

## Two new species of the genus *Wieseria* (Nematoda: Enoplida: Oxystominidae) from the Jiaozhou Bay

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Received 5 July 2017; accepted 22 December 2017

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### Abstract

Two new species of free-living marine nematodes of the genus *Wieseria* are described from the sublittoral sediment of the Jiaozhou Bay in Qingdao. *Wieseria sinica* sp. nov. is characterized by having short labial and cephalic setae in a backward direction; oblong amphidial foveas with double contour; arcuate spicules with alea; ring-like gubernaculum; and clavated tail. *Wieseria tenuisa* sp. nov. is characterized by its very large “a” value (133.6), long labial setae in a forward direction; spicules with alea and hooked proximal end; rodlike gubernaculum; and relatively longer clavated tail (7.9 a.b.d. long). It differs from *Wieseria sinica* sp. nov. mainly by the longer labial setae, slightly straight spicules with hooked proximal end, and its thinner body. Amended dichotomous key to male species of *Wieseria* is provided.

**Key words:** *Wieseria sinica* sp. nov., *Wieseria tenuisa* sp. nov., free-living marine nematode, taxonomy

**Citation:** Huang Mian, Sun Jing, Huang Yong. 2018. Two new species of the genus *Wieseria* (Nematoda: Enoplida: Oxystominidae) from the Jiaozhou Bay. Acta Oceanologica Sinica, 37(10): 157–160, doi: 10.1007/s13131-018-1319-9

### 1 Introduction

The genus *Wieseria* was established by Gerlach (1956). It is characterized by having setiform inner and outer labial sensilla; four cephalic setae; buccal cavity minute or absent; amphidial fovea in various shapes mainly with double contour, situated at the same level of or posterior to cephalic setae; a preloacal supplementary seta present; and conico-cylindrical tail with a swollen, pointed or bifurcate tip (Smol et al., 2014; Yu and Xu, 2017). To date, ten nominal species have been described under *Wieseria* (Yu and Xu, 2017; Campinas Bezerra et al., 2017). However, four species which described from females only were deemed to invalid species (Campinas Bezerra et al., 2017), and they are: *Wieseria inaequalis* Gerlach, 1956; *W. longicaudata* Timm, 1961; *W. longiseta* (Allgén, 1947) and *W. pica* Gerlach, 1956. Six species may be accepted as valid for the genus.

During an investigation of the biodiversity of free-living nematodes in the Jiaozhou Bay in 2016, two unrecorded species of *Wieseria* Gerlach, 1956 were found from subtidal sediment and are described as *Wieseria sinica* sp. nov. and *Wieseria tenuisa* sp. nov., respectively.

### 2 Materials and methods

In July 2016, undisturbed sediments were obtained using a 0.1 m<sup>2</sup> Gray-O'Hara box from a grid of sampling stations in the Jiaozhou Bay. The separate sampling was performed using a sawn-off syringe with a 2.6 cm inner diameter. In a Gray-O'Hara box, the syringe was pushed into the sediment down to 8 cm depth and samples were divided into 0–2 cm and 2–8 cm fractions, and then fixed with equivalent 10% formalin in seawater for long term preservation. In the laboratory, samples were stained with 0.1% rose Bengal for 24 h (Higgins and Thiel, 1988). The

stained samples were washed with tap water to remove residual formalin and then sieved over two mesh sizes (500 and 42 μm) to separate macrofauna (500 μm) from meiofauna (42 μm). Heavier sediment particles were removed using centrifugation in Ludox™ (50% colloidal silica, suspension in water; product of Sigma Aldrich Co., USA) with a specific gravity adjusted to 1.15 g/mL (Jonge and Bouwman, 1977). Nematodes were transferred into 10 mL of a 9:1 (v/v) solution of 50% ethanol : pure glycerin in a cavity block. After ethanol and water were slowly evaporated, the specimens were mounted in glycerin on permanent slides (McIntyre and Warwick, 1984). The descriptions were made from glycerin mounts using a differential interference contrast microscope (Olympus BX53). Line drawings were made with the aid of a camera lucida. All measurements are given using Olympus software of cellSens Standard 1.12, and all curved structures were measured along the arc. Type specimens have been deposited in the Marine Biological Museum of Chinese Academy of Sciences, Qingdao, China.

### 3 Description of *Wieseria sinica* sp. nov. (Figs 1a, b and Fig. 2)

Class Adenophorea Chitwood, 1950  
Order Enoplida Filipjev, 1929  
Family Oxystominidae Chitwood, 1935  
Genus *Wieseria* Gerlach, 1956

#### 3.1 Type material

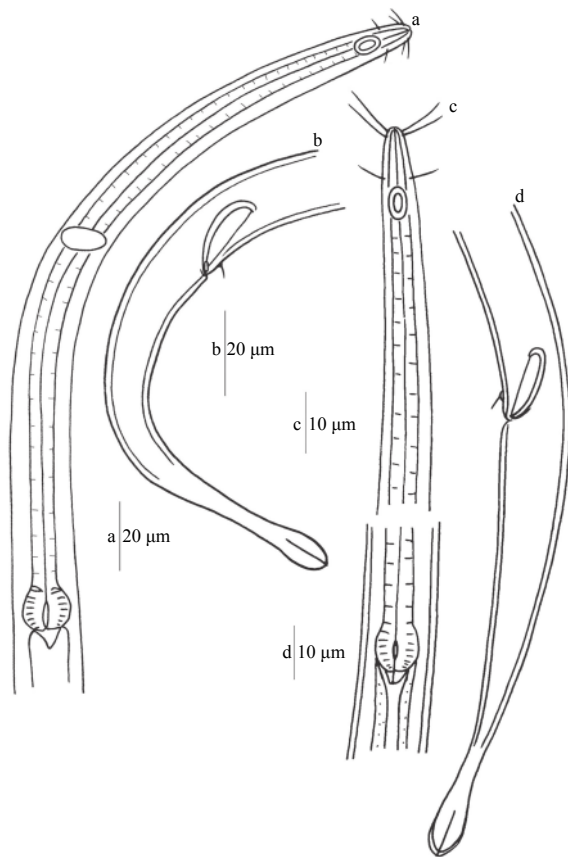
Only one male was obtained and measured. Holotype male on slide JZW11-12-7.

#### 3.2 Type locality and habitat

Subtidal sediment in the Jiaozhou Bay. Station JZW11:

Foundation item: The Natural Science Foundation of Shandong Province under contract No. ZR2014BM008; the National Natural Science Foundation of China under contract No. 41676146.

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**Fig. 1.** *Wieseria sinica* sp. nov. (a, b) and *Wieseria tenuisa* sp. nov. (c, d). a. Lateral view of male anterior end; b. lateral view of male tail end, showing spicules, gubernaculum and precloacal seta; c. lateral view of male anterior end and pharyngeal base; and d. lateral view of male tail end, showing spicules, gubernaculum and precloacal seta.

36°10.7'N, 120°16.2'E, water depth 5.5 m, silt sediment. Specimens present in samples of substrate sediment to a depth of 2–8 cm.

### 3.3 Etymology

The new species name refers to the country China, where the species was discovered.

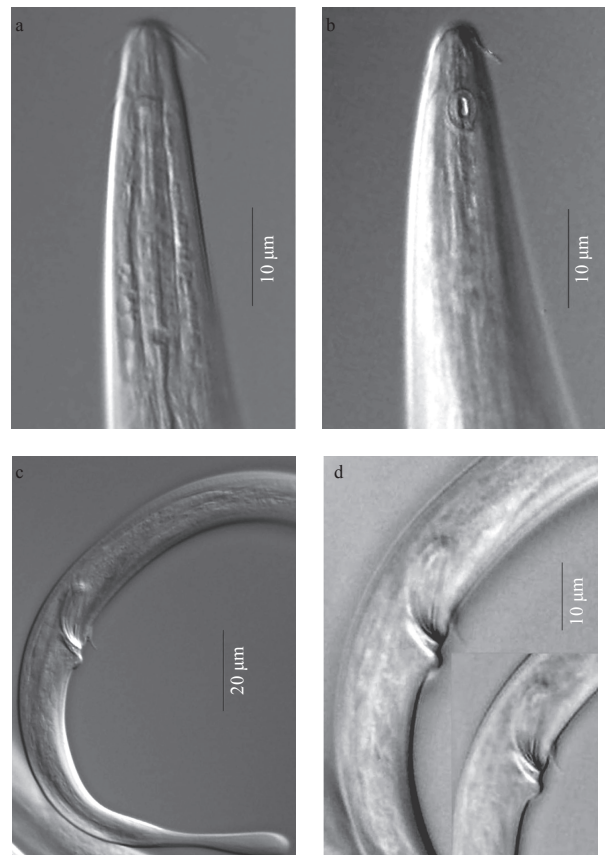
### 3.4 Measurements

$$\text{Holotype male: } \frac{-}{5} \frac{252}{19} \frac{M}{20} \frac{2\ 296}{14} \ 2\ 398 \ \mu\text{m}; \ a=119.9, \\ b=9.6, \ c=23.5, \ \text{Spic}=19,$$

where  $a$  is the ration of body length to maximum body diameter;  $b$  is the ration of body length to pharynx length;  $c$  is the ration of body length to tail length;  $M$  is the maximum body diameter; and  $\text{Spic}$  is the spicule length along arc.

### 3.5 Description

Body slender, nearly cylindrical, with two terminals narrower than body trunk, 2 398  $\mu\text{m}$  long, 20  $\mu\text{m}$  wide in the middle of body. Cuticle smooth. A circle of six inner labial setae close to a circle of six outer labial setae. Inner labial setae 6.5  $\mu\text{m}$  long, situated about 2  $\mu\text{m}$  from the anterior end. Outer labial setae 4  $\mu\text{m}$  long. Four cephalic setae 3.5  $\mu\text{m}$  long, situated about 8  $\mu\text{m}$  posterior to head end. These setae all in a backward direction. Amphidial fovea oblong with double contour, 6  $\mu\text{m}$  long and 4  $\mu\text{m}$



**Fig. 2.** *Wieseria sinica* sp. nov.. a. Male head end, showing labial seta; b. lateral view of male anterior end, showing labial seta and amphidial fovea; c. male tail end; and d. lateral view of male cloacal region, showing spicules, gubernaculum and precloacal seta.

wide, 9  $\mu\text{m}$  from anterior end. Buccal cavity minute, slit-like. Pharynx 252  $\mu\text{m}$ , cylindrical with a terminal bulb. Cardia conical and surrounded by intestine tissue. Nerve ring located in the middle of pharynx length from anterior end. Excretory pore not observed.

Two opposed testes, outstretched, anterior branch on the left of intestine and posterior branch on the right. Spicules arcuate and cuticularized with alae, blunt in the proximal end and pointed in the distal end, 1.4 a.b.d. long. Gubernaculum ring-like appearance in lateral view. A midventral precloacal setae about 4  $\mu\text{m}$  long, positioned 4  $\mu\text{m}$  anterior to the cloacal opening. Clavated tail with a swollen tail tip, 7.3 a.b.d. long. No caudal and terminal seta.

## 4 Description of *Wieseria tenuisa* sp. nov. (Figs 1c, d and Fig. 3)

### 4.1 Type material

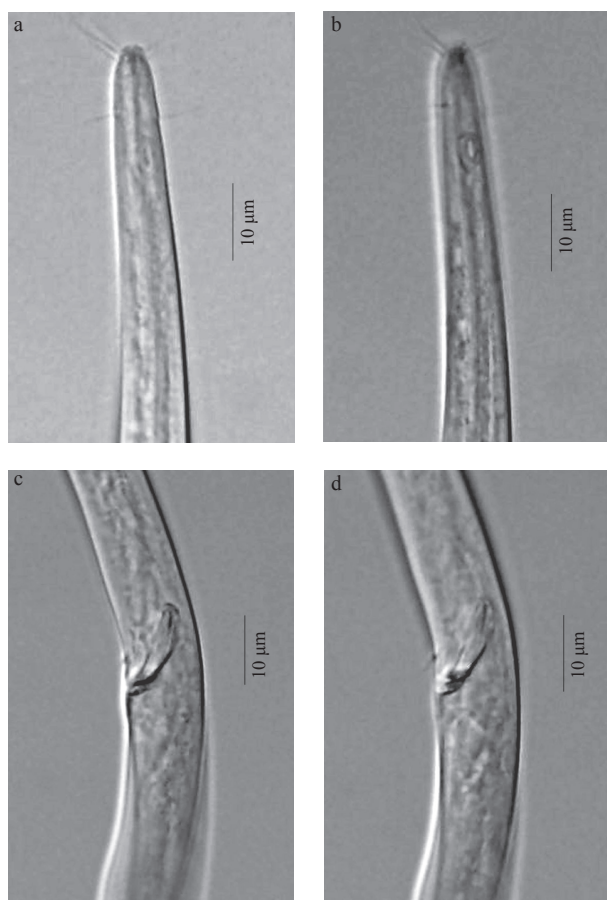
Only one male was discovered and measured. Holotype male on slide JZW16-51-5.

### 4.2 Type locality and habitat

Subtidal sediment in the Jiaozhou Bay. Station JZW16: 36°06'N, 120°15.3'E, water depth 22.5 m, muddy sediment. Specimens present in samples of surface layer sediment to a depth of 0–2 cm.

### 4.3 Etymology

The new species is named after a main feature of the species,



**Fig. 3.** *Wieseria tenuisa* sp. nov.. a. Lateral view of male anterior end, showing labial and cephalic setae; b. lateral view of male anterior end, showing labial seta and amphidial fovea; c. lateral view of male cloacal region, showing spicules; and d. lateral view of male cloacal region, showing spicules and preloacal seta.

viz., its thin body.

**4.4 Measurements**

Holotype male:  $\frac{-240}{3.5} \frac{M}{14} \frac{1783}{14} \frac{1870}{11} \mu\text{m}; a=133.6,$   
 $b=15.6, c=21.5, \text{Spic}=14.$

**4.5 Description**

Body very slender, with two terminals narrower than body trunk, 1 870 µm long, 14 µm wide in the middle of body. Cuticle smooth. A circle of six inner labial setae close to a circle of six outer labial setae, 6.5–7 µm long. Four cephalic setae 4 µm long, situated about 6 µm posterior to anterior end. These setae all in a forward direction. Amphidial fovea oblong with double contour, 5 µm long and 3.5 µm wide, 8 µm from anterior end. Buccal cavity absent. Pharynx 240 µm, cylindrical with a terminal bulb. Cardia conical and surrounded by intestine tissue. Nerve ring located in the middle of pharynx length from anterior end. Excretory pore not observed.

Two opposed testes, outstretched, anterior branch on the left of intestine and posterior branch on the right. Spicules slightly straight, with alae and hooked proximal end, about 1.3 a.b.d. long. Gubernaculum 4 µm long, rodlike, without apophysis. A midventral preloacal setae about 3 µm long, positioned 3 µm

anterior to the cloacal opening. Tail clavate with a swollen tail tip, 7.9 a.b.d. long, without terminal seta.

**5 Discussion**

Recently, Yu and Xu (2017) reviewed the genus *Wieseria* and separated ten species into three main groups, based mainly on the shape of tail tip. Group I is characterized by tail with a swollen tip; Group II is characterized by tail with a pointed tip; and Group III is characterized by tail with a bifurcate tip. Both *Wieseria sinica* sp. nov. and *Wieseria tenuisa* sp. nov. belong to Group I with a swollen tail tip. *Wieseria sinica* sp. nov. is characterized by having short labial and cephalic setae in a backward direction; oblong amphidial fovea with double contour; arcuate spicules with alae; ring-like gubernaculum; and clavated tail 7.3 a.b.d. long. It differs from the most similar species *W. minor* Yu and Xu, 2017 by its much longer body (2 398 µm vs. 1 045 µm) and the presence of spicules alae (vs. absent). Moreover, it differs from *W. glandulosa* (Kreis, 1929) Gerlach, 1956 by the presence of four cephalic setae (vs. absent); and from *W. clavata* Gerlach, 1956 by the position of cephalic setae (anterior to amphids vs. at the central level of the amphidial fovea) and the length of amphidial fovea (6 µm vs. 14 µm). *Wieseria sinica* sp. nov. differs from *W. tenuisa* sp. nov. by its larger body size (2 398 µm vs. 1 870 µm long); shorter outer labial setae (4 µm, in a backward direction vs. 7 µm, in a forward direction); arcuate spicules without hooked proximal end (vs. with hooked proximal end); and ring-like gubernaculum (vs. rodlike gubernaculum).

*Wieseria tenuisa* sp. nov. can be identified by its relatively long labial setae; oblong amphidial fovea with double contour; and spicules with hooked proximal end and alae. It differs from the similar species *W. minor* Yu and Xu, 2017 by its longer labial setae (7 µm vs. 3 µm), the presence of spicules alae (vs. absence), rodlike gubernaculum (vs. cuneate), much thinner body ( $a=133.6$  vs.  $a=80.4$ ), and longer tail (7.9 a.b.d. vs. 5.7 a.b.d.).

Amended dichotomous key to males of species of *Wieseria* (based on Smol et al. (2014); Yu and Xu (2017)):

1. Tail tip swollen or clavate.....2
  - Tail tip pointed or bifurcate.....6
2. Cephalic setae absent.....
  - .....*W. glandulosa* (Kreis, 1929) Gerlach, 1956
  - Cephalic setae present.....3
3. Cephalic setae at the central level of amphids.....
  - .....*W. clavata* Gerlach, 1956
  - Cephalic setae anterior to amphids.....4
4. Spicules without ventral alae.....*W. minor* Yu and Xu, 2017
  - Spicules with ventral alae.....5
5. Labial setae longer than 2 h.d., spicule with hooked proximal end.....*W. tenuisa* sp. nov.
  - Labial setae shorter than 2 h.d., spicule proximal end not hooked.....*W. sinica* sp. nov.
6. Tail tip pointed, body length < 1 mm...*W. Leptura* Vitiello, 1972
  - Tail tip bifurcate.....7
7. Gubernaculum present.....*W. scotlandica* Zhang, 1983
  - Gubernaculum absent.....*W. hispida* Vitiello, 1972

**Acknowledgements**

The authors are very grateful to Wang Chunming for his kind help in collecting samples and to Gao Qun for her slide making.

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