

## NEW DATA ON *ONCOPHORA MELANOCEPHALA* (NEMATODA: CAMALLANIDAE), A LITTLE-KNOWN PARASITE OF SCOMBRID FISHES

MORAVEC F.\*, KOHN A.\*\* & SANTOS L.A.\*\*

### Summary :

The camallanid nematode *Oncophora melanocephala* (Rudolphi, 1819) is redescribed from specimens collected in tunas, *Thunnus thynnus* (L.), *T. albacares* (Bonnaterre), *T. atlanticus* (Lesson) and *Auxis thazard* (Lacépède) from the Atlantic littoral of Rio de Janeiro, Brazil. In addition to a specific structure of the buccal capsule, the species is characterized by the presence of seven pairs of preanal and five pairs of postanal subventral papillae in the male and by an unusual shape of body in the adult female; deirids are described for the first time in *O. melanocephala*. The structure of the buccal capsule of *O. melanocephala*, particularly the presence of a large posterior portion of capsule and a colourless connecting ring between buccal capsule and oesophagus, shows close affinities of *Oncophora* Diesing, 1851 with *Paracamallanus* Yorke et Maplestone, 1928. The findings of *O. melanocephala* in *T. atlanticus* and *A. thazard* represent new host records.

**KEY WORDS :** parasitic nematode, *Oncophora*, marine fish, *Thunnus*, *Auxis*, Atlantic Ocean, Brazil.

**Résumé :** DONNÉES NOUVELLES SUR *ONCOPHORA MELANOCEPHALA* (NEMATODA: CAMALLANIDAE), UN PARASITE PEU CONNU DES POISSONS DE LA FAMILLE DES SCOMBRIDAE

Le nématode Camallanidé *Oncophora melanocephala* (Rudolphi, 1819) est redécrit sur les spécimens récoltés chez des thons des espèces *Thunnus thynnus* (L.), *T. albacares* (Bonnaterre), *T. atlanticus* (Lesson), et *Auxis thazard* (Lacépède) de la côte atlantique de Rio de Janeiro, Brésil. En plus de la structure spécifique de la capsule buccale, l'espèce est caractérisée chez les mâles par la présence de sept paires de papilles préanales et cinq paires postanales subventrales et chez les femelles adultes par une forme du corps inhabituelle. Les deirides sont décrites pour la première fois chez cette espèce. La structure de la capsule buccale de *O. melanocephala*, en particulier la présence d'une vaste portion postérieure et d'un anneau incolore unissant la capsule buccale et l'œsophage, montre les étroites affinités d'*Oncophora* Diesing, 1851 avec *Paracamallanus* Yorke & Maplestone, 1928. *T. atlanticus* et *A. thazard* sont de nouveaux hôtes pour *O. melanocephala*.

**MOTS CLÉS :** nématode parasite, *Oncophora*, poisson de mer, *Thunnus*, *Auxis*, Océan atlantique, Brésil.

Although *Oncophora melanocephala* was established as early as at the beginning of the last century, the morphology of this remarkable nematode remained poorly known for a long time. Rudolphi (1819) was the first to describe this parasite from various Mediterranean Scombridae and from *Thunnus thynnus* autopsied by Natterer & Pohl in Brazil as two different species: *Cucullanus melanocephalus* based on juvenile females and a male body fragment, and *Trichocephalus gibbosus* based on adult females without anterior extremity; their conspecificity was later proved only by Baudin-Laurencin (1971). Diesing (1851) gave a brief description of posterior portions of conspecific females from *T. thynnus* from

Ecuador (see Pinto *et al.*, 1988). Törnquist (1931) redescribed inadequately the morphology of males originating from *T. thynnus* off the Belgian coast and from Bay of Naples, whereas Baudin-Laurencin (1971) reported the finding of *O. melanocephala* mature and immature females from *Neothunnus* (= *Thunnus*) *albacares* from Gulf of Guinea and he (Baudin-Laurencin, 1972) considered the only available male of the same origin to belong to an independent species, *Oncophora albacarensis* Baudin-Laurencin, 1972. The last named species was subsequently synonymized with *O. melanocephala* by Pinto *et al.* (1988), who had redescribed this nematode species from specimens found in *Priacanthus arenatus* Cuvier from Brazil. However, even though their species redescription has been the most complete one, some morphological features are not described or are described inaccurately.

Recent studies on the parasites of fishes of economic importance from the littoral of the Rio de Janeiro State, Brazil, carried out by Brazilian authors of this paper, revealed the presence of *O. melanocephala* in four species of tunas, *Thunnus thynnus*, *T. albacares*,

\* Institute of Parasitology, Academy of Sciences of the Czech Republic, Branišovská 31, 370 05 České Budějovice, Czech Republic.

\*\* Instituto Oswaldo Cruz and CNPq, C.P. 926, Rio de Janeiro, RJ, 21.045-900, Brazil.

Correspondence: F. Moravec.

Tel.: ++420 38 777 5432 – Fax: ++420 38 47743.

E-mail: moravec@paru.cas.cz

*T. atlanticus* and *Auxis thazard*; an examination of the nematode specimens enabled a detailed redescription of this parasite, which we present below.

## MATERIALS AND METHODS

The nematode specimens were collected from *Thunnus thynnus* (L.), *T. albacares* (Bonnerre), *T. atlanticus* (Lesson) and *Auxis thazard* (Lacépède) from the Atlantic Ocean off the coast of the Rio de Janeiro State, locality Cabo Frio, Brazil in the period from March 1996 until November 1997. The nematodes were fixed and preserved in 70 % ethanol and cleared with glycerin for examination. Drawings were made with the aid of a Zeiss microscope drawing attachment. For examination in scanning electron microscope (SEM), the nematodes were postfixed in 1 % OsO<sub>4</sub>, dehydrated through an ethanol series and acetone and then subjected to critical point drying. The specimens were coated with gold and examined with a JSM-6300 scanning electron microscope at an accelerating voltage of 15 kV. All measurements are given in microns unless otherwise stated. The specimens have been deposited in the helminthological collections of the Instituto Oswaldo Cruz, Rio de Janeiro, Brazil (Cat. Nos. 33.966-33.972) and of the Institute of Parasitology, Academy of Sciences of the Czech Republic (ASCR), České Budějovice (Cat. No. N-712). All measurements are in micrometres unless otherwise stated.

## RESULTS

Family Camallanidae Railliet & Henry, 1915

*ONCOPHORA MELANOCEPHALA* (RUDOLPHI, 1819)  
(Figs. 1-3)

Syn.: *Cucullanus melanocephalus* Rudolphi, 1819; *Trichocephalus gibbosus* Rudolphi, 1819; *Oncophora neglecta* Diesing, 1851; *O. albacarensis* Baudin-Laurencin, 1972.

Description: Rather large nematodes with elongate body, adult females much longer than males; body of both sexes broadest at its posterior part. Cuticle thick, with fine, dense transverse striations. Body white, only buccal capsule markedly darkly coloured, almost black. Oral opening slit-like. Mouth formed by two lateral valves, each strengthened on inner surface by numerous (about 20), thin longitudinal thickenings (ribs or ridges) extending posteriorly to its base; a few ridges usually incomplete. Each valve provided with two cephalic papillae (one dorsolateral and one ventrolateral), one small lateral amphid, and two large, longitudinally elongated, strongly sclerotized plates (shields)

in outer buccal wall; plates exceeding posteriorly half of valve. Dorsal and ventral sides of anterior part of buccal capsule provided with large tridents, exceeding considerably posterior end of capsule; tridents of rather complicated structure, with relatively long anterior, undivided part. Anterior portion of capsule formed by valves followed by much shorter and narrower posterior portion of capsule in form of thick-walled ring surrounding spacious cavity. Buccal capsule connected with oesophagus by well developed, thick-walled ring with spacious cavity. Anterior and posterior portions of capsule, as well as tridents, darkly coloured; posterior connecting ring colourless. Posterior margin of connecting ring followed by small, colourless, poorly sclerotized oesophageal cup. Muscular oesophagus approximately as long as glandular oesophagus or somewhat longer. Intestine narrow, straight. Small deirids situated somewhat posterior to level of nerve ring.

Male (four specimens): Length of body 12,852-20,767, maximum width at posterior part of body 245-354. Length of buccal capsule 141-207 (of anterior portion 105-153, of posterior portion 36-51); maximum width of anterior portion 129-192, of posterior portion 75-105. Connecting ring 36-42 long and 39-60 wide. Each valve of capsule bearing about 22 longitudinal thickenings (ridges) extending from anterior to posterior margin, some of these being incomplete. Length of whole tridents 210-255, length of their arms 90-126. Muscular oesophagus 1,115-1,727 long and 136-163 wide; glandular oesophagus 1,197-1,618 long and 150-163 wide. Nerve ring and excretory pore 340-435 and 462-465, respectively, from anterior extremity; deirids not located. Posterior end of body with broad caudal alae supported by pedunculate papillae; caudal alae interconnected anteriorly by somewhat elevated transverse mound. Caudal papillae: seven pairs of preanal and five pairs of postanal thin, pedunculate papillae present; first three pairs of postanals close one to another. Cloacal opening surrounded by two transverse mounds, forming laterally two pairs of additional papillae. Large (right) spicule well sclerotized, 579-843 long, with almost conical distal tip. Small (left) spicule simple, weakly sclerotized, hardly visible, 249-294 long. Tail conical, 84-138 long, sometimes with three poorly developed minute papilla-like outgrowths.

Female (one complete and two incomplete specimens with eggs; measurements of three juvenile specimens in parentheses): Body of gravid females markedly broad at its approximately posterior third and narrow, filiform at its anterior part; in juvenile females posterior part of body not markedly broad. Length of entire body 53,774 (20,482-33,769), length of its narrow anterior part anterior to vulva 37,957 (24,249); width of anterior part of body anterior to vulva 204-367 (299-313), at level of vulva 680-1,251 (258-394), at poste-

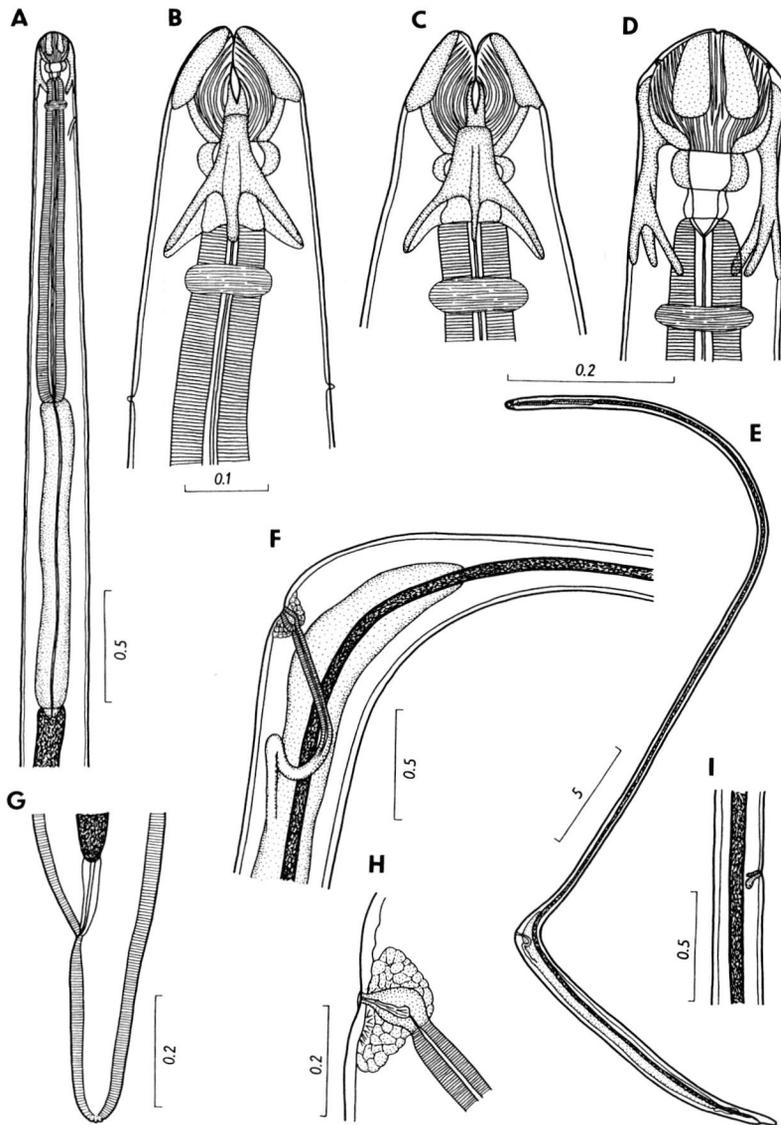


Fig. 1. – *Oncophora melanocephala* (Rudolphi, 1819). A: anterior end of male; B, C: cephalic end of young female, dorsoventral views; D: buccal capsule of male, lateral view; E: young female, general view; F: region of vulva in young female; G: female tail; H: ovijector; I: region of vulva in juvenile female. Scale bars in mm.

rior part 544-898 (272-435). Length of buccal capsule 198 (198-204) (of anterior portion 150 [150-159], of posterior portion 45 [42-51]); maximum width of anterior portion 165 (156-192), of posterior portion 111 (54-108). Connecting ring 33 (30-33) long and 60 (54) wide. Length of whole tridents 233 (219-240), length of their arms 120 (105-111). Muscular oesophagus 1,850 (1,768-1,945) long and 204 (136) wide; glandular oesophagus 1,768 (1,564-1,836) long and 178 (150-163) wide. Nerve ring, excretory pore and deirids 326 (340-394), - (408-449) and 422 (400), respectively, from anterior extremity. Vulva not elevated, situated 12,104-18,496 (5,372-9,520) from posterior end of body. Ovijector with

sclerotized walls, surrounded by mass of cells. Vagina muscular, narrow, directed posteriorly from vulva. Uterus extending anteriorly to short distance anterior to vulva; uterus containing eggs (without eggs in juvenile forms). Tail conical, 326-462 (286) long, with rounded tip bearing three minute, poorly developed papilla-like protrusions.

Hosts: *Thunnus thynnus* (Linnaeus), *T. albacares* (Bonaterre), *T. atlanticus* (Lesson) and *Auxis thazard* (Lacépède) (Thunnini, Scombridae, Perciformes).

Site of infection: Males in stomach and intestine; adult females in pyloric organ penetrating by their cephalic end into stomach.

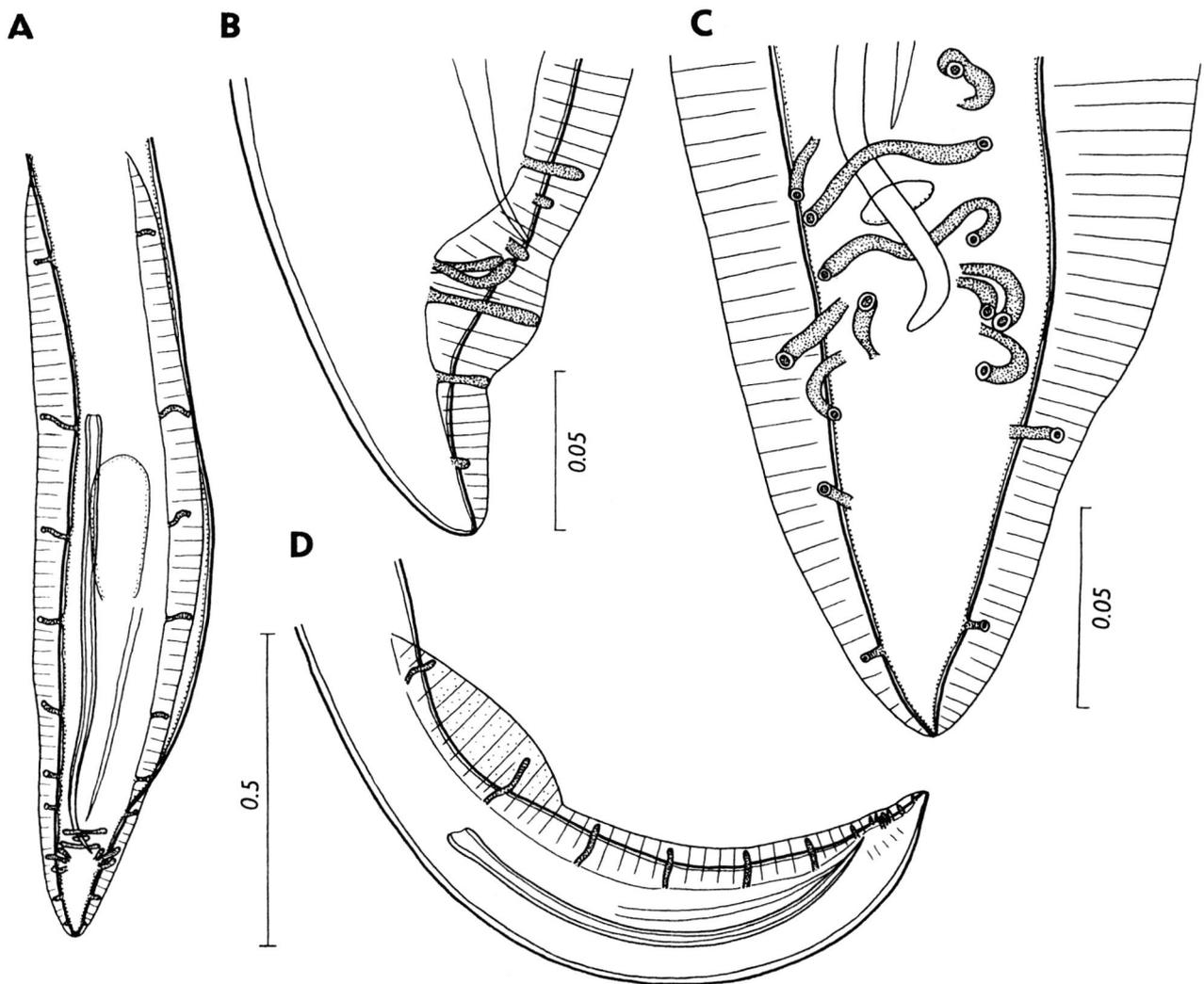


Fig. 2. – *Oncophora melanocephala* (Rudolphi, 1819), male. A: caudal end, ventral view; B, C: tail, lateral and ventral views; D: caudal end, lateral view. Scale bars in mm.

Locality: Cabo Frio, Atlantic Ocean in Rio de Janeiro State, Brazil.

Prevalence and intensity: *T. thynnus*: 16 % (three fishes infected/18 fishes examined), 3-5 nematodes; *T. albacares*: 25 % (10/40), 1-4; *T. atlanticus*: 41 % (7/17), 1-6; *A. thazard*: 100 % (2/2), 1.

## DISCUSSION

Because of difficulties to study the morphology of these big nematodes, especially due to the black colour of their buccal capsule, moderate sclerotization of the left spicule and insufficient transparency of cleared nematode bodies, the specific features of *Q. melanocephala* have not been reliably described by various authors.

Yeh (1960) pointed out that the structure and ornamentations on the buccal capsule form very important diagnostic features in camallanids. According to Törnquist (1931), longitudinal ridges on the internal surface of the buccal capsule of *Q. melanocephala* (reported as *Camallanus melanocephalus*) extend posteriorly to about the mid-length of the valve, whereas Pinto *et al.* (1988) illustrated the ridges extending nearly to its posterior end; in our specimens, the ridges, some of them being incomplete, extended posteriorly to the bottom of the valve. It should be noted, however, that it is extremely difficult to observe the ridges within the black-coloured buccal capsule.

The shape and the structure of tridents associated with the buccal capsule of the present specimens are somewhat different from those illustrated by Pinto *et al.* (1988), but are more similar to their illustration given by Törnquist (1931); the structure of *Q. melano-*

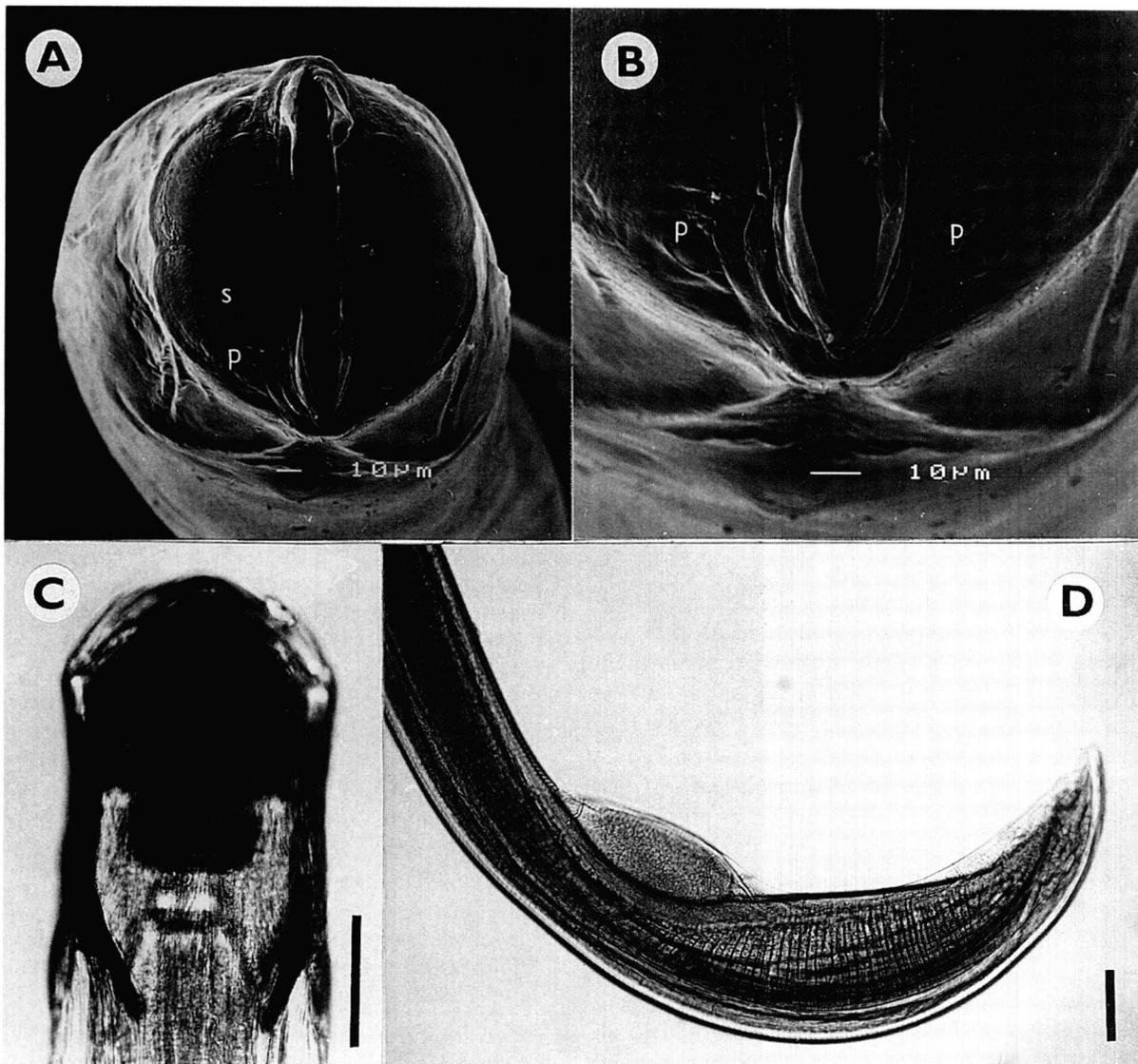


Fig. 3. – *Oncophora melanocephala* (Rudolphi, 1819). A: cephalic end, apical view (SEM); B: part of oral opening in apical view (SEM); C: lateral view of buccal capsule in cleared nematode body (focused to tridents); D: posterior end of male, lateral view. Scales for C, D = 100 µm. Abbreviations: p = oral papilla; s = sclerotized plate (shield) of buccal capsule.

*cephala* tridents is rather similar to that in *Paracamallanus amazonensis* Ferraz & Thatcher, 1992 (see Moravec *et al.*, 1993).

A characteristic feature of *Oncophora* is the presence of a thick-walled ring surrounding a spacious cavity, corresponding to the basal ring of the capsule in *Camallanus* Railliet & Henry, 1915, and a well developed ring interconnecting the base of the capsule with the oesophagus (called “cylinder” by Rigby *et al.*, 1998). By this structure of the capsule, *Oncophora* resembles *Paracamallanus* Yorke & Maplestone, 1926 where, however, the posterior portion of the capsule (basal ring) is much larger; a similar structure of the capsule was described for *Camallanus aotea* Slankis

& Korotaeva, 1974 and, partly, for *C. carangis* Olsen, 1954 (Slankis & Korotaeva 1974, Rigby *et al.* 1998); a strong resemblance of the buccal capsule and trident morphology of *C. aotea* to that of *Oncophora* has already been pointed out by Rigby *et al.* (1998).

Regarding the number of subventral caudal papillae in *O. melanocephala*, Törnquist (1931) was unable to establish their number and distribution. According to Baudin-Laurencin (1972), there are 14 pairs of caudal papillae in this species (reported as *O. albacarensis*), but their character and distribution are not apparent from his description and illustrations. Pinto *et al.* (1988) reported seven pairs preanal, two pairs adanal and six pairs postanal, but, apparently, they did not observe

the papillae in ventral view. The present study shows that only five pairs of subventral pedunculate postanal papillae are present. The presence of two spicules in *O. melanocephala* confirms observations by Törnquist (1931) and Pinto *et al.* (1988); Baudin-Laurencin (1972) reported only one (right) spicule in this species, but he apparently overlooked the left, weakly sclerotized and hardly visible left spicule (Pinto *et al.*, 1988).

At present, *O. melanocephala* is regarded the only valid species of *Oncophora* (= *Piscilania* Yeh, 1960) (see Pinto *et al.*, 1988). However, it has already been mentioned above that, for example, the structure of the capsule and tridents of *Camallanus aotea* is very similar to those of *O. melanocephala*. The present study shows that the presence of an anterior group of continuous ridges and a posterior group of spines can no longer be considered diagnostic of *Oncophora* (Yeh, 1960; Chabaud, 1975; Petter, 1979) and, therefore, *C. aotea* might be transferred to *Oncophora*. However, Petter (1979) considers the unusual shape of body in *O. melanocephala* adult females to be one of the main differential characters for *Oncophora*. The shape of body of adult *C. aotea* is not apparent from the description and, consequently, we refrain from transferring it to *Oncophora*. We agree with Rigby *et al.* (1998) that the diagnostic characteristics of *Oncophora* needs to be re-examined; however, in our opinion, a new delimitation of this genus should be based on a broader taxonomic revision of camallanids. For the time being, we consider *Oncophora* a valid genus, the main feature distinguishing it from other related genera being the shape of the body of adult females. The unusual shape of body of adult females of *O. melanocephala* is undoubtedly associated with their localization in the host's body: while their broad posterior part of the body is in the pyloric organ, they penetrate by their long, thin anterior part to the stomach, where they attach by the buccal capsule to the stomach mucosa.

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