

A New Species of Free-living Nematode of *Daptonema* (Monohysterida: Xyalidae) from the Yellow Sea, China

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Abstract

A new species of free-living marine nematode, *Daptonema macrostoma* sp. nov. from the Yellow Sea, China is described. The new species is characterized by uniquely large buccal cavity, four cephalic setae, amphid circular, S-shaped spicules with a hook at its distal end, gubernaculum invisible and tail conical-cylindrical.

Keywords: Nematode taxonomy, *Daptonema macrostoma* sp. nov., Yellow Sea of China

1. Introduction

In order to study the biodiversity of free-living marine nematodes in the Yellow Sea, China, sediment samples were collected in many sites from the intertidal to the sublittoral region along the Yellow Sea in the past few years. More than 240 species have been identified from these habitats up to now (Huang *et al.*, 2006; Huang & Cheng, 2012). The present paper describes one new species from this region which belong to the genus *Daptonema* Cobb, 1920.

The genus *Daptonema* was established by Cobb in 1920 with the type species *D. fissidens* Cobb, 1920. This genus includes more than 120 species and presents particular difficulty for identification. Wieser (1956) considered *Daptonema* as one of five subgenera of *Theristus*. This subdivision was refuted again by Lorenzen (1977) in a review of the Xyalidae. *Daptonema* species are separated from those of *Theristus* only by the shape of the tail: conico-cylindrical with terminal setae in the former, conical without terminal setae in the latter. Within *Daptonema*, species are distinguished by rather few characters: mainly the relative length of the setae, size and position of the amphids, size and structure of the copulatory apparatus and the shape and length of the tail (Warwick *et al.*, 1998).

So far, more than 120 species of *Daptonema* have been recorded (Gerlach & Riemann, 1973; Tchesunov & Miljutin, 2006; Huang & Zhang, 2010; Electronic databases <http://nemys.ugent.be> and <http://insects.tamu.edu/research/collection/hallan/Nematoda>). The new species *D. macrostoma* sp. nov. differs from the other species in this genus by its uniquely large buccal cavity, four short cephalic setae and S-shaped spicules with a hook at its distal end.

2. Materials and Methods

In July 2008, undisturbed sediments were obtained from a grid of 33 sampling stations between 32°N and 38.83°N, 120.34°E and 124.167°E during the Open Research Cruise by R/V KE XUE SAN HAO in the Yellow Sea, China. Undisturbed sediment samples were taken using a 0.1m² improved Gray-O'Hara box, and a 8 cm depth of meiofauna samples were obtained using a sawn-off syringe with a 2.6 cm inner diameter. Samples were fixed with 5% formalin in filtered seawater. In the laboratory, samples were stained with 0.1% Bengal rose for about 24 hours. All the samples were washed to remove the formalin and sieved over two mesh sizes (500 µm and 42 µm) in order to separate the macrofauna (500 µm) from the meiofauna (42 µm). Heavier sediment particles were removed using centrifugation in Ludox-TM with a specific gravity adjusted to 1.15 (Jonge & Bouwman, 1977). Each sample was washed into a lined Petri dish and the meiofauna was sorted under a stereoscopic microscope up to higher taxonomic levels. Nematodes were transferred into a 9:1 (V : V) solution of 50% ethanol : glycerol in block cavity to slowly evaporate ethanol and then mounted in glycerol on permanent slides. The descriptions were made from glycerin mounts using interference contrast microscopy (Nikon, 80i). Drawings were made with a camera lucida. Type specimens have been deposited in the type collections of the Museum of Qingdao Institute of Oceanology, Chinese Academy of Sciences.

Measurements are in μm . Abbreviations are as follows:

de Man a: body length / max. body diameter; a.b.d.: anal body diameter; de Man b: body length / oesophagus length; de Man c: body length / tail length; c.b.d.: corresponding body diameter; h.d.: head diameter; Spic: spicule length along the arc; V: corresponding body diameter of vulva; V %: position of vulva from anterior end expressed as a percentage of total body length.

Order Monhysterida Filipjev, 1929

Family Xyalidae Chitwood, 1951

Genus *Daptonema* Cobb, 1920.

Daptonema macrostoma sp. nov.

2.1 Type Material

Four males and one female collected from Station 3400-0 and 3400-1.

Holotype: ♂1 on the slide 3400002; Allotype: ♀1 on the slide 3400002; Paratypes: three males on the slides 3400002 and 3400121.

2.2 Type Locality and Habitat

Subtidal muddy sediment in the Yellow Sea. Station 3400-0: 34° N, 120°36' E, water depth 40.5 m, water temperature at the sediment-water interface 11.6°C, salinity 33, silt 86%, clay 13%, sand 0.7%, organic matter 0.4%. Station 3400-1: 34°N, 120°48'E, water depth 48 m, water temperature at the sediment-water interface 11.2°C, salinity 33.2, silt 87%, clay 12%, sand 0.7%, organic matter 0.42%.

2.3 Etymology

This species name refers to its very large buccal cavity.

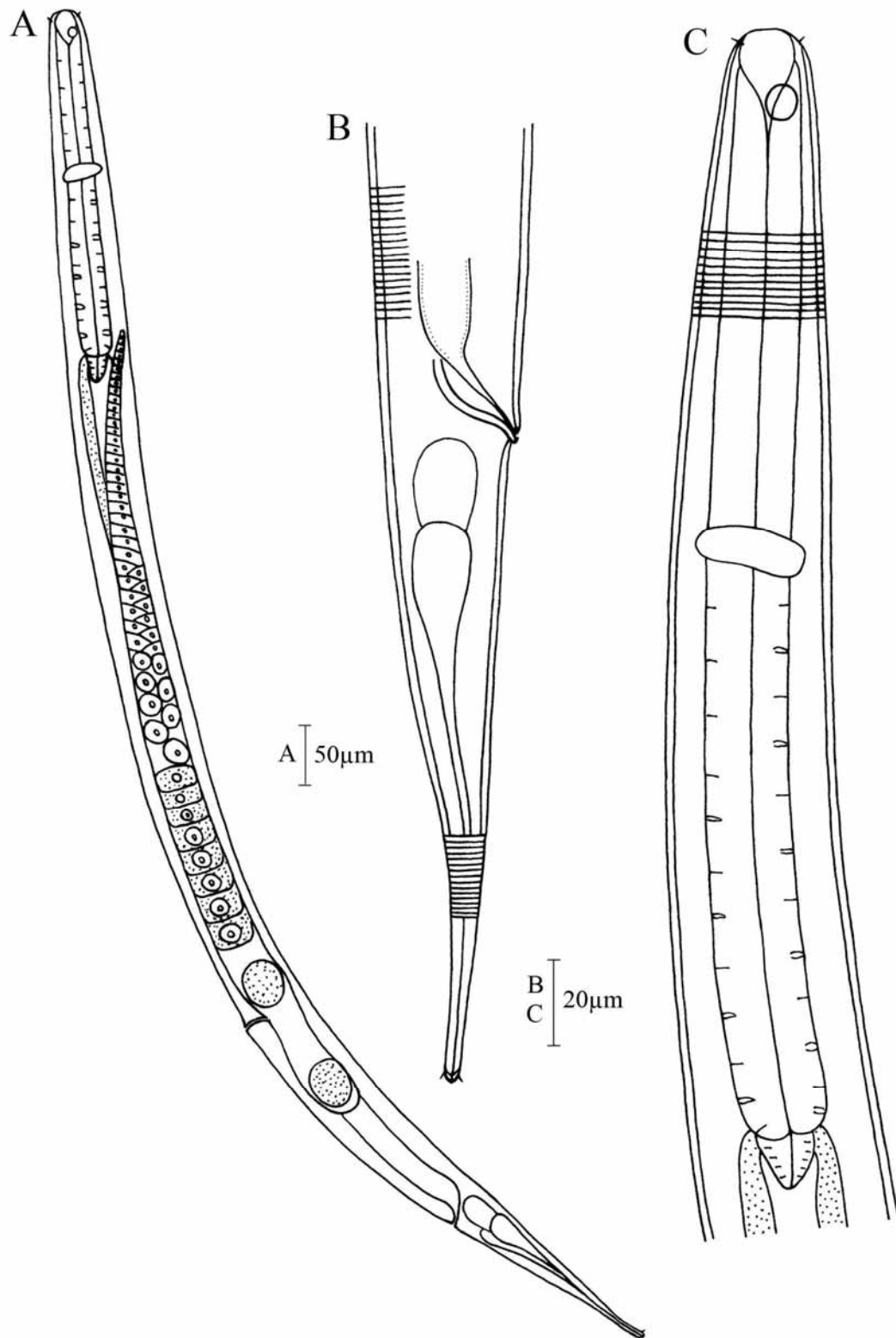


Figure 1. *Daptonema macrostoma* sp. nov. (A) lateral view of female body, showing reproductive system and vulva; (B) lateral view of male tail region, showing spicule and caudal glands; (C) lateral view of male anterior end, showing buccal cavity, cephalic setae, amphids, pharynx and cardia

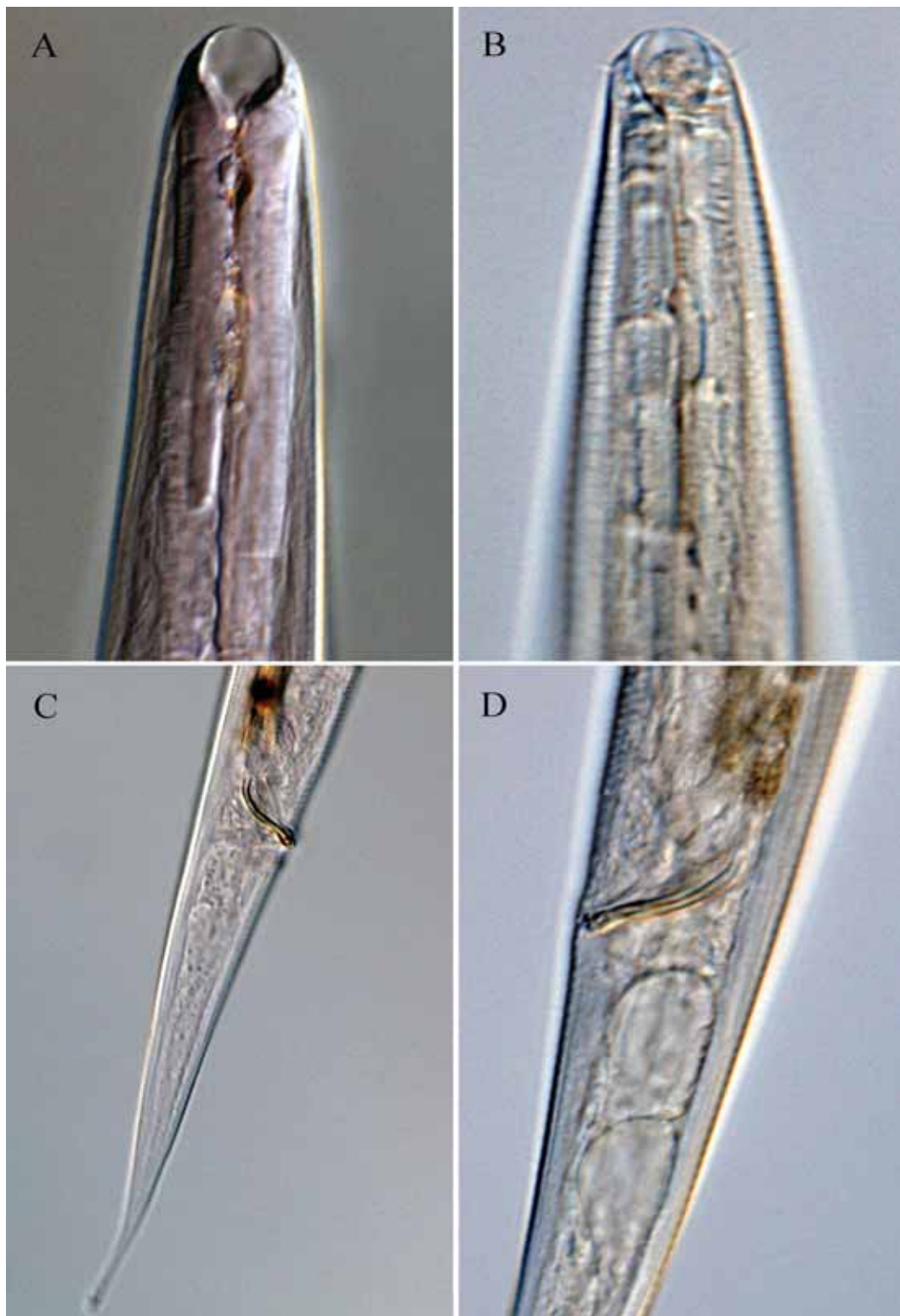


Figure 2. *Daptonema macrostoma* sp. nov. (A) lateral view of female anterior end, showing buccal cavity; (B) lateral view of male anterior end, showing buccal cavity and cephalic setae; (C) lateral view of male posterior end, showing spicule and tail; (D) lateral view of male cloaca region, showing spicule and caudal glands

3. Measurements

Table 1. Individual measurements (and average) of *Daptonema macrostoma* sp. nov. (μm)

Characters	♂1	♂2	♂3	♂4	♀1	Average
Total body length	1150	1151	1183	1078	1281	1169
Maximum body diameter	49	51	53	42	59	51
Head diameter	17	19	18	16	21	18
Width of mouth	15	14	14	13	16	14.4
Length of cephalic setae	3	3	3	3	4	3.2
Nerve ring from the anterior end	125	116	125	110	135	122
Nerve ring c.b.d.	39	40	44	35	49	41
Pharynx length	276	270	273	260	305	277
Pharynx c.b.d.	46	48	49	39	54	47
Spicule length as arc	28	30	30	30	-	29.5
a.b.d.	31	34	32	30	37	32.8
Tail length	164	163	176	160	176	167.8
Tail length / a.b.d.	5.3	4.8	5.5	5.3	4.8	5.1
Vulva from anterior end	-	-	-	-	877	877
Vulva c.d.	-	-	-	-	59	59
V%	-	-	-	-	69	69
a	23.5	22.6	22.3	25.7	21.7	23.2
b	4.2	4.3	4.3	4.1	4.2	4.2
c	7.0	7.1	6.7	6.7	7.3	7.0

Holotype ♂1: — 276 M 986
1150 μm; a=23.5, b=4.2, c=7.0, spic=28
17 46 49 31

Paratype ♀1: — 305 V 1105
1281 μm; a=21.7, b=4.2, c=7.3, V%=69%
21 54 59 37

4. Description

Males. Body slender, gradually tapering towards both extremities. Cuticle with coarse annulations, beginning at base of buccal cavity and ending at tail tip. Labial sensilla not visible. Four short cephalic setae in one circle, 3 μm long. Short somatic setae scattered over body. Buccal cavity very spacious, 15 μm wide, square-rounded, consists of hemispherical cheilostom and conical pharyngostom. Amphids circular, 8 μm in diameter (36% of corresponding body diameter wide), situated at a distance of 15 μm from the anterior end. Excretory pore not obvious. Pharynx cylindrical. Cardia long cordiform. Nerve ring at about 45% of pharyngeal length. Tail conico-cylindrical, 164 μm long (5.3 a.b.d.), tapering with

distal third cylindrical and three terminal setae. Three caudal glands with common opening.

Spicules S-shaped, 28 μm long as arc, slender and tapered with a hook distally. Gubernaculum invisible. No precloacal supplement.

Females. Females have most features in common with males, but are slightly larger. A single anterior outstretched ovary, about 570 μm long. Vulva at 69% of body length from the anterior end.

5. Differential Diagnosis

Daptonema macrostoma sp. nov. is characterized by great buccal cavity, four cephalic setae, S-shaped spicules with a hook at the distal end and gubernaculum invisible. This new species is close to *D. deconincki* Sharma, 1985 in the size and structure of the body. Nevertheless, the spicules of the latter species have bifid tips, 49 μm long, the gubernaculum surrounds the distal half of the spicules and with a dorsal apophysis. This new species also resembles *D. setosum* (Bütschli, 1874) Filipjev, 1930, which has a very big and broad gubernaculum and spicules L-shaped, distally bifurcate.

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References

- Cobb, N. A. (1920). *One hundred new nemas (Type species of 100 new genera)*. Waverly press, Baltimore.
- Gerlach, S. A., & Riemann, F. (1973). *The bremerhaven checklist of aquatic nematodes* (Part 2). Veröff. Inst. Meeresforsch. Bremerch.
- Higgins, R. P., & Thiel, H. (1988). *Introduction to the study of meiofauna*. Washington DC: Smithsonian Institution Press.
- Huang, Y., & Cheng, B. (2012). Three new free-living marine nematode species of the genus *Micoletskyia* from China Sea. *Journal of the Marine Biological Association UK*, 92(5), 941-945. <http://dx.doi.org/10.1017/S0025315411000476>
- Huang, Y., & Zhang, Z. N. (2010). Two new species of Xyalidae (Nematoda) from the Yellow Sea, China. *Journal of the Marine Biological Association UK*, 90, 391-397. <http://dx.doi.org/10.1017/S0025315409000794>
- Huang, Y., Zhang, Z. N., & Liu, X. S. (2006). Studies on the species composition and biodiversity of Free-living marine nematode in the Southern Yellow Sea, China. *Acta Oceanologica Sinica*, 25(2), 87-98.

Jonge, V. N., & Bouwman, L. A. (1977). A simple density separation technique for quantitative isolation of meiobenthos using the colloidal silica Ludox-TM. *Marine Biology*, 42, 143-148. <http://dx.doi.org/10.1007/BF00391564>

Lorenzen, S. (1977). Revision der Xyalidae (freilebende Nematoden) auf der Grundlage einer kritischen Analyse von 56 Arten aus Nord- und Ostsee. *Veröffentlichungen Instituts für Meeresforschung in Bremerhaven*, 16, 197-261.

Tchesunov, A. V., & Miljutin, D. M. (2006). Three new free-living nematode species (Monhysterida) from the Arctic abyss, with revision of the genus *leutherolaimus* Filipjev, 1922 (Linhomoeidae). *Russian Journal of Nematology*, 14(1), 57-75.

Warwick, R. M., Platt, H. M., & Somerfield, P. J. (1998). *Free-living marine nematodes part : Monhysterids*, (Synopses of the British Fauna No. 53), Field Studies council Shrewsbury.

Wieser, W. (1956). Free-living marine nematodes III. Axonolaimoidea and Monhysteroidea. *Lunds Universitets Arsskrift (N. F. 2)*, 52, 1-115.

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