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**SOME HELMINTH PARASITES OF *EPINEPHELUS MORIO*
(PISCES: SERRANIDAE) FROM THE PENINSULA OF YUCATAN,
MEXICO**

by

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ABSTRACT

MORAVEC, F., V.M. VIDAL-MARTINEZ & M.L. AGUIRRE-MACEDO, 1995. Some helminth parasites of *Epinephelus morio* (Pisces: Serranidae) from the Peninsula of Yucatan, Mexico. *Studies Nat. Hist. Caribbean Region* 72: 55-68.

One nematode species, *Hysterothylacium eurycheilum*, the acanthocephalan *Gorgorhynchus davatus* and three larval nematodes, *Anisakis typica*, *Hysterothylacium* sp. and Capillariidae gen. sp. parasitizing the red grouper *Epinephelus morio*, from the Peninsula of Yucatán, South Mexico are described for the first time. New localities, a new host, and the parameters of infection for the five species of helminths are recorded in this paper.

Key words: Helminths, fish, *Hysterothylacium*, *Anisakis*, *Gorgorhynchus*, Capillariidae, Mexico.

INTRODUCTION

The red grouper, *Epinephelus morio* (Valenciennes, 1824) (family Serranidae, Perciformes) is a well-distributed species in the Gulf of México and the most important fishery resource in the Peninsula of Yucatán (SOLANA-SANSORES & ARREQUIN-SANCHEZ 1991). Some aspects of the helminth fauna of this fish

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have been studied in the northern Gulf of Mexico (DEARDORFF & OVERSTREET 1981a; 1981b; 1981c) and the Caribbean (FAJER *et al.* 1979; AMATO 1982; AGUIRRE-MACEDO & BRAY, in press). However, there are no data on the helminth parasites of *E. morio* from southern Gulf of Mexico, including the Peninsula of Yucatán. The aim of this paper is to put on record the results of studies on the helminth fauna of the red grouper off the coast of Yucatán, carried out recently by the Mexican co-authors of this work.

MATERIAL AND METHODS

Samples of the red grouper, *Epinephelus morio* (Valenciennes, 1824), were taken from four localities of the Peninsula of Yucatán, Mexico, in 1992: *Telchac* (7 fish specimens; body length 13-58 cm), *Chuburna* (7 specimens; 24-38 cm), *Río Lagartos* (7 specimens; 12-45 cm), and *Celestún* (3 specimens; 28-31 cm).

The nematodes were fixed in hot 70% ethanol and then stored again in 70% ethanol. The acanthocephalans were maintained in cold water for 15 minutes to evert the proboscis, and subsequently stored in 70% ethanol. For examination, the nematodes were cleared in glycerine, while the acanthocephalans were stained with carmine and after dehydration mounted as permanent preparations in Canada balsam. For examination by scanning electron microscopy, the specimens were transferred to 4% formaldehyde, postfixed in 1% OsO₄, dehydrated through an ethanol series and acetone and then subjected to critical point drying. The specimens were coated with gold and examined with a JEOL 6300 scanning electron microscope at an accelerating voltage of 15 kV. Drawings were prepared with the aid of a Zeiss microscope attachment. All measurements are given in millimetres. The specimens have been deposited in the helminthological collection of the Institute of Parasitology, ASCR, in České Budějovice, Czech Republic.

REVIEW OF HELMINTHS FOUND

NEMATODA

1. *Hysterothylacium eurycheilum* (Olsen, 1952)

(Fig. 1)

(Syn.: *Heterotyphlum eurycheilum* Olsen, 1952)

Description: Medium-sized nematodes. Cuticle with very fine transverse striation. Lips approximately of equal size, provided with membranous flanges on lateral margins, these being markedly broad in posterior half; dorsal lip bearing two subdorsal double papillae; each subventral lip

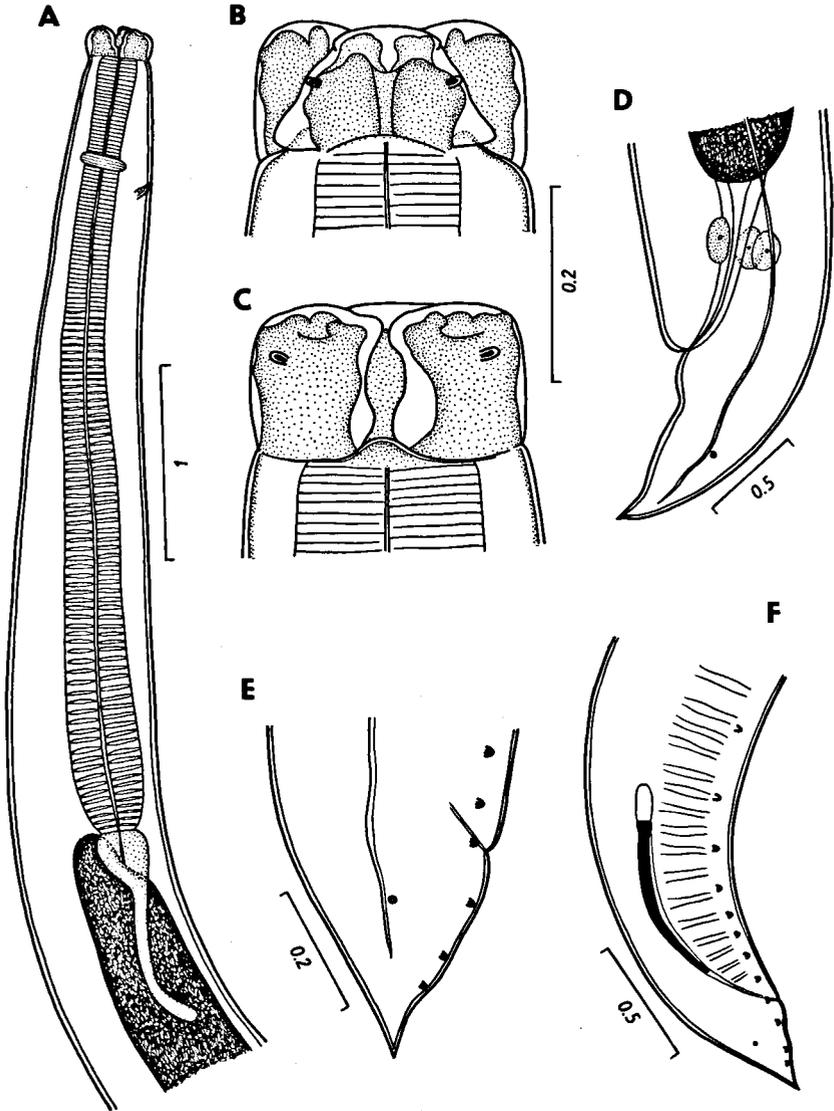


FIGURE 1. *Hysterothylacium eurycheilum* (Olsen, 1952) from *E. morio*. - A: anterior part of body, lateral view; - B, C: cephalic end of female, dorsal and ventral views; - D: tail of female; - E: tail of male; - F: posterior end of male.

with one double subventral papilla and small simple papilla and amphid situated laterally; pulp of lips provided at either side with small lobes at its anterior margin. Interlabia very small, low, inconspicuous. Very narrow lateral alae extending along whole body. Oesophagus long, being distinctly wider at its posterior half. Ventriculus nearly spherical; ventricular appendage comparatively short, markedly narrow. Intestinal caecum very short, not exceeding anterior level of anterior margin of ventriculus. Nerve ring encircling oesophagus approximately at border of first and second sixths of its length; excretory pore just posterior to nerve ring level. Intestine straight. Rectum short, hyaline, surrounded by three large unicellular rectal glands. Tail of both sexes conical, ending in sharp cuticular point. Phasmids well visible, situated laterally approximately at mid-length of tail.

Male (1 specimen): Length of body 37.99, maximum width 0.925. Length of oesophagus 4.31 (11% of body length), maximum width 0.381. Nerve ring and excretory pore 0.789 and 0.911, respectively, from anterior extremity. Size of ventriculus 0.231 x 0.258, length of ventricular appendix 0.938; anterior intestinal caecum 0.258 long. Length ratio of intestinal caecum and ventricular appendix 1 : 3.6. Coils of tubular testis occupying major part of body. Spicules equal, alate except for their distal ends, 0.774 long (forming 2% of body length). Total of 12 pairs of subventral papillae present, 8 being preanals, 1 adanals and 3 postanals; caudal papillae very small, badly visible. Additional pair of small lateral papillae (outlets of phasmids) situated between first and second pairs of subventral postanal papillae. Tail conical, 381 long.

Female (1 nongravid specimen): Length of body 34.94, maximum width 0.857. Length of dorsal lip 0.135, its maximum width at base 0.240; length of interlabia 0.027. Oesophagus 3.69 long (11% of body length), its maximum width 0.340. Size of ventriculus 0.245 x 0.299, length of ventricular appendix 0.952; anterior intestinal caecum 0.095 long. Length ratio of caecum and ventricular appendix 1 : 10. Nerve ring and excretory pore 0.775 and 0.830, respectively, from anterior extremity. Vulva 1.16 from anterior end of body. Vagina pointing backwards. No eggs present in uterus. Tail conical, 0.408 long. Pair of small lateral papillae (outlets of phasmids) present approximately at its mid-length.

Site of infection: intestine.

Locality: Río Lagartos, Yucatán, Mexico (18 July 1992).

Prevalence: 14.3%; intensity of infection: 2 nematodes in one fish.

Comments: This species was originally described by OLSEN (1952) as *Heterotyphlum eurycheilum* from a single available mature female and six immature ones found in *Epinephelus itajara* (Lichtenstein) in Tortugas, Florida. Later DEARDORFF & OVERSTREET (1981a) re-examined the holotype of *H. eurycheilum* from the US National Museum; they found small interlabia in this species (these were reported to be lacking in the original description) and, in accordance with their previous conception (DEARDORFF & OVERSTREET 1981b), they transferred it from *Heterotyphlum* to the genus *Hysterothylacium*. DEARDORFF & OVERSTREET (1981a) redescribed the species on the basis of one male and three mature females from the same host species (*E. itajara*) from Virgin Gorda, Lesser Antilles.

The morphology and measurements of our specimens from *Epinephelus morio* are very similar to those reported for this species by DEARDORFF & OVERSTREET (1981a). They originate from the congeneric fish host from roughly the same geographical region and there is no doubt that they belong to *H. eurycheilum*. Small differences in number of preanal papillae (12 vs 17 pairs), shape of dorsal lip, and length of spicules can be considered to be within an intraspecific variability of this species. *Epinephelus morio* represents a new host record of *H. eurycheilum*.

2. *Hysterothylacium* sp. (? *eurycheilum*)

(Fig. 2)

Fourth-stage larva.

Description: Length of body 5.06, maximum width 0.136. Cuticle smooth. Anlagen of lips weakly developed. Length of oesophagus 0.408. Nerve ring and excretory pore 0.210 and 0.225, respectively, from anterior extremity. Ventriculus spherical, size 0.054 x 0.045; length of ventricular appendix 0.594. Intestinal caecum 0.129 long. Length ratio of caecum and ventricular appendix 1 : 5. Tail conical, 0.204 long, with small terminal cuticular spike.

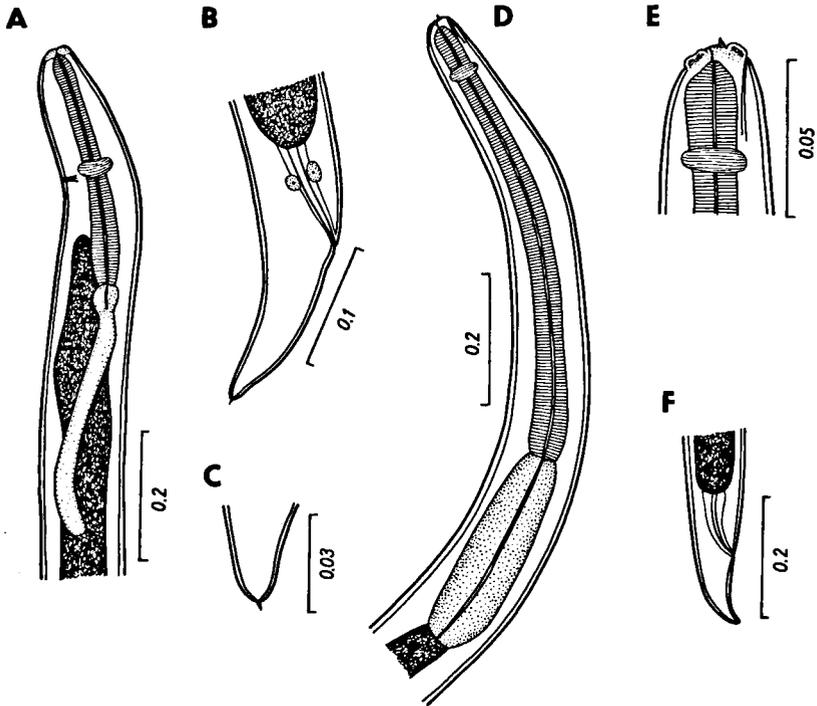


FIGURE 2. Anisakid larvae from *E. morio*: - A-C: *Hysterothylacium* sp. fourth-stage larva (A: anterior end; - B: tail; - C: tail tip); - D-F: *Anisakis typica* third-stage larva (D: anterior end, E: cephalic end, lateral view, F: posterior end).

Site of infection: anterior part of intestine.

Locality: Río Lagartos, Yucatán, Mexico (18 July 1992).

Prevalence: 14.3%; intensity of infection: 1 larva in one fish.

Comments: The presence of lip anlagen and the body size indicate that it is a fourth-stage larva. Although the character of its intestinal caecum and ventricular appendix appears to be different from that in *Hysterothylacium eurycheilum*, it is highly probable that it belongs to this species. The length ratio of the caecum and the ventricular appendix probably changes in the course of the development from the fourth stage to adult. The conspecificity of this larva with *H. eurycheilum* is supported by the fact that it was recorded from the same host species (but from a different specimen) and the same lo-

cality as *H. eurycheilum*. However, hosts may harbour more than one congeneric species of anisakid nematodes (see BRUCE & CANNON 1989).

In the Gulf of Mexico, similar larvae designated as *Hysterothylacium* type MD were reported by DEARDORFF & OVERSTREET (1981c) from the mesentery of nine species of fish of the families Bothidae, Carangidae, Ephippidae, Mugilidae, Sciaenidae, Scombridae and Serranidae, including the red grouper, *Epinephelus morio*.

3. *Anisakis typica* (Diesing, 1861)

(Fig. 2)

Third-stage larva. (Syn.: *Conocephalus typicus* DIESING, 1861; *Anisakis tursiopsis* CRUSZ, 1946)

Description (1 specimen): Body 6.71 long, maximum width 0.190. Cuticle very thick, transversely folded. Excretory pore situated just behind ventrally oriented larval tooth; latter 0.006 long. Small anlagen of lips present. Length of oesophagus including ventriculus 0.755, distance of nerve ring from anterior extremity 0.190. Ventriculus elongate, 0.367 long and 0.109 wide. Junction of oesophagus and ventriculus not oblique. Tail conical, 0.122 long, without distinct terminal spike.

Site of infection: abdominal cavity.

Locality: Telchac, Yucatán, Mexico (27 June 1992).

Prevalence: 14.3%; intensity of infection: 1 larva in one fish.

Comments: According to the taxonomic revision of DAVEY (1971), the genus *Anisakis* Dujardin, 1845 includes only three valid species, viz. *A. simplex*, *A. typica* and *A. physeteris*. These differ from each other mainly in features found in adults. In contrast to *A. simplex* and *A. typica* larvae, the infective larvae of *A. physeteris*, a parasite of the sperm whale (*Physeter catodon*) (DAVEY 1971), are noted for a markedly short ventriculus (see OSHIMA 1972). According to DOLLFUS (1970), it is possible to distinguish *A. typica* larvae in fishes from larvae of *A. simplex*, because the latter have an oblique junction of the ventriculus and the intestine, whereas *A. typica* larvae do not. Although this differentiating feature was doubted by OSHIMA (1972) – who was not able to establish the borderline between the ventriculus and the intestine in

Anisakis larvae – our studies hitherto confirm that this feature can be used to distinguish the two above mentioned larval types. In contrast to the third-stage larva of *A. simplex*, with a distinctly oblique oesophageo-intestinal junction (see e.g. MORAVEC *et al.* 1985), the borderline between the ventriculus and the intestine in the larva of the present material is not oblique, and there is no mucron on its tail tip; also the measurements are substantially smaller in our specimen than in *A. simplex*. Therefore we consider it to belong to *A. typica*.

According to DAVEY (1971), *Anisakis typica* is distributed in the warmer regions of the temperate zone and in tropical waters; its adults are almost exclusively parasitic in cetaceans. The life cycle of *Anisakis* members is inadequately known; according to OSHIMA (1972), small marine crustaceans and possibly other invertebrates serve as the intermediate hosts, while various fish species and squid serve probably only as paratenic hosts of third-stage larvae. *Anisakis* larvae from fishes are known as the agents of a serious parasitic disease in humans, anisakiasis.

4. Capillariidae gen. sp.

(Fig. 3)

Description: Female (1 nongravid specimen): Medium sized nematode with smooth cuticle. Body 8.68 long and 0.041 wide. Lateral bacillary bands with rough structure, 0.021 wide. Entire oesophagus 3.85 long (44% of body length). Muscular oesophagus 0.225 long, distance of nerve ring from anterior extremity 0.081. Stichosome consisting of single row of 36 stichocytes; stichocytes elongate, their length in middle part of stichosome 0.090-0.120, not subdivided into annuli; nuclei of stichocytes large, rounded. Vulva 0.024 behind level of oesophagus end, vulvar lips not elevated. Eggs not present. Length of rectum 0.042. Posterior end of body round, anus terminal.

Site of infection: gills.

Localities: Celestún (13 March 1992) and Río Lagartos (18 July 1992), both Yucatán, Mexico.

Prevalence: 33.3% (Celestún) and 14.3% (Río Lagartos); intensity of infection: 1 specimen in one fish in each locality.

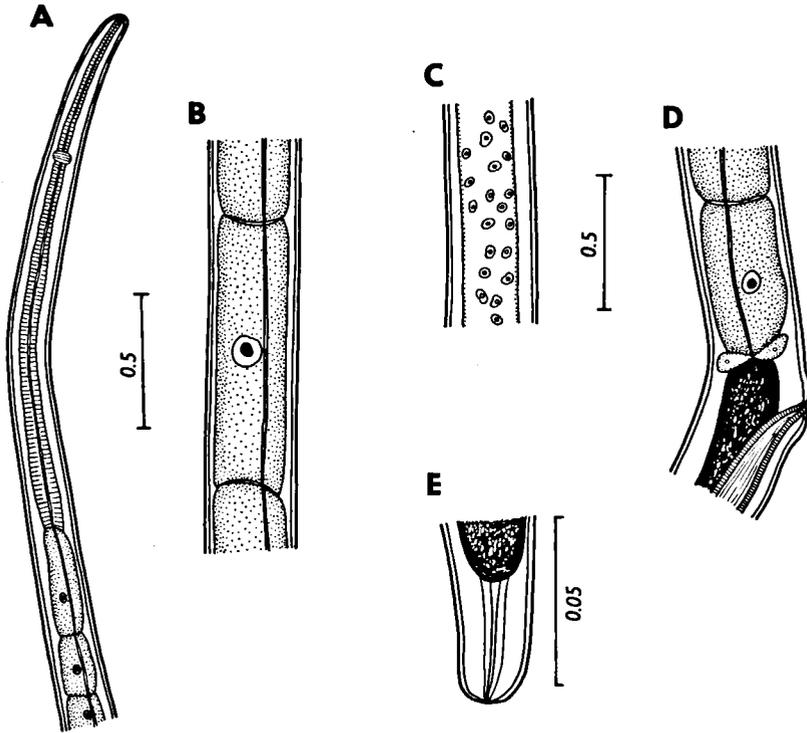


FIGURE 3. Capillariidae gen. sp. young female from *E. morio*. - A: anterior end; - B: stichocyte in middle part of stichosome; - C: stichosome region of body with marked lateral bacillary band; - D: region of vulva; - E: posterior end of body.

Comments: Only a nongravid female and a larva (body length 1.13, width 0.024) were found in *E. morio* from two different localities. In both cases the nematodes were found on the gills where they probably got secondarily from the host's digestive tract during the autopsy. Since no males were available, it is not possible to determine genus and species.

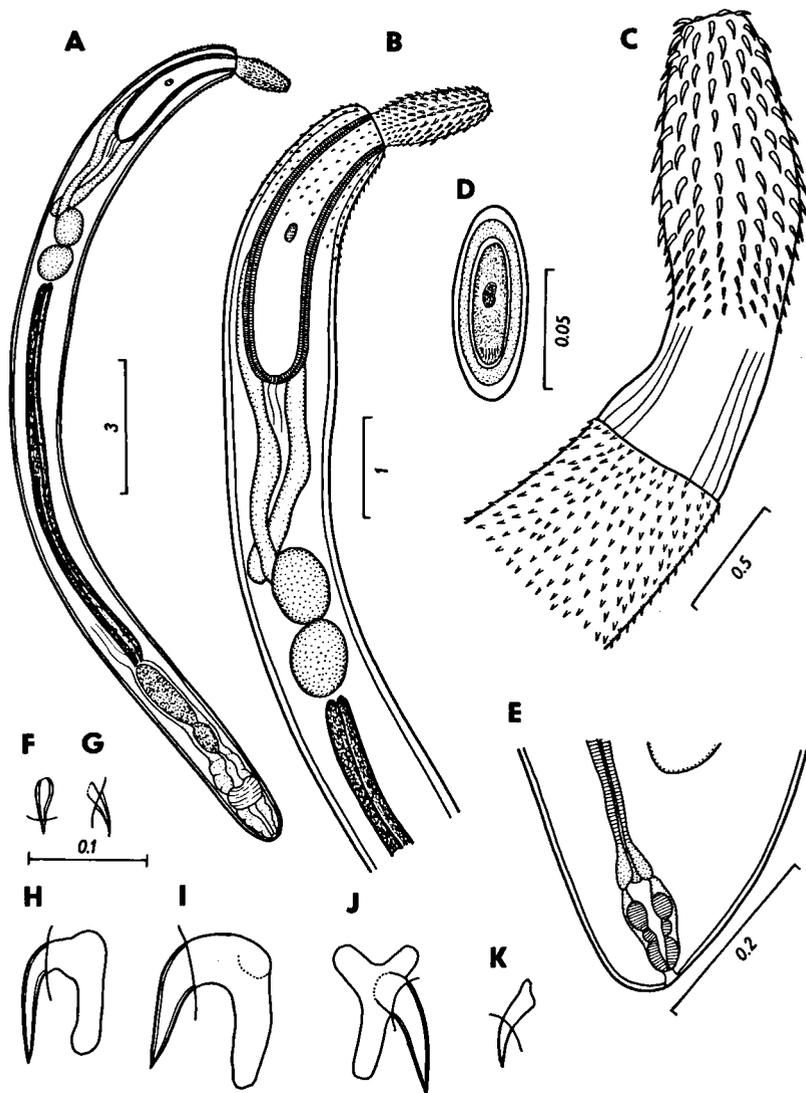


FIGURE 4. *Gorgorhynchus clavatus* Van Cleave, 1940 from *E. morio*. - A: male, general view; - B: anterior part of male; - C: proboscis of female; - D: egg; - E: posterior end of female; - F, G: cuticular spines, apical and lateral views; - H-K: proboscis hooks (H: 2nd anterior hook, I, J: middle hooks in different position; K: last hook).

ACANTHOCEPHALA

5. *Gorgorhynchus clavatus* (Van Cleave, 1940)

(Figs. 4-5)

(Syn.: *Gorgorhynchus cablei* Golvan, 1969)

Description: Body elongate, narrow, its anterior end covered by numerous cuticular spines arranged in longitudinal rows of 10-14 spines each; spination of cuticle extending posteriorly approximately to level of nerve ganglion. Proboscis almost cylindrical, slightly distended at middle; short neck present. Proboscis armed with 20 longitudinal rows of 13-14 hooks each. Anterior hooks comparatively small, with well-developed, posteriorly curved simple roots; middle hooks largest, with Y-shaped roots; posterior 4-5 hooks very small, with short, straight simple roots. Proboscis receptacle two-layered, approximately twice as long as proboscis. Nerve ganglion situated at middle of receptacle. Lemnisci long and narrow, approximately twice as long as receptacle.

Male (3 specimens): Length of body 18.71-23.83, maximum width 1.13-1.27. Length of proboscis 1.31-1.36, maximum width 0.558-0.653; length of neck 0.476-0.598. Anterior, middle and posterior hooks 0.066-0.090, 0.105-0.120 and 0.033-0.054 long, respectively. Length of cuticular spines 0.012-0.024. Proboscis receptacle 2.72-3.13 long. Length of lemnisci 5.44. Testes tandem, elliptical, situated near posterior ends of lemnisci; size of anterior testis 0.884 x 0.612, of posterior one 0.898 x 0.639 in middle sized specimen. Cement glands elongate, narrow, four in number, extending anteriorly to testes. Saeftigen's pouch ovoid. Genital bursa 1.24-1.33 long and 0.99-1.14 wide.

Female (3 specimens): Length of body 21.90-23.39, maximum width 1.32-1.39. Length of proboscis 1.32-1.50, maximum width 0.639-0.653; length of neck 0.544-0.680. Anterior, middle and posterior hooks 0.066-0.075, 0.111-0.126 and 0.027-0.036 long, respectively. Length of cuticular spines 0.015-0.024. Proboscis receptacle 3.06-3.13 long. Length of lemnisci 7.48. Mature eggs elliptical, size 0.066-0.081 x 0.030-0.033.

Site of infection: intestine.

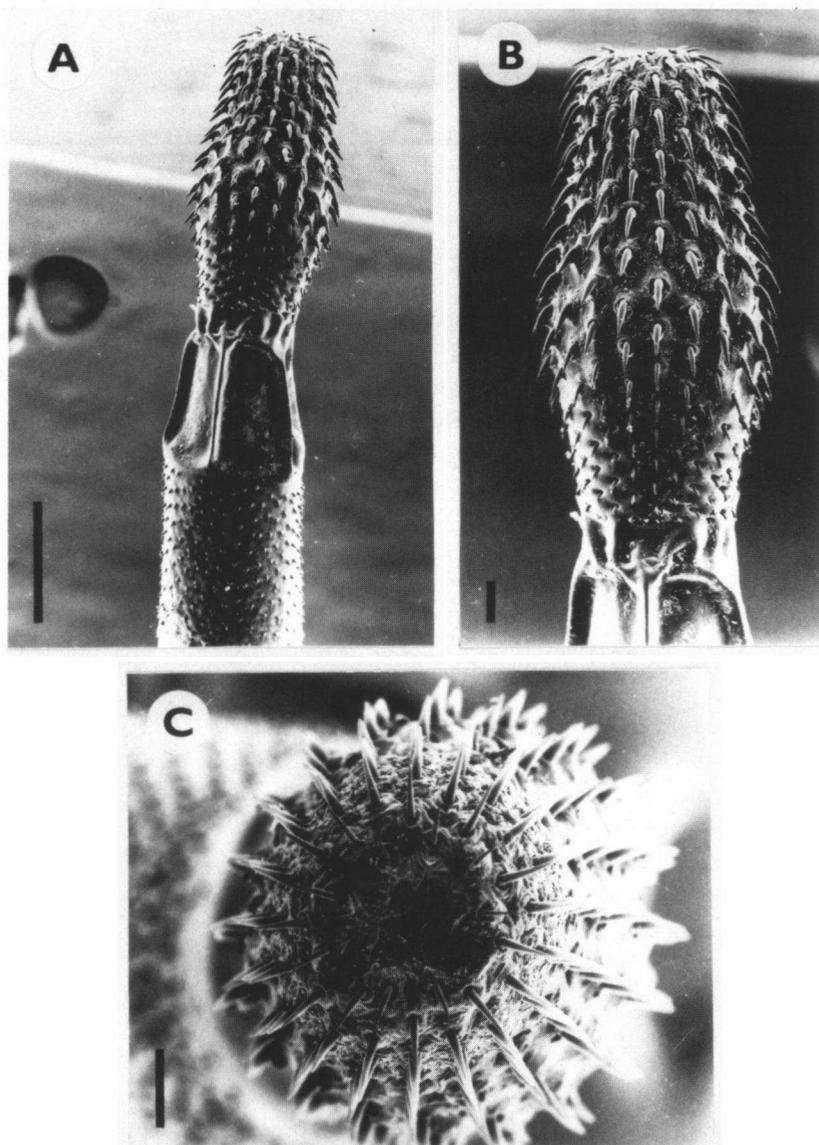


FIGURE 5. *Gorgorhynchus davatus* Van Cleave, 1940 – SEM micrographs. – A: anterior end of body; – B: proboscis; – C: apical view of proboscis. Scale bars: A: 500 μ m; B: 100 μ m; C: 100 μ m.

Localities: Telchac (27 June 1992) and Chuburna (23 May 1991).

Prevalence: 14.3% in Telchac and 71.4% in Chuburna; mean intensity 1.0 (Telchac) and 4.6 (Chuburna) acanthocephalans per fish.

Comments: The present specimens correspond, more or less, to the description of *Gorgorhynchus clavatus* by VAN CLEAVE (1940) and GOLVAN (1969), differing only in somewhat smaller measurements of cuticular spines and eggs. Since also the hosts of both are related and *G. clavatus* has been reported from the nearby region (Jamaica), we consider our specimens to belong to this species.

Gorgorhynchus clavatus was originally described from *Paralabrax humeralis* (Valenciennes in: Cuvier & Valenciennes) (fam. Serranidae) from Galápagos islands by VAN CLAEVE (1940) and subsequently was reported by CABLE & LINDEROTH (1963) from *Lutjanus jocu* (Bloch & Steindachner) (Lutjanidae) from Jamaica. The latter authors described only a juvenile male which GOLVAN (1969) had considered to represent an independent species *Gorgorhynchus cablei* Golvan, 1969, differentiating it from *G. clavatus* principally by somewhat shorter proboscis hooks and different geographical origin. However, according to AMIN (1985), both these species are identical, and this view is supported by the present authors.

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