

# THREE NEW SPECIES OF FREE-LIVING MARINE NEMATODES FROM A SUBLITTORAL STATION IN FIREMORE BAY, SCOTLAND

by

Zhang Zhinan

Shandong College of Oceanography, Qingdao, China

## Résumé

Trois nouvelles espèces de Nématodes marins libres sont décrites des sables sublittoraux de la baie de Firemore (côte Ouest de l'Écosse). *Coninckia macrospirifera* n. sp. est proche de *Coninckia seta* (Wieser et Hopper 1967) mais elle diffère de celle-ci par les soies céphaliques plus courtes, la forme des amphides et du gubernaculum et la présence des soies caudales subventrales. *Pterygonema platti* n. sp. est proche de *Pterygonema cambriensis* Ward 1973 mais elle s'en distingue par le nombre des anneaux cuticulaires et la présence des soies caudales. *Wieseria scotlandica* n. sp. est proche de *Wieseria hispita* Vitiello 1972 mais elle s'en écarte par un corps plus élancé, la présence du gubernaculum, la longueur et la forme des spicules. Des clefs d'identification pour *Coninckia* et *Wieseria* sont données. Les genres *Coninckia* et *Wieseria* sont signalés pour la première fois en Grande-Bretagne.

## Introduction

A detailed investigation of the taxonomy and ecology of the nematode fauna of a sublittoral station in Firemore Bay, Loch Ewe (West coast of Scotland) has been in progress since June 1980. Steele and Baird (1968), McIntyre and Eleftheriou (1968) and McIntyre and Murison (1973) have given detailed descriptions of the Bay and its fauna. The sediment at this 3m deep station is well-sorted sand; median grain size 190-200 $\mu$ m. Descriptions of other new nematode species were given earlier (Platt and Zhang, in press). Ecological results from this study will be published in the future.

The descriptions are based on glycerine mounts. All drawings were made as previously described (Platt and Zhang, in press). The formulae used for the dimensions were as described by Platt (1973). The abbreviations 'S' and 'V' are the spicule length and the relative position of the vulva, respectively. The abbreviations 'h.d.', 'a.b.d.' and 'c.d.' are the head diameter, anal (or cloacal) body diameter and corresponding body diameter respectively. R<sub>1</sub>, R<sub>2</sub> and R<sub>3</sub> refer to the first, second and third circle of head sensilla. Type material has been deposited at British Museum (Natural History). The classification follows that given by Gerlach and Riemann (1973).

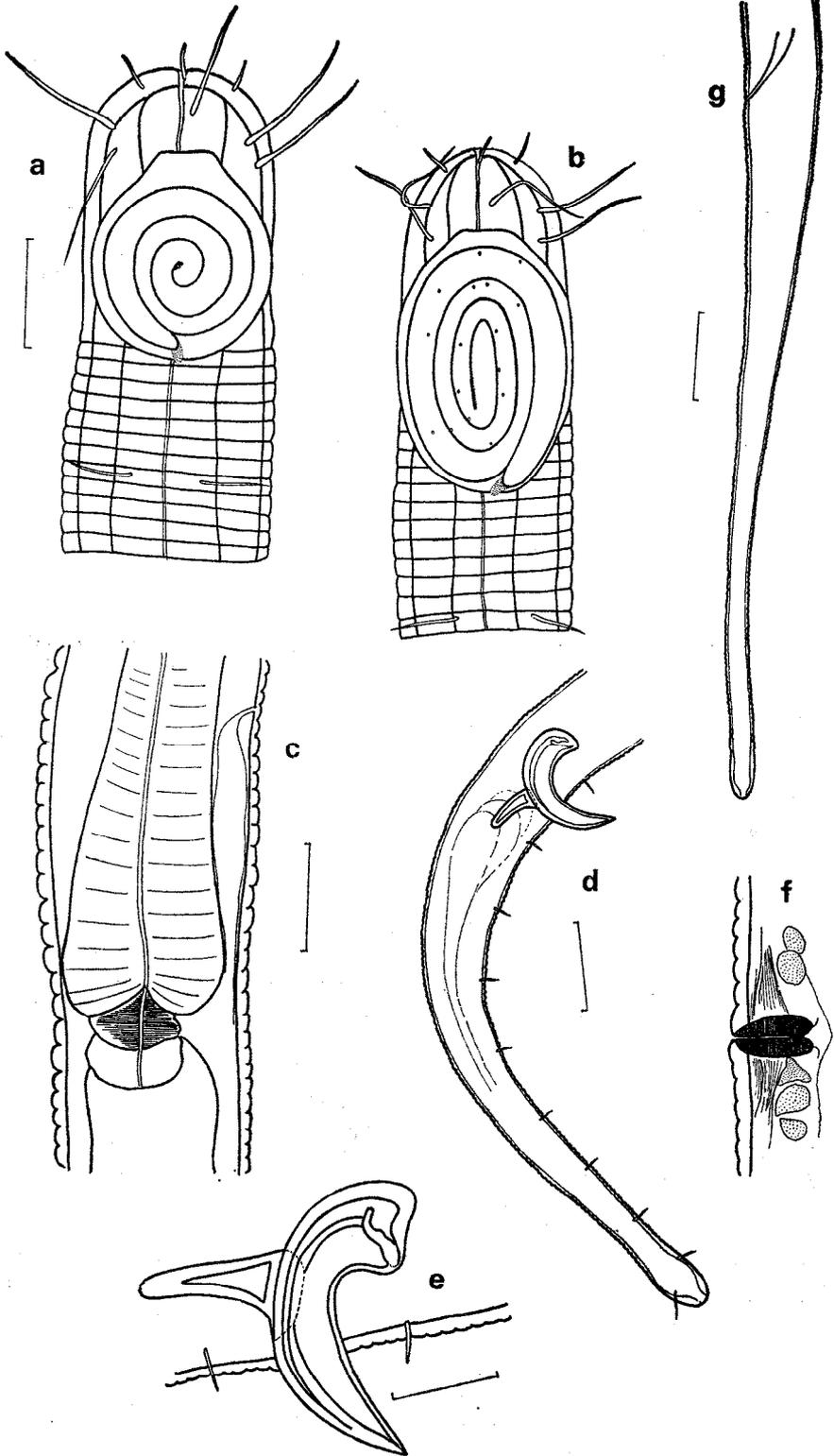


FIG. 1

## Family CONINCKIIDAE

**CONINCKIA MACROSPIRIFERA** sp. nov.

(Fig. 1)

## Material studied

Syntypes: 1 ♂ and 1 ♀, B.M. Reg. Nos. 1981.10.82.

## Body formulae and ratios

♂:	—	187	M	1608	1 750 $\mu$ m; a = 76; b = 9.4; c = 12.3;
	17	19	23	21	S = 24 $\mu$ m
♀:	—	170	M	1674	1 835 $\mu$ m; a = 94; b = 10.8; c = 11.4;
	14	17	19.5	17	v = 51 percent

## Description

Body elongated. Cuticle annulated; annules in male 1.5 $\mu$ m, 2 $\mu$ m and 1.5 $\mu$ m long in the anterior oesophagus, posterior oesophagus and cloacal regions respectively. Six labial setae, 2.5–3 $\mu$ m long in both male and female. Ten cephalic setae into two circles (6+4), about 10.5–12 $\mu$ m long in male, 10–11 $\mu$ m in female. Somatic setae in four sublateral longitudinal rows, 5–6.5 $\mu$ m long spaced at intervals of 18–27.5 $\mu$ m throughout the body in male only. Buccal cavity reduced. Amphids on a plaque, about 10 $\mu$ m behind the anterior extremity, consisting of three turns; amphid more round (15 $\mu$ m  $\times$  14 $\mu$ m) in male, than in the female (22.5 $\mu$ m  $\times$  15 $\mu$ m). Oesophagus narrow but widens slightly at the posterior end. Nerve ring at 52 p. 100 of oesophagus length. Excretory pore situated 29 $\mu$ m anterior to the cardia. Tail elongated: 7.1 a.b.d. in male, 9.5 a.b.d. in female. In the male, the terminal cone is 13.5 $\mu$ m long with two sublateral setae, 6 $\mu$ m in length.

Spicule paired, curved and 25 $\mu$ m long (chord), heavily cuticularized particularly at proximal end. Gubernaculum with caudally directed apophyses, 13 $\mu$ m in length. Two testes.

Vulva cuticularized and prominent. Ovaries paired, opposed and outstretched. Eggs 131  $\times$  9 $\mu$ m.

FIG. 1

*Coninckia macrospirifera*

(a) Head of ♂; (b) Head of ♀; (c) Posterior part of oesophageal region of ♂; (d) Tail region of ♂; (e) copulatory apparatus of ♂; (f) Vulva region of ♀; (g) Tail region of ♀.

Scale bars: d, g = 20 $\mu$ m; others = 10 $\mu$ m.

## Differential diagnosis

*Coninckia macrospirifera* n. sp. may be distinguished from all other species by the greater numbers of amphid turns.

It appears to be most similar to *Coninckia seta* (Wieser and Hopper 1967) in the possession of labial setae, cervical setae and big amphids on a plaque but it may be distinguished by the much shorter cephalic setae, amphid with 3 turns, the structure of gubernaculum and the possession of caudal subventral setae.

## Discussion

*Coninckia* was erected by Gerlach (1956), the type species being *Coninckia circularis* from Kiel Bay, based on a male, a female and juvenile; certain characters apparently displayed sexual dimorphism,

Table 1  
Tabular key to species of the genus *Coninckia*

Species	Sex	Body size (µm)	'A'	Labial setae	Cephalic setae length/h d	Amphids	Structure of gubernaculum	'V' ovary	Subventral setae on tail
<i>Coninckia circularis</i> Gerlach 1956	♂	1080	49	absent	0.36*	one turn with broken contour posteriorly without plaque			
	♀	1930	62	present	0.55*			52	
<i>Coninckia seta</i> (Wieser and Hopper 1967)	♂	1300-1400	59	present	1.30*	oval, one turn plaque with punctuation	with medial and Lateral piece		absent
<i>Coninckia macrospirifera</i> n. sp.	♂	1750	76	present	0.65	3 turns plaque without punctuation	without any additional piece		
	♀	1835	94	present	0.75	3 turns oval plaque with punctuation		51 2, outstretched	
<i>Coninckia mediterranea</i> Vitiello 1972	♀	608	38	absent	0.50*	2 turns without plaque		54 2, re- flected	

\* Calculated from original figure.

such as the presence or absence of labial setae and an amphid plaque, length of the cephalic setae, spiral amphids and so on. Vitiello (1974) described another species *Coninckia mediterranea* based on a female only. Wieser and Hopper (1967) erected a new genus *Paratarvia* (type species *P. seta*) but gave no specific information about

female characters other than the position of the vulva, perhaps because no significant sexual dimorphism could be seen. Lorenzen (1981) synonymised *Paratarvia* with *Coninckia* and erected a new family Coninckiidae, having examined 5 adults and several juveniles belonging to *Coninckia circularis* from Helgoland. Therefore, according to Gerlach (1956) and Lorenzen (1981) in addition to this study, it may be concluded that sexual dimorphism is a characteristic feature of *Coninckia*. There are currently 4 species in the genus (including present species) which can be distinguished using the data contained in tabular key.

### Family CERAMONEMATIDAE

#### Sub-family PSELIONEMATINAE

#### *PTERYGONEMA PLATTI* sp. nov.

(Fig. 2)

#### Material studied

Syntypes: 2 ♂♂, B.M. (N.H.) Reg. Nos. 1981.10.83.

#### Body formulae and ratios

♂:	—	93	M	433	513 $\mu$ m; a = 37; b = 5.2; c = 6.4;
	8.5	13	14	13	s = 17 $\mu$ m
♂:	—	104	M	478	562 $\mu$ m; a = 40; b = 5.4; c = 6.7;
	8.5	12	14	12	s = 17 $\mu$ m

#### Description

Body elongated and conspicuously annulated. Cuticle annules approximately 1.5 $\mu$ m wide and spaced at intervals of 0.5 $\mu$ m. Total number of body annules 250 (46 annules on the tail) in ♂ 1, and 252 (45 on the tail) in ♂ 2. Each annule composed of 8 cuticular plates, the ends of which are prolonged into conspicuous perpendicular ridges, together forming eight longitudinal alae running the length of the body. Somatic setae very rare about 5–6.5 $\mu$ m long. There are pairs of subventral setae on the 11th, 15th, 21st and 31st tail annules (from the cloaca), each 3.5–4 $\mu$ m in length. Cephalic cuticle (cephalic capsule?) heavily cuticularized. Head diameter 8.5 $\mu$ m at the anterior distension. Labial sense organs not seen. Four cephalic setae 17.5 $\mu$ m long (2.0 h.d.). Amphids large, loop-shaped, 11 $\times$ 6.5 $\mu$ m, on plaque which looks like a shield-shaped cuticular plate. At the posterior end of the plaque, there is a distinctive cuticular spur projecting forwards between the two limbs of the amphid. Buccal cavity absent. Oesophagus narrow but widens

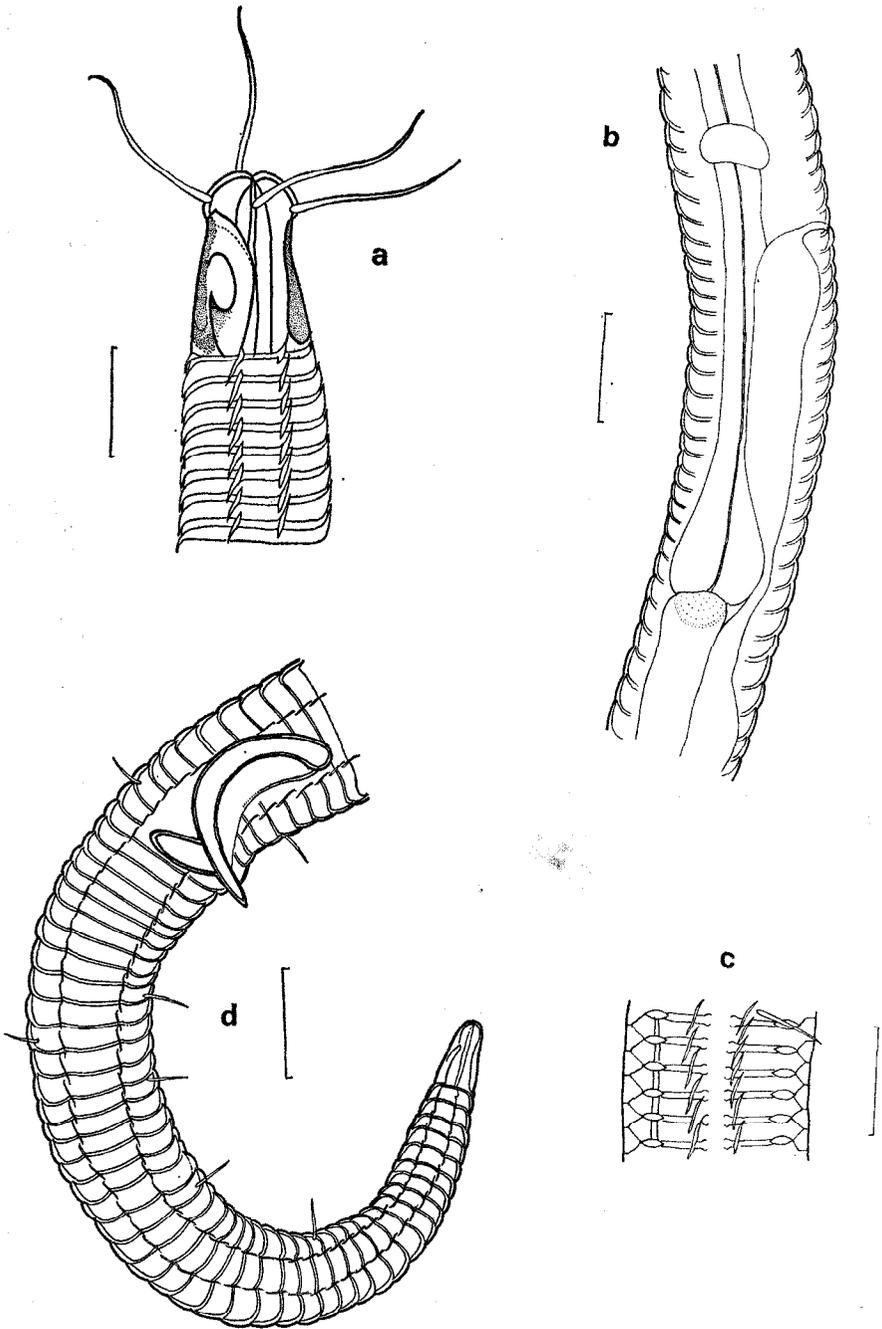


FIG. 2  
*Pterygonema platti*

(a) Head of  $\sigma_1$ ; (b) Posterior part of oesophageal region of  $\sigma$ ; (c) cuticle patterns at middle region of body in  $\sigma$ ; (d) Tail region of  $\sigma$

Scale bars :  $10\mu\text{m}$ .

slightly at the posterior end. Nerve ring at 58 percent oesophagus length (at 20th annule). Excretory pore  $63\mu\text{m}$  from anterior end (at 24th annule). Cardia not clear. Tail elongated, 6.2 a.b.d.; terminal cone present but setae not detected.

Spicules paired curved,  $17\mu\text{m}$  long (chord). Gubernaculum with apophyses  $6.5\mu\text{m}$  long. A single preanal seta,  $3.5\mu\text{m}$  long. No supplements. Two testes. Female not found.

### Differential diagnosis

*Pterygonema platti* sp. nov. may be distinguished from the only other species *P. cambriensis* Ward 1973 by the small number of annules (250-252 vs 'about' 320) and relatively longer cephalic setae (2.0 h.d. vs 1.6 h.d.).

### Discussion

The present species closely resembles *Pterygonema cambriensis* Ward 1973 in the anterior distention of the head, the long cephalic setae and the structure of the amphid (on the plaque, shape of amphid and cuticular spur). However, in addition to the characters mentioned in the differential diagnosis, Ward (1973) did not report the presence of caudal or preanal setae. Together, these differences are sufficient to support the species from Firemore Bay being regarded as a new species. Unfortunately, type material of *P. cambriensis* was not available for study.

## Family OXYSTOMINIDAE

### Subfamily OXYSTOMININAE

#### *WIESERIA SCOTLANDICA* sp. nov.

(Fig. 3)

#### Material studied

Holotype: BM(N.H.) Reg. No. 1981.10.81.

#### Body formulae and ratios

♂:  $\frac{\text{---} \quad 396 \quad \text{M} \quad 2642}{6 \quad 15.5 \quad 16.5 \quad 16}$   $2 \quad 765\mu\text{m}, a = 167.6; b = 7.0; c = 22.5;$   
 $s = 20.5$

#### Description

Body elongated, anteriorly attenuated. Cuticle smooth, 1.5— $2\mu\text{m}$  in thickness. Somatic setae scattered, about 6.5— $7.5\mu\text{m}$  long

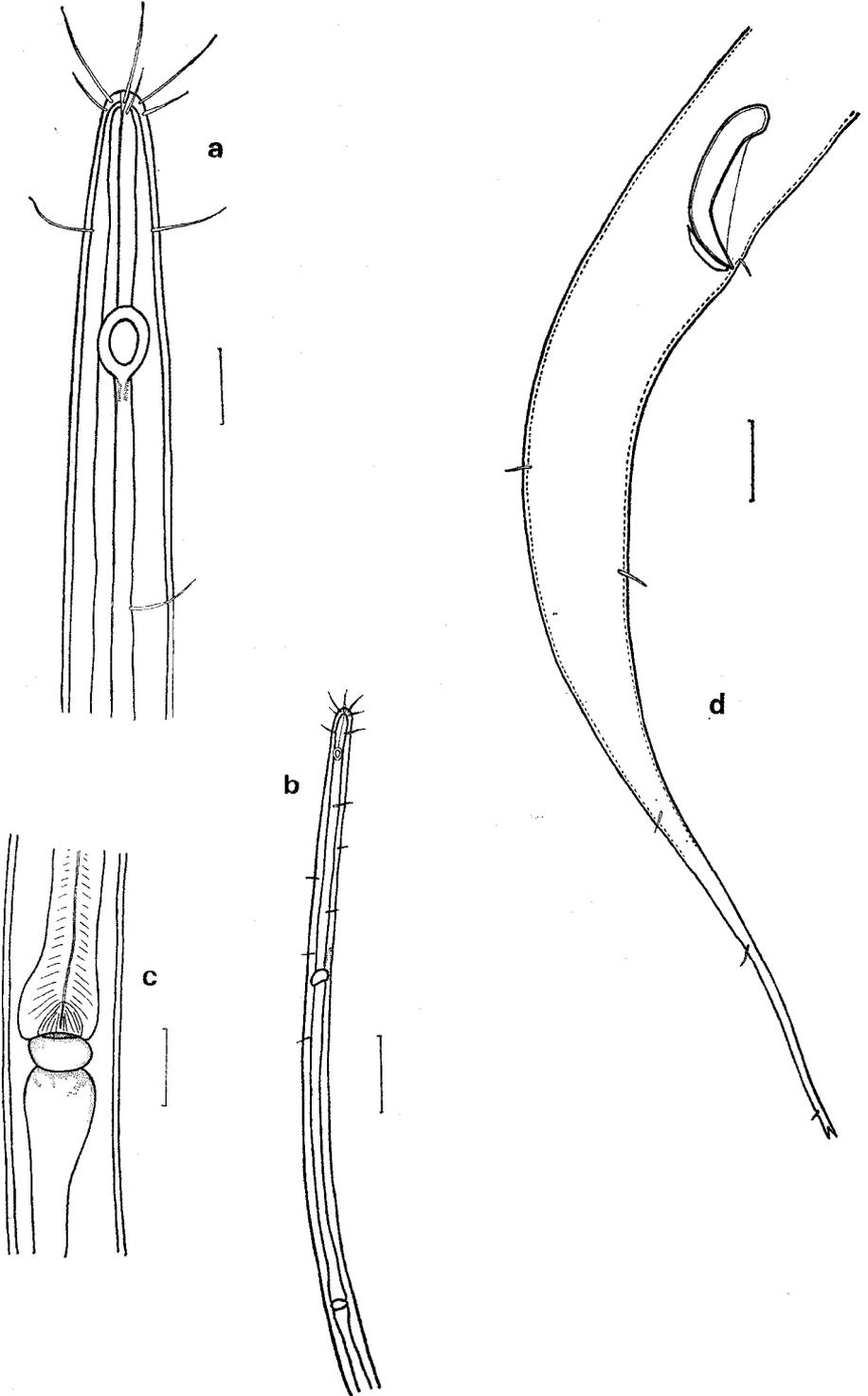


FIG. 3

in the oesophageal region, but less numerous and shorter elsewhere. Head conical with thick cuticle. Labial organs not detected. Twelve cephalic setae into two circles (6+6); first circle,  $14\mu\text{m}$  (2.3 h.d.); second circle,  $7\mu\text{m}$  long. Amphid a slightly elongated loop,  $9.5 \times 6.5\mu\text{m}$  (0.54 c.d.) and  $28.5\mu\text{m}$  from anterior. Four  $10.5\mu\text{m}$  sublateral cervical setae anterior to amphids and two  $10\mu\text{m}$  lateral cervical setae about  $30\mu\text{m}$  posterior to amphid. Buccal cavity only a small narrow funnel. The posterior end of oesophagus is slightly enlarged. Cardia present between oesophagus and intestine (Fig. 30). Nerve ring at 46 percent of oesophagus. Excretory pore  $15\mu\text{m}$  anterior to nerve ring. Tail  $123\mu\text{m}$  long (7.7 a.b.d.), anterior two-thirds conical, then filiform; tip bifurcate. Caudal setae few and scattered.

Spicule  $20.5\mu\text{m}$  (1.2 a.b.d.), curved with both proximal and distal end distinctively bent. Gubernaculum  $7.5\mu\text{m}$  long. Preloacal ventral setae  $2.5\mu\text{m}$  long. Two testes, apparently reflexed.

### Differential diagnosis

*Wieseria scotlandica* n. sp. may be distinguished from the only other species described as having a bifurcate tail tip, *W. hispita* Vitiello 1972, by the presence of a gubernaculum, the length and shape of the spicule and more slender body shape.

### Discussion

Vitiello (1972) provided a useful key to the species of *Wieseria*. It is difficult to make detailed comparison with the four species described from females only. However, the five valid species (including present species) described from males may be distinguished using the following key.

#### Key to species of *Wieseria* (based on males)

1. Without gubernaculum, length of spicule less than 1.1 a.b.d. (2)  
With gubernaculum, length of spicule more than 1.1 a.b.d. (3)
2. Cervical setae same level with amphids,  $R_2 = R_3$ , tip of the tail clavate  
*Wieseria clavata* Gerlach 1956  
Cervical setae anterior to amphids,  $R_2 > R_3$ , tip of the tail filiform and bifurcated  
*W. hispita* Vitiello 1972
3. Length of spicule 1.6 a.b.d., cervical setae absent, tip of tail clavate  
*W. glandulosa* (Kreis 1929)

FIG. 3

#### *Wieseria scotlandica*

(a) Head of ♂; (b) Oesophageal region of ♂; (c) Posterior part of oesophageal region of ♀; (d) Tail region of ♂.

Scale bars: a,c,d =  $10\mu\text{m}$ ; b =  $50\mu\text{m}$ .

Length of spicule 1.3 or less, cervical setae present, tip of tail not clavate ..... (4)

4. Tip of tail pointed, spicule length 0.9 a.b.d. *W. leptura* Vitiello 1972  
Tip of tail filiform and bifurcate, spicule length 1.3 a.b.d.

*W. scotlandica* n. sp.

Four species described from females only are: *Wieseria inaequalis* Gerlach, 1956; *W. longicaudata* Timm, 1961; *W. longiseta* (Allgen, 1947) and *W. pica* Gerlach, 1956.

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### Summary

Three new free-living marine nematode species are described from a sublittoral station in Firemore Bay, Scotland. *Coninckia macrospirifera* n. sp. is similar to *Coninckia seta* (Wieser and Hopper, 1967) from which it can be separated by shorter cephalic setae, the structure of amphids and gubernaculum and the presence of subventral caudal setae. *Pterygonema platti* n. sp. resembles *Pterygonema cambriensis* Ward 1973, from which it is distinguished by the number of body annules and presence of tail setae. *Wieseria scotlandica* n. sp. is similar to *Wieseria hispita* Vitiello 1972, from which it can be distinguished by the presence of a gubernaculum, length and shape of spicule and the more slender body. Keys to *Coninckia* and *Wieseria* species are given. *Coninckia* and *Wieseria* have not previously been recorded from Great Britain.

### REFERENCES

- ALLGÉN, C.A., 1947. — Zur Kenntnis Norwegischer Nematoden, X. Neue freilebende marine Nematoden von der Insel Storfosen. *Det Kong. norske Vidensk. Sels.*, 19 (15), pp. 52-55.
- GERLACH, S.A., 1954. — Nematodes marins libres des eaux souterraines littorales de Tunisie et d'Algérie. *Vie Milieu*, 4, pp. 221-237.
- GERLACH, S.A., 1956. — Diagnosen neuer Nematoden aus der Kieler Bucht. *Kieler Meeresforsch.*, 12 (1), pp. 85-124, pl. 26-42.
- GERLACH, S.A. and RIEMANN, F., 1973. — The Bremerhaven checklist of aquatic nematodes. A catalogue of Nematoda Adenophorea excluding the Dorylaimida. *Veröff. Inst. Meeresforsch., Bremerh.*, Suppl. 4, pp. 1-404.
- HASPELAGH, G., 1973. — Superfamille des Ceramonematoidea (Cobb, 1933) (Nematoda), évolution et systématique. *Annls. Soc. r. zool. Belg.*, 102, pp. 235-251.
- HOPPER, B.E., 1973. — Free-living Marine Nematodes from Biscayne Bay, Florida VI Ceramonematidae: Systematics of *Pseltonema annulatum* var. *beauforti* Chitwood, 1936, and a note on the production and transport of an egg capsule. *Proc. Helm. Soc. Wash.* 40 (2), pp. 265-272.
- KREIS, H.A., 1929. — Freilebende marine Nematoden von der Nordwest küste. Frankreichs (Trebeurden: Côtes du Nord). *Cap. Zool.* 2 (7), pp. 1-97, pl. 1-8.

- LORENZEN, S., 1981. — Entwurf eines phylogenetischen Systems der freilebenden Nematoden. *Veröff. Inst. Meeresforsch. Bremerh.*, suppl. 7, pp. 1-472.
- MCINTYRE, A.D. and ELEFThERIOU, A., 1968. — The bottom fauna of a flatfish nursery ground. *J. mar. biol. Ass. UK.*, 48, pp. 113-142.
- MCINTYRE, A.D. and MURISON, D.J., 1973. — The meiofauna of a flatfish nursery ground. *J. mar. biol. Ass. U.K.*, 53, pp. 93-118.
- PLATT, H.M., 1973. — Freelifving marine nematodes from Strangford Lough, Northern Ireland. *Cah. Biol. Mar.*, 14, pp. 295-321.
- PLATT, H.M., and ZHANG, Z.N., 1982. — New species of marine nematodes from Loch Ewe, Scotland. *Bull. Br. Mus. nat. Hist. (Zool.)* 42 (4), pp. 227-246.
- STEELE, J.H. and BAIRD, I.E., 1968. — Production ecology of a sandy beach. *Limnol. Oceanogr.*, 13, pp. 14-25.
- TIMM, R.W., 1961. — The marine nematodes of the Bay of Bengal. *Proc. Pakist. Acad. Sci.*, 1, pp. 1-88.
- VITIELLO, P., 1972. — Le Genre *Wieseria* Gerlach, 1956 (Nematoda Oxystominidae) *Tethys*, 4, pp. 645-650.
- VITIELLO, P., 1974. — Nouvelles espèces de Desmodorida (Nematoda) des côtes de Provence. *Tethys*, 5, pp. 137-146.
- WARD, A.R., 1973b. — A new species of *Pterygonema* (Nematoda: Ceramonematoidea) from sublittoral sand in Liverpool Bay. *Mar. Biol.*, 19, pp. 204-205.
- WIESER, W. and HOPPER, B., 1967. — Marine nematodes of the east coast of North America I. Florida *Bull. Mus. Comp. Zool.*, 135, pp. 239-344.