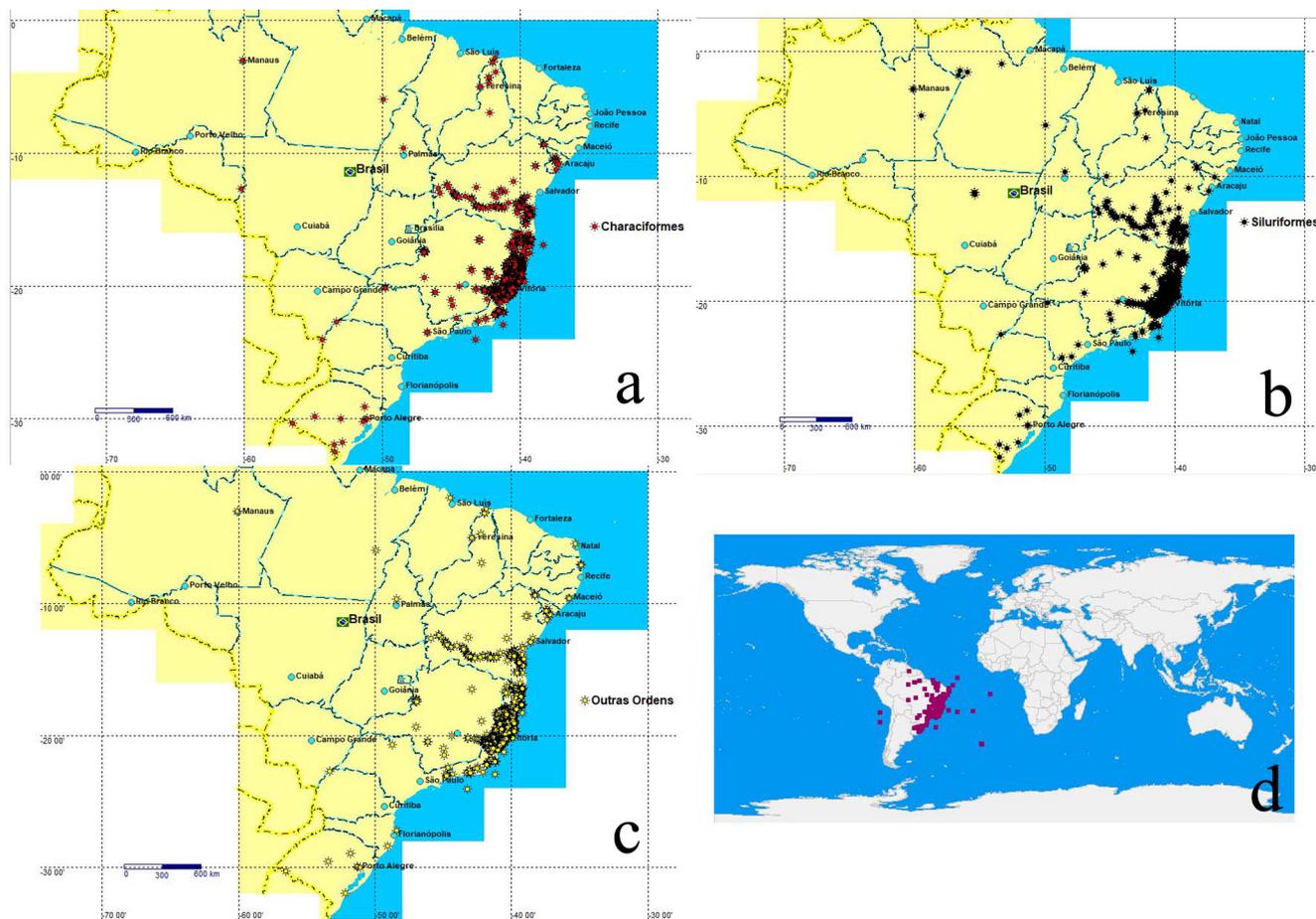


Figure 7. Map of Brazil illustrating the representative fishes in collections. a. Characiformes; b. Siluriformes; c. remaining freshwater fish orders; d. CRIA map of localities.

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Name and acronym	MBML
Institution	Instituto Nacional da Mata Atlântica [former Museu de Biologia Professor Mello Leitão]
Address	Avenida José Ruschi, 4- Centro, Santa Teresa- Espírito Santo, Brazil.
Contact	Setor de Zoologia < mbml.zoologia@inma.gov.br >
Website	Records available at CRIA http://www.splink.org.br
Year of foundation	1949
and area of the collection	Zoological sector including collections occupy an area of 190.5 m ²
Facilities	Leica stereomicroscope coupled to a computer is available for one researcher per time. Two additional stereomicroscopes for students and visitors
Number of visitors per year (averagedata)	90 visitors in collections
Number of loaned lots per year (average)	2015 - six invoices, 47 lots on loan 2016 - eight invoices, 70 lots on loan 2017 - twenty eight invoices, 196 lots on loan