

## Short note

# First records of parasitic nematodes in two species of river fish, San Juan Province, Argentina

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**ABSTRACT.** In rivers and other watercourses from San Juan Province specimens of *Hatcheria macraei* (Girard, 1855), *Psalidodon eigenmanniorum* (= *Astyanax eigenmanniorum* (Cope, 1894), *Jenynsia lineata* (Jenyns, 1842) and *Trichomycterus corduvensis* Weyenbergh 1877 were captured. Of these, *H. macraei* and *P. eigenmanniorum* were parasitized with the nematodes *Rhabdochona acuminata* and *Contracaecum* sp., respectively. The morphometric analysis of the identified nematodes is included. They are the first records of parasitic nematodes of fish from San Juan Province. In this way, the geographical distribution of both nematodes was extended and *H. macraei* and *P. eigenmanniorum* were registered as new hosts.

**Keywords:** nematode parasites, freshwater fishes, San Juan Province

## Introduction

San Juan Province located in the central west of Argentine has several rivers that belong to the basin of the Desaguadero-Salado-Chadileuvú-Curacó Rivers, except for the watercourses that are located at the western end of the province, in the Valle Fértil Department [1–3]. San Juan River is one of the most important sub-basins, occupying about 45% of the area of the province. It is born from the confluence of the rivers Castaño, Los Patos, and Calingasta; runs from West to East and feeds the Ullún Reservoir, located 18 km upstream of the capital of the province, destined for the supply of water for irrigation and electrical production. The rivers in this sector are snowy in spring [1,4].

Likewise, San Juan Province is located within the Subandean-Cuyan ichthyoregion, where 20 species of fish are recorded of which three are introduced species, being Diplomystidae and Percichthyidae the distinctive families of the region [5]. Acosta et al. [6] recorded 21 species in this province, seven of which were introduced for recreational and production purposes. Siluriformes are the best represented, with five species

distributed in two families (Trichomycteridae and Diplomistidae), followed by Characiformes (with three species of Characidae), Cyprinodontiformes (two species of Anablepidae and Poeciliidae), Synbranchiformes (one species of Synbranchidae), Centrarchiformes (two species of Percichthyidae) and Cichliformes (one species of Cichlidae). The introduced species belong to the orders Salmoniformes, Atheriniformes, and Cypriniformes.

*Rhabdochona acuminata* (Molin, 1860) is a nematode with a wide range of hosts, including specimens of the families Percichthyidae (Centrarchiformes), Salmonidae (Salmoniformes), Galaxiidae (Galaxiiformes), Atherinidae (Atheriniformes), Diplomystidae (Siluriformes), Characidae, Bryconidae and Anostomidae (Characiformes) and Anablepidae (Cyprinodontiformes) from Ecuador, Brazil and Argentina [7]. In Argentina, *R. acuminata* was recorded in two regions: in the Northwest was located in the intestine of *Jenynsia lineata* (= *Jenynsia multidentata* (Jenyns, 1842)) (Province of Tucumán) [8], in *Astyanax lacustris* (= *A. asuncionensis* (Gery, 1972)) from El Tunal reservoir [9] and later in *Jenynsia alternimaculata* (Fowler, 1940) from Isasmendi stream, a tributary

of the Arias River (Salta Province) [10] and the Patagonian region: in *Galaxias maculatus* (Jenyns, 1842) (Rio Negro and Chubut Provinces) [11,12], *Galaxias platei* Steindachner, 1898 (Santa Cruz Province) [11], in *Diplomystes mesembrinus* Ringuet, 1982 (Chubut and Río Negro Provinces) [13], *Odontesthes hatcheri* (= *Patagonina hatcheri* (Eigenmann, 1909)) and *Onchorhynchus mykiss* (Walbaum, 1792) (Neuquén Province) [11] and *Percichthys trucha* (Valenciennes, 1833) from Limay River, Río Negro-Neuquén Provinces [14].

On the other hand, *Contracaecum* Railliet & Henry, 1912 larvae present a wide distribution (that is, they are cosmopolitan). It is estimated that there are approximately 100 species of the genus [15]. Likewise, in Argentina, *Contracaecum* larvae were recorded in characids, cyprinids and pimelodids in the Northwest (Tucumán, Catamarca, Salta and Santiago del Estero Provinces) [10,16–23], in pimelodids and serrasalmids of the Northeast (Corrientes and Santa Fé Provinces) [24,25], in atherinids, pimelodids and characids from the Center (San Luis, Córdoba, Mendoza, La Pampa, and Buenos Aires Provinces) [26–32] and in salmonids, galaxids, atherinids, diplomistids and ciprinids from Patagonia ([11,13,27,32–34]).

The purpose of this article is to describe for the first time two nematode taxa that parasitize river fish from San Juan Province.

## Materials and Methods

This work was carried out from examining 11 specimens (7 males, 4 females) of *Hatcheria macraei* (Standard length [Lst] 62.64±15.00 mm (42.28–89.53); weight 3.25±2.00 g (0.89–6.86); 15 specimens (4 males, 11 females) of *Psalidodon eigenmanniorum* (Lst 56.06±8 mm (44.76–75.14); weight 5.17±2.00 g (2.35–8.82); 4 specimens of *Trichomycterus corduvensis* (Lst 41±12 mm (30.29–60.20); weight 1.50±0.71 g (0.77–2.49) and 6 (1 male, 5 females) specimens of *Jenynsia lineata* (Lst 43.26±3.4 mm (37.23–47.74), weight 2.50±0.96 g (1.37–4.33) captured in La Majadita, Valle Fértil Department (February 2016), Río Castaño and Villa Corral (March 2009), Calingasta Department and Ullúm Dam, San Juan Province. Skimming-type hand nets and fishing rods were used. The fishes were fixed in 4% formaldehyde for 24 hr and stored in 70% ethanol. For the extraction of helminths, an incision was made in the middle ventral region of the body, in an ano-operculum

direction and the digestive tract was extracted, according to the technique of Reichenbach-Klinke et al. [35]. All nematodes found were cleared in lactophenol [36] and the morphometric study of them was carried out. The indicators of parasitic infection proposed by Bush et al. [37]. All measurements are given in millimeters unless otherwise stated. The taxonomy of nematodes follows Moravec [7] and Anderson et al. [38]. The taxonomy of fishes follows Fricke et al. [39] and Mirande and Koerber [40]. All nematodes have been deposited in the Colección de Invertebrados (Sección Helminths y Anélidos), Fundación Miguel Lillo (CH-N-FML), Miguel Lillo 251, (4000) San Miguel de Tucumán, Argentina. The fishes examined were deposited in the Colección Ictiológica Fundación Miguel Lillo (CI-FML), Miguel Lillo 251, (4000) San Miguel de Tucumán.

The fishes with which the work was performed were manipulated taking into account the international protocols “Guide for the Care and Use of Laboratory Animals of the National Institutes of Health” [41].

## Results

Of the 11 specimens of *H. macraei* captured six were parasitized with *Rhabdochona acuminata*.

### Order Spirurida Chitwood, 1933

#### Family Rhabdochonidae Travassos, Artigas & Pereira, 1928

*Rhabdochona acuminata* (Molin, 1860)

Hosts: *Hatcheria macraei* (Girard, 1855) (Siluriformes, Trichomycteridae) (CI-FML#6396)

Locality: Río Castaño, Calingasta Department, Province of San Juan

Site of infection: intestine

Quantitative descriptors: prevalence: 54.5%; intensity: 17; mean intensity: 2.8 nematodes per fish  
Deposition of voucher specimen: CH-N-FML#07798

**General description.** Medium-sized nematodes. Mouth opening circular oblong; 4 internal papilla-like structures, 4 cephalic papillae. Prostom funnel-shaped, relatively short with basal teeth. Anterior margin of prostom armed with 14 teeth, lateral teeth arranged in pairs. Amphids with one cuticular adjoinment close to each amphid. Deirids are well developed, simple, situated a short distance from posterior prostom. Lateral alae absent. Tail tip of both sexes conical. Males without caudal alae; spicules unequal and dissimilar.

**Female.** Based on seven gravid specimens,

measurements are presented as mean  $\pm$  SD followed by range in parentheses: length of body 13.5 $\pm$ 1.3 (12.00–15.50), maximum width 0.11 $\pm$ 0.01 (0.10–0.14), Prostom 0.020 $\pm$ 0.003 (0.020–0.030), long by 0.010 $\pm$ 0.004 (0.010–0.020) wide. Vestibule including prostom 0.15 $\pm$ 0.01 (0.13–0.17) long; length of muscular esophagus 0.34 $\pm$ 0.03 (0.30–0.40), of glandular esophagus 1.45 $\pm$ 0.12 (1.25–1.60), Deirids, nerve ring, and excretory pore 0.100 $\pm$ 0.006 (0.10–0.12), 0.200 $\pm$ 0.003 (0.200–0.210) and 0.27 $\pm$ 0.01 (0.25–0.30), from anterior end, respectively. Vulva postequatorial, 6.35 $\pm$ 0.10 (5.00–7.34) from posterior end. Eggs oval, smooth, nonfilamented, 0.020 $\pm$ 0.004 (0.020–0.030) long by 0.010 $\pm$ 0.004 (0.010–0.020) wide. Tail 0.223 $\pm$ 0.03 (0.20–0.30) long; sometimes with tips of tail with cuticular spike.

**Male.** Based on two adult specimens; measurements are presented as a range in parentheses: length of body (7.12–8.5), maximum width (0.10–0.12). Prostom 0.020 long by (0.010–0.020) wide. Vestibule including prostom (0.12–0.14) long; length of muscular esophagus (0.24–0.27) of glandular esophagus (1.00). Deirids, nerve ring, and excretory pore 0.10, (0.17–0.20) and (0.16–0.20) from anterior end, respectively. Spicules dissimilar and unequal. Left spicule 0.50 long; distal part with ventral membranous heel, dorsal hook with tip folded. Right spicule 0.1 long; distal end with dorsal membranous ala. Tail (0.23–0.30) long. Subventral preanal papillae in combinations 8+8; additional lateral pair of papillae between third and fourth subventral pair. Postanal papillae in combination 5+5; additional pair between first and second subventral pairs. Area rugosa absent. Caudal extremity ventrally curved.

On the other hand, in three of the 15 specimens of *P. eigenmanniorum*, *Contraeaecum* sp. larvae were isolated.

#### **Order Ascaridida Skrjabin & Schulz, 1940**

#### **Family Anisakidae Railliet & Henry, 1912**

*Contraeaecum* Railliet & Henry, 1912

Host: *Psalidodon eigenmanniorum* (= *Astyanax eigenmanniorum*) (Cope, 1894) (Characiformes, Characidae) (CI-FML#6397)

Locality: Río Castaño, Calingasta Department, Province of San Juan, Argentina

Site of infection: free or encapsulated in abdominal cavity

Quantitative descriptors: prevalence: 20%; intensity: 3; mean intensity: one nematode per fish

Deposition of voucher specimen: CH-N-FML#07799

**General description (based on three specimens).** Measurements are in mm, range in parentheses. Whitish nematodes, medium to large size. Cuticle with transversal striations. Head end rounded, bearing small ventral cuticular tooth. Three lips present, one dorsal and two ventrolateral. Between the last two is observed a cuticular tooth 0.01 length and behind it the excretory pore. Each subventral lip has a papilla and two dorsal lips. Total body (17.40–18.20) length; body (0.51–0.84) width. Nerve ring-anterior end (0.20–0.30). Esophagus narrow (1.64–1.74) length; ventriculus small and rounded, 0.10 length and 0.10 wide; Ventricular appendix (0.43–0.50) length. Intestine brownish, dark. Intestinal caecum very long (1.20–1.30) length; extending anteriorly almost to nerve ring. Rectum short, three small rectal glands present. Tail conical (0.10–0.15).

Parasitic helminths were not found in *Trichomycterus corduvensis* or *Jenynsia lineata*.

In conclusion, the morphology of *R. acuminata* specimens recovered from *H. macraei* is in agreement with the previous descriptions [8,12,42–44]. Likewise, the morphology of *Contraeaecum* sp. from San Juan Province proved to be similar size than those specimens reported by Ramallo and Torres [18], Ramallo et al. [23] in the Northwest of Argentina.

Due to the above, in this note parasitic nematodes of river fish are registered for the first time from San Juan Province. Finally, the present finding of *R. (R.) acuminata* and *Contraeaecum* sp. represent new records of hosts and localities.

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