

Two new free-living marine nematode species of the genus *Paramarylynna* (Chromadorida: Cyatholaimidae) from the Yellow Sea, China

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Two new species of free-living marine nematodes Paramarylynna filicaudata sp. nov. and Paramarylynna stenocervica sp. nov. from the Yellow Sea, China are described. Paramarylynna filicaudata sp. nov. is characterized by a homogeneous cuticle with transverse rows of even dots; spicules boat-shaped, swollen in the middle and gradually tapering towards both ends; tail conical with a long filiform terminal portion and without subventral setae on the conical part. Paramarylynna stenocervica sp. nov. is characterized by the marked narrower anterior part of the neck region; heterogeneous cuticle with transverse rows of punctations and the punctations of anterior contracted portion larger and more widely spaced than the remaining portion; spicules curved and cephalate proximally; gubernaculum boat-shaped, swollen in the middle and gradually tapering towards both ends, five small tubular preloacal supplements.

Keywords: *Paramarylynna filicaudata* sp. nov., *Paramarylynna stenocervica* sp. nov., Yellow Sea, China

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INTRODUCTION

In July 2008, undisturbed sediments were obtained from a grid of 33 sampling stations between 32°N and 38°50'N 120°20'E and 124°10'E during the Open Research Cruise by RV 'KE XUE SAN HAO' in the Yellow Sea, China (Figure 1). Many species of free-living marine nematodes were determined and some new species were discovered. The present paper describes two new species from this region which belong to the genus *Paramarylynna* Huang & Zhang, 2007.

Paramarylynna was established in the family Cyatholaimidae by the authors in 2007. The type species of the genus is *Paramarylynna ventralseta* Huang & Zhang. Since then *Paramarylynna ventralseta* is the only valid species of the genus and no other new member has been added. *Paramarylynna* is characterized by a cuticle with transverse rows of even dots; lateral differentiation absent; gubernaculum large and dilated at the distal end, without distal dentate; tail conico-cylindrical.

MATERIALS AND METHODS

Undisturbed sediment samples were taken using a 0.1m² improved Gray–O'Hara box corer in July 2008, and meio-fauna samples were obtained using a syringe (2.6 cm diameter). Samples were fixed with 5% formalin in filtered

seawater. In the laboratory, sorting and slide mounting were carried out as detailed by Huang & Zhang (2010) and Huang & Wu (2010). Type specimens have been deposited in the type collections of the museum of the Institute of Oceanology, Chinese Academy of Sciences.

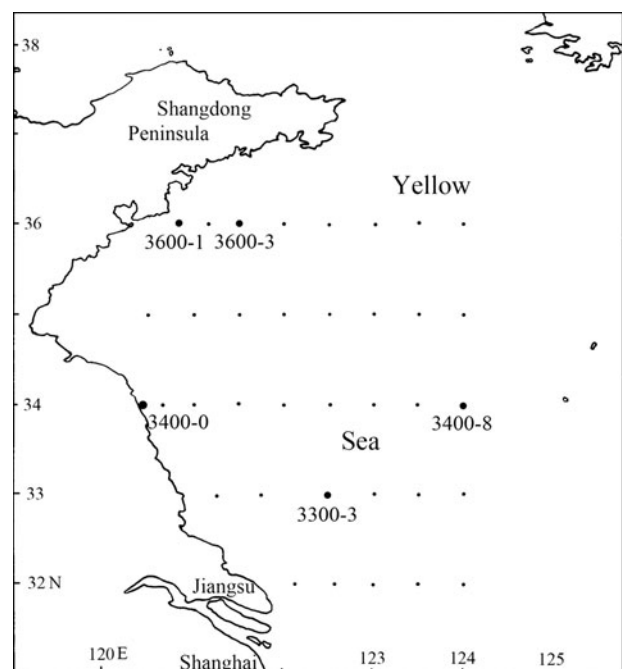


Fig. 1. Map of sampling stations in the Yellow Sea.

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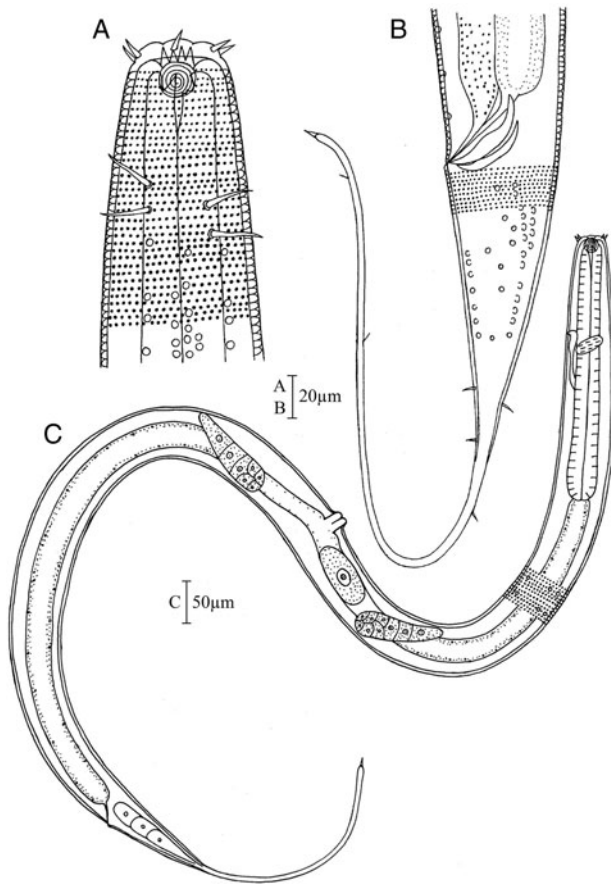


Fig. 2. *Paramarylynna filicaudata* sp. nov. (A) Lateral view of male anterior end; (B) lateral view of male posterior end; (C) lateral view of female body.

Abbreviations are as follows: a, body length/ maximum body diameter; a.b.d., anal body diameter; b, body length/ pharynx length; c, body length/tail length; c.b.d., corresponding body diameter; Spic, spicule length along arc; V, distance

of vulva from the anterior end of body; V%, V/body length × 100%.

SYSTEMATICS

Order CHROMADORIDA Lorenzen, 1981
 Family CYATHOLAIMIDAE Filipjev, 1918
 Genus *Paramarylynna* Huang & Zhang, 2007
Paramarylynna filicaudata sp. nov.
 (Figures 2 & 3)

TYPE MATERIAL

Four males and three females collected and studied.

Holotype: ♂ 1 on slide 126194-401; paratype: ♀ 1 on slide 126194-221; paratypes: three males and two females on slides 126194-401 and 126194-221 respectively.

TYPE LOCALITY AND HABITAT

Subtidal muddy sediment in the Yellow Sea. Station 3400-8: 34°N, 124°E, water depth 80 m.

ETYMOLOGY

The new species name refers to the filiform tail shape.

MEASUREMENTS (SEE TABLE 1)

$$\text{Holotype } \sigma^1: \frac{-335 \quad M \quad 1845}{29 \quad 67 \quad 68 \quad 52} 2280 \mu\text{m};$$

$$a = 32.6, b = 6.8, c = 5.2, \text{Spic} = 45 \mu\text{m}$$

$$\text{Paratype } \sigma^1: \frac{-342 \quad V \quad 1820}{30 \quad 72 \quad 87 \quad 49} 2270 \mu\text{m};$$

$$a = 28.4, b = 6.6, c = 5.1, V\% = 41\%$$

DESCRIPTION

Males: body long, cylindrical, maximum diameter 51–59 µm. Head diameter 25–29 µm, about 53% of diameter at the base

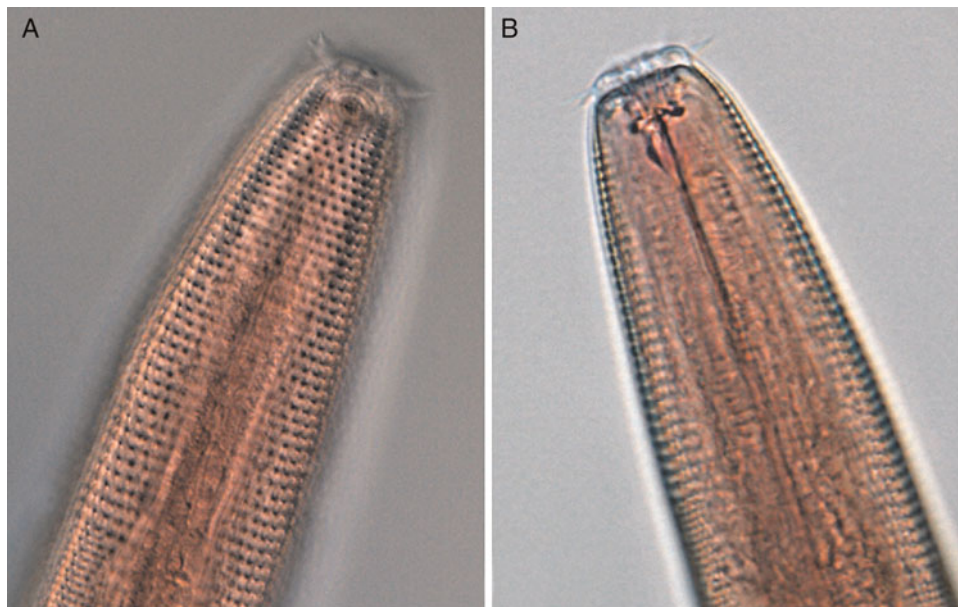


Fig. 3. *Paramarylynna filicaudata* sp. nov. (A) Lateral surface view of male anterior end, showing cephalic setae, amphidial fovea and cuticle punctuation; (B) lateral optical section of female head end, showing buccal cavity with dorsal tooth and ventrosulateral teeth; (C) lateral optical section of male posterior body part, showing copulatory apparatus; (D) lateral view of female posterior end, showing filiform tail end.

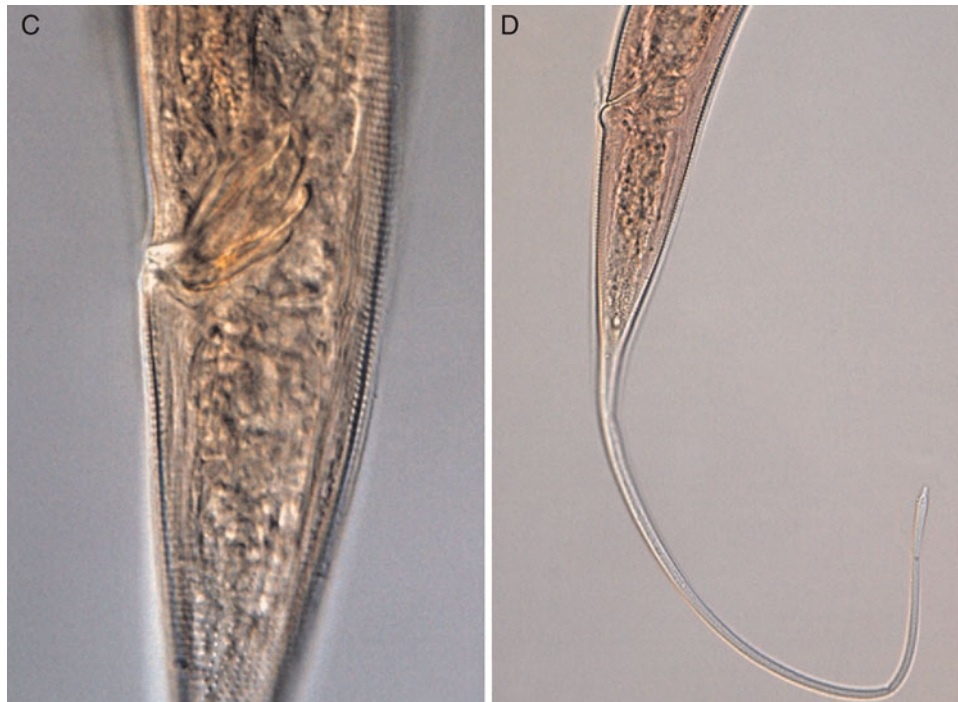


Fig. 3. Continued

of pharynx. Cuticle transversally annulated and punctuated (Figures 2A & 3A). The dots about the same size and closely arranged in transversal rows, beginning from level of cephalic setae to tail end. At the pharyngeal region, the dots are more conspicuous than that on the rest of the body. Six longitudinal rows of simple rounded cuticle pores, but fewer in cervical part. No lateral differentiation, but numerous lateral modified punctuations (LMPs) present in cluster in pharyngeal and cloacal region. Four longitudinal files of two to three sub-lateral cervical setae.

Amphidial fovea round, multispiral with 5 turns, 13–17 μm (about 0.4 c.b.d.) wide, situated at a distance near the

apex. Mouth opening surrounded by six conical lips with hardly visible inner labial sensilla. Outer labial and cephalic sensilla short, arranged in one circle of ten setae. Four cephalic setae more or less equal to six outer labial setae, about 10 μm long.

Buccal cavity with a distinct large dorsal tooth and two small ventrosublateral teeth (Figures 2A & 3B). Pharynx cylindrical, slightly broadened at base. Nerve ring at 43% of pharyngeal length from anterior end. Ventral gland not clearly defined. Excretory pore situated anterior to the nerve ring. No cardia.

Tail elongated, 420–460 μm (8.4–9.0 a.b.d.), with a long filiform part constituting about two thirds of total tail

Table 1. Individual measurements (and average) of *Paramarylynnia filicaudata* sp. nov. (in μm).

Characters	♂1	♂2	♂3	♂4	♀1	♀2	♀3	Average
Total body length	2280	2130	2210	2160	2270	2260	2130	2205
Head diameter	29	30	28	29	30	28	27	29
Length of cephalic setae	10	10	9	9	9	10	10	10
Amphids diameter	17	13	–	15	12	–	15	15
Nerve ring from the anterior end	130	160	125	130	150	165	134	142
Nerve ring c.b.d.	62	56	60	56	60	65	61	60
Pharynx length	335	316	328	322	342	350	340	333
Pharynx c.b.d.	67	60	70	65	72	75	66	68
Maximum body diameter	70	66	72	70	82	80	72	73
Spicule length along the arc	46	40	43	39	–	–	–	42
Length of gubernaculum	38	27	30	25	–	–	–	30
a.b.d.	52	50	50	49	50	52	47	50
Tail length	435	430	420	430	450	460	448	439
Tail length/a.b.d.	8.4	8.6	8.4	8.8	9.0	8.8	9.5	9
Vulva from anterior	–	–	–	–	922	890	855	889
Vulva c.d.	–	–	–	–	82	80	72	78
V%	–	–	–	–	41	39	40	40
a	32.6	32.3	30.7	30.9	28.4	29.0	29.6	30.5
b	6.8	6.7	6.7	6.7	6.6	6.5	6.3	6.6
c	5.2	5.0	5.3	5.0	5.1	4.9	4.8	5.0

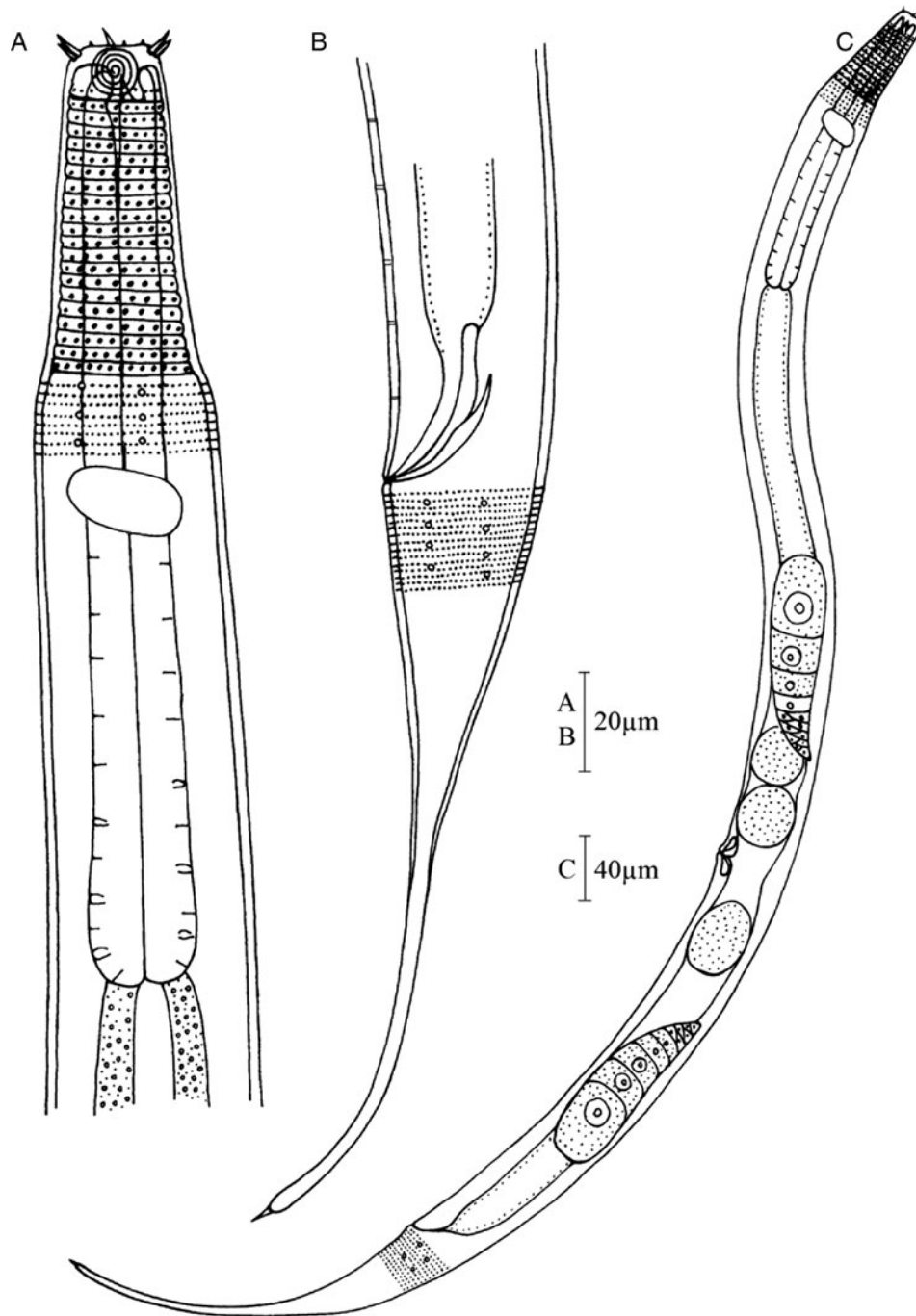


Fig. 4. *Paramarylynna stenocervica* sp. nov. (A) Lateral view of male anterior end; (B) lateral view of male posterior end; (C) lateral view of female body.

length, and with a delicate terminal spinneret (Figure 3D). No subventral setae on the conical part. Three caudal gland cells situated within the conical part.

Spicules 42 μm measured along arc (mean value), boat-shaped, swollen in the middle and gradually tapering towards both ends (Figure 2B). Gubernaculum curved, 30 μm as arc, without apophysis. Precloacal supplements not clear. Testes are indistinct.

Females: similar to males in most respects, but the tail relatively longer than that of males. Didelphic, ovaries antro- dorsally reflexed; anterior ovary situated subventrally to the right of the intestine, posterior one subventrally to the left

of the intestine. Vulva at 40% of body length from anterior end. Eggs oval.

DIFFERENTIAL DIAGNOSIS AND DISCUSSION

Paramarylynna filicaudata sp. nov. are characterized by long filiform tail and absence of subventral setae on conical part of tail; spicules boat-shaped, swollen in the middle and gradually tapering towards both ends. This new species is closely related to *P. subventrosetata* Huang & Zhang, 2007, but differs from it by the following characters: longer filiform tail, without subventral setae on the conical part of the tail, and spicules taper proximally compared to two rows of subventral setae

Table 2. Individual measurements (and average) of *Paramarylynnia stenocervica* sp. nov. (in μm).

Characters	♂ ₁	♂ ₂	♂ ₃	♂ ₄	♂ ₅	♀ ₁	♀ ₂	♀ ₃	♀ ₄	♀ ₅	Average
Total body length	1190	1120	1255	1185	1170	1290	1185	1300	1285	1345	1230
Maximum body diameter	46	44	46	45	46	46	48	56	51	53	48
Head diameter	19	18	20	19	19	19	18	19	19	18	19
Length of cephalic setae	6	6.5	7	6	6	6	8	6	5	6	6
Amphids diameter	11	–	10	11	10	11	10	10	10	11	10
Nerve ring from the anterior end	95	94	100	97	100	100	100	106	100	99	99
Nerve ring c.d.	41	39	43	43	43	42	44	47	44	46	43
Pharynx length	196	202	210	206	207	220	216	218	218	216	211
Pharynx c.d.	44	44	45	44	45	43	47	53	46	49	46
Spicule length as arc	40	39	43	40	40	–	–	–	–	41	41
Length of gubernaculum a.b.d.	31	29	32	29	31	–	–	–	–	31	31
Tail length	182	168	168	182	178	150	190	182	198	192	179
Tail length/a.b.d.	5.9	5.3	4.9	5.5	5.6	5.0	5.8	5.4	6.4	6	5.6
Vulva from anterior	–	–	–	–	–	653	601	643	643	656	639
Vulva c.d.	–	–	–	–	–	46	48	56	51	53	51
V%	–	–	–	–	–	51	51	50	50	49	50
a	25.9	25.5	27.3	26.3	25.4	28	24.7	23.2	25.2	25.4	25.7
b	6.1	5.6	6.0	5.8	5.7	5.9	5.5	6.0	5.9	6.2	5.9
c	6.6	6.7	7.5	6.5	6.6	8.6	6.2	7.1	6.5	7.0	6.9

present on the conical tail part and spicules cephalated in *P. subventrosetata*.

Order CHROMADORIDA Lorenzen, 1981
 Family CYATHOLAIMIDAE Filipjev, 1918
 Genus *Paramarylynnia* Huang & Zhang, 2007
Paramarylynnia stenocervica sp. nov.
 (Figures 4 & 5)

TYPE MATERIAL

Five males and five females collected and studied.

Holotype: ♂₁ on slide 3600-101; paratype: ♀₁ on slide 3400-002; paratypes: four males and four females on slides 3300-302 and 3600-302, 303 respectively.

TYPE LOCALITY AND HABITAT

Subtidal muddy sediment in the Yellow Sea. Station 3600-1: 36°N 120°50'E, water depth 30 m; 3600-3: 36°N 121°30'E, water depth 30 m and station 3300-3: 33°N 122°30'E, water depth 20 m.

ETYMOLOGY

The new species name refers to the strongly narrower anterior end of the body.

MEASUREMENTS (SEE TABLE 2)

$$\text{Holotype } \sigma_1: \frac{-196 \quad M \quad 1010}{19 \quad 44 \quad 46 \quad 31} 1190 \mu\text{m};$$

$$a = 25.9, b = 6.1, c = 6.6, \text{Spic} = 40 \mu\text{m}$$

$$\text{Paratype } \sigma_1: \frac{-220 \quad V \quad 1140}{19 \quad 43 \quad 46 \quad 30} 1290 \mu\text{m};$$

$$a = 28, b = 5.9, c = 8.6, V\% = 51\%$$

DESCRIPTION

Males: body spindle-shaped, sharply tapering towards the anterior end from the anterior third of pharynx onwards (Figure 4C). Cuticle heterogeneous with transverse rows of punctuations, the lateral ones slightly larger. The punctuations of anterior narrower portion larger and more widely spaced than on the rest of the body (Figures 4A & 5B).

Amphidial fovea slightly oval transversally, multispiral with 5 turns, 10–11 μm wide (50% c.b.d.) (Figure 5B). Anterior border of amphidial fovea 9 μm from anterior end. Head diameter 19 μm , 21% of diameter at the base of pharynx. Inner labial papillae not observed, six outer labial setae short, four cephalic setae, 6 μm long.

Buccal cavity with a distinct large dorsal tooth and two small ventrosulateral teeth (Figures 4A & 5A). Pharynx cylindrical, with slightly widened base, no true bulb (Figure 5A). Nerve ring at 46% of pharyngeal length from anterior end. Ventral gland small, located posterior to pharynx. Excretory pore anterior to the nerve ring. No cardia.

Tail conico-cylindrical, 6 a.b.d. long, with a long filiform part, longer than half the total tail length, and with delicate terminal spinnerete (Figure 5C). Caudal glands not clear.

Spicules 41 μm along arc, curved and cephalate proximally. Gubernaculum 31 μm , boat-shaped, swollen in the middle and gradually tapering towards both end. Five small tubular preloacal supplements (Figures 4B & 5D).

Females: similar to males in most respects, but slightly longer in body length. Didelphic, ovaries antidromously reflexed. Vulva at 49% of body length from anterior end. Eggs round.

DIFFERENTIAL DIAGNOSIS AND DISCUSSION

Paramarylynnia stenocervica sp. nov. is characterized by a marked narrower anterior part, cuticle heterogeneous with transverse rows of punctuations, larger and more spaced anteriorly and slight lateral differentiation. Spicules curved and cephalate. Gubernaculum boat-shaped, dilate in the middle and gradually tapering towards both ends. Five small tubular preloacal supplements. It is easily

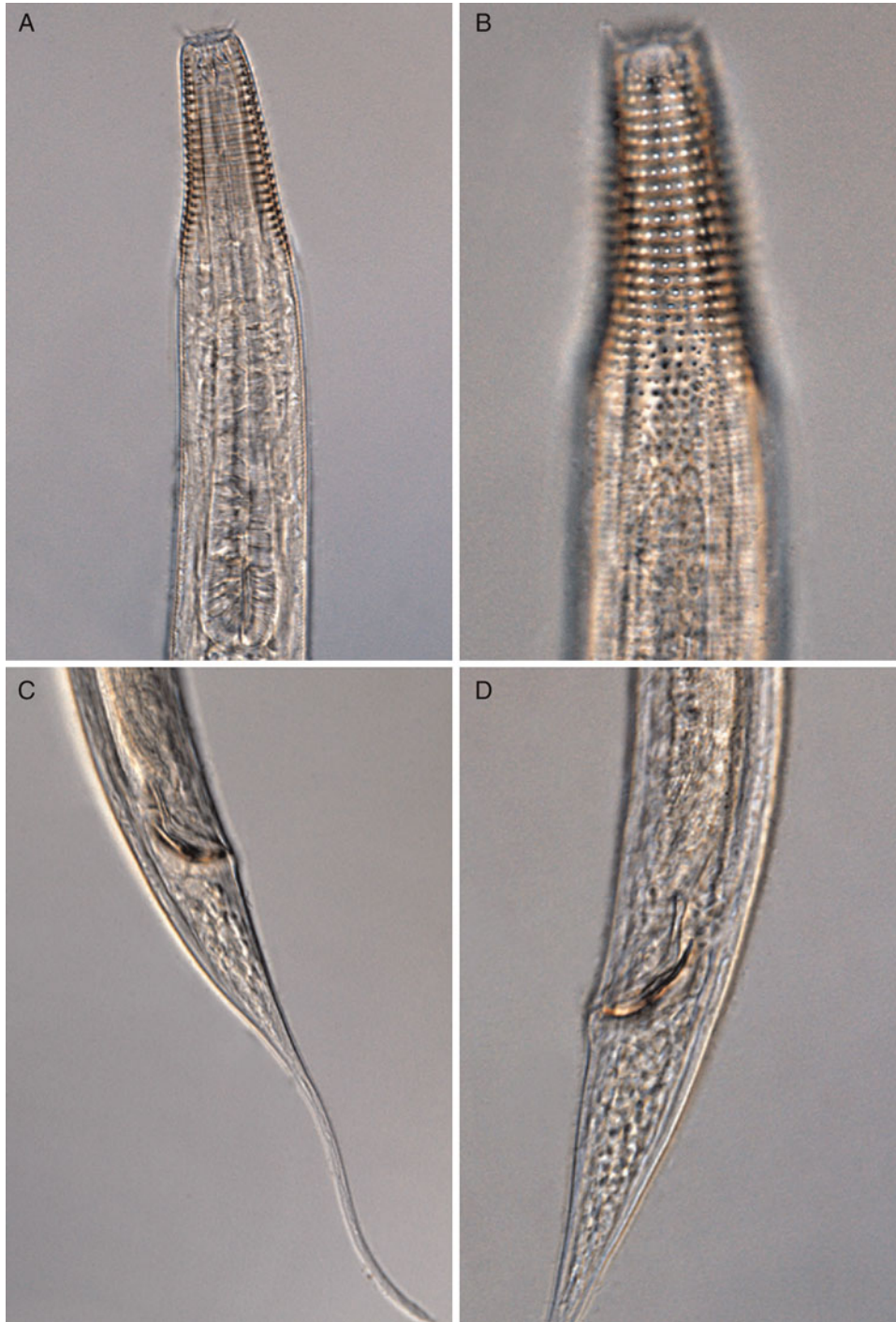


Fig. 5. *Paramarylynna stenocervica* sp. nov. (A) Lateral optical section of male head end, showing cephalic setae, buccal cavity, dorsal teeth and pharynx; (B) lateral surface view of female head end, showing cephalic setae, amphidial fovea and cuticle punctation; (C) lateral view of male posterior end, showing spicules, gubernaculum and tail; (D) lateral view of male posterior body part, showing spicules, gubernaculum and precloacal supplements.

differentiated from other two species of the genus by the marked narrower anterior part of the neck region and heterogeneous cuticle.

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REFERENCES

- Huang Y. and Zhang Z.N.** (2007) New genus and one new species of free-living marine nematodes from the Yellow Sea, China. *Journal of the Marine Biological Association of the United Kingdom* 87, 717–722.
- Huang Y. and Zhang Z.N.** (2010) Two new species of Enoplida (Nematoda) from the Yellow Sea, China. *Journal of the Marine Biological Association of the United Kingdom* 90, 391–397.
- and
- Huang Y. and Wu X.Q.** (2010) Two new free-living marine nematode species of the genus *Vasostoma* (Comesomatidae) from the Yellow Sea, China. *Cahiers de Biologie Marine* 51, 19–27.

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