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EDITORIAL

Queridas associadas e associados,
Iniciamos aqui mais uma edição do Boletim da SBI, ainda isolados fisicamente, mas sempre conectados virtualmente.

Primeiramente, gostaríamos de tratar neste editorial um aspecto bastante importante: as **Eleições para a Diretoria e Conselho Deliberativo da nossa sociedade.**

Conforme comunicamos anteriormente, em função da pandemia do novo coronavírus e do adiamento do EBI 2021, as próximas eleições para os cargos de Diretoria (presidência, secretaria e tesouraria) e do Conselho Deliberativo, que ocorrem a cada dois anos, acontecerão de **maneira remota** em 2021, por meio de plataforma *online*. No início deste Editorial explicamos um pouco mais sobre como ocorrerão as eleições. Esperamos que leiam atentamente e nos contatem caso tenham dúvidas.

VAGAS A SEREM PREENCHIDAS

1) **Diretoria:** as inscrições para eleição da Diretoria da SBI ocorrerão por chapas, as quais deverão conter os nomes dos candidatos aos cargos de Presidente, Secretário e Tesoureiro.

2) **Conselho Deliberativo da SBI:** candidatos ao Conselho Deliberativo devem se inscrever individualmente. O Conselho Deliberativo é composto por 7 (sete) membros. Duas destas vagas se encontram preenchidas por membros eleitos em 2019 para gestões de 4 (quatro) anos, e uma terceira vaga será automaticamente ocupada pela atual Presidente da SBI, assim que encerrar sua gestão. Portanto, em 2021 serão preenchidas **4** vagas para o Conselho Deliberativo, uma delas para gestão de 4 (quatro) anos (o/a candidato/a mais votado/a) e outras **3** vagas para gestões de 2 (dois) anos.

Procedimentos para a inscrição de chapas para a Diretoria e candidatos ao Conselho Deliberativo da Sociedade Brasileira de Ictiologia

As inscrições deverão ser realizadas nas duas **primeiras semanas de novembro**, entre os dias 1 e 14/11/2020. Lembramos que, de acordo com o Estatuto da SBI, **somente associados adimplentes no ato da inscrição poderão se candidatar à Direção e ao Conselho Deliberativo**. Solicitamos aos associados interessados que verifiquem se suas anuidades se encontram regularizadas junto à tesouraria da SBI, através do e-mail tesouraria.sbi@gmail.com.

As inscrições de chapas para a Diretoria devem ser feitas por meio de documento em formato PDF único, contendo os nomes e assinaturas dos candidatos à Presidência, Secretaria e Tesouraria. Esse documento deve ser enviado para contato.sbi@gmail.com, com o assunto "Chapa para a eleição SBI 2021". Apenas um dos componentes da chapa deve enviar este e-mail, colocando em cópia os outros dois componentes.

As inscrições para o Conselho Deliberativo também serão feitas através do e-mail contato.sbi@gmail.com. Nesse caso, o assunto do e-mail deverá conter "Candidatura ao Conselho Deliberativo SBI", e o nome completo do candidato deve ser indicado no próprio corpo da mensagem.

PROCEDIMENTO ELEITORAL

Será formada uma Mesa Eleitoral durante o processo eleitoral, composta pelo atual Presidente do Conselho Deliberativo, Roberto Reis, e mais dois associados voluntários, responsáveis por fiscalizar e validar o processo eleitoral. Desde já, convidamos os associados interessados em compor a Mesa Eleitoral que entrem em contato com a secretaria da SBI pelo e-mail contato.sbi@gmail.com

Por fim, ressaltamos que apenas **associados adimplentes até o dia 31 de dezembro de 2020** poderão votar. **Contarmos com a sua participação para fortalecer a nossa Sociedade nesse momento muito importante!** Para isso, é importante regularizar a sua anuidade o quanto antes. Solicitamos também que todos **confiram seu e-mail de cadastro na SBI**, na área do associado (que pode ser acessada em https://www.sbi.bio.br/pt/associados), já que a liberação para a votação será feita por este e-mail. Portanto, solicitamos a todos os associados(as) que **atualizem seu e-mail** o mais breve possível, e informem seus colegas para fazerem o mesmo.

Cronograma do Processo Eleitoral 2021 para a composição da Diretoria e Conselho Deliberativo da Gestão 2021-2023 da SBI.

Etapa	Data prevista
Contratação de plataforma online	Setembro de 2020
Inscrições das candidaturas	01 a 14 de novembro de 2020
Divulgação das chapas e candidatos ao Conselho	A partir de 16 de novembro de 2020
Data máxima para atualização dos e-mails para votação	31 de dezembro de 2020
Votação online (48 horas)	02 e 03 de fevereiro de 2021
Divulgação dos resultados	05 de fevereiro de 2021

Qualquer dúvida, caras(os) associadas(os), por favor, não hesitem em nos contatar (pelo e-mail contato.sbi@gmail.com, ou diretamente com o Roberto Reis, Presidente da Mesa Eleitoral, pelo e-mail reis@pucrs.br).

Mas agora, comentando um pouco mais desta edição do Boletim, a seção de “Destaques” traz um documento enviado à Secretaria de Aquicultura e Pesca, solicitando a proibição da coleta e comercialização de *Gramma brasiliensis*, demonstrando suas características bio-ecológicas e explicitando os impactos que a Instrução Normativa nº. 10/2020 poderá causar na espécie, já que tal normativa permitiu que sua captura e comercialização fossem liberadas, dependendo da jurisprudência estadual.

Este Boletim também conta com uma comunicação na forma de um tributo à **Dra. Mônica de Toledo Piza Ragazzo** e **Dr. Ralf Britz** pela condução do curso “Anatomia comparada de peixes – um enfoque evolutivo”, trazendo aspectos da sua criação e entrevistas com ex-alunos, demonstrando o impacto que tal curso teve em suas vidas.

Por fim, este Boletim também conta com seis belíssimos PEIXES DA VEZ, e alguns eventos online que podem interessar aos nossos associados.

Com votos de boa saúde, deixamos vocês com a leitura do Boletim.

Fiquem bem!

Um grande abraço,

Lina, Carla e Veronica
Diretoria SBI, gestão 2019-2021

BSBI nº 133 - setembro de 2020

"ANATOMIA COMPARADA DE PEIXES – UM ENFOQUE EVOLUTIVO" INTENSIVE TRAINING COURSE BRINGS ON A NEW GENERATION OF SKILLED ICHTHYOLOGISTS

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ABSTRACT

In this paper, we pay tribute to the researchers and professors Dr. Mônica de Toledo Piza Ragazzo and Dr. Ralf Britz, who conceived and have been conducting the course "Anatomia comparada de peixes – um enfoque evolutivo". Based on the interviews made and on the testimonials provided by several alumni, we consider this course as a milestone in the training of researchers in Comparative Anatomy of fishes and consequently has contributed to the advancement in systematics of Neotropical fishes. In October of 2017, Mônica and Ralf were interviewed by Kleber Mathubara and Victor Giovannetti, and permissions for the publication of the testimonials in full were granted by both researchers. Also, testimonials from participants of each one of the course's offerings along with impressions on the current landscape of anatomical studies in Brazil and world-wide are presented.

RESUMO

Neste artigo homenageamos os pesquisadores e professores Drª Mônica de Toledo Piza Ragazzo e Dr. Ralf Britz, que desenvolveram e vêm conduzindo o curso "Anatomia comparada de peixes – um enfoque evolutivo". Com base nas entrevistas e nos relatos concedidos por ex-alunos afirmamos que este curso representa um marco na formação de pesquisadores na área de anatomia comparada de peixes e por consequência contribui para o avanço da sistemática de peixes neotropicais. Em outubro de 2017, Mônica e Ralf foram entrevistados por Kleber Mathubara e Victor Giovannetti, a publicação da entrevista de forma integral foi consentida por ambos os entrevistados. Adicionalmente, relatos de alguns ex-alunos do curso e impressões dos entrevistados sobre o panorama atual dos estudos de anatomia comparada, tanto no Brasil quanto no mundo, são apresentados.

INTRODUCTION

Anatomia comparada de peixes – um enfoque evolutivo [*Comparative anatomy of fishes – an evolutionary focus*] (BIZ-5704), is a course offered as part of the Zoology Graduate Program (PGZOO) of Instituto de Biociências of Universidade de São Paulo (IBUSP). It was conceived by Mônica de Toledo-Piza Ragazzo and Ralf Britz, and its first offering was in 2007. Since then, the course was offered five other times on alternating years from 2010 to 2018, completing six offerings. A total of almost 90 students, from all regions of Brazil and including eight foreign students (from Colombia, Costa Rica, France, Peru, Paraguay, UK and USA), have completed this remarkable course. All six offerings were held at the Centro de Biologia Marinha of Universidade de São Paulo [Marine Biology Center of the University of São Paulo] (CEBIMar-USP) in São Sebastião, a municipality located in the coast of São Paulo state, where students and teachers are hosted for two weeks. The facilities provided by CEBIMar assure a highly immersive environment for the course, an aspect deemed crucial by Mônica and Ralf for the success of the course in all these years. The seventh offering of the course was scheduled to take place in April 2020, but it had to be postponed due to the COVID-19 global pandemic.

Among the alumni of the course are some that currently have research and teaching positions at universities, who have themselves strongly encouraged their own students to attend the course. Undeniably, the course has contributed to the formation of a new generation of ichthyologists working on fish anatomy in a broader perspective, not only as a source of characters for a phylogenetic study. In order to better understand the history behind the course, including how it was originally conceived and how it has been executed during the different years, Mônica de Toledo Piza Ragazzo and Ralf Britz were interviewed by Kleber Mathubara and Victor Giovannetti (both former students of the course) during Ralf's visit to Brazil in order to attend the II International Symposium on Phylogeny and Classification of Neotropical Fishes, held in Londrina in 2017. The interviews included questions about the inception of the course, the logistical challenges involved in its delivery, instructor expectations, impressions and future perspectives for the course in the upcoming years. Lastly, participants from each of the different offerings of the course were invited to provide a personal testimonial, reporting what were the impacts that the course had on their academic career.

INSTRUCTORS' BACKGROUND

- **Mônica T. P. Ragazzo:**

Mônica de Toledo Piza Ragazzo graduated from Instituto de Biociências of the Universidade de São Paulo (IBUSP) in 1988 and later studied as a master's student under the supervision of Professor Naércio Menezes at the Museu de Zoologia de São Paulo (MZUSP). At first, she was not quite sure about studying fishes, but then she was hooked by the idea of developing a "systematic and detailed type of work"; something that Dr. Menezes described as disciplined and contemplative. Her master's project was on the taxonomy of the characiform genus *Acestrorhynchus* Eigenmann & Kennedy, 1903, the same genus that Menezes had studied during his Ph.D. Initially, Mônica had to manage her available time between a teaching job in an elementary school and her master's project, but later she later obtained a fellowship from FAPESP (Fundação de Amparo à Pesquisa

do Estado de São Paulo – São Paulo State scientific funding agency), and dedicated her time exclusively to the project until its completion in August 1992. Regarding that period, Mônica stressed how important her experience at the MZUSP was, saying "I consider that I learned all the fundamental aspects about collection curatorship and taxonomic work during those two years... it gave me confidence".

> Mônica started pursuing a doctorate degree abroad, and eventually her application was accepted by the graduate program of the City University of New York. She started her graduate studies under the supervision of Dr. Melanie Stiassny, Curator at the American Museum of Natural History (AMNH), New York, in September 1992. At that time, Professor Mario de Pinna, currently at MZUSP, had almost completed his Ph.D. in New York, and he helped Mônica with the application process, although they only met in person after she arrived in the U.S. She mentioned that during the brief period they interacted at the AMNH, Mario became a close friend and had an important role in helping her to understand basic aspects about Phylogenetic Systematics.

Mônica also pointed out the impact of Dr. Richard Vari from the Smithsonian Institution (USNM) in her formation: "Rich Vari was a reference for me over there (U.S.); he was extremely supportive throughout the period I lived in the U.S. and his work had a great influence on the way I would do my own". Mônica traveled to Washington D.C. several times to meet Dr. Vari to discuss her thesis. After finishing her Ph.D. in June 1997, Mônica went back to Brazil, and received a research grant from FAPESP to start her postdoctoral fellowship at MZUSP, in October 1997. In August 2000, she took up a teaching and research position at Departamento de Zoologia, IBUSP.

- **Ralf G. Britz**:

Ralf Britz recalls that his interest in fishes started when he was seven years old, after he got his first fish tank "I just absolutely loved keeping fish, looking at fish". In the beginning, his interest was mostly from an aquarist's perspective, but within the context of a committed fascination for nature. He signed up for a Biology degree and graduated in one of the

smaller but oldest universities in Germany, Tübingen. Interestingly, Ralf was first drawn to the study of genetics, and he actively pursued genetics courses. After a week in the lab, he knew that genetics was not his thing, one of the reasons being: he found the actual work boring and not so attractive because things could not be seen or touched.

> Later, he became fascinated by Zoology courses, dissecting animals and exploring character evolution, and applied for a specialization in Zoology. He explained the course routine saying: "We called it '*Grosspraktikum*' which means a dedicated laboratory-based course and it was the whole semester, every day, ten hours doing something. In my case, zoology, vertebrates, meant dissecting (...) the whole semester, only vertebrates, only dissecting and talking about different character systems and how they compare". During his specialization, he had the opportunity to dissect different kinds of animals, mainly mammals, forming groups with other students and learning together. He also took additional courses taught by Dr. Gerhard Mickoleit, Willi Hennig's colleague, who introduced Ralf to character evolution and phylogenetic systematics through practical classes with animals. Ralf stressed that these were really intense but very good courses, which gave him a solid basis in comparative vertebrate and invertebrate anatomy and phylogenetics.

Ralf conducted his masters and Ph.D. in Germany studying fish anatomy, specifically anabantid ontogeny in the context of bony fish development. While he was attending a European Ichthyological Meeting in the Netherlands, he met Dr. Melanie Stiassny (AMNH). On that occasion, Dr. Staissny told Ralf about the Collection Study Grants offered by the AMNH that allowed a week-long visit to their collection. He applied for the grant, got it and went to New York; that was his first flight ever and his first time in the U.S. About that experience, Ralf said "it was all very scary, if you come from a small place like Tübingen then you know, these high rises buildings are really, really scary".

> During one of the last couple of days of his visit, Ralf heard from Dr. Stiassny about a guy in Washington D.C. who was really interested in using ontogenetic series in order to

understand the homology of several structures in fishes. At that time, Ralf was studying the development of labyrinth fishes (Anabantiformes). Then, he booked a train ticket to Washington D.C. and spent a couple of hours at the Smithsonian Institute (USNM) talking to Dr. G. David (Dave) Johnson, both collaborated in many papers since. After finishing his Ph.D., Ralf applied for a postdoc at the AMNH and in 1995, he left Germany to spend a year working with Dr. Stiassny. Ralf later got a position as an assistant professor in Tübingen until 2004 when he started working as a researcher at the Natural History Museum in London where he would stay until 2019. Then, he took up a position at the Senkenberg Natural History Collections in Dresden, Germany.

- **Mônica and Ralf: from a friendship to the course**

Mônica and Ralf met in 1995 in New York, and at that time Mônica had already passed the qualifying exams and was totally immersed in her Ph.D. project on Characiform fishes, family Cynodontidae. Ralf had just arrived there to start his postdoc. About her impression of Ralf, Mônica said “he was someone who knew a lot about fishes and was really enthusiastic. He had some aquariums in his office at the AMNH and always wanted to show us something”. Ralf was working on ontogeny and, at that time, Mônica was clearing and staining fish specimens for her phylogenetic study.

At first, Mônica was insecure about dissecting and accidentally ruining the material due to her lack of experience in this procedure. She told us that one day Ralf came to her and said: “Come here, it is simple'', and it took him what looked like just five minutes at the time to dissect a specimen. Then, he turned to her and said, “that’s it, go ahead, now you shouldn’t have much of a problem”. After this, she saw the importance of overcoming her initial difficulty. This story is just one example of how Ralf was always willing to help, he also encouraged her to work on questions related to fish reproduction and ontogeny. That was the beginning of a friendship between them.

Figura 1. Mônica and Ralf along with Marcelo de Carvalho (gray t-shirt) and James Van Tassel (white t-shirt) in New Orleans during JMIH in 1996.

At that time, Dr. Marcelo Carvalho was also a Ph.D. student at the AMNH, and the three of them spent a lot of time together. Their daily routine included chats, meals, coffee breaks (Fig. 1) and rollerblading in Central Park during the summertime. During some of those chats, Ralf told them about his background, especially about the vertebrate anatomy course in Germany, and Mônica mentioned that there was nothing like that in Brazil. Mônica told Ralf that based on her experience in Brazil, students learned anatomy on their own, reading papers and examining and dissecting specimens. For example: "I was working on Characiformes, then I followed the work of Weitzman (1962) on the osteology of *Brycon meeki* while exploring the osteology of my own group of interest."

Having learned fish anatomy on her own, Mônica still felt a great gap in her knowledge that limited her to propose and tackle other questions in fish systematics. In her job interview for an academic position at IBUSP, Mônica was asked: “If you get the position and have to propose a course, what would you like to teach?” She promptly answered that she would like to teach fish anatomy, one of those “heavy” courses. The emphasis on the word ‘heavy’ is because, in her opinion, the best courses she took were those in which students were required to work hard in order to learn and pass the course. The idea of filling this gap in the anatomical training of new students, combined with the close friendship formed between Mônica and Ralf were the first steps towards the making of the course.

In 1996, Ralf accepted a position as Assistant Professor at Tübingen and went back to Germany. One of his responsibilities was to teach the fish section of the same vertebrate anatomy course that he had taken as a student years ago. Ralf and Mônica kept in contact during this period, nurturing the idea of giving a similar course in Brazil. Ralf spent six years teaching in Germany and then was invited by Dave Johnson to spend two years (between 2002 and 2004) in Washington D.C. working on fishes at the USNM as a senior visiting researcher. At the end of these two years in Washington D.C., Ralf applied for a position at the Natural History Museum in London in 2004 and became a researcher at the museum. This was a decisive moment and Ralf contacted Mônica: “Now I have a permanent job, it’s a research job. I don’t have any teaching responsibilities. I’ll be happy to develop this course with you and teach it”. Thus, the first offering of the course took place in 2007.

THE COURSE

“Anatomia comparada de peixes - um enfoque evolutivo” is an intense, specimen-based course on fish anatomy held at the Centro de Biologia Marinha da Universidade de São Paulo (CEBIMAR). The present format of the course is two weeks long (with the exception of the first edition in 2007 that lasted for three weeks, with the weekends off), Mônica and Ralf agree that this change was fundamental to the immersive aspect of the course. Most of the time is filled with laboratory classes in the morning and afternoon; lectures are kept to a minimum. The main focus is on specimen

dissection and examination and students are able to improve their dissection skills, examine specimens from several different groups, and discuss character evolution of several anatomical complexes (skeleton, musculature, nerves, main blood vessels) in an evolutionary context (*i.e.* fishes as stem vertebrates). The first week of the course is devoted to the dissection of specimens of Elasmobranchii (sharks and rays), which represent the more plesiomorphic arrangement of soft tissues (muscles, nerves and main blood vessels). During the second week, due to students' choice in almost all offerings of the course so far, the main focus is on the skeleton of representatives of bony fishes (Teleostei) and their modifications along the fish phylogenetic tree. In some offerings the students opted to further explore the musculature instead of the skeleton. The students are evaluated by means of two oral exams using the specimens that they worked on during the course. Students are also encouraged to present short lectures on several anatomical complexes and structures intermittently during the laboratory classes. So far, six offerings of the course have been completed, and almost 90 students from South America, the United States and United Kingdom have attended the course (Fig. 2). Over the years, this course has become a catalyst of the formation of ichthyologists.

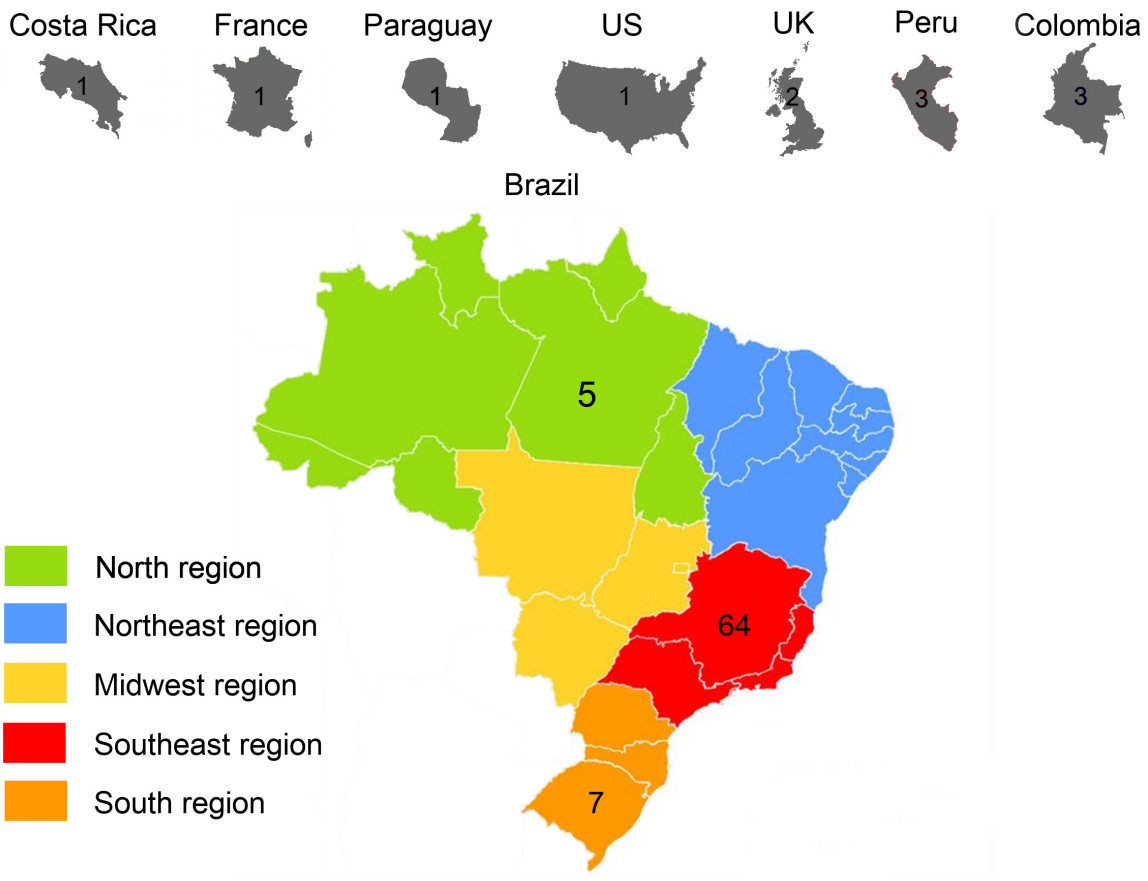

Figura 2. Map depicting the number of students that attended the course by region of Brazil (considering their institutions) and foreign students.

- **Challenges of the course**

According to Mônica and Ralf, the main challenges for the first offering of the course were acquiring the adequate biological material and choosing the workspace where the course would be held. At that time, IBUSP did not have a taxonomically and phylogenetically representative teaching collection of fish skeletons neither was the collection at MZUSP, which was constituted mainly by ostariophysans, which was not ideal since Mônica and Ralf needed a broader phylogenetic representation for the course. Obtaining shark specimens to dissect turned out to be more difficult than previously imagined. A few specimens of sharks and rays for the first two offerings of the course came from the teaching collection at IBUSP, and the remaining were donated by colleagues from different institutions. For the following four course offerings, specimens were imported from a North American company (Carolina Supplies) specialized in the supply of biological teaching material.

> Most of the fish skeletons used during the course were prepared specifically for it, in order to achieve a better taxonomic and phylogenetic representation for this purpose at IBUSP, and complementary material came from the dry skeleton collection of MZUSP. Eduardo Mattos (a former technician at the Departamento de Zoologia of IBUSP) was responsible for the preparation of most of the dry skeletons for the first offering of the course, most of which continue to be used. Mônica highlights the importance of high-quality technical support in the university. About this topic, she stated: “It takes time and dedication to prepare good specimens for study purposes, and availability of good material makes all the difference in courses of anatomy (...) That is one aspect that we can still improve.” Many of the cleared and stained specimens used in the course were prepared by Mônica for another course on Actinopterygii systematics, previously taught by Mônica and Dr. Pinna at MZUSP.

According to Mônica, so far there have not been any major difficulties in obtaining financial support to cover Ralf’s expenses to come to Brazil. This was made possible through a program for foreign visiting professors held by the Office of Graduate Studies (in Portuguese, PRPG) from USP in 2007, 2010, 2012 and 2018. In 2014 and 2016 Ralf´s trip was funded

by the Zoology Graduate Program from IBUSP through the Academic Excellence Program (in Portuguese, PROEX/CAPES). Lodging for all students at CEBIMar in São Sebastião, for the two weeks of the course, has been funded by IBUSP since the first offering of the course. This makes the course more inclusive, allowing students that would not be able to attend otherwise. However, travel costs to São Paulo still are an obstacle for students from other regions of Brazil and abroad.

> The fact that the course is presented in English in its entirety proved to be an obstacle for several students in varying degrees. Ralf always tried to make it clear that he was not an English native speaker either, that he would repeat as many times it was necessary in order to make every student understand. Mônica was always ready to bridge any gaps that might appear due difficulties with the language

Ralf pointed out that another challenge faced in each of the course's offerings was knowing when to stop. About this he said: "Comparative vertebrate anatomy doesn't have a limit; you can go wider, there are so many taxa you can look at, you can look at so many character systems. So, you have to decide what you actually will do." Because of his previous experience teaching a fish course in Germany, he already had a good idea of which topics he would like to cover in terms of chondrichthyans as representatives of plesiomorphic vertebrates, the basic arrangement of muscles, skeletal elements, nerves, and blood vessels. On bony fishes, he mentioned that they could not cover the same basic arrangement of one species, but instead, they would focus on a single character system and see how it has been modified in evolution. According to him, most students choose to investigate the skeleton in most of the cases. However, in some of the offering of the course the second week was focused on myology.

> As each offering attracts a new and heterogenous group of students, Ralf and Mônica felt a need to adapt how much information was presented in each offering of the course according to the profile of each student group. The level of detail has changed over the years depending on the course

and on the demands of its students, but every person that took the course heard the characteristic speech from Ralf: “I am the source of information and you will decide when you had enough.”

Mônica and Ralf both agree that the CEBIMar facilities in São Sebastião are the perfect location for holding the course because “it creates an atmosphere and classes can become very intense which is very good, because we do it every day.” During the first offering of the course, students had the weekends off, which Ralf thinks was not an advantage. He stated, “people start doing something else, their minds are occupied with other issues, and doing it every day over the weekend for two weeks, including weekends, makes sure that the students stay focused on the topic.”

- **Impressions and expectations**

On the expectations regarding the impact that the course would have on the students, Mônica commented that believed from the start that they would enjoy getting in touch with Ralf and expanding their minds. She also emphasized that the course also had a great impact in her formation as both an ichthyologist and a teacher and that she has learned a lot from this course. About this she said: “I try to use some of his teaching strategies in the classes that I teach, as to how to approach some subjects, trying to start from real evidence” and added “it is difficult to escape from the context in which you had your earlier academic development, we have to learn other ways, and that [the course] was enlightening for me.”

They both highlight the psychological impact of the course on the students, considering how immersive and challenging it is. Mônica pointed out that Ralf’s personality is really suited for it, saying “he approaches people with his firm and demanding posture. He brings a different cultural aspect from what we are used to.” Mônica argued that even being playful and approachable, Ralf is “extremely serious about the object of study” and “he has this really strong cultural background from the Germanic school, which he brings with him.”

> Mônica emphasizes the theoretic-practical aspect of the course in linking basic concepts with real specimens. Topics of the course are also taught in regular undergraduate courses on vertebrate zoology, but the approach is totally different. Mônica also attributes the great success of the course to its immersive environment that is only possible in the way it is currently done (*i.e.*, students studying and learning together for two weeks). She further commends the simplicity of the course using specimens, drawing in the blackboard using no high-tech approach. “We don’t need any fancy 3D imaging to teach.”.

To Ralf, the positive side of giving the course in Brazil is the number of students interested in keeping the course alive, making it last and impacting others. Ralf said: “there was a demand and we had the product that fitted this demand, so we were able to sell it.” When asked about the negative sides of giving a course in Brazil, Ralf remembers none as long as there were some good beers to drink during downtime.

> To Mônica, the positive impact in terms of student development goes beyond Brazilian borders. Systematic ichthyology is historically strong in Brazil and recently many students from other South American countries have been attracted to graduate programs in Brazil and have taken the course. Also, according to Mônica: “The course provides a solid basis on fish anatomy in a short period of time.” After the course, everyone gets back to their realities, their own projects, “but the little seed was planted, now it is up to them to water it.”.

Mônica highlights the horizontal interaction between students during the two weeks of the course as one of its best features, this encourages contact between people at the same stage of their careers and the opportunity to form future professional partnerships. She hopes that the students perceive this opportunity, “and realize that they can use it to make collaborative projects move forward.” She finishes, saying: “the impact of the course is more than just to provide training in anatomy,

it expands academic horizons." Ralf adds "as long as there are students and Mônica can get the funding to support the course, I am more than happy to come and teach." (Fig. 3).

Figura 3. Mônica and Ralf at the beach at CEBIMar in 2010.

Students and their impressions

In this section, we list all the students that took the course in each of its offerings. We also invited some of them to provide short testimonials on how their experience during the course was and how it might have impacted their careers and projects.

First offering – 2007 (Fig. 4): Aléssio Datovo da Silva; Aline Felippe Pasquino; Anderson Daniel Ramos; Andre Luiz Netto Ferreira; Carine Cavalcante Chamon; Fernando Apone; George Mendes Taliaferro Mattox; Ilana Fichberg; José Luís Olivan Birindelli; Kevin Conway; Leandro Melo de Sousa; Luciana Finotti Tosin; Marina Vianna Loeb; Micheli Ferrari Beccari; Murilo de Carvalho.

Figura 4. Class of 2007 during an introductory lecture from Ralf. From left to right: Aline Felippe Pasquino, Micheli Ferrari Beccari, Luciana Finotti Tosin, Marina Vianna Loeb, Aléssio Datovo da Silva, Murilo de Carvalho, Kevin Conway, Ilana Fichberg, Carine Cavalcante Chamon, George Mendes Taliaferro Mattox.

From this class we invited Professor George Mattox (Universidade Federal de São Carlos - Campus Sorocaba, UFSCAR), who still collaborates with Mônica and Ralf, to share some of his experiences and insights on the course.

> "I took the course in its first offering, in 2007. During the course I tried, as did my colleagues, to take part in the experience as much as I could, from the rich practical classes dissecting specimens, to the theoretical discussions, presentations and seminars. I consider the great synergy between the students of high importance, probably enabled by the dynamics promoted by the course, concentrating the students in an "isolated" environment and for a good amount of time for total immersion on the course subjects. This synergy certainly permitted a better appreciation of the course by all parties, both students and professors.

At the time, I was halfway into my Ph.D. term and could, through the course, build a solid practical and theoretical framework that would help me on my own data collection (osteological and myological) of my group of interest (Characiformes: Characinae). The course was, without doubt, really positive in this sense. In addition, the scientific rigor was constantly encouraged along the course, and I tried to incorporate this aspect in my professional career, both on the preparation and dissection of specimens, and on the scientific foundation of my observations and interpretations in my research.

Also, partially as a result of the course, I consolidated my academic collaboration with Dr. Mônica Toledo-Piza, my Ph.D. supervisor, who would come to be my supervisor during my post-doc. A good part of my scientific output was made in collaboration with Prof. Mônica. A year after the course I also started to collaborate with Dr. Ralf Britz which culminated in research internships abroad under his supervision during my post-doc, between 2010 and 2013. Since the course, the three of us took part in several research projects, scientific expeditions, academic meetings and published five papers as co-authors. Both researchers are part of a current FAPESP project coordinated by me.

Regarding specifically Dr. Ralf Britz, I believe that we always had a good relationship. During the course, when we were getting to know each other, the seriousness and professionalism with which he conducts the course and science in general caught my attention. His academic rigor was evident in his lectures, always filled with knowledge and a constant pursuit of scientific excellence. These are also values that I have learnt to pursue in my own career. One year after the course I was able to briefly visit the collection of the Natural History Museum in London as a side project and we started to think about a possible collaboration. In 2010,

when I went back to England once again, I did a brief internship in Dr. Britz's lab, examining an ontogenetic series of *Heterocharax* that was relevant to my group of study (Heterocharacinae). Dr. Britz has always been very thoughtful every time he hosted me in his lab, always making sure that my visits were as pleasant and fruitful as possible. The following year I went back to Dr. Britz's lab, that time already with a post-doc grant from FAPESP, focused on the osteology of the miniature fish *Priocharax* and on the development of the skeleton in Characiformes. During my post-doc, there were two periods of internship in his lab, the first one for roughly four months in 2011 and the second for approximately five months. On both occasions, Dr. Britz has encouraged me to take part in all academic events in the Museum, resulting in a unique experience in my career. Also, at that time, Dr. Britz made an academic visit to Brazil, also funded by FAPESP, when we had the opportunity to take part in a field work expedition to the Rio Negro in the Amazon. During this period, we developed some scientific projects as co-authors, some of them already published, strengthening our collaborations and friendship that remain active to this day."

We also invited comments from Professor José Luís Olivan Birindelli (Universidade Estadual de Londrina, UEL), who developed a course on fish anatomy partially inspired by Mônica and Ralf's course.

"I took the course in July 2007, when I was in the second year of my Ph.D. If I am not mistaken, it was the first offering of the course, and at the time it lasted for three weeks (with the weekends off). I did my masters between August 2004 and July 2006, Ph.D. between august 2006 and July 2010 and my post-doc between August 2010 and December 2012, when I was hired by Universidade Estadual de Londrina as a Zoology professor. I currently teach the course Zoologia 6 (Amniota) to undergrad students, and a course for graduate students on fish comparative anatomy.

The course was special in some aspects, from which, personally, the following deserve to be highlighted: The course takes place at the amazing base of CEBIMar/USP, it was clearly a good thing to be only few meters away from the beach every day; The course gathered students from different places enabling the exchange of experiences and newly acquired knowledge; Ralf's knowledge of fish anatomy is evident, especially regarding higher groups; Ralf is a provocateur, along the course he made sure to be provocative with the students, always challenging methods being used in current research projects and papers, including studies that a great part of the class was developing at the time. He also required that the students presented published papers in some of the classes, and there were oral exams at the end of each week, resulting in some terror about who would pass the course and who would not. And some of the students actually failed the course. This had a positive side because it encouraged us to study a lot. The seclusion provided by the course made the students get acquainted with each other, made us interact more and took us away from day-to-day life. This atmosphere combined with Ralf's encouragement towards us to study made fish anatomy the focus of our lives for those three weeks.

The course was important for my comparative anatomy studies (the studies on the swim bladder, for example) and during the preparation of my thesis. The course made me realize that anatomy is learned through practice. There is nothing better than comparing skeletons. I use this strategy a lot in my undergrad (comparing skeletons of different reptiles, for example) and graduate courses. I have been teaching a graduate course on the same subject as Ralf's course: Anatomia comparada de peixes.(Comparative Anatomy of Fishes) I taught this course at UEL (with

great engagement of UEM students) in 2012, 2013, 2014 and 2016. In 2015, I taught this course at MPEG. The course is partially based on Ralf's course and partially on Mônica's orientations, who teaches a similar course for undergrad students and takes part in Ralf's courses. I contacted Mônica before I started teaching my course for the first time and her guidance and orientations helped me to adapt the course to a shorter period and mainly focused on osteology."

Second offering – 2010 (Fig. 5): André Luis da Silva Casas; Andrea de Carvalho Paixão; Barbara Borges Calegari; Fernando Camargo Jerep; Fernando Cesar Paiva D'Agosta; Henrique Rosa Varella; Lívia Medeiros Cordeiro; Manoela Maria Ferreira Marinho Koh; Mariangeles Arce Hernandez; Mateus Costa Soares; Rodrigo Antunes Caires; Rodrigo Kenji Nakagawa; Thiago Nilton Alves Pereira; Veronica Slobodian.

Figura 5. Class of 2010 in a group photo at the beach at CEBIMar. From left to right: André Luis da Silva Casas, Fernando Cesar Paiva D'Agosta, Thiago Nilton Alves Pereira, Fernando Camargo Jerep, Lívia Medeiros Cordeiro, Manoela Maria Ferreira Marinho Koh, Rodrigo Kenji Nakagawa, Mariangeles Arce Hernandez, Henrique Rosa Varella, Mateus Costa Soares, Barbara Borges Calegari, Veronica Slobodian, Rodrigo Antunes Caires Motta, Andrea de Carvalho Paixão.

From this class we invited Professor Manoela Maria Ferreira Marinho Koh (Universidade Federal da Paraíba, UFPB) who collaborated with both Mônica and Ralf after taking the course.

> "My interest in the course came with the stories from its previous class (2007). I took the course in 2010, during the first year of my Ph.D., and it certainly helped me on the osteological analysis that I had proposed in my project. The course approaches fish anatomy in a deep and intense manner, which is essential for those who intend to work in the area. Ralf is extremely didactic and is never satisfied until all the questions raised are solved. Mônica is always supportive towards the students, making sure it all runs smoothly. This was the environment in which some ideas to deepen the analysis of my Ph.D. project appeared. In 2011, Ralf, Mônica, George Mattox and I were part of a field trip to the middle Rio Negro aiming to collect small fishes. On that occasion, we matured the ideas raised during the course. During the following year I took an internship under Ralf's supervision at the National History Museum in London, when I started some projects on development and miniaturization of fishes. This partnership was of great value to my development as an ichthyologist. Ralf is extremely passionate about research, detail driven and, clearly, stubborn – characteristics that make him an exceptional fish anatomist! His papers are motivational and have been inspiring a generation of Brazilian ichthyologists."

We also invited Barbara Borges Calegari, who is an employee at Pontifícia Universidade Católica do Rio Grande do Sul (PUC-RS).

"The idea of taking Ralf and Monica's course, encouraged by several colleagues, was welcomed with a mix of fear and excitement at first. I knew the high level of detail and demand that the course entailed and that it would be a great challenge for a masters' student at that point. But I also knew the amount of knowledge framework that this course would add in my career, so there I went.

The course had very intensive day-to-day classes, where you could experience in detail everything that you always wished to learn in fish, from every muscle, type of scales, nerves, osteological structures, physiology, all systems (circulatory, respiratory), but it goes much further. Ralf has the ability to get everything in a large-scale context with an evolutionary view, comparing the studied traits and structures between and within large groups of fishes, discussing the homology, origin, ontogeny, functionality, embryology and everything that is important to understand evolution. Ralf wanted us to go beyond learning concepts and functions, he motivated us to construct the knowledge from examining specimens, thinking about the principle of how, why, and when the morphological changes happened in evolutionary terms. I must say that he is tireless in helping the students until each and every question is solved and understood, it does not matter how simple it might seem.

The course sometimes got difficult and mentally tiring because of the amount of information delivered, but it also provided a great sense of proximity and closeness within the student group and the professors, allowing great friendships to be formed, which we'll carry for life. The high level of the course also pushed us to challenge our own limitations, encouraging insights in self-knowledge and self-growth. I gained a lot of values that motivate me to improve the quality of my studies. Mônica's role in this course was fundamental from the start, including the organization of the schedule, the careful preparation of the biological material used in the dissections, all support to students including help with the English language and her patience to translate or to explain the same questions many and many times. Her understanding of morphology of fishes complements and exemplifies many evolutionary scenarios described by Ralf during the classes.

The information and skills acquired along the course have greatly contributed to the achievement of goals in my work. I learned to constantly seek explanations, beyond the basic research line, not being limited to regular questions. This course was undoubtedly transformative for me, contributing to my basic knowledge in ichthyology, which I will always use as an initial point in my research. I encourage anyone who wants to deeply learn about fishes to take Ralf and Monica's course.".

Third offering – 2012 (Fig. 6): Akemi Shibuya; Carolina Rettondini Laurini; Flávia de Figueiredo Petean; Guilherme Moreira Dutra; João Paulo Capretz Batista da Silva; Maíra Portella Ragno; Maria Laura de Souza Delapieve; Marina Barreira Mendonça; Murilo Nogueira de Lima Pastana; Pedro Pereira Rizzato; Priscila Camelier de Assis Cardoso; Sarah Thazia Viana de Figueiredo; Thiago Silva Loboda; Tulio Franco Teixeira; Victor Giovannetti.

Figura 6. Class of 2012 in a group photo at the beach at CEBIMar. From left to right: João Paulo Capretz Batista da Silva, Victor Giovannetti, Maíra Portella Ragno, Murilo Nogueira de Lima Pastana, Akemi Shibuya, Thiago Silva Loboda, Maria Laura de Souza Delapieve, Tulio Franco Teixeira, Carolina Rettondini Laurini, Priscila Camelier de Assis Cardoso, Guilherme Moreira Dutra, Flávia de Figueiredo Petean, Sarah Thazia Viana de Figueiredo, Pedro Pereira Rizzato, Marina Barreira Mendonça.

From this class, we invited Professor Priscila Camelier, (Universidade Federal da Bahia, UFBA).

> “I heard about Mônica and Ralf’s course as soon as I joined the fish division in MZUSP. I applied to it as soon as I started to attend Ph.D. disciplines, because anyone who sets foot in the fish division is informed: “you have to take this course!” This course is a watershed for the formation of an ichthyologist. It is the honest truth.

I attended the course in 2012, it was the second discipline that I took during my Ph.D. I can say without a doubt, it was the best discipline that I took in my entire life, including disciplines across my academic career. Talking about the course and trying to explain my experience is practically impossible given the complete immersion it provides and the wide variety of topics it covered.

> The setting provided by the course in which everybody is sleeping, waking up together, having breakfast, lunch and dinner together, learning together. We breathe fish, breathe fish anatomy, breathe comparative anatomy. All this immersion makes the course an experience that simply could not be described; it must be lived.

As I had some language barriers, I was insecure before the entire process and at the beginning of the course, but this issue was quickly solved. First, because Mônica, so kind, always able to resolve and to intervene in any language barrier. Second, I do not know how other students’ experiences were, but to me Ralf has always been dear, really understanding and patient. He always made me comfortable with my English mistakes, explaining more than once. I guess that insecurity was my greatest obstacle, but it was quickly handled with some help from Mônica and Ralf.

As I mentioned before, this discipline was a watershed for my formation as an ichthyologist, it certainly was, now I look at comparative morphology and evolution of fishes in a different way. Certainly, as a professional, it made me rethink didactic strategies applied in a discipline. Despite Mônica and Ralf's course being extremely dense, I cannot imagine how it would be taught in any other way. Today as a professor, when thinking about the disciplines that I teach, this course always comes to my mind as a model, inspiring me to give my classes, especially those related to comparative anatomy. And not to mention that this discipline opened wonderful doors, not only in a professional point view, but personally as well, which I regard almost as important, if not more than from the professional point of view. Today I have true brothers and sisters, and it all started in Mônica and Ralf's course, to me this is priceless, no "parhypural" can pay for this friendship that I built.

I am extremely thankful, both professionally and personally both to Ralf and Mônica for providing me the opportunity to live this wonderful experience.".

Fourth offering – 2014 (Fig. 7): Alaina Cristine Rosa; Ana Cláudia dos Santos; Arieli Matheus Cherobim; Breno Neves de Andrade; Caio Isola Dallevo do Amaral Gomes; Diego Francisco Biston Vaz; Emanuel Bruno Neuhaus; Jéssica Teske; Maria Del Carmen Paradeda Gonzalez; Mariana Frias de Campos; Renan Andrade Moreira; Thierry Salmon; Willian Massaharu Ohara.

Figura 7. Class of 2014 in a group photo in the lab where the classes took place at CEBIMar. From left to right: Breno Neves de Andrade, Ana Cláudia dos Santos, Maria Del Carmen Paradeda Gonzalez; Mariana Frias de Campos; Arieli Matheus Cherobim, Thierry Salmon, Caio Isola Dallevo do Amaral Gomes, Renan Andrade Moreira, Jéssica Teske, Emanuel Bruno Neuhaus, Alaina Cristine Rosa, Willian Massaharu Ohara, Diego Francisco Biston Vaz.

From this class, we invited Renan Andrade Moreira, Ph.D. in Zoology from Universidade de São Paulo (USP).

"The course 'Anatomia comparada de peixes – um enfoque evolutivo' was undoubtedly the most outstanding of all graduate disciplines. I have applied everything that I learned to my academic life in the design and development of classes and research projects. In so many ways, discussions raised during the course were crucial in my Ph.D., as they made me reinterpret much of the data and helped present a much better end result. I just have to thank Mônica and Ralf for the opportunity to attend this course which in the end seems to have been little for the amount of content and almost endless discussions. Thanks are also due to Mônica for making this opportunity possible."

Fifth offering – 2016 (Fig. 8): Aline Nayara Poscai; Allan Pierre Bonetti Pozzobon; Arturo Angulo Sibaja; Dahyes Felix Regasso; Dario Ruben Faustino Fuster; João Pedro Trevisan dos Santos; Kleber Mathubara Leite; Kole Matthew Kubicek; Lucas Romero de Oliveira; Nicole Estefania Ibagon Escobar; Paola Cristina Roque Lemes; Priscila Madoka Miyake Ito; Sonia Vanessa Meza Vargas; Vinícius Corrêa Espíndola; Viviane Monteiro Silva Kupriyanov.

Figura 8. Class of 2016 in a group photo in the lab where the classes took place at CEBIMar. From left to right: Dahyes Felix Regasso, João Pedro Trevisan dos Santos, Sonia Vanessa Meza Vargas, Paola Cristina Roque Lemes, Allan Pierre Bonetti Pozzobon, Aline Nayara Poscai, Lucas Romero de Oliveira, Kleber Mathubara Leite, Kole Matthew Kubicek, Nicole Estefania Ibagon Escobar, Dario Ruben Faustino Fuster, Priscila Madoka Miyake Ito, Viviane Monteiro Silva Kupriyanov, Vinícius Corrêa Espíndola, Arturo Angulo Sibaja.

From the fifth class we invited Kole Kubicek, who is a Ph.D. student under the supervision of Kevin Conway (who also took the course in its first offering) in the Department of Wildlife and Fisheries Sciences and Biodiversity Research and Teaching Collections, Texas A&M University.

"I first learned about the course from Dr. Kevin W. Conway, my graduate adviser who had attended the class the first year in which it was taught, and from Ralf while collaborating with him on research in London. As someone who is interested in the comparative anatomy of fishes, I was very excited when the opportunity presented itself for me to attend the course in 2016. I have taken comparative anatomy courses in the United States in which students simply learn to identify and memorize anatomical structures, gaining only a superficial understanding of anatomy. Ralf and Mônica go further by presenting the material of this course in such a way that you do not just simply learn to identify the different components of anatomical systems but gain a true understanding of how these components interact and function (*e.g.* which nerves, muscles and skeletal components contribute to opening the jaws; the uptake of oxygen through the gills) via hands-on dissection, examination and student led discussion. We also addressed and discussed relevant topics to the field of comparative anatomy such as homology and phylogenetic systematics. We were regularly encouraged to think for ourselves and not to blindly accept information without questioning its validity. The experience I gained from this course has been incredibly useful to my research on the early development in fishes and has helped me to solidify that this is the field I wish to continue to pursue.

As a citizen of the U.S., my experience extended beyond just the course itself as this was my first time to travel to Brazil. From the moment I arrived I felt incredibly welcome and everyone that I met was more than happy to help out with my inability to speak Portuguese. I was able to meet several great people and friends who I am happy will be my future colleagues in the ichthyological community. I was also regularly encouraged to try many of the local (and I might add some of the best) foods during my time in São Sebastião. Since taking the course, I have kept in contact with several of my fellow classmates and was fortunate enough to be able to see everyone again on a second trip to Brazil in 2017. My experience during the duration of the course has been one of the best opportunities I have ever had and due to its intensity and rigor it has by far been the most informative and applicable course that I have ever taken. I strongly encourage anyone who is given the chance to attend."

We also invited Sonia Vanessa Meza-Vargas, Ph.D. student at Museu de Ciência e Tecnologia da Pontifícia Universidade Católica do Rio Grande do Sul (PUC-RS) to share her experiences and insights about the course.

"I was informed about the course through colleagues that had already taken the course (*e.g.*, Emanuel from MNRJ, Barbara and Maria Laura from PUCRS) as well as from comments from my teachers suggesting that I should take the course. Along with all of that, came the personal opinions that said that the course was quite demanding, hard and that it was taught entirely in English. It almost seemed like they were advising me not to take it, but all the comments were always followed by something like "but it is really good, you have to take it" or "despite all of that it was one of the best courses I ever took". I tried to be objective at that time, already knowing it was not going to be easy.

When I got there, at the beginning, I paid close attention to everything people have told me, but after a while I stopped worrying. Besides, it was not as people had warned me. Professor Mônica really helped me stop worrying because she was really accessible, and as the days went by, I realized Ralf was also quite accessible (contrary to what I have been told). It seems that the course was changing as time went by and I really enjoyed the offering I was part of.

At the end of the day it was nothing like what I have been told, it was much better. It was quite demanding, most of all because it is a lot of information for a short period of time, but I really enjoyed it. Now I strongly advise my colleagues to take the course, including those from abroad."

Since my Ph.D. project is focused on molecular data I wanted to give as much importance to the morphological aspect as I could, and taking the course helped me to learn and consolidate some information and concepts. This was one of the reasons why I took the course, regardless of the project focus. I think that anyone who wants to become an ichthyologist must take courses such as this one to help in their basic foundation. I also realized that it was important to make new professional connections, we were not only getting new information from the professors but learning from each other as well."

Sixth offering – 2018 (Fig. 9): Ariane Standing; Arthur de Lima Oliveira e Silva; Carolina Santos Vieira; Cintia Oliveira Carvalho; Daniel Pires Coutinho; Emilia Welter Wendt; Erika Zolcsák de Sousa; Gustavo A. Ballen; Junior Alberto Chuctaya Vasquez; Karla Diamantina de Araújo Soares; Lorena Soares Agostinho; Manuela Dopazo de Vasconcellos Leão; Nathalie Amorim Fernandes; Paulo Presti; Sergio Alexandre dos Santos.

Figura 9. Class of 2018 in a group photo in the lab where the classes took place at CEBIMar. From left to right: Gustavo A. Ballen, Junior Alberto Chuctaya Vasquez, Paulo Presti, Emilia Welter Wendt, Sergio Alexandre dos Santos, Arthur de Lima Oliveira e Silva, Daniel Pires Coutinho, Lorena Soares Agostinho, Manuela Dopazo de Vasconcellos Leão, Cintia Oliveira Carvalho, Carolina Santos Vieira, Nathalie Amorim Fernandes, Karla Diamantina de Araújo, Erika Zolcsák de Sousa Soares, Ariane Standing.

From this class, we invited Junior Alberto Chuctaya Vasquez, Ph.D. student at the Universidade Federal do Rio Grande do Sul (UFRGS).

> "I am from Peru, currently doing my Ph.D. in UFRGS. The first time I heard about the course from professor Mônica Toledo in 2014, during a field expedition in the Peruvian Amazon and I realized the importance of taking this course if I were to work with fish taxonomy. That was one of my goals. I took the course in 2018 and it was a great experience, I have never had a course on fish anatomy, so practically everything was new to me. I recognize that the course changed the way I saw morphology. Studying muscles, bones, and nerves of different fishes for nearly 12 hours a day for almost three weeks is a unique experience.

Every day I learned new things, many of them impressive. The course was taught in such a sequence that facilitated learning. We started with external characteristics such as ampullae of Lorenzini, then musculature, followed by nerves and how the muscles are innervated, then studying the skeletal system of some actinopterygians and lastly the circulatory system. I highly recommend taking this course, I will be always grateful to Ralf and Mônica for it. It definitely opened doors for me, to seek more knowledge, to ask lots of questions, to acknowledge the importance of the study of fish anatomy with evolutionary, descriptive and ontogenetic focuses, and to make sure that all of this knowledge is shared with less experienced ichthyologists. This testimonial is too short to express how important this course was to me."

FINAL CONSIDERATIONS

Ralf and Mônica express their concern about the future of anatomical studies in Brazil and worldwide. In Ralf's opinion, morphology has been coming under pressure from other disciplines since the start of the twentieth century. Despite the pressure, morphology has survived. He referred to Molecular Systematics as a 'new threat' arguing that many positions that were held by morphologists are being replaced by molecular systematists, who might not have an appreciation for anatomy or the organism itself. Mônica also said that we are "in a changing world in which people are getting distant from the organisms. They are becoming secondary".

Mônica believes that Brazilian Ichthyology has a strong tradition in taxonomic and phylogenetic studies. The study of fish anatomy was predominantly towards the gathering of characters and character states for phylogenetic studies. In her opinion the course and Ralf's experience brought another perspective to the study of fish anatomy, a much broader one, focused on character complexes evolution rather than relationships among lineages. About her own experience she said: "During the 90´s we learned anatomy in the context of the paradigm of Phylogenetic Systematics and our goal was to propose characters to build and analyze character matrixes. From there, Brazil has become a hub for anatomical studies, mainly because of our huge biodiversity and because we still have people interested on working on it.".

To Mônica, it would be interesting to have other courses like this covering other groups of vertebrates. So far, the course was attended by students whose research interests are focused on fishes. To Mônica, students working with other vertebrate groups could also benefit from taking the course: "the course has fishes as the study object, but it goes way beyond that. It is about learning how to think in systematics and evolutionary terms, to discuss homology questions, (...) to think about things, even how to do science.".

Students that took the course are disseminating the knowledge across the country and trying to adapt similar courses to their own realities. Many alumni still work on ichthyology and are already employed. A brief survey using Lattes and ResearchGate platforms was carried out in order to access how many of the alumni of the course are still working in academia. The subjects were considered academically active if their profiles showed updates or activity in either of the two cited platforms since the start of 2019. This survey pointed out that from the total of 88 alumni, 73 of them, roughly 84%, are still active and involved in academia in some capacity. Of those, 18 (20.5% of the total) are still carrying out their master's or Ph.D. projects, whereas 21 of them (23% of the total) have research and/or teaching positions. A great number of former students

were at the II International Symposium on Phylogeny and Classification of Neotropical Fishes (Fig. 10), which made Ralf realize the impact of the course on these people. Mônica stated that “time will tell what will remain of all of this”.

Well, we can say that it is already telling. As alumni of the course the authors would like to acknowledge the effort and care with which Mônica and Ralf planned and executed the course throughout all these years and would like to assure them that it has been of huge importance for several of its participants, thank you. The authors would also like to take this opportunity to acknowledge that this text is opinionated and subject to bias in the perspectives of the authors and the interviewees. We do not, in any shape or form, intend to homogenize the experiences of the almost 90 alumni based on our own.

Figura 10. Mônica, Ralf and the alumni of the course who attended the II International Symposium on Phylogeny and Classification of Neotropical Fishes in Londrina in 2017.

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Steindachneridion scriptum (Miranda Ribeiro, 1918)

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Figura 1. *Steindachneridion scriptum*. Fotografia de Weferson J. Graça

Nome popular: Suruvi, sorubim, surubim, surubim-letra, bocudo.

Informações gerais: *Steindachneridion* Eigenmann (1919) é um gênero da família Pimelodidae, composto por seis espécies que estão distribuídas pela América Latina (Fricke *et al.,* 2020). Dentre elas, destaca-se *Steindachneridion scriptum (*Miranda Ribeiro, 1918) por apresentar valor comercial e importância na pesca para comunidade indígena Kaingang, da bacia do rio Tibagi (Tommasino, 2002) e comunidades ribeirinhas locais, além do grande potencial para piscicultura (Baldisserotto, Gomes, 2005), uma vez que possui comportamento dócil, fácil manejo e resistência a baixas temperaturas (Meurer, Zaniboni-filho, 2000).

Identificação: *Steindachneridion scriptum* é um peixe de grande porte e corpo alongado (Shibatta *et al.,* 2002), com comprimento total de 77,4 cm (Garavello, 2005) porém, já foram encontrados exemplares de 90 cm e sete kg (Zaniboni-filho *et al.,* 2004). Há indivíduos semelhantes à este porte depositados no Museu de Zoologia da Universidade Estadual de Londrina (MZUEL). Possui coloração acinzentada, com o abdômen esbranquiçado e manchas pretas alongadas ou estriadas irregularmente distribuídas pelo corpo, de formato vermiculado. Suas nadadeiras também apresentam coloração escura, semelhante ao corpo, lábios finos e barbilhão maxilar longo (Garavello, 2005).

Biologia: essa espécie tem preferência para biótopos mais profundos com leitos rochosos e após corredeiras (Agostinho *et al*., 2008). Apresenta atividade noturna e hábito alimentar piscívoro (Meurer, Zaniboni-filho, 2000). *Steindachneridion scriptum* é uma espécie migratória, realizando suas migrações moderadamente para reprodução, com desova de dezembro a fevereiro (Zaniboni-Filho, Schulz 2003).

Distribuição: é conhecida para as bacias dos rios Uruguai e Alto rio Paraná (Miranda Ribeiro, 1918; Fricke *et al.,* 2020).

Conservação: segundo o Livro Vermelho da Fauna Brasileira Ameaçada de Extinção (2018) esta espécie consta na categoria "Em Perigo" de extinção para todo o território brasileiro. Em relação às listas estaduais a espécie é considerada como "Criticamente em perigo" para os estados de Minas e Rio Grande do Sul, "Ameaçada" em São Paulo, "Vulnerável" no Paraná e "Em Perigo" em Santa Catarina (ICMBIO, 2018). *Steindachneridion scriptum*, juntamente com outras espécies migradoras, estão presentes na cascata de reservatórios do rio Paranapanema, porém em baixos números. O declínio de espécies migradoras mostra que o sistema de reservatórios tem interrompido a migração a longa distância (Orsi *et al.*, 2016; Jarduli *et al.*, 2020). Como *S. scriptum* é uma espécie de regiões de corredeira, a construção de barragens a afeta ao provocar a mudança do ambiente lótico para lêntico, alterando seu habitat e seus eventos migratórios de reprodução (Agostinho *et al*., 2008; ICMBIO, 2018). Para que seja possível arquitetar planos de manejo e conservação da espécie, sugere-se que haja mais pesquisas sobre a biologia de *S. scriptum* e que indivíduos com boa variabilidade genética sejam mantidos em centro de conservação de espécies.

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Eucinostomus argenteus Baird & Girard, 1855

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Nome popular: Carapicu.

Informações gerais: *Eucinostomus argenteus* Baird & Girard, 1855 popularmente conhecida como "Carapicu", apresenta grande importância ecológica e econômica, sendo utilizada como isca por algumas comunidades pesqueiras (Leão, 2016). Contudo, as espécies deste gênero apresentam-se morfologicamente pouco diferenciadas, tornando difícil sua identificação e determinando grande problemática taxonômica para o grupo devido à sobreposição de caracteres morfológicos (Jacobina *et al*. 2019).

Identificação: os representantes do gênero *Eucinostomus* caracterizam-se como espécies de pequeno porte, podendo atingir tamanho até 30 cm (Smith, 1997). *Eucinostomus argenteus* possui a boca protáctil, sulco pré-maxilar continuo e estreito, e oito rastros na parte inferior do arco branquial. As nadadeiras dorsal e anal possuem sua base revestida de escamas, sendo a dorsal composta por 9 a 10 espinhos, enquanto a nadadeira anal possui três espinhos e 8 raios; a nadadeira caudal é homocerca bifurcada (Menezes, Figueiredo, 1980; Nelson, 2006). O corpo se apresenta achatado lateralmente, de coloração prateada e coberto por escamas ciclóides, com a presença de uma linha lateral fina, escura e bem delineada que corre longitudinalmente em toda a sua extensão.

Biologia: pertencente à família Gerreidae, *Eucinostomus argenteus* é uma espécie estuarino-marinha de pequeno porte e médio , com dieta diversificada, alimentando-se de pequenos organismos como invertebrados bentônicos e organismos zooplanctônicos (FAO, 1974; Menezes, Figueiredo, 1980; Cervigón, 1993; Nelson, 2006; Denadai *et al*. 2012) Além disso, também têm papel importante na cadeia trófica em determinados ambientes, segundo Vasconcelos-Filho (2001). Sua reprodução ocorre geralmente no verão, nos meses de outubro a dezembro, principalmente em manguezais, sendo que este ecossistema se apresenta frequentemente como um habitat de transição, no qual podem ser encontradas principalmente formas juvenis e larvais (Chaves, Otto, 1999).

Distribuição: a espécie é amplamente distribuída pelo continente americano, podendo ocorrer nas costas do Oceano Pacifico, desde a Califórnia até o Peru, e no Oceano Atlântico, desde os Estados Unidos até o sul do Brasil, ocupando principalmente águas rasas de praias arenosas, lagoas costeiras, manguezais e estuários (Eschmeyer *et al*. 1983; De La Cruz-Agüero *et al*. 2015).

Conservação: os componentes deste grupo de organismos apresentam grande importância na pesca comercial, artesanal e esportiva, principalmente na região Nordeste do Brasil onde são bastante apreciados para o consumo humano (Bezerra *et al*. 2001). Sua capturada ocorre grande quantidade por diferentes tipos de artefatos de pesca, além de utilizada como isca para outros peixes (Cabral-Solis *et al*. 2007), esta espécie encontra-se descrita como "pouco ameaçada", segundo a lista vermelha mundial de espécies ameaçadas da IUCN (IUCN, 2015).

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RAIA-SANTA, EMPLASTRO

Rioraja agassizii (Müller e Henle, 1841)

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Nome popular: Raia-santa, Emplastro.

Informações gerais: as raias da espécie *Rioraja agassizii* são conhecidas popularmente no Brasil como raias-santas e estão descritas como componentes da família Arhynchobatidae (Vooren *et al.*, 2018). Essa espécie é considerada endêmica do Oceano Atlântico Sul Ocidental e caracteriza-se como uma espécie costeira, sendo encontrada em ambientes de fundos lamosos, arenosos ou pedregosos. A reprodução é contínua ao longo do ano, sendo observados picos diferenciais na proporção de fêmeas ovadas durante a primavera (Oddone, Amorim, 2007a). O tempo gestacional é de seis a sete meses. Alimentam-se de poliquetos, pequenos peixes ósseos (Bornatowski, Abilhoa, 2012), com predileção por crustáceos, principalmente anfípodes (Vooren *et al.*, 2018).

Identificação: os representantes de *Rioraja agassizii* são morfologicamente caracterizados por possuírem cortina nasal com formato quadrangular e aba nasal em forma de foice, com a presença média de 23 aguilhões caudais nas fêmeas e 19 nos machos. Apresentam coloração dorsal geralmente castanho-clara e uma mancha negra na extremidade ventral do focinho (Gomes *et al.*, 2010), com a presença de dois ocelos claros localizados um em cada lado nas nadadeiras (Bornatowski, Abilhoa, 2012).

Biologia: as raias, seguindo o padrão biológico dos elasmobrânquios, encontram-se entre as espécies com maior risco de extinção devido a aspectos biológicos particulares do seu ciclo de vida (Walker, Hislop, 1998), destacando-se o longo período na fase juvenil e descendência pouco numerosa. *R. agassizii* apresenta maturidade sexual de oito anos para machos e seis anos para as fêmeas, sendo de 20 anos a longevidade média para indivíduos de ambos os sexos. A espécie é ovípara (Oddone, Amorim, 2007a), apresentando processo de reprodução caracterizado pela deposição dos ovos já fecundados que apresentam projeções semelhantes a chifres na casca, com produção média anual de 124 cápsulas ovígeras. O comprimento total médio dos machos é de 30 cm, podendo eventualmente atingir até 40 cm (Vooren *et al.*, 2018).

Distribuição e habitat: *Rioraja agassizii* é endêmica das águas litorâneas do Atlântico Sul Ocidental, ocorrendo nas plataformas sul e sudeste do Brasil entre os Estados de Espírito Santo e Rio Grande do Sul e norte da Argentina (Menni, Stehmann, 2000). Por se tratar de organismo de vida costeira, habita a região da plataforma continental com distribuição batimétrica inferior a 130 metros de profundidade, com preferência por águas temperadas (Oddone *et al.*, 2007b).

Conservação: a espécie é muito requisitada no meio pesqueiro e sofre intensa ameaça à sua conservação, determinada pela pesca de emalhe e de arrasto-de-fundo recorrentes na plataforma continental brasileira, bem como pelo fato da espécie ser capturada com fins comerciais, para exportação principalmente para a Ásia. Devido às condições de sobrepesca ocorridas na região sul do Brasil, uma situação de quase esgotamento dos estoques foi registrada entre 1980 e 2005, o que levou a um declínio de cerca de 50% da abundância original (Ferreira *et al.*, 2010). Os estudos têm mostrado uma baixa resiliência desta espécie às atividades pesqueiras em razão da taxa anual de mortalidade estar acima do máximo sustentável (Casarini, 2006). Neste contexto, a espécie se encontra em estado de risco, estando classificada atualmente na Lista Vermelha da IUCN (União Internacional para a Conservação da Natureza) como "vulnerável" e pelo ICMBio (Instituto Chico Mendes de Conservação da Biodiversidade) como "em perigo" (Vooren *et al.*, 2018). Neste contexto, é de extrema importância a continuidade do monitoramento das capturas e a identificação e proteção de regiões críticas ao longo de toda a sua área de ocorrência, objetivos presentes no Plano de Ação Nacional para Conservação dos Tubarões e Raias Marinhos Ameaçados de Extinção no qual *R. agassizii* está inserida.

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Leporinus unitaeniatus Garavello, Santos, 2009

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Figura 1. *Leporinus unitaeniatus,* NUP 22651, 137,7 mm CP, reservatório de Itaipu, Paraná, Brasil. Vista lateral esquerda.

Nome popular: piau, aracu

Localidade-tipo: rio Araguaia, Santa Terezinha, estado de Mato Grosso, Brasil (Garavello, Santos, 2009).

Informações gerais: *Leporinus* é o gênero mais rico em espécies dentre os Anostomidae, congregando cerca de 80 espécies válidas (Fricke *et al*., 2020), amplamente distribuídas na América do Sul e importantes para a pesca. As descrições recentes de espécies novas têm sido baseadas, principalmente, no padrão de colorido (*i.e.* faixas, listras e máculas no corpo), número de dentes e escamas (*i.e.*, linha lateral, longitudinais acima e abaixo da linha lateral, e circumpedunculares). *Leporinus unitaeniatus* Garavello, Santos, 2009 foi descrita do alto rio Araguaia, é de porte médio e de interesse para o aquarismo.

Identificação: *Leporinus unitaeniatus* tem um padrão de colorido único entre as espécies congêneres por apresentar uma única listra longitudinal marrom (em exemplares fixados em álcool), centrada sobre a linha lateral, que se estende inconspicuamente desde a ponta do focinho até a região mediana do flanco, a partir de onde se estende conspicuamente até o fim do pedúnculo caudal (vs. colorido uniforme ou com barras verticais ou com uma ou mais listras longitudinais se estendendo conspicuamente ao longo de todo o flanco ou se estendendo apenas na metade posterior do flanco ou com pintas) (Garavello, Santos, 2009). Também estão presentes 11–13 barras transversais marrom-escuras ao longo do dorso, que se estendem até duas séries de escamas acima da linha lateral, mas que tendem a se tornar inconspícuas em indivíduos maiores. Em alguns indivíduos, a parte anterior da listra está ausente, o que aproxima *L. unitaeniatus* de *L. geminis* Garavello, Santos, 2009 e *L. nigrotaeniatus* (Jardine, 1841), juntamente com a baixa altura do corpo (não superando 26% CP em nenhuma das três espécies) e a presença de muitas escamas na linha lateral (42–44 em *L. unitaeniatus*; 40–43 em *L. geminis*; 41–43 em *L. nigrotaeniatus*) (Sidlauskas, Vari, 2012; Birindelli *et al*., 2013). Adicionalmente, em exemplares maiores de *L. nigrotaeniatus* a série de pequenas manchas arredondadas logo abaixo

da linha lateral, entre a margem posterior do opérculo e a vertical que atravessa a origem da nadadeira dorsal, tende a se apagar (Eigenmann, 1912), tornando esses indivíduos ainda mais similares a *L. unitaeniatus*. No entanto, *L. unitaeniatus* difere de *L. geminis* por possuir dentes alongados e incisiviformes, com borda cortante estreita (vs. dentes curtos e ligeiramente molarizados, com uma borda cortante se estendendo posteriormente; Garavello, Santos, 2009) e de *L. nigrotaeniatus*, por possuir 6 séries de escamas acima e 5 abaixo da linha lateral (vs., respectivamente, 5 e 4; Eigenmann, 1912).

Biologia e habitat: espécie de tamanho médio, encontrada em áreas de corredeiras e cachoeiras de rios de água clara do sistema Araguaia-Tocantins, onde co-ocorre com *Leporinus maculatus* Müller, Troschel, 1844 e *L. geminis*. Embora não seja especialista em corredeiras, habita substrato rochoso (Hrbek *et al*., 2018). Não há estudos específicos determinando os itens alimentares de *L. unitaeniatus*, mas as congêneres têm hábitos alimentares generalistas (principalmente detritos, insetos e fontes vegetais) e o tipo de alimento ingerido depende da disponibilidade destes no hábitat (Goulding, 1981). Não são migradores de longa distância e não apresentam cuidado parental. A reprodução é negativamente afetada por represamentos (Angulo-Valencia *et al*., 2017); provavelmente pelo hábito reofílico e pela relação da sua abundância com a sazonalidade do regime hidrológico sazonal (Orsi *et al*., 2018).

Distribuição: *Leporinus unitaeniatus* está distribuída na bacia do rio Tocantins-Araguaia (Garavello, Santos, 2009), de onde é descrita. Contudo, Garavello *et al*. (2010) mencionaram coletas de espécimes no rio Paranaíba, bacia do alto rio Paraná. Com base em registros da Coleção Ictiológica do Nupélia, amplia-se aqui sua distribuição para outros tributários da bacia do alto rio Paraná, como o rio Claro, rio Corumbá e rio Sucuriú. Recentemente, foi coletado um espécime (Figura 1) no reservatório de Itaipu, estado do Paraná, representando o primeiro registro para a região e o mais ao Sul da espécie.

Etimologia: o epíteto específico *unitaeniatus* é uma alusão à faixa marrom escura, única, delgada e horizontal na linha lateral (Garavello, Santos, 2009).

Conservação: *Leporinus unitaeniatus* foi categorizada como Least Concern (LC - menos preocupante) no Livro Vermelho da Fauna Brasileira Ameaçada de Extinção (ICMBio, 2018).

Agradecimentos: agradecemos ao Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) pelo suporte Programa de Pesquisas Ecológicas de Longa Duração - PELD sítio 6 e a Coordenação de Aperfeiçoamento Pessoal de Nível Superior (Capes) pelas bolsas de doutorado de HCP, ISP e RCO e de mestrado de ABS.

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ARACANGUIRA, GALO DO ALTO, GALO-RABUDO, GALO DE PENACHO

Alectis ciliaris (Bloch, 1787)

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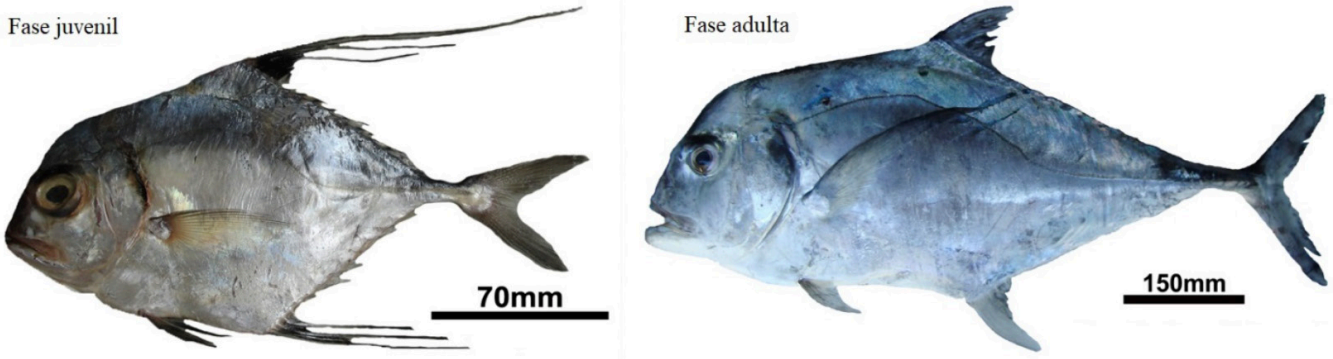

Nome popular: Aracanguira, Galo do alto, Galo-rabudo, Galo de Penacho.

Informações gerais: os peixes da espécie *Alectis ciliaris* pertencem à família Carangidae, ordem Perciformes (Nelson, 2006). São pelágicos, e vivem em águas neríticas e oceânicas. São peixes de grande porte, com tamanho médio de 100 cm (mas alcançando até 150 cm) e peso atingindo até cerca de 23 kg (Froese, Pauly, 2020). É uma espécie com baixo interesse comercial, sendo também utilizados em pesca esportiva e aquarismo, estando distribuídos pelos oceanos tropicais e subtropicais (Froese, Pauly, 2020). Li *et al.* (2016) publicaram a sequência completa do DNA mitocondrial dessa espécie (GenBank número : NC025566), a partir de amostras da África, e encontraram que o mesmo apresenta 16.570 pb de comprimento, consistindo em 37 genes mitocondriais típicos de animais e uma região de controle, o mesmo com o arranjo típico de genes mitocondriais de vertebrados. Havia 10 regiões de sobreposição de genes, totalizando 30 pb e 12 regiões espaçadoras intergênicas, totalizando 67 pb. A composição base geral da cadeia pesada foi de 28,32% para A, 26,77% para T, 16,16% para G, 28,75% para C com um ligeiro viés de AT de 55,09% (Li *et al*., 2016).

Identificação: A espécie apresenta os seguintes caracteres morfológicos: corpo alto e comprimido lateralmente; presença de 24 a 41 escudos bem desenvolvidos sobre a parte posterior da linha lateral (assim como em *Caranx*). Primeira nadadeira dorsal com 7 espinhos curtos desprovidos de membrana interconectante, que desaparecem em exemplares com cerca de 18 cm de comprimento; segunda nadadeira dorsal com 1 espinho e 18 a 19 raios e anal com 2 espinhos anteriores destacados (ausentes em exemplares adultos) seguidos de 1 espinho e 15 a 17 raios. Os raios anteriores das nadadeiras anal e segunda dorsal são extremamente alongados e filamentosos em juvenis, tornando-se mais curtos com o crescimento; nadadeiras peitorais tipicamente alongadas (mais longas que os maiores raios das pélvicas). Na fase juvenil as nadadeiras são maiores e são utilizadas como uma forma de mimetismo, tornando-os semelhantes às medusas, com intuito de afastar predadores (Bray, 2018). Na fase adulta seu comprimento ultrapassa cerca de 1 metro. Apresentam corpo uniformemente prateado e dorso ligeiramente escuro (prata-esverdeado) (Rocha, Costa, 1999).

Biologia: A dieta é baseada em crustáceos sedentários ou de movimento lento e ocasionalmente de caranguejos e peixes. Os adultos costumam ser mais solitários que os juvenis da espécie, com isso, acabam sendo muitas vezes presa de tubarões e outros peixes maiores. Seus ovos são globulares,

preenchidos com bolha de óleo, contribuindo para flutuabilidade. As larvas são pelágicas e mostram diferenças no tamanho da cabeça, raios dorsais, barbatanas peitorais e espinhos durante o desenvolvimento. Um estudo na Índia determinou um pico na abundância de larvas em abril (Premalatha, 1911).

Distribuição e habitat: Localidade-tipo: Surate, Índia. A espécie apresenta ampla distribuição nos oceanos tropicais em todo o mundo em uma faixa de temperatura de 18 a 27 °C, embora seja mais frequentemente encontrada em águas costeiras. Atlântico Ocidental: Massachusetts, EUA e Bermuda até Santos, Brasil; em todo o mar do Caribe e no Golfo do México (Menezes *et al.*, 2003). Atlântico Leste: Senegal ao Congo. Oceano Índico Ocidental: Mar Vermelho até a Baía de Algoa, África do Sul e Sri Lanka. Pacífico Leste: do México ao Peru (Froese, Pauly, 2020). Os adultos da espécie preferem águas costeiras até profundidades de 100 m, habitando recifes e destroços, como naufrágios, ao longo da coluna d'água. Os juvenis são pelágicos, habitando áreas costeiras e também mar aberto (Froese, Pauly, 2020).

Etimologia: na mitologia grega o nome do gênero é uma referência a uma das três erínias, filhas de Hades e Perséfone. As erínias, na mitologia grega, eram personificações da vingança. Enquanto Nêmesis (deusa da vingança) punia os deuses, as erínias puniam os mortais. Eram Tisífone (Castigo), Megera (Rancor) e Alecto (Inominável) (Erínias, 2020). E o nome específico, ciliaris, vem do latim, em alusão à presença nessa espécie de raios anteriores muito alongados nas nadadeiras dorsal e anal.

Conservação: no Brasil, a espécie *Alectis cilaris* é capturada com fins comerciais desde o Delta do Parnaíba (PI) até a Baia de Todos os Santos (BA), principalmente em áreas de recifes e paredões profundos; a principal arte de pesca para sua captura é a linha de mão. Possui baixa importância comercial devido a sua pequena representatividade (Lessa, Nóbrega, 2000). Pela lista da IUCN (International Union for Conservation of Nature) a espécie é descrita como “menos preocupante” (Herdson *et al.*, 2020), portanto, não está ameaçada de extinção.

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Pinirampus pirinampu (Spix & Agassiz, 1829)

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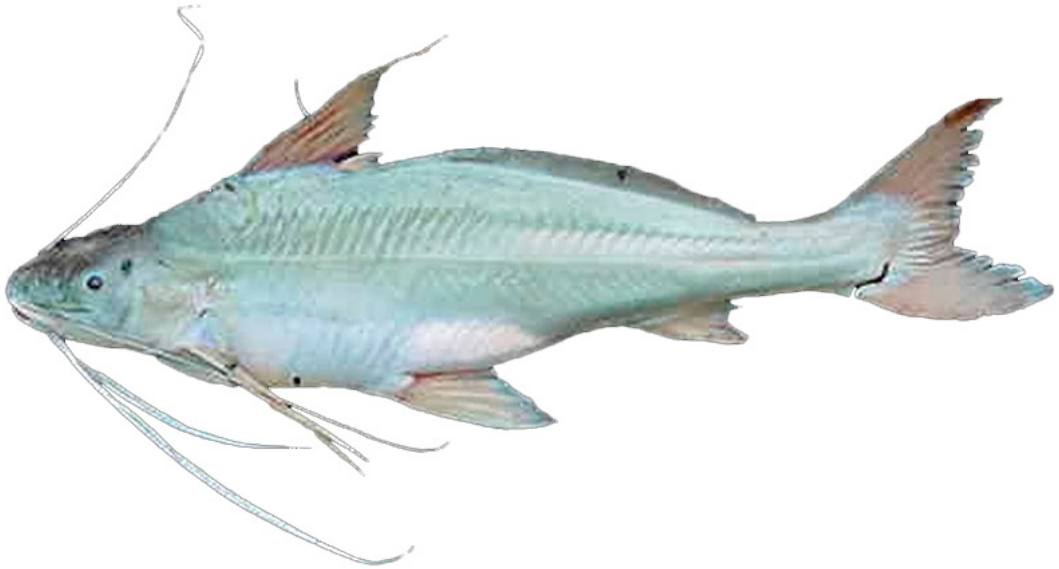

Nome popular: barbado, barba-chata e mandi-alumínio.

Informações gerais: o gênero *Pinirampus* Bleeker, 1858 consiste atualmente em apenas uma espécie, o *Pinirampus pirinampu* (Spix & Agassiz,1829) (Mateus, Penha, 2007; Fricke *et al.,* 2020). Sinonímia de *Pimelodus pirinampu* (Fricke *et al.,* 2020). Sua carne é muito apreciada na gastronomia, fazendo com que seja cobiçado na pesca de subsistência e na pesca esportiva, além da grande importância ecológica (Barthem, Goulding, 1997; Dias *et al.,* 2004; Shibatta, Dias, 2006).

Identificação: apresenta coloração cinza escuro na parte superior do corpo e na nadadeira dorsal (Graça, Pavanelli, 2007). Seu ventre tem coloração clara juntamente com as nadadeiras pélvica, anal e adiposa (Britto *et al.,* 2003). Algumas características morfológicas são marcantes como: a nadadeira adiposa longa e baixa, e a presença de barbilhões sensitivos longos e achatados na mandíbula e no maxilar (Ohara *et al.,* 2017). Possui boca terminal, nadadeira dorsal com sete raios, as nadadeiras peitorais com 13 a 17 raios, sendo que o primeiro raio nas duas é ossificado; nadadeira anal possuindo de 11 a 15 raios e pélvica com sete; tamanho máximo registrado de 92 cm, pesando até 8,3 kg (Graça, Pavanelli, 2007; Ohara *et al.,* 2017).

Biologia: diferente da maioria dos bagres esta espécie tem comportamento diurno e pelágico com características migratórias; seu período reprodutivo ocorre entre outubro e fevereiro, com fecundação externa e sem cuidado parental (Carolsfeld *et al.,* 2004; Shibatta, Dias, 2006). Possui predominantemente desenvolvimento assincrônico acumulativo em relação à maturação dos ovócitos, apresentando, em maioria, desovas únicas no período de reprodução (Orsi, 2010). Utiliza-se de reservatórios para alimentação, e ambientes lóticos para reprodução e desenvolvimento (Dias *et al.,* 2004; Orsi *et al.,* 2016; Garcia *et al.,* 2019). Apresenta hábito predador, em alguns locais estritamente piscívoro, alimentando-se principalmente de lambaris (*Astyanax* spp.), mandi-beiçudo (*Iheringichthys labrosus)*, piranhas (*Serrasalmus* spp.) e camarões (Britto *et al.,* 2003; Shibatta, Dias, 2006; Orsi, 2010).

Distribuição: registrado para as bacias dos rios Amazonas, Essequibo, Orinoco, Paraguai e Paraná (Dias *et al.,* 2004; Fricke *et al.,* 2020).

Conservação: estudos sobre *P. pirinampu* são mais restritos à parasitologia e citogenética, faltando informações ecológicas e biológicas na literatura (Carolsfeld *et al.,* 2004; Dias *et al.,* 2004). Ainda que pouco se conheça sobre seus aspectos reprodutivos e comportamentais, sabe-se que é um peixe, e susceptível a ameaças. Como se trata de uma espécie migradora, as fragmentações ambientais causam um grande impacto em sua biologia, principalmente devido à construção de barragens (Orsi *et al.,* 2016). A baixa taxa de ocorrência e frequência de captura pode ter como causa os impactos por ações antrópicas: desmatamento, "peixamento equivocado", competição com espécie invasora e uso de agrotóxicos (Britto *et al.,* 2003; Orsi *et al.,* 2016). Contudo, a espécie não se encontra no livro vermelho das espécies ameaçadas de extinção (ICMBio, 2018 (volume 6)). Ações de manejo como restrição a pesca e avaliações de estoques pesqueiros, são medidas necessárias para melhorar o cuidado com essa espécie (Orsi *et al.,* 2016). A conservação do ambiente é um dos meios mais eficazes para a proteção, desenvolvimento e reprodução dessa espécie. (Garcia *et al.,* 2019).

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A Diretoria tem participado ativamente de diversas manifestações relacionadas à proteção dos ambientes naturais brasileiros e apoio às pesquisas científicas e órgãos de fomento nacionais (CNPq e Capes), com assinaturas e apoio de documentos, cartas, notas, todos produzidos pela SBPC e discutidos com diversas sociedades científicas brasileiras.

Um deles faz menção às queimadas e impactos no Pantanal Mato-grossense e outros Biomas. Este documento foi encaminhado aos setores ambientais e Ministério do Meio Ambiente (MMA) (NOTA DE REPÚDIO AO DESCASO GOVERNAMENTAL NO COMBATE A INCÊNDIOS FLORESTAIS PANTANAL MATOGROSSENSE). Tal documento suscitou a publicação de notícia no Jornal da Ciência.

Outro documento endossado pela SBI foi relacionado ao Projeto de Lei (PL) que ameaça a autonomia financeira das universidades paulistas e a Fapesp (Nota contra o Projeto de Lei 529 – ALESP).

Por fim, a SBI endossou documento de apoio à Capes relacionado ao Programa Nacional de Pós-Graduação em uma manifestação conjunta sobre a avaliação do PNPG 2011-2020 e a elaboração do PNPG 2021-2030.

EVENTOS

I SIMPÓSIO BRASILEIRO DE MORFOLOGIA COMPARADA DE VERTEBRADOS – agora online

Tendo em vista que o panorama da pandemia para 2021 ainda é muito incerto, I SiMorf ocorrerá integralmente na modalidade online. A nova data definida para o evento é **2 a 5 de fevereiro de 2021**, de **14h às 21h**. Inscrições para o evento se encontram abertas, e mais informações podem ser acessadas em: https://www.simorf2020.com.br

SIMPÓSIO *online* ELASMulheres

Convidamos a todes para participar do Simpósio **ELASMulheres**, evento online a ser realizado entre os dias **9 e 13 de novembro** deste ano. As palestras ocorrerão no período noturno (das 18h às 21h) e serão transmitidas via **YouTube** pelo canal Ictiomulheres. O evento tem como objetivo divulgar as pesquisas e contribuições de mulheres cientistas nas diferentes áreas de estudo com elasmobrânquios. Maiores informações sobre a programação e instruções para inscrição e emissão de certificados serão disponibilizadas por meio do **Instagram** @ictiomulheres.

AUMENTANDO O CARDUME

Para afiliação, o pagamento da anuidade pode ser feito com cartão de crédito, PayPal ou depósito/transferência bancária. Confira em nosso site as facilidades!

Damos **boas-vindas** aos nossos novos afiliados: Aryano Junio Rodrigues dos Santos, Erival Gonçalves Prata, Guilherme Augusto Cruz Gomes de Sá, Jacqueline da Silva Batista, Jones Santander Neto, Lucas Silva de Medeiros, Márcio Joaquim da Silva, Marcos Roberto dos Reis Junior, María Fernanda Martínez Polanco, Rosemary de Jesus de Oliveira.

Deixe sempre o seu cadastro atualizado no site da Sociedade. Qualquer dúvida ou dificuldade em recuperar sua senha, nos escreva (tesouraria.sbi@gmail.com ou contato.sbi@gmail.com).

PARTICIPE DA SBI

Para afiliar-se à **SBI**, é fácil: acesse a homepage da sociedade no endereço **http://www.sbi.bio.br** e cadastre-se. A filiação dará direito ao recebimento online da revista Neotropical Ichthyology (NI), e a descontos na inscrição do **Encontro Brasileiro de Ictiologia** e na anuidade e congresso da **Sociedade Brasileira de Zoologia**. Além disso, sua participação é de fundamental importância para manter a **SBI**, uma associação sem fins lucrativos e de Utilidade Pública oficialmente reconhecida. Fazemos um apelo aos orientadores associados para que expliquem e sensibilizem seus alunos sobre a importância da filiação por um preço acessível, pois estudantes pagam somente 50% da anuidade.

Para enviar suas contribuições aos próximos números do Boletim **SBI**, basta enviar um email à secretaria (boletim.sbi@gmail.com). Você pode participar enviando **artigos**, **comunicações**, **fotos** de peixes para a primeira página e dados sobre o 'Peixe da Vez', **notícias** e outras informações de interesse da sociedade. **Contamos com a sua participação!**

EXPEDIENTE

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CNPJ: 53.828.620/0001-80

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