

Life cycle of *Sciades herzbergii* (Siluriformes: Ariidae) in a mangrove on the island of São Luís, Maranhão, Brazil



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Abstract

During the life cycle of a teleost there are three basic events: feeding, growth and reproduction, which are closely linked and related to environmental conditions. The main objective of this study was to evaluate the role of mangroves in the life cycle of the species *Sciades herzbergii*. Thus, in this study aspects of the population of *S. herzbergii* present in a mangrove in Raposa, Maranhão, Brazil were addressed; encompassing length distribution and macroscopic analysis of the gonads. Sampling was monthly. 316 specimens of fish were collected, of which 6 males, 7 females and 303 with undetermined sex. The length amplitude varied between 100 to 406 mm, with an average of 167.32 mm, and a standard deviation of 44.41.

Keywords: Gonadal maturation; Teleost; Growth; Raposa

Introduction

The species of the Ariidae family have typical estuarine habits, but they also occur in marine and freshwater environments without the influence of seawater. As for its distribution, both in tropical and subtropical waters [1]. In Brazil, there are several studies involving species of the Ariidae family in estuarine systems, among which can be highlighted, studies that addressed reproductive aspects carried out in the Cananeia estuary complex in the State of São Paulo in Sepetiba Bay, State of Rio de Janeiro in Pinheiros Bay, an estuarine region on the coast of Paraná in estuaries on the west coast of the State of Maranhão [2-5].

In relation to ecological aspects in the Rio Goiana estuary, northeastern Brazil, bordering the States of Pernambuco and Parnaíba in the São Vicente estuarine complex, State of São Paulo [6,7]. As bioindicators to assess the environmental quality of a conservation unit in the State of Maranhão [8]. About feeding in the Paranaguá Bay estuary, in southeastern Brazil in a mangrove in the Curuçá estuary in northern Brazil in streams of Ilha do Caranguejo in the State of Maranhão [9-11]. The main objective of this study was to evaluate the role of mangroves in the life cycle of the species *Sciades herzbergii*. In this way, aspects of the population of *S. herzbergii* present in a mangrove in Raposa, Maranhão, Brazil were addressed; encompassing length distribution and macroscopic analysis of the gonads.

Material and Methods

The study area is located in the northeastern part of the island of São Luís, Municipality of Raposa (02 ° 25 '22 "S and 44 ° 05' 21" W), comprising a set of tidal channels, flooded during high tide, and characterized by having low relief and a dominant mangrove flora (Figure 1). Sampling of the specimens was monthly, between August 1999 and November 2000. The fishing equipment used was the igarape net, also called "taping net". The captured specimens were packaged in the field in labeled plastic bags, placed in polystyrene boxes with ice and transported to the laboratory, where identification was carried out based on the literature [12,13,14]. For each specimen, the following data were computed: total length, total weight, sex and stage of maturity.

Some care was taken to identify the gender and stage of maturity, such as, for example, proceeding to the identification as soon as possible after the collection. Because both for the identification of sex and the classification of gonadal maturity stages, the analysis was based on characteristics such as color, shape, superficial vascularization, flaccidity and size of the gonad in relation to the abdominal cavity. The identification of sex and stage of maturity was made through visual inspection of the gonads, comparing their aspects with the scales proposed in the literature adapted to the conditions of the study [15,16,17].



Figure 1: Set of tidal channels in the Municipality of Raposa (Source: Google earth images database from 2021. Available at: <https://earth.google.com>. Accessed on: April 2021).

Ovaries

- **Stage A:** Immature - Filiform, translucent and reduced in size, close to the spine;
- **Stage B -** Maturing - They can occupy from one third to two thirds of the celomatic cavity, there is the presence of a capillary network; it is already possible to observe opaque granules that correspond to the oocytes against the light;
- **Stage C:** Mature - They are turgid, being able to occupy practically the entire celomatic cavity, a higher frequency of translucent and / or opaque granules, the vascularization varies from very intense to almost imperceptible;
- **Stage D:** Spawners - Flaccid, still extensive, but less bulky and with a hemorrhagic aspect, occupying less than half of the celomatic cavity.

Testicles

- **Stage A:** Immature - Reduced to filaments close to the spine;
- **Stage B:** Maturing - Rounded or lobed, with two or three vesicles;
- **Stage C:** Mature - Turgid, whitish or yellowish, occupy a large part of the celomatic cavity and, under pressure, the membrane breaks, eliminating less viscous liquid sperm;

- **Stage D:** Exhausted - Flaccid, hemorrhagic in appearance, occupy less than half the volume of the celomatic cavity.

Results

A total of 316 specimens were collected, totaling a biomass of 12919.88g of *S. herzbergii* in the mangrove of Raposa, during 16 months of collections. The specimens collected in the present study of *S. herzbergii* presented a range of length from 100 to 406 mm, with an average of 167.32 mm and a standard deviation of 44.41. Of the 316 specimens collected during the study period, it was only possible to identify the sex of 13 individuals, 6 males, 7 females and 303 with undetermined sex. Regarding the identification of gonadal maturity stages, ten individuals in stage A - immature, and one individual in stage B - in maturation were identified.

Discussion

Studies carried out on Ilha do Caranguejo, located in the Mearim estuary in the Bay of São Marcos, about 30 km from the island of São Luís, in which both the fishing equipment (tapping net) was the same and the type of environment (mangrove), the length amplitude varied between 21.2 to 48.5 cm [11], therefore, very similar to the length amplitude (16.7 to 44.4 cm) found in this study. According to the literature the maximum recorded length for this species was 94.2 cm TL [18]. Thus, the size of the specimens observed is probably due to both the fishing equipment

used and the type of environment. In this study it was only possible to identify sex through visual inspection of the gonads in just 4.11% of the total number of individuals observed.

In other studies involving species of the Ariidae family, it was also not always possible to identify the sex of all individuals sampled. In the case of *Genidens genidens* and *Cathorops spixii* in Sepetiba Bay, 67% and 83% were identified, respectively [3]; *Genidens machadoi* in the lagoon of Tramandai, sex was identified in 30% of the individuals examined [19]; the specimens of *Cathorops spixii* from trawling along the northern coast of Santa Catarina, both sex and maturation stage were not recognized, indicating a young condition [20]. Only individuals in developmental stages A and B (juveniles) were observed, and according to Vazzoler [16] are considered “in reproduction” individuals in which the gonads are in stages C or D, therefore, *S. herzbergii* in this study were not considered “reproducing” in the mangrove of Raposa.

Some authors consider estuarine-dependent marine fish that use the estuary as a breeding or spawning area, but spend most of their life at sea [21]. Thus, studies characterized the strategy of using communities in the estuaries for 12 families, among them, the Arriidae family, represented by 6 species, among them the species *S. herzbergii* that was considered in the estuarine-dependent category [22]. *S. herzbergii* in the Raposa mangrove can be considered as an estuarine-dependent species, but that use the estuary as a breeding area, because most of the individuals sampled were juveniles.

Conclusion

The study found that *S. herzbergii* does not complete its life cycle in the mangrove of Raposa, because no matured or spawned individuals were observed. In this study, the role of mangroves in the life cycle of the species *S. herzbergii* corresponds to the events of growth and feeding. As for the presence of a greater number of individuals in the shorter length frequencies, it refers to the fact that the mangrove of Raposa is a “nursery” for juvenile forms of the species *S. herzbergii*.

References

1. Marceniuk A P, Menezes A A (2007) Systematics of the family Ariidae (Ostariophysi, Siluriformes), with a redefinition of the genera. *Zootaxa* 1416: 1-126.
2. Mishima M, Taniji S (1985) Fecundidade e incubação dos bagres marinhos (Osteichthyes, Ariidae) do complexo estuarino lagunar de Cananéia (25°S, 48°W). *Boletim do Instituto de Pesca* 12(2): 77-85.
3. Gomes ID, Araujo FG, Azevedo MCC, Pessanha ALM (1999) Biologia reprodutiva dos bagres marinhos *Genidens genidens* (Valenciennes) and *Cathorops spixii* Agassiz (Siluriformes, Ariidae), na Baía de Sepetiba, Rio de Janeiro, Brasil. *Revta bras Zool* 16(2).
4. Fávaro LF, Frehse FA, Oliveira RN, Schwarz-Junior R (2005) Reprodução do bagre amarelo, *Cathorops spixii* (Siluriformes, Ariidae), da Baía de Pinheiros, região estuarina do litoral do Paraná, Brasil. *Rev Bras Zool* 22(4): 1022-1029.
5. Azevedo JWJ, Castro ACL, Porto HLR, Lima PRS (2010) Size and age at first maturity of the crucifix sea catfish, *Sciades proops* (Valenciennes, 1840) (Siluriformes: Ariidae), caught off western Maranhão state, Brazil. *Arq Ciên Mar* 43(2): 96-102.
6. Dantas DV (2008) Variação espaço-temporal das espécies da família Ariidae (Siluriformes) no estuário do Rio Goiana (PE/PB –Brasil). Recife. Dissertação [Mestrado em Oceanografia] - Universidade Federal de Pernambuco.
7. Schmidt TCS, Martins IA, Reigada ALD, Dias JF (2008) Taxocenose de bagres marinhos (Siluriformes, Ariidae) da região estuarina de São Vicente, SP, Brasil. *Biota Neotrop* 8(4): 073-081.
8. Sousa DBP, Almeida ZS, Carvalho-Neta RNF (2013) Biomarcadores histológicos em duas espécies de bagres estuarinos da Costa Maranhense, Brasil. *Arq. Bras Med Vet Zootec* 65(2): 369-376.
9. Oliveira-Neto JF, Spach HL, Schwarz-Junior R, Pichler HA (2008) Diel variation in fish assemblages in tidal creeks in southern Brazil. *Brazilian Journal of Biology* 68(1): 37-43.
10. Giarrizzo T, Saint-Paul U (2008) Ontogenetic and seasonal shifts in the diet of the pemecou sea catfish *Sciades herzbergii* (Siluriformes: Ariidae), from a macrotidal mangrove creek in the Curuçá estuary, Northern Brazil. *Rev Biol Trop* 56(2): 861-873.
11. Ribeiro EB, Almeida ZS, Carvalho-Neta RNF (2012) Hábito alimentar do bagre *Sciades herzbergii* (Siluriformes, Ariidae) da Ilha dos Caranguejos, Maranhão, Brasil. *Arq Bras Med Vet Zootec* 64(6): 1761-1765.
12. Figueiredo JL, Menezes NA (1978) Manual de peixes marinhos do sudeste do Brasil. II. Teleostei (1). Museu de Zoologia, Universidade de São Paulo Brasil.
13. Fischer W (1978) FAO species Identification sheets for fishery purposes. Western Central Atlantic (Fishing Area 31). Rome.
14. Nelson JS (1994) Fishes of the world. In: Third edition. John Wiley & Sons, Inc., New York, P. 600.
15. Vazzoler AEAM (1981) Manual de métodos para estudos biológicos de populações: reprodução e crescimento. Brasília, CNPq. Programa Nacional de Zoologia 108.
16. Vazzoler AEAM (1996) Biologia da Reprodução de peixes teleósteos: teoria e prática. Maringá, EDUEM 169.
17. Dias JF, Peres-Rios E, Chaves PTC, Rossi-Wongtschowski CLB (1998) Análise macroscópica dos ovários de teleósteos: problemas de classificação e recomendações de procedimentos. *Revista Brasileira de Biologia* 58(1): 55-69.
18. Lima RRS, Camello-Neto AA (2021) Fish bycatch caught by shrimp fisheries in western tropical Atlantic Recife: CEPE 204.
19. Machado R, Ott PH, Sucunza F, Marceniuk AP (2012) Ocorrência do bagre marinho *Genidens machadoi* (Siluriformes, Ariidae) na laguna Tramandai, sul do Brasil. *Neotropical Biology and Conservation* 7(3): 214-219.
20. Souza LM, Chaves PTC (2007) Atividade reprodutiva de peixe (Teleostei) e o defeso da pesca de arrasto no litoral norte de Santa Catarina, Brasil. *Revista Brasileira de Zoologia* 24(4): 113-121.
21. Yanez-Arancibia A, Nugent RS (1977) El papel ecologico de los peces en estuarios y lagunas costeras. *Anales del Centro de Ciencias del Mar y Limnología de la Universidad Nacional Autónoma* 4(1): 107-114.
22. Andrade-Turbino MF, Ribeiro ALR, Vianna M (2008) Organização espaço-temporal das ictiocenoses demersais nos ecossistemas brasileiros: Uma síntese. *Oceol Bras* 2(4): 640-661.



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