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MAZOCRAEOIDES MAKRODEMAS SP. N. (POLYOPISTHOCOTYLEA: MAZOCRAEIDAE) FROM THE GILLS OF *PELLONA CASTELNAEANA* VALENCIENNES, 1847 (CLUPEIFORMES: PRISTIGASTERIDAE) IN THE BRAZILIAN AMAZON

MAZOCRAEOIDES MAKRODEMAS SP. N. (POLYOPISTHOCOTYLEA: MAZOCRAEIDAE) DE LAS BRANQUIAS DE *PELLONA CASTELNAEANA* VALENCIENNES, 1847 (CLUPEIFORMES: PRISTIGASTERIDAE) EN LA AMAZONIA BRASILEÑA

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ABSTRACT

The first species of Monogenoidea gill parasites of the family Mazocraeidae is recorded for a freshwater fish in Brazil. *Mazocraeoides makrodemas* sp. n. is described on *Pellona castelnaeana* from Catalão Lake, in the Solimões River, State of Amazonas, Brazil. The main characteristics that differ from the others are: anterior body portion three times bigger than the posterior one; two lateral and two internal anchors.

Keywords: Amazon – Fish parasites – Freshwater – Monogenoidea – Solimões River

RESUMEN

La primera espécie de parásitos branquiales de Monogenoidea de la familia Mazocraeidae se ha registrado para un pez de agua dulce en Brasil. *Mazocraeoides makrodemas* n. sp. se describe en *Pellona castelnaeana* del Lago catalán em el río Solimões, Estado de Amazonas, Brasil. Las principales características que difieren de los otros son: la parte anterior del cuerpo tres veces superior a la posterior; dos áncoras laterales y dos áncoras internas.

Palabras clave: Agua Dulce – Amazonas – Monogenoidea – Parásitos de los peces – Río Solimões

INTRODUCTION

The fish species of the family Pristigasteridae are included in nine genera and 38 marine species. Four freshwater species occur in the Amazon region, *Pellona castelnaeana* Valenciennes (1847), *P. flavipinnis* (Valenciennes, 1836), *Pristigaster cayana* Cuvier (1829) and *Ilisha amazonica* (Miranda Ribeiro, 1920).

Mazocraeidae Price (1936) is a type family of the suborder Mazocraeinea, the largest one of higher monogeneans in Bykhovsky's system. However, this family remains one of the least examined ones. This is first of all due to the extreme mazocraeid clamp structure's complexity. The clamps are much modified: some elements of clamp skeleton fused, supplementary sclerites are formed by sclerotization of fibrous-based substations of the clamp walls. Most sclerites are very broad but thin, they overlap one another and are poorly visible. That is why almost all the works on mazocraeids have the most general and very rough pictures of their clamps. There are only a few articles in which mazocraeid clamps are carefully examined (Bykhovsky & Nagibina, 1954; Llewellyn, 1957; Mamaev, 1981).

Three parasitic species are reported for *P. castelnaeana*, all of which in the Amazon region. One species of Digenea *Bacciger pellonae* Thatcher, 1992. One of Copepoda *Acusicola pellonidis* Thatcher & Boeger, 1983. One of Branchiura *Dolops carvalhoi* Lemos de castro, 1949 (Malta & Varella, 1983). In this work the first parasitic species of Monogenoidea was described for *P. castelnaeana*.

MATERIAL AND METHODS

Sixty-three individuals of *P. castelnaeana* were collected in May, July, September and November 2015. In the Catalão lakes complex, the Solimões River a fluvial-lacustrine system located at the confluence of the Negro and Solimões rivers, in the municipality of Iranduba 03°10` 04"S and 59°54`45" W. The necropsies were performed in the field; the gills were fixed in 5% formalin and analyzed in a stereomicroscope at the Fish Parasitology Laboratory (LPP) of National Research Institute of the Amazon (INPA).

The monogenoids were collected and fixed in 5% formalin. Permanent slides were prepared in Hoyer's medium. The drawings and measurements were made with the aid of a light and micrometric ocular camera coupled to the Olympus BH-2 optical microscope. The nomenclature adopted for the clamp sclerites is that of Mamaev (1981), namely: scleritum arcuatum anterius (SAA), scleritum antero-lateralia (SAL), scleritum antero-supplementarium, (SAS), scleritum medio-basale (SMB), scleritum medio-supplementarium (SMS), scleritum postero-supplementarium (SPS), scleritum arcuatum posterius (SAP) and scleritum labiatum (SL).

The measuring methods adopted for the haptoral hooks and the copulatory spines are those of Agrawal & Sharma (1988). The average measurement is followed by the range and number (n) of specimens measured in parentheses and the standard error. Holotype and paratypes were deposited in the helminth collections of the National Research Institute of the Amazon, Manaus, Amazonas, Brazil.

RESULTS

Mazocraeoides makrodemas sp. n. (Figs. 1 – 2)
Description: Body clavate with 4 pairs of clamps on margin of posterior body region (Fig. 1). Haptoral zone embraces testis and ovary. Haptor with two pairs of anchors, one in the center and one in the side. Worm length 4.26 (2.75-7.5) ±1.29, width 0.32 (0.1-0.51) ±0,12 at the widest part and 0.08 (0.1-0.5) ±0.02 at the narrowest; haptoral size 0.8 (0.5-0,8) x 0.51 (0.3-0,7) ± 0.11, the anterior region distal to the body is narrow and widens progressively to the haptor and is about three times larger than the haptoral region.. Haptor sub-rectangular, longer than wide. Four pairs of clamps of open type equal in size with short peduncles, but very visible and defined, they have 5 sclerites: SAA, SMB, SPS, SAP and SL. Clamps similar in shape, sub-equal, asymmetrical; 1, 2, 3, 4 – 0.17 (0.1-0,3) × 0.16 (0.1- 0.2) ±0.06 in diameter. SAA semicircular extending to meet the SAP. SMB sub-pentagonal with six parallel irregular shaped holes,

SPS overlapping the median portion of the SL in shape-inverted "V". SAP split in two, smaller than SL and located above SMB. SL broad and overlaping the SAA.

Anterior end with a pair of suction cups 0.09 (0.1-0.2) × 0.09 (0.1-0.2) ± 0.06. Oval pharynx, 0.05 (0.03-0.06) × 0.08 (0.05-0.09). Copulatory organ below the intestinal bifurcation. Intestinal cecum with lateral diverticula extending to the height of the first pair of clamps. Single testis, elongated, 0.4 (0.3-0.6) × 0.05 (0.02- 0.07) smaller than the ovary in the haptoral region. Circular copulatory organ 0.03 (0.02-0.04) × 0.03 (0.02-0.04), armed with eight large spines in equal sizes facing outwards. Ovaries with two parts, one anterior and the other posterior, connected by a filament, 0.6 (0.5-0.8) × 0.1 (0.1-0.2) lie to right of testis. Follicular vitelation, follicles densely distributed between the level of intestinal bifurcation and the posterior body extremity. Yolk ducts at ovary level. Vagina not observed. Eggs 0.4 (0.3-0.05) × 0.05 (0.03-0.06) with long filaments at the ends.

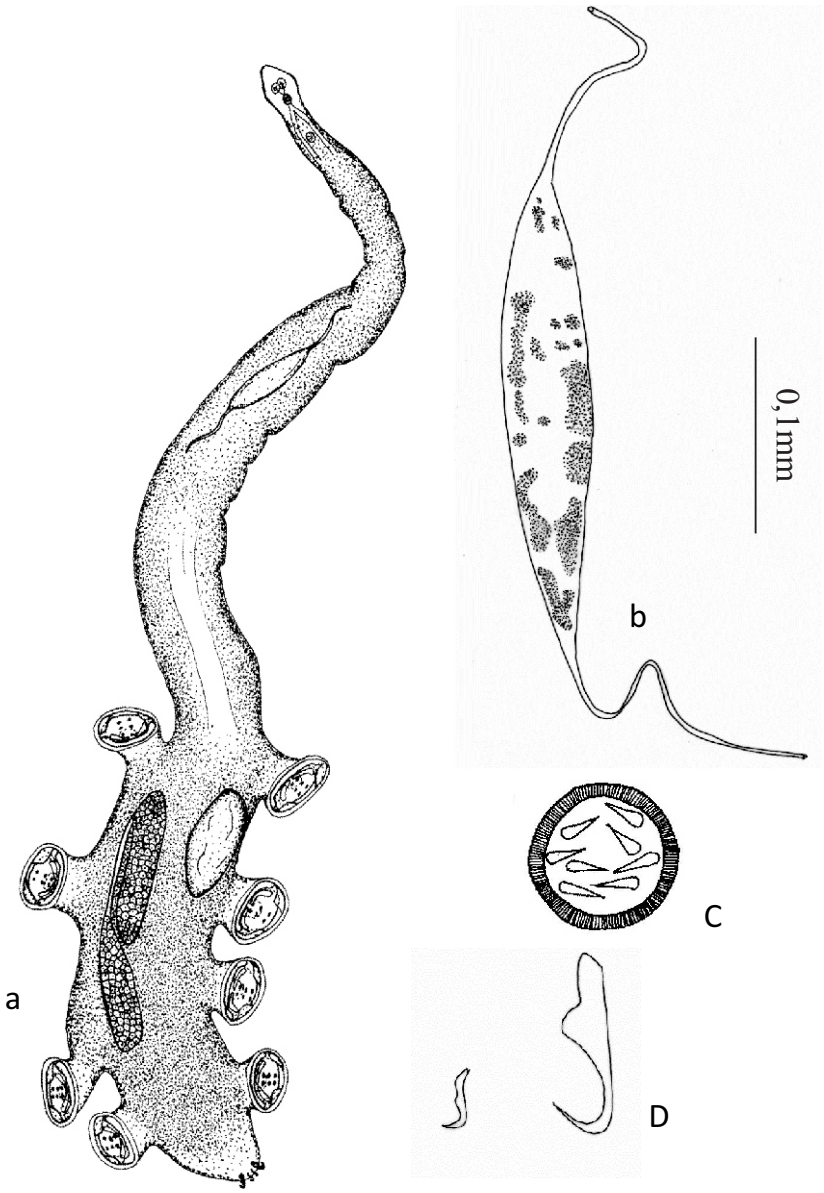

Figure 1. a) specimen of *Mazocraeoides makrodemas* sp. n., b) egg, c) genital crown and d) internal anchor and external anchor.

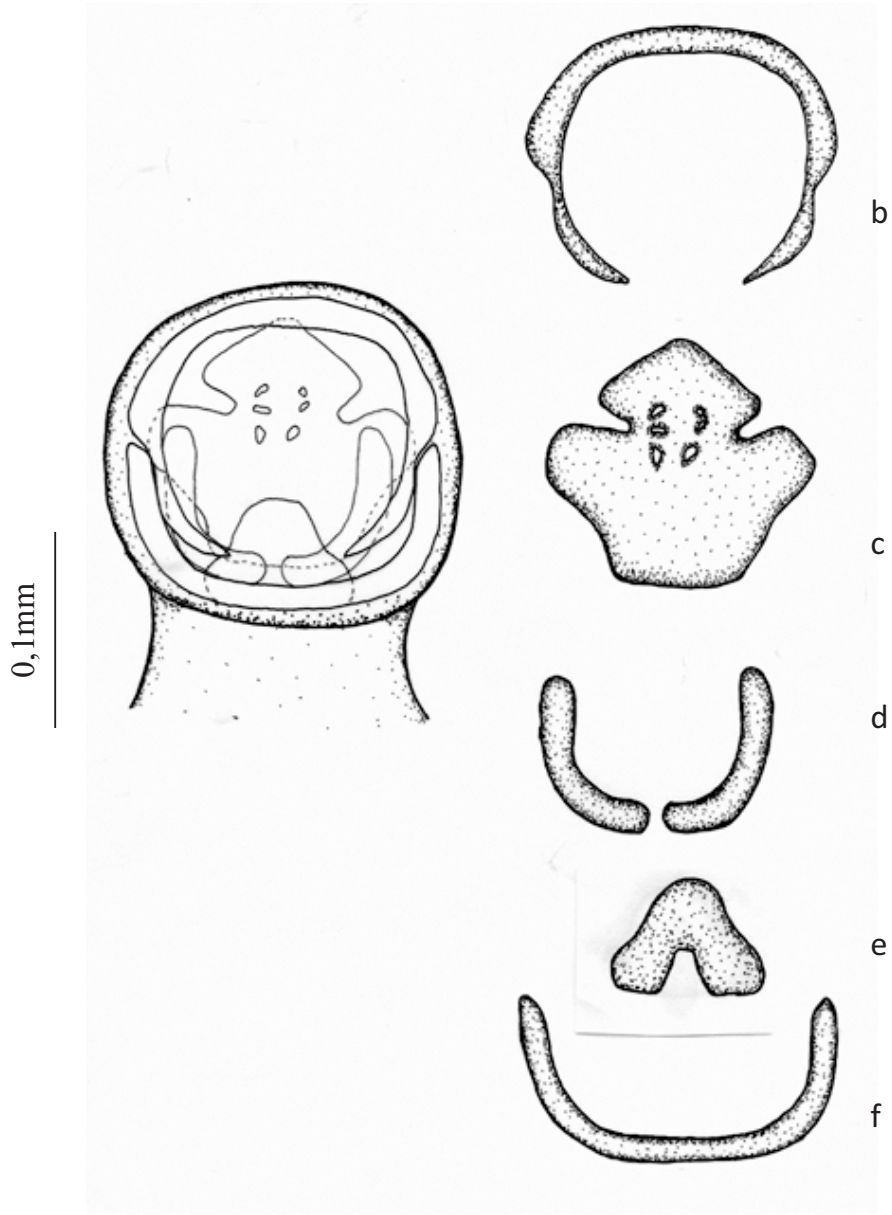

Figure 2. a) Clamp, b) anterior arch sclerite (SAA), c) basal sclerite (SMB), d) posterolateral sclerite (SPL), e) posterolateral supplementary scleritis (SPS), and f) labial scleritis (SL).

Taxonomic summary
Type-host and locality: *Pellona castelnaeana* Valenciennes, 1847
Type-locality: Catalão lakes complex, the Solimões River (03°10` 04"S and 59°54`45" W).
Prevalence: 15.41
Mean intensity of infestation: 1-3
Maen abundance: 0.2
Site: Gills.
Material deposited: Holotype INPA – 694; Paratypes INPA – 695

Etymology: The specific name is from the Greek (makro = big + demas = body) and refers to the big body size.

DISCUSSION

Mazocraeidae species were cited parasitizing marine fish from India (Gupta & Krishna, 1976; Gupta & Masoodi, 1985; Kritsky & Bilqees, 1972,

1973), United States (McMalon, 1963), China (Jianying *et al*., 1998), Brazil (Kohn & Santos, 1988; Tavares *et al.,* 2004) and parasites of the Engraulidae, Pristigasteridae and Clupeidae families.

Nine species of *Mazocraeoides* are known: *M. georgei* Price, 1936; *M. clupei* Gupta & Krishna, 1976; *M. dussumieriai* Gupta & Krishna, 1976; *M. gussevi* Gupta & Masoodi, 1985; *M. indica* Gupta & Krishna, 1976; *M. jairajpurii* Gupta & Masoodi, 1985; *M. pellonai* Gupta & Krishna, 1976; *M. puriensis* Gupta & Krishna, 1976 and *M. prashadi* Chauhan, (1950) (Gupta & Masoodi, 1978).

Mazocraeoides makrodemas differs from the nine species of the genus because its anterior body portion shows to be three times larger than the posterior one. The haptoral has pedunculated clamps, two lateral anchors and two internal anchors. Single copulatory organ with eight long and central spines. Sclerites mean basal, anterior arch, lateral, posteral superior single. Elongated testicle when compared to the species of the genus and similar as to the location in the haptoral portion. *M. georgey* presents three pairs anchors in the haptor and non-pedunculated clamps.

For Brazil only two species of the genus *Mazocraeoides* are registered parasitizing only marine fish. Until the present study, there was no record of monogenea for freshwater fish in Brazil (Eiras *et al*., 2016).

In this work we recorded the first species of Mazocraeidae parasitizing a Brazilian freshwater fish of the family Pristigasteridae, *P. castelnaeana*, and the second time that a species of the genus Mazocraeoides parasitizes a fish of the genus *Pellona* Valenciennes, 1847.

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