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Case Report – *Heteronybelinia* spp. in *Pomatomus saltatrix* (Linnaeus, 1766)

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Abstract: *Heteronybelinia is a genus of cestodes's order frequently find in fishes with fifteen species described in literature. This study aimed report the presence of cestodes of the genus Heteronybelinia spp. in Pomatomus saltatrix. The fish was purchased from a supermarket in the city of Jaú, São Paulo, Brazil. The cestode larvae found in the internal organs were collected during necropsy with the aid of a needle, fixed in AFA and identified. These parasites have great hygienic sanitary importance, once some species parasitize fishes' musculature generating negative aspects in their appearance and economic losses in aquaculture. In addition, another well-known aggravating factor is the immunogenic reactions that are currently being studied in fish parasitized with Trypanorhyncha cestodes.*

Keywords: *Heteronybelinia* spp., *Pomatomus saltatrix*, parasitosis in fish, Trypanorhyncha.

1. INTRODUCTION

The fish species *Pomatomus saltatrix* [1], popular know as bluefish, belongs to Actinopterygii class, Pomatomidae family, and is find in subtropical, tropical, coastal, and oceanic waters [2]. Helminths and plathelminths -i.e. Trypanorhyncha cestodes- are often find into marine environment and has been widely reported in fish species with commercial importance.

The order Trypanorhyncha belongs to Plathelminths phylum, which has 290 species described. [3]. It has worldwide distribution [4] and parasitizes both marine fish and invertebrates [5-6], specially from tropical and subtropical regions [4]. Nowadays, there are reports of this cestode in 60 fish species from Brazil [3]. According to São Clemente [7], parasites from Trypanorhyncha order found in *P. saltatrix* [1] were *Callitetrarhynchus gracilis* [8], *Callitetrarhynchus speciosum* [9], and *Pterobothrium crassicolle* [10].

Trypanorhyncha has a sanitary and economic importance [11] due to disgusting aspect in parasitized seafood for consumers [12]. Another point is the economic loss to aquaculture, once parasitized animals generates less feed consumption, which is also and important fact for zootechnical losses [11].

According to Decree number 9.013 of March 20th of 2017, which treats about sanitary inspection of seafood, it is considered unfit seafood those with disgusting aspect, such as mutilation, deformation, or with high intensity of parasites that can cause zoonosis or only bad aspect for consumers [12].

This group of parasites has low zoonotic potential [11], however, there are a few cases that reported that some species of this cestode can stimulate immune system of the host. Reactions due to systemic hypersensitivity are not the same for all hosts and in some cases can causes anaphylaxis [3, 13-14]. Cases in humans were reported, which shows the risk of raw seafood intake that could be parasitized [15]. This way, studies about seafood quality has good advances with the objective of guarantee healthy food for consumers [16-17]. Thus, this study aimed report *Heteronybelinia* [18] in *Pomatomus saltatrix* [1].

2. MATERIALS AND METHODS

Necropsy of one *Pomatomus saltatrix* [1] was performed according to Noga [19]. The fish was

acquired from a supermarket in Jaú city, São Paulo, Brazil. For this purpose, fish was put in a bag and transported refrigerated to the laboratory for necropsy and identification of the parasites.

Cestode larvae found in internal organs were sampled during necropsy with a needle, fixed in AFA, and identified as described by [20], followed by photo documentation.

3. RESULTS AND DISCUSSION

During necropsy, it was found cestode larvae of the genus *Heteronybelinia* [18] (Figs.1 and 2). *Heteronybelinia* [18] belongs to Tentaculariidae family and Trypanorhyncha order. In the Trypanorhyncha order exists about 290 species, but few information is available of pathogenesis in the host [3]. Tentaculariidae Family has sixteen genera, which are *Acoeleorhynchus* [21], *Aspidorhynchus [22], Congeria [23], Heteronybelinia* [18], *Kotorella [24], Kotorelliella [25], Mixonybelinia* [18], *Nybelinia [21], Pleronybelinia [26], Rhynchobothrius, Ruffieria* [27], *Syngenes [27], Tentacularia [28], Abothros [29], Pierretia* [30], *and Stenobothrium [10], being the last three genera considered as Tentacularia [28]. There are fifteen species of Heteronybelinia genus* [18] reported, which are *Heteronybelinia annakohnae* [31], *Heteronybelinia australis* [25], *Heteronybelinia elongata* [32], *Heteronybelinia estigmena* [33], *Heteronybelinia eureia* [33], *Heteronybelinia heteromorphi* [18], *Heteronybelinia mattisi* [34], *Heteronybelinia minima* [18], *Heteronybelinia nipponica* [35], *Heteronybelinia overstreeti* [4], *Heteronybelinia palliata* [36], *Heteronybelinia perideraeus* [37], *Heteronybelinia pseudorobusta* [25], *Heteronybelinia robusta* [38], and *Heteronybelinia yamagutii* [33].

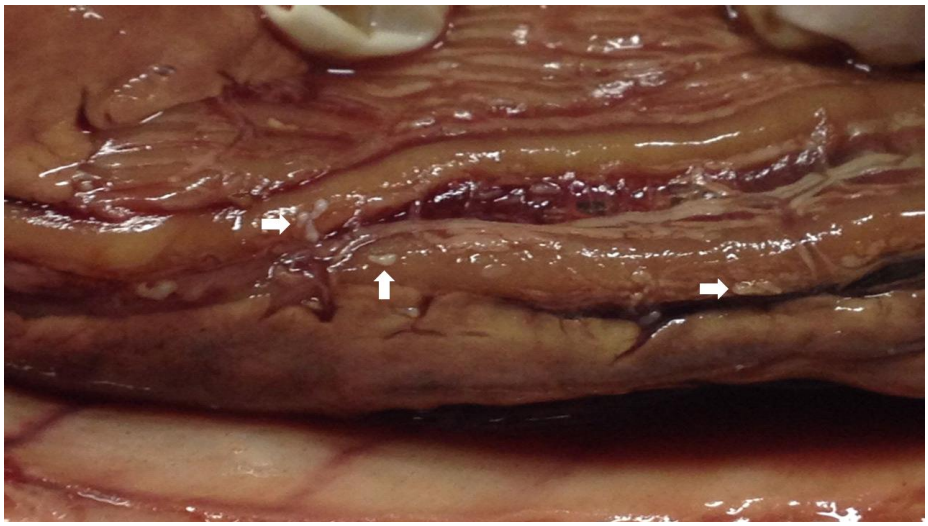

Fig 1. *Heteronybelinia* spp. metacestodes in the serous of the internal organs (arrow) of *Pomatomus saltatrix*

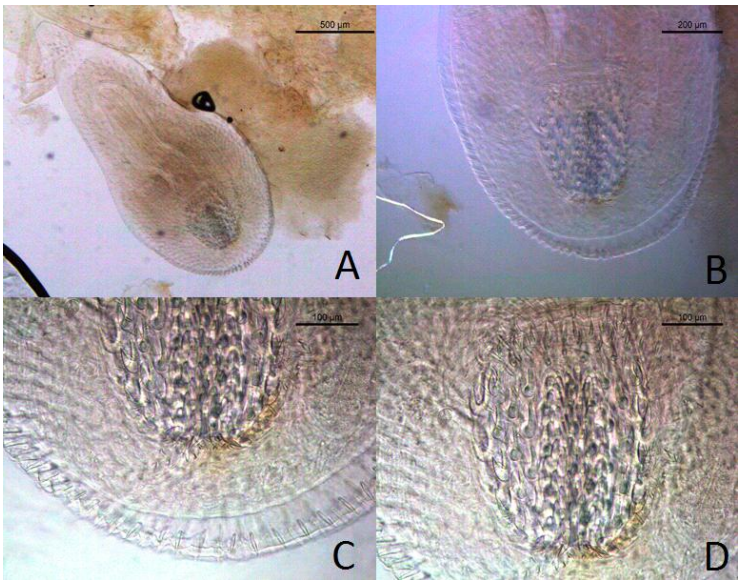

Fig 2. Microscopic observation of *Heteronybelinia*. **A.** *Heteronybelinia* spp. **B.** Basal region. **C.** Aculeus in the basal region. **D.** Aculeus

The oriental cuisine -i.e. japanese food- have been more popular nowadays, increasing the risk of raw seafood intake, which can cause parasite infections in consumers [39]. Studies about seafood quality have been performed to guarantee safety of the products [16]. Among parasites species, those that belong to Trypanorhyncha order has a sanitary and hygienic importance [11,40].

Parasitized seafood does not present high zoonotic potential, but the presence of the parasites cause fishes' disgusting aspect to consumers and consequently decrease sale of this products generating some economic losses to aquaculture [11].

Adults larvae habits gastrointestinal tract of elasmobranch fishes, such as sharks and rays, which are definitive hosts. Although, metacestodes are find in teleosts, elasmobranchs, and marine invertebrates, acting as intermediate hosts. In this stage, the parasites could be find in the cavity, organs serous, mesentery, and muscle [5, 41-42].

Some researchers, such as Rodero and Cuellar [43] reported that this cestodes can cause allergy and anaphylactic reactions. This process can occur due to seafood ingestion or contaminants substances, such as histamine, toxins, and parasites [44]. In sensitized hosts, this reaction could even been caused by cooked parasitized seafood, once allergens are resistant to the heat [45].

Tropomyosin and parvalbumin isoforms are the main molecules involved in allergy process of crustacea and fish intake, respectively [46]. In a study, people in Spain presented seroprevalence of antibodies against *Gymnorhynchus gigas* cestode [47], which causes modulation of cholinergic activity and alterations in the gastrointestinal tract [14].

Studies performed with Trypanorhyncha order occur since 1990, describing allergical reactions and hipersensitivity in murine model [13, 43, 48-49]. Infections by these parasites in humans are considered rare, once there are only three cases reported in the literature [3, 13, 43, 48-50]. Two cases were caused by *Hepatoxylon trichuri* [51], being one in the South Africa and other in Moçambique [52-53]. The other report was caused by *Nybelinia surmenicola* [33], that described the presence of the parasite in the palatine tonsil in a japan man [55].

Due to the allergic response and sensitivity in the host is caused by these cestodes by oral via, lead to parasite resistance to digestive process, which causes IgE response. In all cases reported in humans, larvae were found in the feces, showing resistance to gastrointestinal tract resistance [52-53].

The prevalence and quantity of infections caused by Trypanorhyncha vary due to fish age, food habits, and immune response [55].

There are no reports of *Heteronybelinia* [18] parasiting *P. saltatrix* [1] until the moment of this study.

According to Alves *et al*. [56], *Nybelinia* [21] was found in the mesentery, although, São Clemente *et al*. [57] reported this same genus in mesentery, stomach serous, and celomatic cavity. *Heteronybelinia rougetcampanae* [33] and *Myxonybelinia beveridgei* [58], which also belongs to Tentaculariidae family, were found in celomatic cavity and mesentery, stomach serous and liver, respectively [57]. As described by Amato *et al*. [59] and São Clemente *et al*. [7, 40], infection prevalence and intensity, infection intensity variation, number of species by infection site, and number of parasites in the muscle or others places are related to disgusting aspect in parasitized seafood.

During necropsy, it was found some alterations, such as steatosis in the liver, liquefaction necrosis in the kidney, hepatic congestion, lamellae fusion in the gills, necrosis in the stomach, and opacity of the eyes.

São Clemente [7], reported the species of Trypanorhyncha order found in *P. saltatrix* [1], which were *Callitetrarhynchus gracilis* [8], *Callitetrarhynchus speciosum* [9], and *Pterobothrium crassicolle* [10]. This information supports that this is the first report of *Heteronybelinia* in *P. saltatrix* [1] until this study.

4. CONCLUSION

We conclude that the parasites of Trypanorhyncha order, genus *Heteronybelinia* can parasite *Pomatomus saltatrix* [1], being this the first report of this cestode in this host.

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