

A NEW GENUS OF DACTYLOGYRID FROM THE GILLS OF *GALAXIAS MACULATUS* (OSMERIFORMES: GALAXIIDAE) IN MAULLÍN BASIN, PATAGONIA, CHILE

Gustavo P. Viozzi, Sandra L. Marín*, Juan Carvajal†, Norma Brugni, and Melinka Mancilla*

Laboratorio de Parasitología, Centro Regional Universitario Bariloche, Universidad Nacional del Comahue, Quintral 1250, 8400 Bariloche, Argentina. e-mail: gviozzi@bariloche.com.ar

ABSTRACT: During a parasitological survey of *Galaxias maculatus* (Jenyns, 1842) in the Maullín Basin (Chilean Patagonia), specimens of a new species of Monogenea were collected from the gills. This species is described as the only member of a proposed new genus, *Inserotrema* n. gen. (Dactylogyridae, Ancyrocephalinae), characterized by similar hooks with 2 subunits, overlapping gonads, coiled cirrus with counterclockwise rings, articulated accessory piece formed by 2 parts, a needlelike sclerite threading the distal part of the MCO, and a sclerotized midventral vagina. This new genus is proposed for dactylogyrids from gills of galaxiids (Galaxiidae). *Inserotrema puyei* n. sp. infects gills of *G. maculatus* from Llanquihue Lake, Maullín River, and Maullín Estuary. This is the first species of Ancyrocephalinae described from gills of a galaxiid.

Members of superfamily Galaxioidea (Osmeriformes) are found only in the southern hemisphere, including galaxiids (Galaxiidae), the most widespread family (Nelson, 1994). *Gyrodactylus* sp. von Nordmann, 1832 (Gyrodactylidae), from gills of *Galaxias brevipinnis* Günter, 1966 in New Zealand, and *Philureter trigoniopsis* Viozzi and Gutiérrez, 2001 (Dactylogyridae) from the ureters and urinary bladder of *Galaxias maculatus* (Jenyns, 1842) in Argentinean Patagonia are the only records of monogeneans infecting galaxiids (Fletcher and Whittington, 1998; Kohn and Cohen, 1998; Hine et al., 2000; Viozzi and Gutiérrez, 2001). A new species of Dactylogyridae was found infecting gills of *G. maculatus* (Osmeriformes: Galaxiidae) from freshwater and brackish waters of the Chilean Patagonia. This species is described as the only member of a proposed new genus of Ancyrocephalinae.

MATERIALS AND METHODS

Specimens of *G. maculatus* (Chilean puye) were collected from Llanquihue Lake, Maullín River, and Maullín Estuary in southern Chile, with the use of nets and electrofishing equipment. Fishes were brought to the laboratory and immediately examined with the aid of a dissecting microscope; parasites were removed from gills. Some specimens were studied live; others were relaxed and killed in 1:4,000 formalin, and preserved in 5% formalin. Some worms were fixed in hot formalin, stained in Gomori's trichrome or Grenacher's carmine-alum, and mounted in Canada balsam. Illustrations were prepared with the aid of a camera lucida. Measurements and numbering of hook pairs followed Kritsky et al. (1986) and Mizelle and Price (1963). Male copulatory organ length was measured with the use of a calibrated curvimeter on camera lucida drawings. Some measures of haptor sclerites were taken from specimens cleared in lactophenol. Measurements are expressed in micrometers, with the mean followed in parentheses by the range and number of specimens measured.

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* Instituto de Acuicultura, Universidad Austral de Chile, P.O. Box 1327, Puerto Montt, Chile.

† Centro de Investigación y Desarrollo i-mar, Universidad de los Lagos, P.O. Box 557, Puerto Montt, Chile.

DESCRIPTION

Inserotrema n. gen.

Diagnosis: Dactylogyridae, Ancyrocephalinae. Body fusiform, comprising cephalic region, trunk, peduncle, and haptor. Tegument smooth. Four cephalic lobes, head organs in 2 bilateral pairs; cephalic glands lateral to pharynx. Two pairs of eyes. Mouth subterminal, midventral, anterior to pharynx. Pharynx muscular, glandular. Two intestinal caeca confluent posterior to gonads, lacking diverticula. Genital pore midventral, near level of intestinal bifurcation. Gonads intercecal, overlapping; vas deferens looping around left intestinal cecum; seminal vesicle a dilatation of vas deferens with a distal loop. Two prostatic reservoirs. Copulatory complex comprising sclerotized male copulatory organ (MCO) and accessory piece; MCO a coiled tube with counterclockwise rings, accessory piece formed by proximal and distal parts; proximal part connected to base of MCO, and a needlelike sclerite threading the distal part of the MCO. Seminal receptacle anterior to germarium. Vagina sclerotized; vaginal aperture midventral. Vitellaria dense. Haptor armed with ventral and dorsal anchor/bar complexes, 7 pairs of hooks with ancyrocephaline distribution (4 dorsal, 10 ventral), similar in shape and size; hook with shank comprising proximal and distal subunits, proximal subunit expanded.

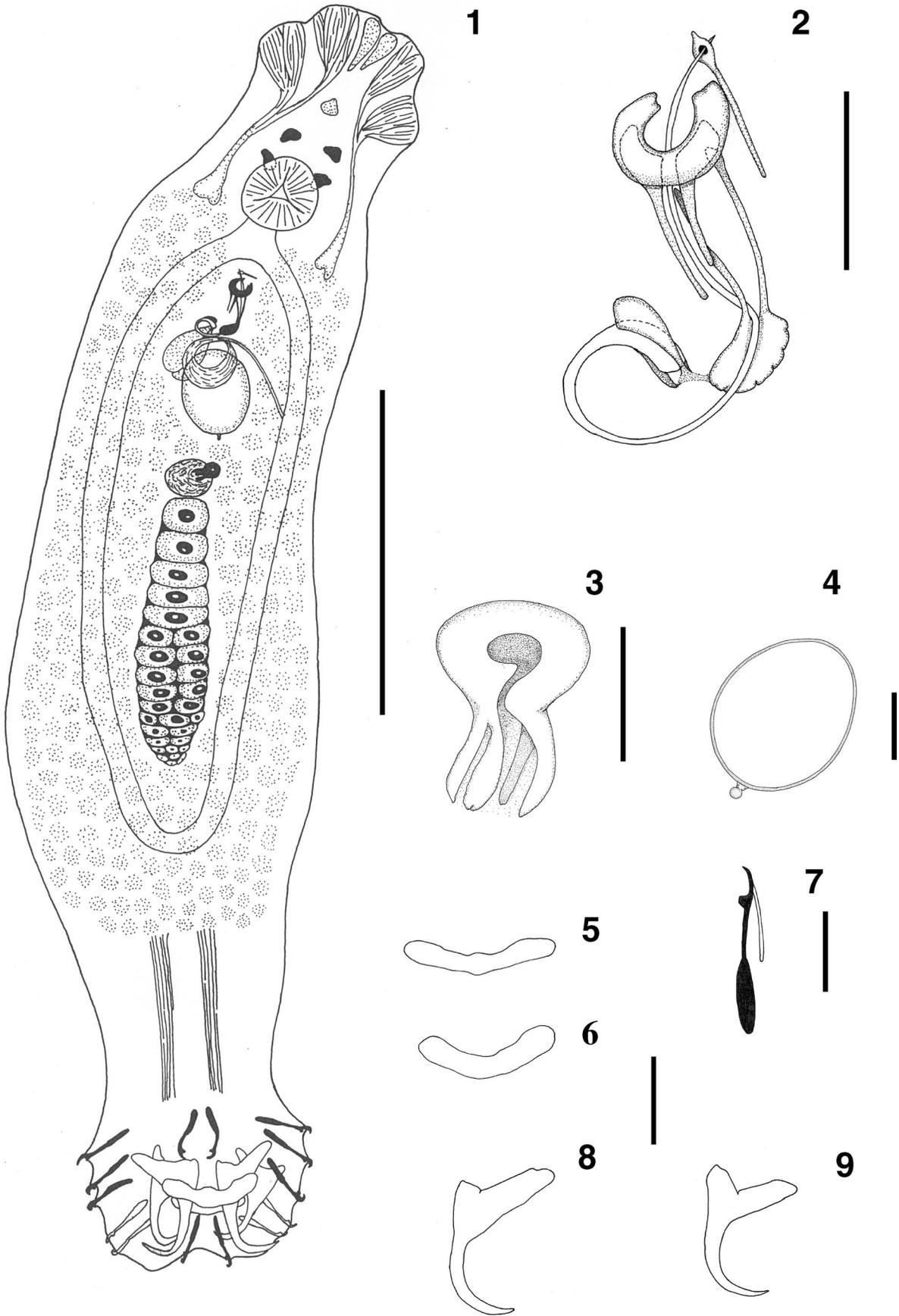
Etymology: The genus name is from the Latin, *Insero*, meaning to thread (pass a thread through the eye of a needle), appended to the commonly used ending, *-trema*, and refers to the needlelike piece of the copulatory complex.

Inserotrema puyei n. sp.

(Figs. 1–9).

Description: Body 410 (317–569; n = 22) long, 111 (74–149; n = 21) wide, cephalic lobes moderately developed; pharynx slightly ovate, 33 (22–41; n = 22) long, 33 (22–43; n = 22) wide. Esophagus short. Peduncle short with 1 pair of retractile muscles. Haptor 65 (45–84; n = 21) long, 67 (53–84; n = 18) wide. Ventral anchor 32 (26–36; n = 14) long, with slightly curved shaft, base 19 (17–23; n = 14) wide, with elongate superficial root. Dorsal anchor 28 (25–30; n = 6) long, with superficial root slightly elongated, base 16 (11–18; n = 6) wide. Ventral bar 26 (20–31; n = 17) long, slightly U-shaped. Dorsal bar 25 (22–30; n = 9) long. Hooks similar with protruding short thumb, delicate point, shank comprising proximal and distal subunits; proximal subunit expanded. Filamentous-hooklet loop (FH loop) extending to union of shank subunits. Hooks 20 (18–23; n = 67) long. Male copulatory organ 52 (46–55; n = 15) long, a coil about 1.5 rings. Accessory piece comprising proximal forklike part with 2 anterior projections, connected to a crestlike sclerite in the base of MCO through a variable articulation process; distal collarlike part with 2 posterior projections,

FIGURES 1–9. *Inserotrema puyei* n. gen., n. sp. (1) Whole mount, adult (composite, ventral view). Bar = 100 µm. (2) Copulatory complex (ventral view). Bar = 10 µm. (3) Vagina. Bar = 5 µm. (4) Egg. Bar = 20 µm. (5) Ventral bar. Bar = 20 µm. (6) Dorsal bar. Bar = 20 µm. (7) Hook. Bar = 10 µm. (8) Ventral anchor. Bar = 20 µm. (9) Dorsal anchor. Bar = 20 µm.



and needlelike sclerite in which distal portion of MCO is threaded. Germarium 76 (50–92; n = 5) long, 16 (13–20; n = 5) wide. Sclerotized vagina formed by incomplete ring with 2 pairs of posterior projections. Vitellaria follicular, present in trunk except in zone of vaginal pore. Single brownish egg 40 (28–52; n = 2) long, 30 (22–37; n = 2) wide, with short polar filament.

Taxonomy summary

Type host: *Galaxias maculatus* (Jenyns, 1842) (Chilean puye).

Site of infection: Gills.

Type locality: Llanquihue Lake (41°11'S, 73°01'W) Patagonia, Chile.

Other localities: Maullín River (41°16'S, 73°01'W), Maullín Estuary (41°36'S, 73°36'W).

Specimens deposited: Holotype (439/1); 4 paratypes (439/2–5) deposited in the Colección Nacional de Parasitología del Museo Argentino de Ciencias Naturales Bernardino Rivadavia, Buenos Aires, Argentina. Five paratypes (MZUC 32685–32689) deposited in Colección del Museo de Zoología Universidad de Concepción, Concepción, Chile. Nine paratypes (213/1–3; 214/1–6) deposited in the Colección Parasitológica de la Universidad Nacional del Comahue, (Bariloche, Argentina). Three paratypes (USNPC nos. 99479, 99480) deposited in the United States National Parasite Collection, Beltsville, Maryland.

Prevalence: Ninety-one percent (October 2005, Llanquihue Lake, n = 11); 9.1% (October 2005, Maullín River, n = 11); 100% (October 2005, Maullín Estuary, n = 15).

Mean intensity: Forty-seven point six (October 2005, Llanquihue Lake, n = 11); 1.0 (October 2005, Maullín River, n = 11); 13.4 (October 2005, Maullín Estuary, n = 15).

Etymology: Species name refers to the common name of host.

DISCUSSION

Inserotrema puyei n. g., n. sp. is a member of Ancyrocephalinae (sensu Kritsky and Boeger, 1989) based on the anatomy of internal organs, morphology, and number of haptor sclerites.

The new genus is characterized by the combination of the following features: ventral and dorsal anchor/bar complexes, overlapping gonads, coiled male copulatory organ with counterclockwise rings, articulated accessory piece with a needlelike sclerite, sclerotized midventral vagina, and hooks similar with 2 subunit, proximal subunit expanded.

The only monogeneans cited for osmeriform hosts are *Paracyclocotyle cherbonnieri* Dollfus, 1970 (Polyopisthocotylea) from *Alepocephalus bairdi* Goode and Bean, 1879 (Alepocephalidae) and *Laminiscus gussevi* Pålsson and Beverley-Burton, 1983 (Gyrodactyloidea) from *Mallotus villosus* (Müller, 1776) (Osmeridae) in Atlantic Canadian waters (McDonald and Margolis, 1995). The only described ancyrocephalin parasitizing osmeriforms is *P. trigoniopsis* from *G. maculatus* of Andean Patagonian lakes (Viozzi and Gutiérrez, 2001). *Inserotrema* n. gen. differs from the monotypic species of *Philureter* by the site of infection (ureters and urinary bladder in *P. trigoniopsis*), by the body shape (triangular in adults of *P. trigoniopsis*), by the hooks (without subunits in *P. trigoniopsis*), by the dorsal anchor bar/complexes (variable in shape or absent in *P. trigoniopsis*), and by the position of gonads (tandem in *P. trigoniopsis*).

Other South American species of the Ancyrocephalinae parasitizing freshwater fishes having the combination of the following characters: dorsal and ventral anchor/bar complexes, hooks with 2 subunits, overlapping gonads, coiled cirrus, and an articulated accessory piece, belong to *Notozothecium* Boeger and Kritsky, 1988, *Ancistrohaptor* Agarwal and Kritsky, 1998, and *Protorhinoxenus* Domingues and Boeger, 2002 from Characiformes, and *Gonocleithrum* Kritsky and Thatcher, 1983 from Osteoglossiformes (see Kritsky and Thatcher, 1983; Boeger and

Kritsky, 1988; Kritsky et al., 1996; Agarwal and Kritsky, 1998; Domingues and Boeger, 2002). *Inserotrema puyei* n. gen. n. sp. differs from the species of those genera by the midventral vaginal aperture and by the needlelike piece threading the distal end of the MCO. In addition, the new species differs from *Protorhinoxenus* by the similar hooks and anchors with superficial roots, from *Ancistrohaptor* by the ventral anchor without elongated shaft, from *Gonocleithrum* by lacking gonadal sclerite, and from *Notozothecium* by lacking projection of ventral bar. *Inserotrema puyei* is the first Dactylogyridae species described from gills of a galaxiid.

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