

Daptonema parabreviseta sp. nov. (Xyalidae, Nematoda) from the Jiaozhou Bay of the Yellow Sea, China*

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Abstract A new species of free-living marine nematode of the genus *Daptonema* Cobb, 1920 is described from the sublittoral sediment of the Jiaozhou Bay, Qingdao. *Daptonema parabreviseta* sp. nov. is characterized by having narrowed anterior end; small funnel-shaped buccal cavity; short cephalic setae; spicules with bulbiform proximal end and pointed distal end; gubernaculum tubular shape with a blunt dorsal apophysis. The female genital system presents a spacious postvulval sac. The new species closely resembles *Daptonema brevisetosum* Thanh & Gagarin, 2009. However, it differs from *Daptonema brevisetosum* by having relatively narrowed head (10 μ m vs 20 μ m); spicules with bulbiform proximal end and pointed distal end, not bifurcated at distal end. Female genital system with a spacious postvulval sac (vs absent).

Keyword: new species; free-living marine nematode; taxonomy

1 INTRODUCTION

In order to assess the biodiversity of free-living nematodes in the Jiaozhou Bay of the Yellow Sea, sediment samples were collected at a number of sites from the intertidal to sublittoral regions in the past two years. To date, 198 species of free-living nematodes have been found in this sea area. *Daptonema* is a common and abundant nematode genus in the Jiaozhou Bay. Twelve species of *Daptonema* were discovered and one of them was regarded as new to science. These species are *Daptonema amphorum* Leduc 2015; *Daptonema divertens* Boucher & Helléouet 1977; *Daptonema exutum* (Wieser, 1956); *Daptonema flagellicauda* Lorenzen, 1973; *Daptonema karabugasensis* Tchesunov, 1980; *Daptonema nanum* Lorenzen, 1972; *Daptonema normandicum* de Man, 1890; *Daptonema oxycerca* (de Man, 1888); *Daptonema proprium* (Lorenzen, 1972); *Daptonema spirum* (Gerlach, 1959); *Daptonema xyaliforme* (Wieser and Hopper, 1967) and *Daptonema parabreviseta* sp. nov.

The genus *Daptonema* was established by Cobb in 1920 based on the type species *Daptonema fissidens* Cobb, 1920. It is a dominating and large genus in a

variety of habitats. Currently, 177 species are recorded in this genus around the world (Guilini et al., 2018). However, only 95 species were identified as valid species after a lot of revisions by a number of nematologists (Lorenzen, 1977; Venekey et al., 2014; Leduc, 2015; Guilini et al., 2018). Other species were transferred to other genera, taxon inquirendum and synonyms cases. *Daptonema longiapophysis* Huang & Zhang, (2010) was the first recorded in the Yellow Sea. *Daptonema* species are separated from those of the most similar genus *Theristus* only by the shape of the tail. *Daptonema* species having conico-cylindrical tail with terminal setae, and *Theristus* species having conical tail without terminal setae. Within *Daptonema*, species present particular difficulty for identification and distinguished by rather few characters: mainly the relative length of the setae, size and position of the amphideal fovea, size and structure of the copulatory apparatus and the shape and length of the tail (Warwick et al., 1998, Lorenzen, 1977).

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Table 1 Individual measurements of *Daptonema parabreviseta* sp. nov. (in μm except a, b, c, c' and V%)

Character	Holotype			Paratype		
	♂1	♂2	♂3	♂4	♀1	♀2
Total body length (L)	864	816	871	847	920	1064
Maximum body diameter (M)	43	45	46	42	53	57
Head diameter	8.8	9.6	8	8.2	8.3	9.6
Length of cephalic setae	2	2.5	2.4	2.8	2	2
Diameter of amphids	3.3	3.5	4.1	4	3	2
Pharynx length	118	109	118	113	128	153
cbd at base of pharynx	37.9	41.6	39	37	47.9	48.5
Spic	41	41.9	39.5	42.5	-	-
Tail length	129	135	133	135	144	150
abd	34.8	35.3	35	36.6	38.2	38.3
c'	3.7	3.8	3.8	3.7	3.8	3.9
V	-	-	-	-	544	674
cbd at vulva	-	-	-	-	52.4	56.5
V%	-	-	-	-	59.2	63.4
a	20.1	18.1	18.9	20.2	17.4	18.7
b	7.3	7.5	7.4	7.5	7.2	7.0
c	6.7	6.0	6.5	6.3	6.4	7.1

Abbreviations see Section 2.

2 METHOD

Undisturbed sediment samples were taken using a 0.1m² improved Gray-O'Hara box corer in July 2016 from Jiaozhou Bay. Sampling, sorting and slide mounting followed those described in Gao and Huang (2017); Huang et al. (2017). Description and measurements were made from glycerin mounts using a differential interference contrast microscope (Olympus BX53). Line drawings were made with the aid of a drawing tube coupled to the microscope. All measurements are given using Olympus software of cellSens Standard 1.12, and all curved structures were measured along the arc. Type specimens were deposited in the Marine Biological Museum of Chinese Academy of Sciences, Qingdao, China.

Abbreviations used in the figures and table (Figs. 1–2, Table 1) are as follows: a: body length / max. body diameter; abd: body diameter at the cloaca (male) or anus (female); b: body length / pharynx length; c: body length / tail length; cbd: corresponding body diameter; c': tail length / abd; hd: head diameter; spic: spicule length along arc; V: corresponding body diameter of vulva; V%: position of vulva from anterior end expressed as a percentage of total body length.

3 SPECIES DESCRIPTION

Order Monhysterida Filipjev, 1929
 Family Xyalidae Chitwood, 1951
 Genus *Daptonema* Cobb, 1920.
Daptonema parabreviseta sp. nov.

3.1 Type material

Four males and two females were obtained from the Jiaozhou Bay. Holotype, ♂1 on slide number JZW 11-4. Paratypes: ♂2 on slide number JZW 11-4, ♂3, ♂4, ♀1, ♀2 on the slide number JZW11-3, respectively.

3.2 Type locality and habitat

Specimens were collected from the surface 0–2 cm sublittoral silt sediment in the Jiaozhou Bay (JZW-11: 36°10'16"N; 120°16'51"E). Water depth of 5.5 m.

3.3 Etymology

The species is closely resembled to known species *Daptonema brevisetosum* Thanh & Gagarin, 2009.

3.4 Measurement

All measurement data are given in Table 1.

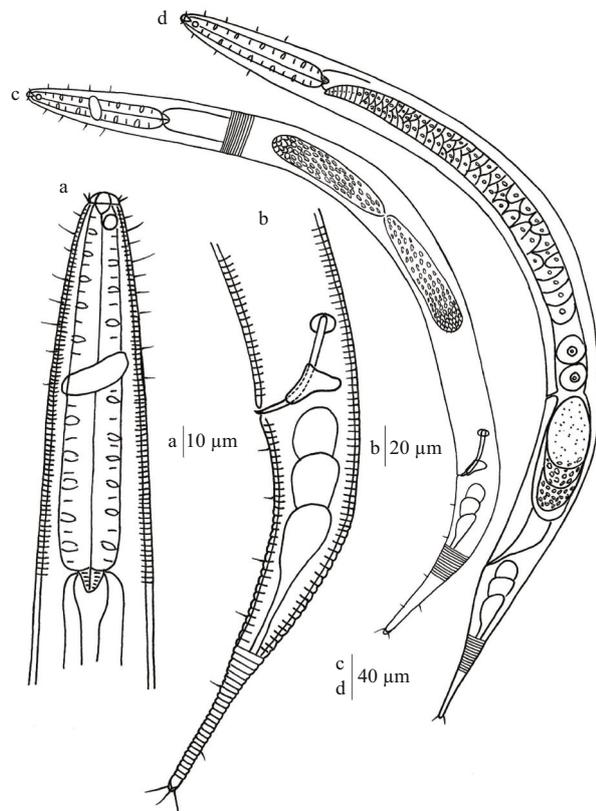


Fig.1 *Daptonema parabreviseta* sp. nov.

a. lateral view of male anterior end; b. lateral view of male posterior end; c. entire view of male body; d. entire view of female body.

3.5 Description

Males. Body slender. Anterior end narrowed. Cuticle transversely striated. Somatic setae short, rare, mainly in longitudinal rows at cervical and tail region. Head rounded, with six spherical lips. Labial region isolated from the rest of body. Inner labial sensillae not observed. Outer labial sensillae setiform. Six outer labial setae and four cephalic setae united in almost one circle. Length of outer labial setae 2 µm or 23% of head diameter. Length of cephalic setae 2.5 µm or 28% of head diameter. Amphidial fovea circular, 3.3 µm in diameter, and occupying 20% of corresponding body diameter. Amphidial fovea situated at a distance of one head diameter from the anterior end. Buccal cavity small, funnel-shaped. Cervical setae present, 3–4 µm long. Pharynx cylindrical, slightly broadening towards the base. Cardia well developed, conical, surrounded with intestinal tissue. Ventral gland and excretory pore not observed. Nerve ring at the middle of pharyngeal length. Testes paired, opposed. Anterior one positioned on the left side of intestine, posterior one

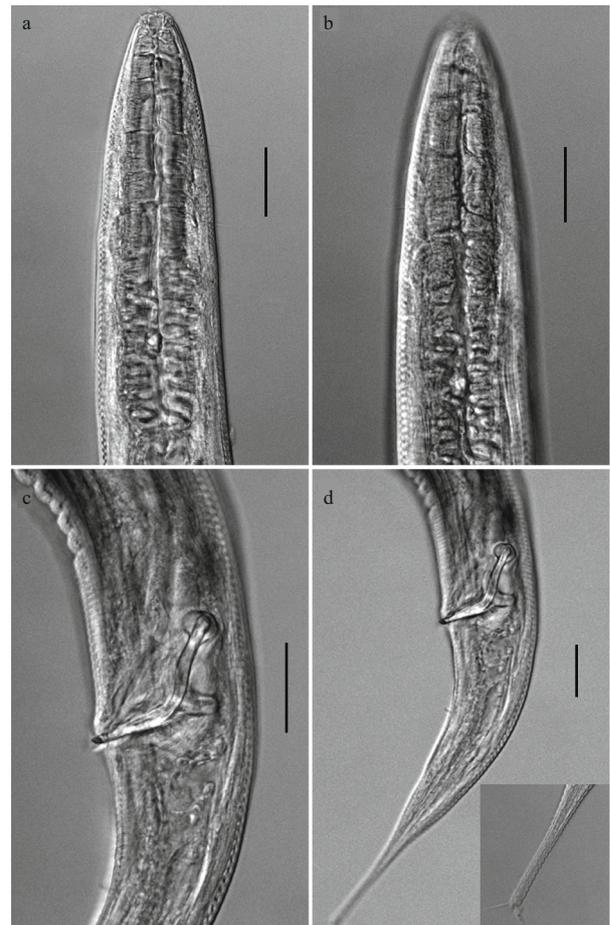


Fig.2 *Daptonema parabreviseta* sp. nov.

a. lateral view of male anterior end, showing buccal cavity, cephalic setae and pharynx; b. lateral view of male anterior end, showing amphidial fovea; c. lateral view of male cloacal region, showing spicules and gubernacular apophysis; d. lateral view of male tail end. (Scale bar: 20 µm).

positioned on the right side of intestine. Spicules arcuate, 1.2 abd long, conspicuously bulbiform at the proximal end and pointed at the distal end. Gubernaculum 0.5 times cloaca diameters long, surrounding the spicula like a oversleeve, and bearing a prominent blunt dorsal apophysis.

Tail conico-cylindrical with last one third cylindrical, 3.7 cloacal body diameters long, with subventral rows of short setae. Three terminal setae 9–11 µm long. Three caudal glands and spinneret well developed.

Females. Body rather thicker than males. Amphidial fovea slightly smaller than in males. Tail without subventral rows of setae. Gonad single, anterior, outstretched, reaching almost to the base of the pharynx. Postvulval sac present and spacious with eggs. Vulva situated posterior to midbody; its lips not cuticularized and not protruded.

3.6 Differential diagnosis and discussion

Daptonema parabreviseta sp. nov. is characterized by having narrowed anterior end; small funnel-shaped buccal cavity; short cephalic setae; spicules with bulbiform proximal end and pointed distal end; gubernaculum tubular shape with a blunt, dorsal apophysis. Its female genital system with a spacious postvulval sac. The new species closely resembles *Daptonema brevisetosum* Thanh and Gagarin (2009) and *Daptonema normandicum* (de Man, 1890), but differs from *Daptonema brevisetosum* by having relatively narrowed head (10 μm vs 20 μm), spicules with bulbiform proximal end and pointed distal end (vs cephaloid proximal end and bifurcated distal end). Female genital system with a spacious postvulval sac (vs absent). The new species differs from *Daptonema normandicum* by having shorter cephalic setae (0.2 hd vs 0.6–0.7 hd), shorter somatic setae (4 μm vs 10 μm), shorter pharynx ($b=7.4$ vs $b=5\text{--}6.5$ μm), smaller amphidial fovea (0.2 c.b.d. vs 0.3–0.4 c.b.d.), spicules with bulbiform proximal end and pointed distal end (vs bifurcated at distal end). Nevertheless, *Daptonema normandicum* is a species of worldwide distribution. From 1933 to 1967, many authors successively described the species *Daptonema normandicum* (*Monhystera normandica*, *Theristus normandicus*) from different area, (e.g. Allgén, 1933 from Norway; De Coninck and Schuurmans Stekhoven, 1933 from Belgium; Schuurmans Stekhoven, 1950 from Black Sea; Gerlach, 1951 from Kieler Bay of Germany; Timm, 1952 from Maryland, 1963 from Arabian Sea; Wieser and Hopper, 1967 from Florida). Their cephalic setae, cervical setae, amphideal fovea, spicules and so on of these different specimens have greater variation in the value. The body size of these specimens varies from 960 μm to 1 700 μm ; the length of cephalic setae varies from 0.7 to 0.9 head diameter; cervical setae vary from lack to 1.5 corresponding body diameter long; spicules vary from 34 μm to 51 μm long (i.e. 0.9–1.2 abd). However, their common characters are head with twelve relatively longer setiform sensilla, spicules arcuate with strongly knobbed proximally, gubernaculum with a small terminal apophysis, not dorsal apophysis. The main differences between the new species and *Daptonema normandicum* described by above authors are in the new species having ten relatively shorter setiform sensilla, spicules with conspicuously bulbiform proximally. Gubernaculum surrounding the spicula like an oversleeve, and bearing a prominent blunt

dorsal apophysis.

Moreover, by having similar shape of spicules, the new species resembles *Daptonema setyhiolocella* Aryuthaka & Kito, 2012. However, the latter having well developed epidermal chords consisting of large cells with transparent appearance (bridge-like structures); abundant cervical setae (15 μm long), somatic setae short (8 μm long) and sparse except in pharyngeal region, small and anteriorly located circular amphids (13%–19% of cbd); spicules well cuticularized, strongly curved at middle portion (L-shaped), distal end not furcate, 1.2/1.1 (1.0–1.2; 1.1 ± 0.04) abd long on arc; gubernaculum with small, rounded dorsal apophysis and short lateral piece and conico-cylindroid tail with 4 long terminal setae.

4 DATA AVAILABILITY STATEMENT

The authors declare that the data supporting the findings of this study are available within the article. The data will be available on request from the corresponding author.

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