

PARACAPILLARIA RHAMDIAE SP. N. (NEMATODA: CAPILLARIIDAE) FROM RHAMDIA GUATEMALENSIS (PISCES) IN YUCATAN, MEXICO

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Summary :

A new nematode species, *Paracapillaria rhamdiae* sp. n., is described from the stomach of the freshwater bagre (pimelodid catfish) *Rhamdia guatemalensis* (Günther) from cenotes (= sinkholes) in Yucatan, Mexico. It is characterized by very small body measurements (body length of male and female 1.0 mm and 1.1-1.7 mm, respectively), a conspicuously short spicule (0.087 mm), very short stichocytes, and by the size (0.040-0.048 × 0.020-0.028 mm) of eggs; eggs in uterus may contain already fully formed larvae by which it differs from all other congeners (in addition to morphological features). This is the first *Paracapillaria* species reported from a freshwater fish in Mexico.

KEY WORDS : *Paracapillaria rhamdiae*. *Rhamdia guatemalensis*. cenotes. Yucatan. Mexico.

Résumé : *PARACAPILLARIA RHAMDIAE* N. SP. (NEMATODA : CAPILLARIIDAE) CHEZ *RHAMDIA GUATEMALENSIS* (PISCES) AU YUCATAN, MEXIQUE

Une nouvelle espèce de nématode, *Paracapillaria rhamdiae* n. sp., est observée dans l'estomac d'un silure d'eau douce (poisson-chat), *Rhamdia guatemalensis* (Günther) au Yucatan, Mexique. Elle est caractérisée par de très faibles mensurations (longueurs corporelles respectives du mâle et de la femelle 1,0 et 1,1 à 1,7 mm), un spicule remarquablement court (1,087 mm), des stichocytes très courts et la taille des œufs (0,040 à 0,048 × 0,020 à 0,028 mm); dans l'utérus les œufs peuvent déjà contenir des larves complètement formées, ce en quoi l'espèce diffère de tous ses congénères (outre les traits morphologiques). C'est la première espèce de *Paracapillaria* rapportée chez un poisson d'eau douce du Mexique.

MOTS CLES : *Paracapillaria rhamdiae*. *Rhamdia guatemalensis*. cenotes. Yucatan. Mexique.

In the course of the investigations into the parasites of fishes in cenotes (sinkholes) in the Peninsula of Yucatan, carried out by the research team of the Centre for Research and Advanced Studies of the National Polytechnic Institute (CINVESTAV-IPN) in Mérida, Yucatan, in 1993 and 1994, capillarid nematodes referable to the genus *Paracapillaria* Mendonça, 1963 were recovered from the stomach of the bagre, *Rhamdia guatemalensis* (Günther), collected from three cenotes in central Yucatan. Their morphology considerably differs from that of other hitherto known congeneric species and, therefore, they are considered to represent a new species. This is described herein.

Cenotes or sinkholes are small surface, mostly freshwater bodies connected with subterranean streams, which are typical of the Peninsula of Yucatan; they represent unique ecosystems with characteristic biota.

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MATERIALS AND METHODS

The nematodes were recovered from scrapings of the stomach mucosa of fishes. After washing in physiological saline, they were fixed in hot 4% formaldehyde and cleared with glycerine for examination. Drawings were made with the aid of an Olympus microscope drawing attachment. After examination some specimens were mounted in glycerine-gelatin preparations, others have been stored in vials with 70% ethanol. All measurements are given in millimetres.

RESULTS

PARACAPILLARIA RHAMDIAE SP. N.

Description : Very small, fine nematodes. Cuticle almost smooth. Two lateral bacillary bands present. Body markedly short, with relatively broad posterior part. Anterior end narrowed, rounded, cephalic papillae indistinct. Muscular oesophagus short, distinctly expanded at posterior part. Nerve ring encircling muscular oesophagus approximately at border of its first and second thirds. Stichosome consisting of single row of conspicuously short stichocytes subdivided sometimes into 2-3 transverse annuli; stichocytes somewhat more elongate at middle part of sticho-

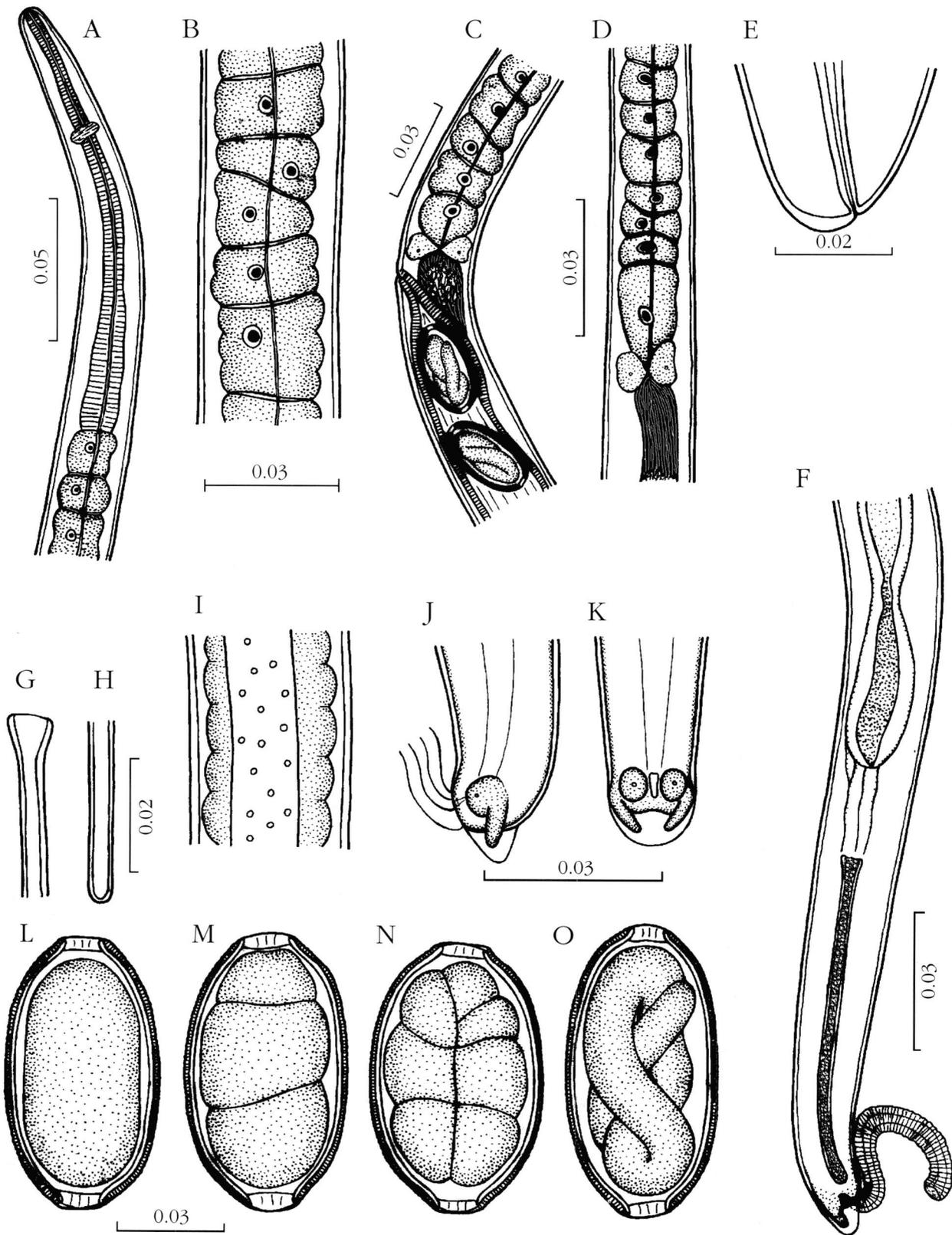


Fig. 1. – *Paracapillaria rhamdiae* sp. n. A. – anterior end of female; B. – middle part of stichosome in female; C. – region of vulva; D. – region of oesophago-intestinal junction in male; E. – caudal end of female; F. – posterior end of male; G,H. – proximal and distal ends of spicule; I. – oesophageal region of female body with marked lateral bacillary band; J,K. – caudal end of male, lateral and ventral views; L,O. – eggs from uterus at different stages of development.

some and markedly short, frequently transverse, at its anterior and posterior parts; stichocytes 26-29 in number, containing large cell nuclei. Two wing-like cells present at oesophago-intestinal junction.

Male (1 specimen, holotype) : Length of body 1.03, maximum width at region of testis 0.050. Lateral bacillary bands 0.008 wide. Entire oesophagus 0.533 long (52 % of body length). Muscular oesophagus measuring 0.080, being encircled by nerve ring at 0.030 from anterior extremity. Stichosome 0.453 long, of uniform colour, consisting of 26 conspicuously short stichocytes. Spicule smooth, well sclerotized, 0.087 long and 0.003 wide; its anterior end somewhat expanded, posterior end rounded. Spicular sheath nonspinous, of uniform width; evaginated sheath 0.051 long and 0.007 wide. Seminal vesicle 0.046 long and 0.016 wide. Spicular canal not distinguished. Posterior end of body rounded, provided with well developed membraneous bursa supported by two finger-shaped lateral projections 0.003 long, not reaching to posterior margin of bursa. One pair of large round adanal papillae present at base of caudal projections. Length of tail including membraneous bursa 0.115, length of caudal membrane 0.006.

Female (5 specimens; measurements of allotype in parentheses) : Body length of gravid female 1.07-1.74 (1.74), maximum width at posterior part of body 0.045-0.055 (0.050); one non gravid female measuring 1.41 in length and 0.055 in width. Width of lateral bacillary bands 0.018-0.025 (0.025). Length of entire oesophagus 0.485-0.615 (0.580), representing 33-46 (33) % of body length. Muscular oesophagus 0.130-0.175 (0.150) long, stichosome 0.355-0.440 (0.430) long; number of stichocytes 26-29 (26). Distance of nerve ring from anterior extremity 0.053-0.063 (0.055). Vulva 0.005-0.020 (0.018) behind level of oesophagus end, vulvar lips not elevated or only slightly elevated. Eggs oval, polar plugs not protruding. Egg wall thin, two layered, inner layer hyaline, outer layer thin, with distinct, fine dense superficial sculpture. Size of mature eggs 0.040-0.048 × 0.020-0.028 (0.040-0.048 × 0.023-0.025), thickness of their wall 0.001-0.002 (0.002); polar plugs 0.003 (0.003) long and 0.005 (0.005) wide. Of four available gravid females, two (including allotype) contained eggs in uterus with already fully formed larvae, one contained eggs with content cleaved into several blastomeres, and egg contents of one female were uncleaved. Larvated eggs appearing to be somewhat more elongate in comparison with non embryonated eggs. Eggs arranged in one file in anterior part of uterus and in two files in more distant region. From 3 to 19 (19) mature eggs present in uterus. Ovary extending posteriorly to about mid-length of rectum; rectum 0.045 (0.045) long. Posterior end of body rounded, anus subterminal (almost terminal);

cuticle of dorsal anal lip somewhat inflated; length of tail 0.003-0.005 (0.005).

Type host : bagre, *Rhamdia guatemalensis* (Günther), local name "juil de cenote" or "bagre" (fam. Pimelodidae, Siluriformes).

Site of infection : in mucosa of stomach.

Type locality : Hubicu Cenote (20°49'132 N, 88°10'348 W) (Zona Valladolid), Yucatan, Mexico (holotype collected on 25 April 1994).

Other localities : Ixin-há Cenote (20°37'819 N, 89°06'667 W) and Chen-há cenote (20°41'394 N, 89°52'605 W) (both Zona Sotuta), Yucatan, Mexico.

Prevalence and intensity : Hubicu : 6% (in 1 out of 16 fishes examined), 1 nematode; Ixin-há : 5% (in 4 out of 88), 1-4 nematodes; Chen-há : 12% (in 1 out of 8), 2 nematodes.

Deposition of specimens : holotype, allotype and paratypes in the Institute of Parasitology, Academy of Sciences of the Czech Republic, in České Budějovice (Helm. Coll. n° N - 639); paratypes in Universidad Nacional Autónoma de Mexico, Mexico City.

Etymology : The specific name of this species relates to the generic name of its type host.

DISCUSSION

The general morphology of this species, particularly the structure of the male caudal end (presence of bursa supported by lateral lobes, nonspiny spicular sheath) indicates that it belongs to the genus *Paracapillaria* Mendonça, 1963, including the parasites of fishes, amphibians and reptiles. In his revision of capillariids from fishes, Moravec (1987) listed six nominal species of this genus parasitizing fresh water, marine and brackish-water fishes : *P. piscicola* (Travassos, Artigas et Pereira, 1928) (type species), *P. belenae* (Layman, 1930), *P. plectroplites* (Johnston et Mawson, 1940), *P. teixeirafreitasi* (Caballero, 1971), *P. parophrysi* (Moravec, Margolis et McDonald, 1981) and *P. gibsoni* Moravec, 1987. An additional species, *P. xenentodoni* De et Maity, 1994 has been established only recently (De and Maity, 1994). Of them, *P. belenae*, *P. teixeirafreitasi*, *P. parophrysi*, *P. gibsoni* and *P. xenentodoni* occur only in marine or estuarine fishes, whereas only *P. piscicola* and *P. plectroplites* are parasitizing freshwater fishes; *P. piscicola* is a parasite of cypriniform fishes of the family Characidae in Brazil, whereas *P. plectroplites* is parasitic in perciform fishes (fam. Percichthyidae and Theraponidae) in Australia.

The new species from *Rhamdia guatemalensis* differs from all other *Paracapillaria* species from fish in mar-

edly small body measurements (in other species the male and the female are at least 3 and 5 mm long, respectively) and especially in its conspicuously short spicule; this is longer than 0.2 mm in other species. In contrast to all its congeners, the new species has conspicuously short stichocytes and larvated eggs in uterus. It is the first species of *Paracapillaria* known from fishes of the order Siluriformes.

By body measurements and the length of spicule, the new species resembles also *Capillostrongyloides sentinosa* (Travassos, 1927), a species described from the stomach of characoid fishes from Brazil. According to Moravec (1987), the genus *Capillostrongyloides* Freitas et Lent, 1935 is closely related to *Paracapillaria* which may well represent only a sub-genus of the first genus. However, *C. sentinosa* can be distinguished from the new *Paracapillaria* species of the present material mainly by the presence of short, rounded (vs. elongate, finger-shaped) ventrolateral projections supporting the male bursa and by nonembryonated mature eggs in uterus.

A very interesting feature of the new species is the presence of eggs in uterus that already contain fully formed larvae. This phenomenon is quite unusual in capillariids (the content of mature eggs of almost all capillariid species is uncleaved) and it has so far been observed rarely in a few species from bats, birds and amphibians (Moravec and Cosgrove, 1982; Moravec, 1986). This is probably associated with the mode of the life cycle of this nematode. The tendency to produce more developed eggs (with contents already cleaved into several blastomeres) was observed also in the congeneric species *Paracapillaria teixeirafreitasi* (see Caballero, 1971).

This new species is the second representative of the genus *Paracapillaria* known from Mexico (besides *P. teixeirafreitasi* parasitic in the estuarine gobiid *Gobiomorus dormitor* - see Caballero, 1971).

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