INTRODUCTION

Parahemiurius (Vaz and Pereira, 1930) species (Digenea, Hemiuriidae) are found over a wide area, mainly in subtropical and temperate waters (Bray 1990), extending from Gulf of Mexico towards South American Atlantic Ocean, also in American Pacific Ocean and, probably, in Japanese waters (Manter 1940). Parahemiurius spp., especially P. merus (Linton, 1910), have been frequently recorded infecting temperate pelagic fishes (e.g. clupeids, carangids, salmonids and engraulids) from most oceans (Bray 1990). Few species of Hemiuriidae have its life cycle described (Køie 1979, 1990, 1991, 1992, 1997) and no species of Parahemiurius has its life cycle completely described (Bray 1990).

The digeneans that use three hosts are a good example of a complex life cycle (Marcogliese 1995). Species like Hemiurius communis Odhners, 1905 which uses molluscs, copepods and fishes as host (Køie 1995) shows the usual Digenea life cycle. Each transmission between the hosts is a challenge and the risk of a failed event may be reduced with strategies such as the ability of some species to perform a truncated life cycle (Poulin 2001, Poulin & Cribb, 2002). The development of progenetic metacercariae in the second intermediate host is one way to abbreviation of the life cycle (Poulin & Cribb 2002). In the present study, were identified progenetic metacercariae of P. merus found in Parasagitta friderici (Ritter-Zahony, 1911) (=Parasagitta friderici?).

MATERIAL AND METHODS

The hosts were collected in the Baía de Paranaguá (25°30'S, 48°31'W), Paraná, southern of Brazil, during September and October 1996. A sub-sample (n=190) of chaetognaths was examined and the parasitological index of prevalence, mean intensity and mean abundance of infection (all sensu Bush et al. 1997) of P. merus were established. Some parasite specimens were stained with Semichon’s carmine, cleared with beechnut creosote, and mounted in Canada balsam. Others were examined with Aman’s lactofenol with a drop of picric acid solution. Measurements of ten parasites specimens were taken using light microscope and the mean value is presented in mm followed by the standard deviation (± SD).

PROGENETIC METACERCARIAE OF PARAHEMIURIUS MERUS (PLATYHELMINTHES, DIGENEA, HEMIURIDAE) INFECTING PARASAGITTA FRIDERICI (CHAETOGNATHA) FROM SOUTHERN COAST BRAZIL

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RESUMO

Metacercárias progenéticas de Parahemiurius merus (Platyhelminthes, Digenea, Hemiuridae) parasitando Parasagitta friderici (Chaetognatha) da costa sul do Brasil

Parahemiurius merus é um hemiurideo amplamente distribuído e que normalmente infecta peixes pelágicos de regiões temperadas. Há alguns registros deste parasito em quetognatos. Seu ciclo de vida não é conhecido. Neste estudo metacercárias progenéticas de P. merus encontradas parasitando Parasagitta friderici da baía de Paranaguá (Brasil) são descritas. A prevalência desta parasitose foi de 86.8%, intensidade de infecção variando de 1 a 11, média de 2,26 e abundância média de 1,96 (n=190). Medidas e descrição de alguns espécimes de P. merus parasitas de P. friderici são apresentadas. Os índices parasitológicos são os mais elevados já reportados na relação entre Hemiuridae e Chaetognata. Este é o primeiro registro de metacercárias progenéticas em P. merus infectando quetognatas no Brasil.

PALAVRAS CHAVE: Chaetognatha; Digenea; Hemiuriidae; Parahemiurius merus; Parasito; Plâncton.

KEY WORDS: Chaetognatha; Digenea; Parasite; Hemiuridae; Parahemiurius merus; Plankton.
Representative vouchers were deposited at Helminthological Collection of Instituto Oswaldo Cruz in Rio de Janeiro (Brazil) CHIOC. Slides with progenetic metacercariae inside of host: CHIOC 36596a – d; Slides with progenetic metacercariae only: CHIOC 36967 a–d.

RESULTS AND DISCUSSION

In the examined sub-sample (n=190), most of chaetognaths were parasitized (n=165) by *P. merus* (Fig. 1, 2, 3), corresponding a prevalence of 86.8%. Sometimes, high intensity of infection (1 to 11) was observed and the mean intensity of infection was 2.26. The mean abundance was 1.96.

The parasitism of Chaetognata by trematodes was already reported throughout the world. Some cases include Biscayne Bay (Overstreet 1969), Indian Ocean (Øresland & Bray 2005), and Argentine coast (Cavaleri 1963, Pearre 1976). In this study is reported high intensity of infection. In contrast, Prado - Rosas et al., (2005) examined many specimens (n= 22.508) of six chaetognath species from Mexican Caribbean Sea, and found only 19 hemiurids, with an intensity of infection of 1 for all parasitized host.

Measurements of the morphometric characters of P. merus are: 0.44 (±0.05) total length, 0.16 (±0.02) width; oral sucker 0.04 (±0.01) diameter; pharynx 0.03 length, 0.02 width; acetabulum 0.08 (±0.01) diameter; seminal vesicle 0.02 diameter; anterior testes 0.06 (±0.01) length, 0.04 (±0.02) width; posterior testes 0.06 (±0.01) length, 0.04 (±0.01) width; ovary 0.07 (±0.01) length, 0.03 (±0.01) width; eggs 0.02 length, 0.01 width; two vitelline masses, 0.07 (±0.01) length, 0.05 (±0.03) width and 0.06 (±0.01) length, 0.07 (±0.07) width.

All measurements in this study are smaller than those reported for P. merus parasitizing fishes (Bray 1990), except the oral sucker and eggs length. These measurements must be analyzed with prudence, owing the different techniques used to prepare the parasites, which can alter the original size of the organism. In addition, Bray (1990) do not specify which techniques were used to prepare de measured parasites. On the other hand, changes in size can be expected, since the parasites may show distinct responses according to different environments, as an adaptation to improve the success in their lifecycles (Poulin 2005). According to this, the reduced space available in the chaetognaths body cavity may limit parasite growth but do not hinder their sexual maturation.

The observed parasites had the uterus filled with eggs (Fig. 3). In most part of the cases, some parasites eggs had been released in the host body cavity (Fig. 4). Some of them were hatched, showing a miracidium escaping through the egg operculum (Fig. 5). Daponte et al. 2008, had also reported eggs production by P. merus parasitizing P. friderici in Argentina. However, these parasites represented a small part of the sample, and their eggs appeared in small number. This is the first record of P. friderici infected by P. merus progenetic metacercariae in Brazilian waters.

The infection of chaetognaths may occur through predation on infected copepods or cladocerans, since it preys on zooplankton (Dollfus 1960, Pearre 1976). Conversely, all metacercariae were found in the chaetognaths' body cavity. It suggests that the infection does not occur through feeding or that metacercariae ingested are able of migrate from the digestive tract lumen towards the body cavity. According to Prado-Rosas et al. (2005) the body cavity infection is resultant of direct penetration.

Adults of P. merus are usually found in fishes. The role of chaetognaths in P. merus life cycle is uncertain. The infection may be accidental, with the chaetognath representing a dead-end host. On the other hand, it is possible to admit that chaetognaths really participate as an additional intermediary host in the P. merus life cycle. In this case, metacercariae may have become progenetic in chaetognaths that have escaped from the predation by the parasite’s definitive host, such as a fish. This study supports this idea, since embrionated eggs and miracidia were found inside the most part of chaetognaths examined.

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