

## Nematode parasites of the characid freshwater fish *Brycon guatemalensis* in the Usumacinta River, Chiapas, Mexico

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### Summary

During the study of the helminth parasites of some fishes of the Usumacinta River in the locality Frontera Corozal (Frontera Echeverría), State of Chiapas, Mexico, 2 species of South American nematodes, *Neocucullanus neocucullanus* Travassos, Artigas et Pereira, 1928 from Brazil and *Rhabdochona acuminata* (Molin, 1860) from Brazil, Ecuador and Argentina were recovered from the intestine of the characid fish, *Brycon guatemalensis*.

Findings of these nematode species represent new host and geographical records.

Key words: nematodes; *Neocucullanus*; *Rhabdochona*, freshwater fish; *Brycon guatemalensis*; Argentina; Brazil; Mexico

### Introduction

According to Espinosa-Pérez *et al.* (1993), in Mexico, the Characidae is represented by 5 genera, *Astyanax* Baird et Girard, *Bramocharax* Gill, *Brycon* Müller et Troschel, *Hypessobrycon* Eigenmann and *Roeboides* Günther. *Brycon* includes only one species, *B. guatemalensis*, restricted to the Usumacinta River in the State of Chiapas.

A survey of helminth parasites of freshwater fishes carried out by the research teams of the Centre for Biological Research, Autonomous University of Morelos State (UAEM) and National Autonomous University of Mexico (UNAM) in the Usumacinta River in Chiapas, Mexico, revealed the presence of 2 species of nematodes so far reported from South American fishes. Results of their morphometrical evaluation are presented herein.

### Materials and Methods

Fish were collected with a hand net from the Usumacinta River in the State of Chiapas, Mexico, in January 2002. They were transported to the place where they were dissected within 24 hours after being captured. The nematodes recovered from the intestine of fishes were washed in physiological saline, fixed in hot 4 % formaldehyde and cleared with glycerine for examination. Drawings were made with the aid of a NIKON microscope. After examination, the specimens were stored in vials with 70 % ethanol. Some specimens of both species from *B. guatemalensis* were dried by critical point method for study under a scanning electron microscope (SEM). In addition, 1 male of *R. acuminata* from the intestine of *Percichthys trucha* (Valenciennes, 1837) from the Chubut River, Patagonia, Argentina, was studied by SEM in order that it might be compared with the Mexican specimens.

All measurements are given in micrometres unless otherwise stated. Voucher specimens of both Mexican species and that from Argentina have been deposited in the Parasitological Collection of the Centre for Biological Research, Autonomous University of Morelos State (cat. nos. N-100-102).

### Results

Family: Cucullanidae Cobbold, 1864

*Neocucullanus neocucullanus* Figs. 1, 2

Description: Larger yellowish nematodes with smooth cuticle (Fig. 2-A, D). Male smaller than female. Cephalic end rounded (Figs. 1, 2-A, B). Lateral alae absent. Oral open-

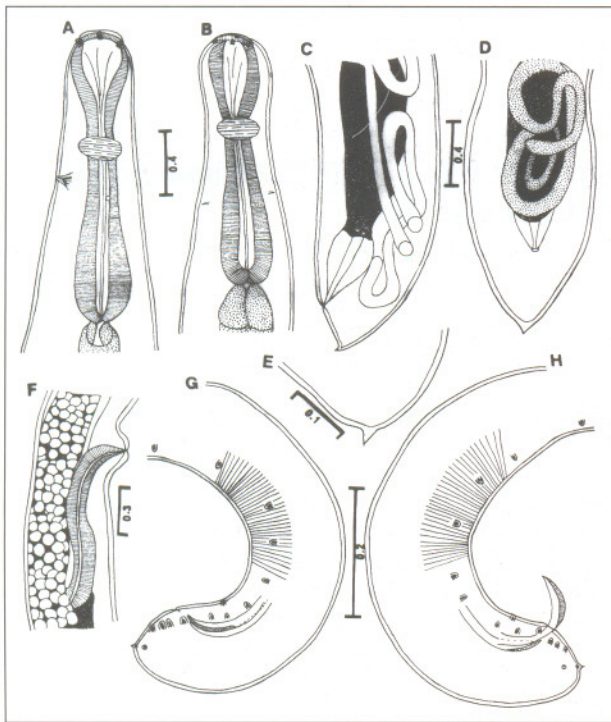


Fig. 1. *Neocucullanus neocucullanus*. A – anterior extremity of male, lateral view; B – anterior extremity of female, ventral view; C, D – posterior extremity of female, dorsal and ventral views; E – caudal extremity of female; F – region of vulva, lateral view; G, H – posterior extremity of male, lateral views

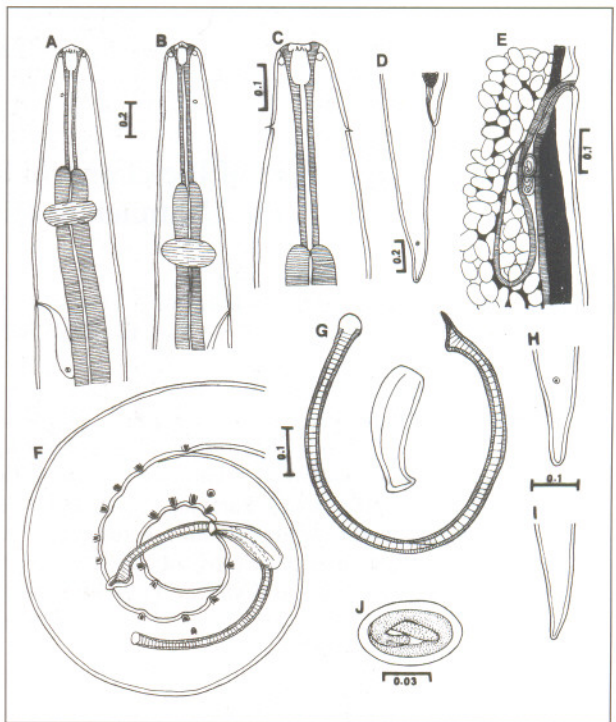


Fig. 3. *Rhabdochona acuminata*. A, B – anterior extremity of male, lateral views; C – anterior extremity of female, ventral view; D – posterior extremity of female, lateral view; E – region of vulva; F – posterior extremity of male, lateral view; G – spicules; H – tail tip of female; I – tail tip of male; J – egg

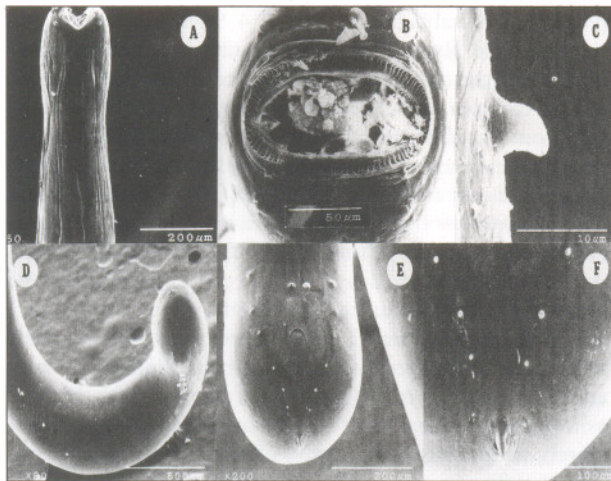


Fig. 2. *Neocucullanus neocucullanus*. SEM micrographs A – anterior extremity of male, ventral view; B – apical view of male; C – deirid; D – caudal extremity of male, ventrolateral view; E – caudal extremity of male, ventral view; F – male tail tip

ing dorsoventrally elongated, surrounded by narrow membranous ala (collarete) supported by row of numerous minute teeth. Four submedian cephalic papillae and pair of small lateral amphids present (Fig. 2-B). Pseu-

dobuccal capsule (oesophastome) as wide as posterior part of oesophagus, with distended anterior and posterior parts. Intestinal caecum absent. Nerve ring encircling oesophagus short distance posterior to pseudobuccal capsule (Fig. 1-A, B). Deirids simple (Fig. 2-C). Deirids and excretory pore situated at level of posterior half of oesophagus. Tail of both sexes rounded with terminal mucron (Figs. 1-E, G, H, 2-D, E, F).

Male (based on 5 specimens): Length of body 15.41 – 16.96 mm, width 529 – 552. Entire oesophagus 0.972 – 1.01 mm, minimum width 174 – 195, maximum width in posterior region 98 – 103; oesophastome 172 – 174 long, and 80 – 98 wide. Nerve ring, excretory pore and deirids 368 – 391, 632 – 690 and 680 – 724, respectively, from anterior end. Length of spicules 268 – 418. Gubernaculum absent. Preanal sucker well developed. Caudal papillae 13 pairs, 8 preanal, 1 adanal and 4 postanal (3 subventral and 1 lateral). One unpaired median papilla present on anterior anal lip. Phasmids at base of mucron. Tail short, 253 – 320 long, rounded, with terminal mucron.

Female (based on 5 specimens): Length of body 18.36 – 28.19 mm, wide 522 – 627. Entire oesophagus 1.15 – 1.96 mm, minimum wide 103 – 121, maximum wide in posterior region 202 – 208; oesophastome 213 – 223 long and 103 – 121 wide. Nerve ring, excretory pore and deirids 402 – 460, 556 – 576 and 690 – 839, respectively, from ante-

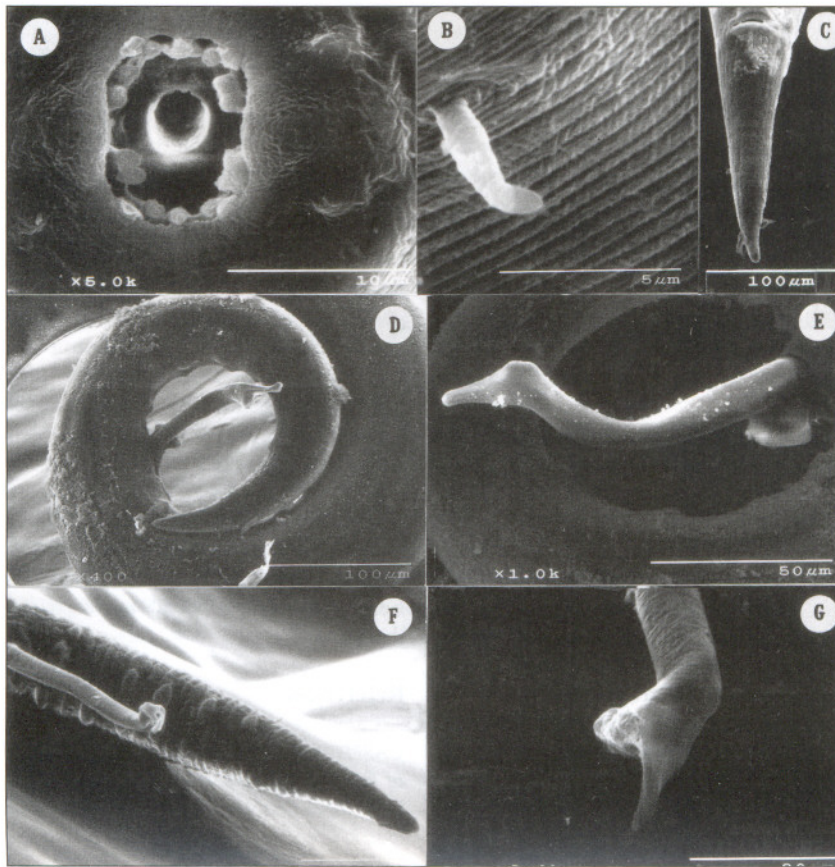


Fig. 4. *Rhabdochona acuminata*. SEM micrographs (A – E from Mexican specimens; F – G from Argentinean specimen). A – apical view of male; B – deirid; C – caudal end of female; D – posterior extremity of male; E – distal end of left spicule, lateral view; F – posterior end of male; G – distal tip of left spicule

rior end. Vulva postequatorial, 9.61 – 15.64 mm from cephalic end. Vulvar lips elevated. Uteri opposed, containing immature eggs. Tail short, 167 – 207 long, with terminal mucron at tip.

Host: *Brycon guatemalensis* Regan (Characidae, Characiformes).

Site of infection: Intestine.

Locality: Frontera Echeverria (90°53'18"N, 16°49'24"W), Usumacinta River, Chiapas, Mexico (collected in January 2002).

Prevalence and intensity: 2 fish infected/2 fish examined; 10 – 12 nematodes.

*Rhabdochona acuminata* (Molin, 1860) Figs. 3, 4

Description: Medium size nematodes. Cuticle with light transverse striation (Fig. 4-B). Oval mouth surrounded by 4 minute cephalic papillae, 2 lateral amphids (Fig. 4-A). Prostom funnel shaped, with basal teeth; anterior margin of prostom armed internally with 14 teeth (3 dorsal, 3 ventral, and 4 on each lateral side, the later forming pairs) (Figs 3-A, B, C, 4-A). Vestibule relatively long (Fig. 3-C). Small deirids simple (Fig. 4-B), situated in first third of vestibular length (Fig. 3-C). Tail of both sexes conical (Figs 3-H, I, 4-

C, D).

Male (based on 5 specimens): Length of body 13.36 – 15.26 mm, maximum width 142 – 170. Prostom 25 – 27 long, 10 – 16 wide. Length of vestibule including prostom 154 – 170, of muscular oesophagus 374 – 416, of glandular oesophagus 3.11 – 3.95 mm. Nerve ring encircling muscular esophagus 230 – 253 from anterior end of body; excretory pore 333 – 402, deirids 62 – 75 from anterior end. Subventral preanal papillae occurring in following combinations: 9 + 9, 9 + 10, 10 + 10, 11 + 11; additional lateral pair of papillae at level of third pair. Postanal papillae occurring in following combinations: 6 + 6 and 7 + 7, second pair lateral, others subventral. Area rugosa absent. Left spicule 473 – 510 long, length of shaft 239 – 266, distal tip broad with a dorsal tooth-like process and covered by membrane. Right spicule 110 – 115 long, with small ventral barb at distal tip. Length ratio of spicules 1: 4.3 – 4.5. Tail conical, 315-379.

Female (based on 5 specimens): Length of body 26.17 – 34.67 mm, maximum width 253 – 303. Prostom 25 – 36 long, 20 – 25 wide. Length of vestibule including prostom 170 – 213, of muscular oesophagus 414 – 591, of glandular oesophagus 3.61 – 5.08 mm. Nerve ring, excretory pore

and deirids 230 – 299, 342 – 450, and 59 – 82, from anterior extremity, respectively. Tail conical, 211 – 312 long, with terminal rounded tip. Vulva at 14.09 – 22.88 mm from anterior end of body. Muscular vagina directed anteriorly from vulva. Uterus amphidelphic. Anterior ovary near end of oesophagus, posterior ovary not far from rectum. Mature eggs oval, larvated, smooth 29 – 32 long, 16 – 18 wide.

Host: *Brycon guatemalensis* Regan (Characidae, Characiformes).

Site of infection: Intestine.

Locality: Frontera Echeverria (90°53'18"N, 16°49'24"W), Usumacinta River, Chiapas, Mexico (collected in January 2002).

Prevalence and intensity: 2 fish infected/2 fish examined; 18 – 29 nematodes.

## Discussion

The present results show that the Mexican freshwater fish *Brycon guatemalensis* serves as a definitive host of two species of intestinal nematodes, *Neocucullanus neocucullanus* and *Rhabdochona acuminata*, both previously reported only from South American freshwater fishes.

To date, 2 species of *Neocucullanus* have been reported from freshwater fishes in the New World, both from South America: *N. neocucullanus* Travassos, Artigas et Pereira, 1928 and *N. multipapillatus* Petter, 1989, both from fishes of the Characidae from the Paraná River basin in Brazil and Paraguay, respectively (Moravec, 1998). These species were distinguished by possessing different numbers of caudal papillae and by the presence or absence of the gubernaculum in males.

The morphology and biometrical features of the *Neocucullanus* species recorded from Mexican freshwaters are similar to those in *N. neocucullanus*. *N. neocucullanus* was reported to possess caudal alae; however, in the authors' opinion, these are not caudal alae but a thickened cuticle (see Fig. 2-D, E) (see also Moravec, 1998). The unpaired papilla on the anterior cloacal lip was not reported by Travassos *et al.* (1928), but it is present in the Mexican specimens (see Fig. 2-E).

The general morphology and measurements of *Rhabdochona* specimens correspond to *Rhabdochona acuminata* (Molin, 1860), a species described by Molin (1860) from the intestine of the characid fish *Brycon falcatus* Müller et Troschel, 1844 of the Paraná River basin in Brazil and recently redescribed by Cremonte *et al.* (2002) from *Diplomystes mesembrinus* Ringuelet, 1982 (Siluriformes, Diplomystidae) and *Percichthys trucha* (Perciformes, Percichthyidae) from the Chubut River, Patagonia, Argentina. While redescribing the species, the authors compared the measurements reported from different hosts and pointed out that there is a large morphometric variability, mainly in the body size, length spicule ratio, and the number and ar-

range of caudal papillae.

This survey represents the first study of the nematode fauna of *B. guatemalensis* in Mexico, and the findings are new geographical and host records. Also, the presence of both nematodes in Mexican freshwaters, far away from the nearest previous records (Brazil and Paraguay for the former and Brazil, Ecuador and Argentina for the latter), confirms that both these species are widespread, as has been pointed out by Cremonte *et al.* (2002) for *R. acuminata*.

At present, including *R. acuminata*, 8 species of *Rhabdochona* are known from Mexican freshwater fishes (Caspeta-Mandujano, 2004). The finding of *Neocucullanus neocucullanus* in Mexico is the first record of the representative of this genus from North American freshwaters.

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