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A new genus and three new species of free-living marine nematodes from the Yellow Sea, China

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Abstract

One new genus, *Paramphimnhystrella* gen. nov., and three new species of free-living marine nematodes in this genus, *P. elegans* sp. nov., *P. minor* sp. nov., and *P. sinica* sp. nov., are described and illustrated from the Yellow Sea, China. *Paramphimnhystrella* gen. nov. differs from the similar genus *Amphimnhystrella* by the elongated buccal cavity, cervical setae and large caudal glands. *Paramphimnhystrella elegans* sp. nov. is characterized by ovoid amphids and spicules with a small hook at distal end and cylindrical part of tail shorter than conical part. *Paramphimnhystrella sinica* sp. nov. is characterized by circular amphids, wide buccal cavity, spicules with blunt tip, and cylindrical part of tail longer than conical part. *Paramphimnhystrella minor* sp. nov. differs from the other two species by its smaller body (shorter than 800 µm), circular amphids, and spicules with sharp tip. The type species of this new genus is *P. elegans* gen. nov. and sp. nov. Types are deposited in the College of Marine Life Sciences, Ocean University of China.

Keywords: China, free-living marine nematodes, new genus, new species, Yellow Sea

Introduction

Undisturbed sediments were collected from a grid of 23 sampling stations (from 32.5°N to 37°N, 121.5°E to 125°E) during the course of an ecological survey of the overwinter grounds of anchovy in the Yellow Sea, China in January 2003. Meiofaunal abundance varied from 553 to 1400 individuals per 10 cm² (929 ± 289 ind/10 cm²), with 81–93% (809 ± 247 ind/10 cm²) of the specimens being nematodes. Up to now, only 36 species of marine nematodes have been recorded from the Yellow Sea (Zhang and Platt 1983; Zhang *et al.* 1994; Zhang and Ji 1994; Hope and Zhang 1995; Huang and Zhang 2004, 2005; Zhang 2005; Zhang and Huang 2005). In this investigation, a number of previously undescribed species of nematodes were found. These were studied in detail at the Ocean University of China.

In this paper we describe the new genus *Paramphimnhystrella* gen. nov. in the family Xyalidae, belonging to the order Monhysterida; three new species of this genus were found in the Yellow Sea, China.

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Material and methods

Sampling, subsampling, sorting, and slide mounting were carried out as detailed by Huang and Zhang (2004, 2005) and Zhang (2005).

Morphometric data are presented using the modification of Filipjev's standard formula described by Platt (1973). The types are deposited in the College of Life Sciences, Ocean University of China. Measurements are in μm . Abbreviations are as follows: a.b.d., anal body diameter; b, body length/oesophagus length; c, body length/tail length; c.d., corresponding body diameter; Sc, spicule length as chord; V, vulva distance from the anterior end of body; V%, V/total body length.

Genus description

Order MONHYSTERIDA Lorenzen, 1981

Family XYALIDAE Chitwood, 1951

Genus *Paramphimonhystrella* gen. nov.

Description

Body length 740–1916 μm . Cuticle smooth. Head tapering. Buccal cavity deep, conical or cylindrico-conical, with sclerotized walls. Tooth lacking. Ten cephalic setae; numerous cervical setae. Double-walled ovoid or circular amphids. Spicules slender. Gubernaculum absent. No precloacal supplement. Single anterior ovary. Three caudal glands, and the proximal two large and obvious. Three terminal setae.

Diagnosis and discussion

Paramphimonhystrella gen. nov. is close to *Amphimonhystrella* Timm, 1961, but differs from it by its elongated cylindrical or conical stoma; two groups of 8–10 cervical setae each, instead of four cervical setae each group; two of three caudal glands large and obvious. The body size is larger than in species of *Amphimonhystrella*. This new genus is also similar to *Elzalia* Gerlach, 1957, but differs from the latter by the elongated stoma, presence of cervical setae, and the structure of spicules. The principal difference between this new genus and *Amphimonhystrella* and *Elzalia* is the structure of the buccal cavity, which is regarded as characteristic of genera in the family Xyalidae. The buccal cavities of species in this new genus are elongated conical and differ distinctly from other genera in this family. Consequently, we propose *Paramphimonhystrella* as a new genus. The type species of this new genus is *Paramphimonhystrella elegans* sp. nov.

Species descriptions

Order MONHYSTERIDA Lorenzen, 1981

Family XYALIDAE Chitwood, 1951

Genus *Paramphimonhystrella* gen. nov.

Paramphimonhystrella elegans sp. nov.

(Tables I, II; Figures 2, 3)

Table I. The modification of Filipjev's standard formula of *Paramphimonhystrella elegans* sp. nov.

Holotype male 1:	–	220	M	1480	1778 μm; a=53.9, b=8.1, c=6.0, Sc=26
	6	33	33	27	
Paratype female 1:	–	176	V	1522	1830 μm; a=50.8, b=10.4, c=5.9, V=55%
	7	32	36	32	

Table II. Measurements of *Paramphimonhystrella elegans* sp. nov. (in μm).

Characters	♂1	♂2	♀1	♀2	♀3
Total body length	1778	1916	1830	1866	1286
Maximum body diameter	33	34	36	38	29
Head diameter	6.5	7	7	7.5	6.5
Buccal cavity length	13	16	14	18	12
Buccal cavity width	3.5	5	5	4	3
Cephalic setae	4	5	4	5.5	5
Amphid length	11	12	9	12	8
Amphid width/c.d.	0.5	0.47	0.38	0.44	0.5
Nerve ring from anterior	120	108	102	128	98
Nerve ring c.d.	29	31	29	33	26
Oesophagus length	220	196	176	212	154
Oesophagus c.d.	33	34	32	36	27
Anal diameter	27	31	32	32	29
Tail length	298	280	308	296	250
Tail length/a.b.d.	11	9	9.6	9.3	8.6
Spicule length as chord	26	23	–	–	–
Vulva from anterior	–	–	1015	920	684
Vulva c.d.	–	–	36	38	24
V%	–	–	55	49	53
a	53.9	56.4	50.8	49.1	47.6
b	8.1	9.8	10.4	8.8	8.4
c	6.0	6.8	5.9	6.3	5.2

Type material

Two males and three females collected from Stations 11594, 11794, 12494, and 14394 (Figure 1). Holotype: ♂1 (ZB030190) slide number ZB030112213, Station 11594. Paratypes: ♂2 (ZB030191) ZB030113122, Station 11794 and three females (ZB030192, ZB030193, and ZB030194) ZB0301122234, ZB030115213, and ZB030120321, Station 11594, 12494, and 14394.

Type locality

Benthic in the Yellow Sea. Station 11594: 34°29.74'N, 122°30.21'E, 63 m, Md₀ 6.01, organic matter 2.02%; Station 11794: 34°29.86'N, 123°29.10'E, 78 m, Md₀ 8.91, organic matter 4.15%; Station 12494: 33°59.76'N, 122°59.85'E, 68 m, Md₀ 7.54, organic matter 2.78%; Station 14394: 33°00.37'N, 124°29.22'E, 64 m, Md₀ 3.64, organic matter 1.1%.

Etymology

This species is named after the beautiful slender body.

Figure 1. Map of distributed stations of new species in the Yellow Sea.

Description

Body length 1286–1916 μm ; maximum body diameter 29–38 μm . Cuticle smooth. Head tapering. Buccal cavity conical, strongly elongated, and cuticularized. Ten cephalic setae in one circle, 4–5 μm long each. Two circles of ten cervical setae each, first group at the level of the amphids, 7 μm long; the second circle about 14 μm behind amphids, 10 μm long. Amphids ovoid, 8–12 μm long, about 14 μm from the head end. Oesophagus 154–220 μm . Tail 250–308 μm long, conico-cylindrical. Conical part about two-thirds of tail length; anal diameter 27–32 μm . Three caudal glands, and the proximal two large and obvious. Three terminal caudal setae, about 20 μm long.

Male. Spicule 24–26 μm long, with a small hook at distal end. Gubernaculum and precloacal supplement lacking.

Female. A single anterior ovary, about 430 μm long; vulva at about 49–55% of body length.

Diagnosis and discussion

Paramphimonhystrella elegans sp. nov. is characterized by ovoid amphids, the spicules with a small hook at distal end. It is close to *Paramphimonhystrella minor* sp. nov. But the principal differences between the two species are the body size, the shape of the amphids, the structure of the head, buccal cavity and spicules. In this species, the body length is more than 1200 μm ; the amphids are ovoid. In *P. minor* sp. nov. the body is shorter than 800 μm ; amphids are circular; spicules with sharp tip. It is similar to *Paramphimonhystrella sinica* sp. nov. in body size, but amphids are circular, and spicules have a blunt tip in the latter.

Order MONHYSTERIDA Lorenzen, 1981

Family XYALIDAE Chitwood, 1951

Genus *Paramphimonhystrella* gen. nov.

Paramphimonhystrella minor sp. nov.

(Tables III, IV; Figures 4, 5)

Figure 2. *Paramphimonhystrella elegans* sp. nov. (A) Lateral view of male head end, showing buccal cavity, amphid, and cervical setae; (B) lateral view of female body, showing single anterior ovary; (C) lateral view of male tail, showing spicule and caudal glands.

Type material

Three males and three females collected from Stations 12494 and 11594 (Figure 1). Holotype: ♂1 (ZB030195) slide number ZB030115414, Station 12494. Paratypes: two males (ZB030196–97) ZB0301122142, Station 11594 and two females (ZB030198–99) ZB0301122142 and ZB030115414, Station 11594 and 12494.

Figure 3. *Paramphimonhystrella elegans* sp. nov. (A, B) Lateral view of male head end, showing buccal cavity, amphids, and cervical setae; (C) lateral view of female head end, showing buccal cavity and amphids; (D) lateral view of male tail, showing spicule and caudal glands.

Table III. The modification of Filipjev's standard formula of *Paramphimonhystrella minor* sp. nov.

Holotype male 1:	–	114	M	610	740 μm; a=56.9, b=6.5, c=5.7, Sc=12
	3	13	13	12	
Paratype female 1:	–	130	V	650	770 μm; a=48.1, b=5.9, c=6.4, V=61%
	4	16	16	13	

Table IV. Measurements of *Paramphimonhystrella minor* sp. nov. (in μm).

Characters	♂1	♂2	♂3	♀1	♀2
Total body length	740	792	764	770	755
Maximum body diameter	13	14	13	16	14
Head diameter	3	3.5	3	4	3
Buccal cavity length	13	13	11	12	12
Buccal cavity width	2.5	2	2	2	2.5
Cephalic setae	1.5	2	2	2	1.5
Amphid width	5	5.5	4.5	5	5
Amphid width/c. d.	0.56	0.58	0.5	0.53	0.5
Nerve ring from anterior	65	72	55	65	78
Nerve ring c.d.	12	14	11	14	13
Oesophagus length	114	131	100	130	127
Oesophagus c.d.	13	16	13	16	14
Anal diameter	12	12	10	13	11
Tail length	130	130	160	120	110
Tail length/a.b.d.	10.8	10.8	16	9.2	10
Spicule length as chord	12	12	13	–	–
Vulva from anterior	–	–	–	470	480
Vulva c.d.	–	–	–	16	12
V%	–	–	–	61	63
a	56.9	49.5	58.8	48.1	53.9
b	6.5	6.1	7.6	5.9	5.9
c	5.7	6.1	4.8	6.4	6.9

Type locality

Benthic in the Yellow Sea. Station 12494: 33°59.76'N, 122°59.85'E, 68 m, Md₀ 7.54, organic matter 2.78%; Station 11594: 34°29.74'N, 122°30.21'E, 63 m, Md₀ 6.01, organic matter 2.02%.

Etymology

This species is named for the small body.

Description

Body length 740–792 μm; maximum body diameter 13–16 μm. Cuticular striation not observed. Head attenuated. Buccal cavity deep, conical, and strongly cuticularized. Ten cephalic setae, about 2 μm long. Two groups of eight cervical setae each, first group at the level of the amphids, 3–4 μm long; the second group of setae 7–8 μm long. Amphids circular, diameter about 5 μm and 0.5–0.58 corresponding body diameter wide; about 12 μm from the head end. Tail 110–160 μm long, conico-cylindrical. Conical part about

Figure 4. *Paramphimonhystrella minor* sp. nov. (A) Lateral view of female body, showing position of vulva; (B) lateral view of male head end, showing buccal cavity amphid and cervical setae; (C) lateral view of male tail, showing spicule and caudal glands; (D) lateral view of male anterior region, showing a cylindrical oesophagus; (E) lateral view of female tail, showing three caudal glands.

half of tail length; anal diameter 10–13 µm. Two large obvious caudal glands. Three terminal caudal setae, 2–3 µm long.

Male. Spicules 12–13 µm long, slender with sharp tip. Gubernaculum and precloacal supplement absent.

Female. A single anterior ovary; vulva at about 61–63% of body length.

Diagnosis and discussion

Paramphimonhystrella minor sp. nov. is characterized by its small body (shorter than 800 µm), circular amphids. It is close to *Paramphimonhystrella elegans* sp. nov. in

Figure 5. *Paramphimonhystrella minor* sp. nov. (A, B) Lateral view of male head end, showing buccal cavity, amphid, and cervical setae; (C) lateral view of male tail, showing spicule and caudal glands.

the structure of the buccal cavity, but differs in body size and in the shape of the amphids. It is similar to *Paramphimonhystrella sinica* sp. nov. in the shape of the amphids, but the principal differences between the two species are the buccal cavity and the head structure. In species of *Paramphimonhystrella sinica* sp. nov. the head is extended and buccal cavity is wider.

Order MONHYSTERIDA Lorenzen, 1981
Family XYALIDAE Chitwood, 1951
Genus *Paramphimonhystrella* gen. nov.
Paramphimonhystrella sinica sp. nov.
(Tables V, VI; Figures 6, 7)

Type material

Two males and two females collected from Stations 152194 and 12494 (Figure 1). Holotype: ♂1 (ZB0301100) slide number ZB030123413, Station 152194. Paratypes: one male (ZB0301101) ZB030115122, Station 12494 and two females (ZB0301102–03) ZB030115213, ZB030123413, Stations 12494 and 152194.

Table V. The modification of Filipjev’s standard formula of *Paramphimonhystrella sinica* sp. nov.

Holotype male 1:	–	182	M	792	1012 μm; a=31.6, b=5.6, c=4.6, Sc=26
	10	31	32	27	
Paratype female 1:	–	192	V	832	1114 μm; a=35.9, b=5.8, c=4.0, V=48%
	11	30	31	22	

Table VI. Measurements of *Paramphimonhystrella sinica* sp. nov. (in μm).

Characters	♂1	♂2	♀1	♀2
Total body length	1012	1012	1114	1142
Maximum body diameter	32	30	31	29
Head diameter	10	9	11	10
Buccal cavity length	22	16	19	13
Buccal cavity width	9	8	7	4
Cephalic setae	8	7	7	5
Amphid width	12	10	8	9
Amphid width/c.d.	0.63	0.56	0.4	0.64
Nerve ring from anterior	86	95	95	–
Nerve ring c.d.	27	28	29	–
Oesophagus length	182	180	192	132
Oesophagus c.d.	31	29	30	25
Anal diameter	27	22	22	27
Tail length	220	222	282	222
Tail length/a.b.d.	8.1	10	12.8	8.2
Spicule length as chord	26	34	–	–
Vulva from anterior	–	–	530	610
Vulva c.d.	–	–	30	26
V%	–	–	47.6	53.4
a	31.6	34.9	35.9	39.4
b	5.6	5.6	5.8	8.7
c	4.6	4.6	4.0	5.1

Type locality

Benthic in the Yellow Sea. Station 152194: 32°30.44'N, 125°28.21'E, 73 m, Md₀ 2.32, organic matter 1.05%; Station 12494: 33°59.76'N, 122°59.85'E, 68 m, Md₀ 7.54, organic matter 2.78%.

Etymology

This species is named for the type locality, the Yellow Sea of China.

Description

Body length 1012–1142 μm ; maximum body diameter 29–32 μm . Cuticle smooth. Head extended. Buccal cavity widely cylindrico-conical. Ten cephalic setae, 5–8 μm long. Two groups of ten cervical setae each, first group at the level of the amphids, about 8 μm long; the second circle about 16 μm behind amphids, 19 μm long. Amphids circular, diameter 8–12 μm , about 17 μm from the head end. Tail 220–282 μm long, conico-cylindrical. Conical part about third of tail length; anal diameter 22–27 μm . Three terminal caudal setae, about 16 μm long.

Male. Spicules 26–34 μm long, slender with blunt tip. Gubernaculum and precloacal supplement lacking.

Female. A single anterior ovary; vulva at about 48–53% of body length.

Diagnosis and discussion

Paramphimonhystrella sinica sp. nov. is characterized by the circular amphids, extended head, broad buccal cavity, and cylindrical part of tail longer than conical part. It differs

Figure 6. *Paramphimonhystrella sinica* sp. nov. (A) Lateral view of male head end, showing buccal cavity, amphids, and cervical setae; (B) lateral view of female body, showing position of vulva; (C) lateral view of male tail, showing spicule and terminal setae; (D) lateral view of female tail, showing caudal glands.

from *Paramphimonhystrella elegans* sp. nov. and *Paramphimonhystrella minor* sp. nov. by the structure of the head, the buccal cavity, the shape of amphids, and the proportion of cylindrical part of tail and conical part. In *P. elegans* sp. nov., the amphids are ovoid and the spicule has a hook at distal end, the cylindrical part of the tail is shorter than the conical part while in *P. minor* sp. nov. the body size is small, generally shorter than 800 µm, amphids are circular, but the head is not extended and the spicule has a sharp tip, not a hook at distal end, and cylindrical part of tail is about the same length as the conical part.

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Figure 7. *Paramphimonhystrella sinica* sp. nov. (A) Lateral view of male head end, showing buccal cavity, amphid, and cervical setae; (B) lateral view of male tail, showing spicule and terminal setae.

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