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Hoplias aff. *malabaricus* Bloch, 1794 (Characiformes: Erythrinidae) parasites

Parasitos de **Hoplias** *aff.* **malabaricus** *Bloch, 1794 (Characiformes: Erythrinidae)*

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ABSTRACT: Aquatic organisms are a subject of great interest because of their nutritional value and their high availability as human food. As a result, an increasing number of studies are being conducted on potentially harmful aquatic organisms such as aquatic parasites that compromise host health, as well as affect public health by zoonosis. A balance between the characteristics of healthy and diseased states in fish infected by parasitic fauna is dependent on parasite–host–environment interactions. Here, we have compiled a bibliographical review of the general aspects and epidemiology of the parasites of *Hoplias* aff. *malabaricus* Bloch, 1794, a widely distributed and consumed fish species in Brazil.

KEYWORDS: helminths; review; trahira; Brazil.

RESUMO: Os organismos aquáticos têm sido alvo de constante interesse por conta de suas características nutricionais e da crescente disponibilização na alimentação humana. Sendo assim, estudos relacionados a organismos nocivos presentes nos ecossistemas aquáticos têm se intensificado, como, por exemplo, acerca dos parasitos, que podem interessar à saúde pública como zoonose ou comprometer a higidez dos hospedeiros. Os peixes apresentam sua fauna parasitária característica em que o equilíbrio do estado saúde-doença é dependente da interação da tríade parasito-hospedeiro-ambiente. Com isso, o objetivo do presente trabalho foi fazer uma revisão bibliográfica de aspectos gerais e da epidemiologia dos parasitos de *Hoplias* aff. *malabaricus* Bloch, 1794, amplamente distribuído e consumido no Brasil.

PALAVRAS-CHAVE: helmintos; revisão; traíra; Brasil.

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The trahira, *Hoplias* aff. *malabaricus* Bloch, 1794 (Characiformes: Erythrinidae), is a fish well adapted to lentic environments. It has a broad head in the posterior portion, a dilated mouth with strong teeth, a cylindrical and elongated body with a slight lateral compression and covered in oval scales (NOVAES; CARVALHO, 2011).

Trahira has good carcass yield, high meat quality, and is the target species for commercialization. Therefore, it has a huge impact on the economy and public health (ALMEIDA, 1998).

Trahira is an agile, ravenous predator that preys on wide range of fish species (MONTENEGRO et al., 2013). This characteristic of its predation creates favorable conditions for the permanence and dissemination of parasites in the aquatic environment (BARROS et al., 2007).

Health surveillance agencies have observed that parasitic zoonoses are transmitted by consuming raw or undercooked fish. Therefore, this species can cause diseases in humans, creating a huge risk to public health if consumed raw or undercooked (LLAGUNO et al., 2008).

In sweet fish, the main zoonotic helminths found are *Eustrongylides* sp. (Dioctophymidae) and *Contracaecum* sp. (Anisakidae) (LUQUE, 2004).

Worldwide, humans have been accidentally infected with helminths found in fish, such as nematodes of the *Anisakis* species (KIM et al., 2006) and *Diphyllobothrium latum*, a cestode found in sweet fish or marine fish species that migrate to freshwater for breeding, having bear and man as the definitive hosts. The adult parasite is found in the small intestine of humans, and the eggs are released through the feces, five to six weeks post infection. Exposure to these eggs causes severe lesions and diseases with variable pathogenesis (SAMPAIO et al., 2005; EMMEL et al., 2006).

It is thought the introduction of zoonotic parasites in Brazil is by the import of salmon meat for consumption in oriental dishes (SANTOS; FARO, 2005).

Parasites of the phylum Nematoda (Rudolphi, 1808), that infect fish, exhibit considerable sexual dimorphism and are dioecious, with an indirect evolutionary cycle and planktonic copepods as the intermediate hosts (LUQUE, 2004).

CORRÊA et al. (2013a) identified larvae of *Contracaecum* sp. in the lakes of Pirassununga, state of São Paulo, Brazil. BENIGNO et al. (2012) estimated prevalence rates of 95.19 and 53.84% for larvae of *Contracaecum* sp. and *Eustrongylides* sp., respectively, in *H.* aff. *malabaricus* in the state of Pará, Brazil.

TAKEMOTO et al. (2009) identified *Paracapillaria piscicola*, *Procamallanus (Procamallanus) peraccuratus*, *Procamallanus (Spirocamallanus) inopinatus*, *Goezia spinulosa*, and *Eustrongylides ignotus* larvae and *Contracaecum* sp. in *H.* aff. *malabaricus* from the state of Paraná, Brazil, and PARAGUASSÚ; LUQUE (2007) identified *Contracaecum* sp. in *H.* aff. *malabaricus* in Rio de Janeiro, Brazil.

In humans with hypersensitivity, the ingestion of Anisakidae-infected fish (e.g., *Anisakis simplex*) may result in allergic reactions due to the presence of parasitic particles that act as antigens, triggering an immune response (MONTORO et al., 1997). Ingestion of endotoxins released by the parasite larvae in dead fish muscle has been reported to be toxic to humans (AUDICANA et al., 2002). The pathogenic potential of *Contracaecum multipapillatum* has been experimentally demonstrated under laboratory conditions by infecting mammals, thus, validating the need to inspect fish intended for human consumption (MUELLER et al., 2004).

The metacercariae of Digenea Carus, 1863 species that parasitize fish alter the tissues leading to the formation of nodules, resulting in carcass deformation, and thus, affecting its commercial value. In addition, infection by these parasites results in debilitation, making the host susceptible to predation by other piscivorous animals, which further act as a definitive host (PAVANELLI et al., 2002).

PARAGUASSÚ (2006) reported the occurrence of the parasite *Ithyoclinostomum dimorphum* in trahiras collected from the state of Rio de Janeiro. Similarly, RODRIGUES (2010) studied the parasites in trahiras and reported *I. dimorphum* from Rio Grande do Sul, Brazil, and the digenean trematode *Diplostomum* sp. from the Paraná River, São Paulo (LACERDA et al., 2013).

The metacercariae of some species of Clinostomidae can attach under the host's skin, forming nodules of light and relief coloring (DIAS et al., 2003); these metacercariae sometimes migrate to the eyes, causing blindness (SANTOS et al., 2002).

Monogenea Van Beneden, 1858 are mostly ectoparasites of fish, amphibians, and freshwater reptiles and have a direct evolutionary cycle. In fish, they are found mostly in the gills, nostrils, and on the exterior of the body (PAVANELLI et al., 2002).

CORRÊA et al. (2013b) detected monogenoids of *Urocleidoides eremitus* and *Anacanthorus* sp. in the gills of *H.* aff. *malabaricus* from Pirassununga, state of São Paulo.

After infection, the major clinical symptoms exhibited by the host are increased mucus production, reduction in body weight, and hemorrhage (PAVANELLI et al., 2002). The infected fish manifest compromised respiration as the monogenoids cause the lamellae to collapse, which may lead to mortality (MARTINS et al., 2000).

Acanthocephala Rudolphi, 1808 comprises helminths that possess a retractile proboscis with hooks that aid in fixation onto the lumen of the gastrointestinal tract of the host. Their biological cycle requires an arthropod and a vertebrate as the intermediate and definitive hosts, which harbor the larval and adult forms, respectively (THATCHER, 2006).

The acanthocephalan species *Grasilisentis variabilis* and *Quadrigyrus brasiliensis* were discovered in the Amazon region and *Quadrigyrus torquatus* in the regions of Mato Grosso, Brazil (THATCHER, 2006). ROSIM et al. (2005) were the first ones to report *Quadrigyrus machadoi* from *H.* aff. *malabaricus* collected from a pond in Aguaí, state of São Paulo, and TAKEMOTO et al. (2009) identified *Q. machadoi* in *H.* aff. *malabaricus* in the floodplain of the Upper Paraná River, Brazil.

Some acanthocephalan species are zoonotic and have been studied because of their importance in human health (TANTALEÁN et al., 2005).

For completion of the biological cycle of members of Pentastomida Diesing, 1836, two hosts are required — one intermediate and one definitive. Fish act as the intermediate hosts for the larvae, while the adult cycle of the parasites is completed in the respiratory tract of reptiles (THATCHER, 2006). Specimens of *Sebekia oxycephala* were obtained from trahira (TAKEMOTO et al., 2009) collected from the Upper Paraná River.

Glochidium (Bivalvia Linnaeus, 1758), a larval stage of bivalve mollusks, usually acts as a temporary fish parasite. The larvae attach to the gill cavity, fins, or external surface of the body, forming nodules at the fixation site, in which it continues its biological cycle until they become adults (ARAÚJO, 2001).

BONETTO (1954) described a glochid from a Hyriidae species collected from Paraná River parasitizing the posterior tip of a branchial filament of *H.* aff. *malabaricus*.

The presence of parasitic helminths in fish is a common occurrence in the aquatic habitat. The environmental conditions determine the developmental cycle of these parasites, which usually present a seasonal variation in infection rates, with an increase in parasitic load in the hotter months (June to September) and a decrease in the colder months (December to March) in northern Brazil. Since most of the parasites found in *Hoplias* are pathogenic and can be transmitted to other hosts (EIRAS, 1994), knowledge of the parasitic infection in this fish is essential.

The evaluation of parasites of trahira is of utmost significance to public health, since the fish can harbor zoonotic parasites that can cause health issues in humans. Furthermore supervision of inspection and surveillance (BRASIL, 1952) need to be intensified. It is paramount that people be instructed to consume roasted or cooked fish. If consumption of raw fish is desired, it is recommended that the fish is frozen at -20ºC for one week to inactivate any potentially zoonotic parasites (EDUARDO et al., 2005).

Currently available information on the parasitic classes that affect fishes is limited, and further research is necessary.

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