

59569

A NEW AND TWO KNOWN SPECIES
BELONGING TO SUBFAMILY LEPTOLAIMINAE
(LEPTOLAIMIDAE, NEMATODA)
FROM POLLUTED INTERTIDAL SAND IN SCOTLAND.

by

K. Jayasree Vadhyar

Kerala Agricultural University, Fisheries Station,
Puduvaypu, Cochin-682508, India.

Résumé

Une espèce nouvelle et deux espèces déjà décrites appartenant à la sous-famille des Leptolaiminae (Leptolaimidae, Nématodes), d'un sable intercotidal pollué d'Ecosse.

Stephanolaimus longispiculum sp. nov., *S. spartinae* Lorenzen, 1969 and *Leptolaimus* (*Tubulaimus*) *ampullaceus* (Warwick 1970) Alekseev et Rassadnikova, 1977 sont décrites à partir de spécimens trouvés dans le matériel récolté dans un sable pollué d'Ecosse. Une révision de la clé de *Stephanolaimus* est fournie.

Introduction

The species described in this paper were encountered in the material collected during the period August, 1974 — June, 1975 from two polluted sandy beaches viz., 1) Irvine Beach (55°38'N, 4°44'W) in the Firth of Clyde on the west coast of Scotland and 2) Portobello Beach (55°57'N, 3°7'W) in the Firth of Forth on the east coast of Scotland.

The descriptions are based on glycerine mounts and the illustrations have been made with the aid of a Wild drawing tube fitted to a Wild M-20 microscope. The material studied has been deposited at the British Museum (Natural History). Curved structures such as spicules have been measured as the chord and not as the curve. The classification followed in this paper is that given in the Bremerhaven Checklist of Aquatic Nematodes by Gerlach and Riemann (1973).

FAMILY LEPTOLAIMIDAE

Subfamily Leptolaiminae

***STEPHANOLAIMUS LONGISPICULUM* sp. nov. (Fig. 1)**

Material studied: 4 ♂♂ and 2 ♀♀, B.M. (N.H.) Reg. No. 1976 2256-7.

Measurements

σ_1	—	266	M	1622	L = 1790 μ m; a = 59.7; b = 6.7; c = 10.7 Spicule = 55 μ m
	9	26	30	20	
σ_2	—	270	M	1535	L = 1710 μ m; a = 68.4; b = 6.3; c = 9.8 Spicule = 65 μ m
	8.5	20	25	20	
σ_3	—	306	M	1732	L = 1928 μ m; a = 62.2; b = 6.3; c = 9.8 Spicule = 68 μ m
	9	26	31	22	
σ_4	—	300	M	1620	L = 1780 μ m; a = 63.6; b = 5.9; c = 11.1 Spicule = 70 μ m
	9	24	28	21	
φ_1	—	302	956	1852	L = 2016 μ m; a = 67.2; b = 6.7; c = 12.3 Vulva = 53 percent
	8	24	30	20	
φ_2	—	296	1090	1898	L = 2090 μ m; a = 61.5; b = 7.1; c = 10.9 Vulva = 48 percent
	9	28	34	22	

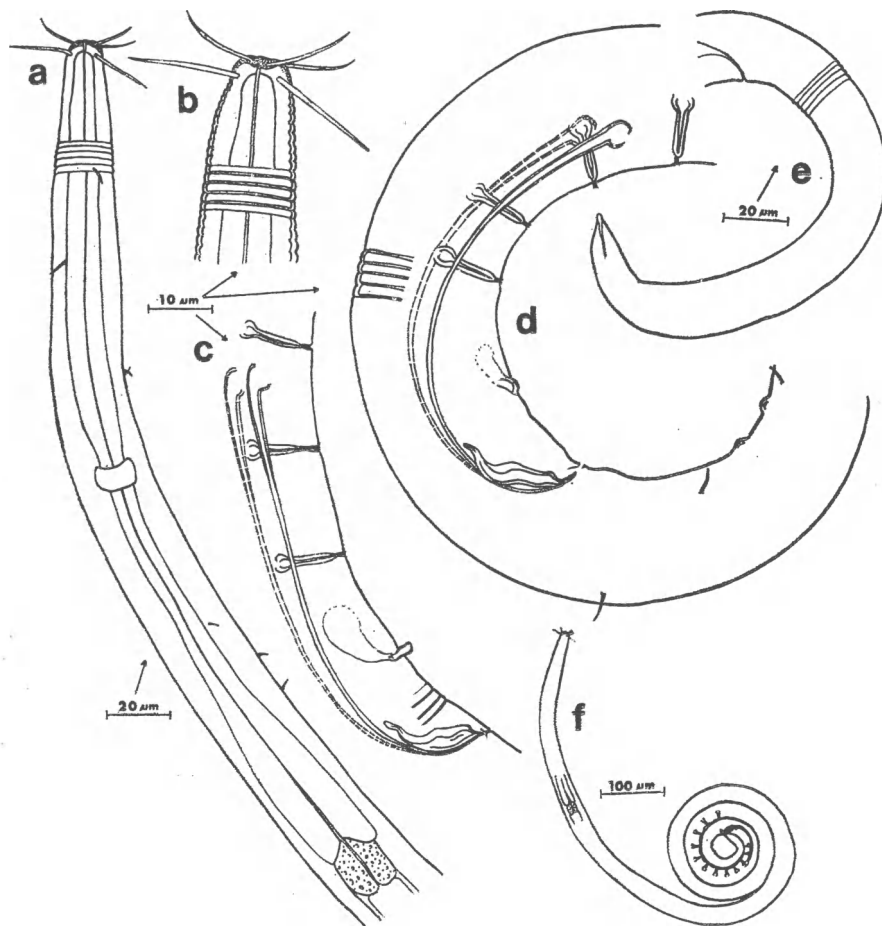


FIG. 1

Stephanolaimus longispiculum sp. nov.

a: Oesophageal region of σ_1 ;
 c: spicular apparatus of σ_1 ;
 e: tail region of φ ;

b: head region of σ_1 ;
 d: spicular apparatus of σ_2 ;
 f: σ_1 entire.

Description

Cuticle with very pronounced coarse annulations of about 1-1.5 μ m width throughout the body. Mouth opening encircled with six lips, each with a labial papilla. Buccal cavity minute. Buccal region densely cuticularised and dark. Six external labial setae, 11.5-13 μ m (1.4 head diameter) long and four cephalic setae, 15-17.5 μ m (1.9 head diameter) long, present. Amphids not seen. Oesophagus broader at the base, but, no true basal bulb. Oesophageal-intestinal valve distinct, 11-12 μ m long and 7 μ m wide. Nerve ring situated at 48-50 percent of oesophageal length. Somatic setae scarce and scattered, 4-6 μ m long. Tail, anterior 4/5th almost cylindrical and the rest conical; 7.6-8.9 cloacal diameter or anal diameter long in both sexes.

Male. Spicules equal, very long and thin with proximal cephalisation; 2.8-3.3 cloacal diameter long. In their retracted position, their proximal ends lie approximately on level with the third supplement from posterior end. Gubernaculum paired, narrow proximally and expanded distally, each piece situated lateral to each spicule; 14-5-16 μ m long. 12-13 tubular precloacal supplements present. About half way between the posterior-most supplement and the cloaca, a strong, blunt hyalin seta present ventrally. In three of the four males examined, this structure was seen projecting outside the body—see Fig. 1c—but, in one male, it was in the form of a slight cuticular bump—see Fig. 1d. A glandular organ opens into it. Two post-cloacal papilloid supplements present.

Female. A single, post-vulvar and reflexed ovary was clearly observed. Only a small pre-vulvar pouch was seen instead of the anterior ovary.

Discussion

Stephanolaimus longispiculum sp. nov. is closest to *S. paraflavensis* Gerlach, 1953, which is the only other species of the genus possessing comparable spicules and post-cloacal papilloid supplements. But these two species can be distinguished from each other from the differences summarised in the following table.

Species	α value	Annulations of cuticle	Ratio between the lengths of external labial setae and cephalic setae	Number of precloacal tubules
<i>S. paraflavensis</i>	88-90	faint; scarcely perceptible	1:2.3	6-7
<i>S. longispiculum</i>	59.7-68.4	coarse; pronounced	1:1.3	12-13 (plus a hyalin seta)

Occurrence

Found only in small numbers in the material collected from Portobello beach in the Firth of Forth. Not found in the Firth of Clyde material.

STEPHANOLAIMUS SPARTINAE Lorenzen, 1969 (Fig. 2)

Material studied: 2 ♂♂, B.M. (N.H.) Reg. No. 1981.

Measurements

♂ ₁	—	264	M	1332	L = 1500µm; a = 78.9; b = 5.7; c = 8.9 Spicule = 19.5µm
	8	17	19	13	
♂ ₂	—	250	M	1242	L = 1410µm; a = 78.3; b = 5.6; c = 8.4 Spicule = 20µm
	7	17	18	14	

Description

Cuticle with coarse annulations, 1-1.2µm wide. Cuticular annulations in the head region indistinct. Mouth surrounded by six lips each bearing a small conical labial papilla. Buccal cavity minute. Six external labial setae, 10-11µm (1.4 head diameter) long and four cephalic setae, 13-14µm (1.8-1.9 head diameter) long present. Two lateral subcephalic setae, 8µm (1-1.1 head diameter) long present; situated just posterior to the cephalic setae. Amphids not perceptible. Oesophagus broader at the base but a true basal bulb lacking. Dark globular inclusions present in the oesophageal and intestinal regions. Oesophageal-intestinal valve 8µm long, pyriform and distinct. Nerve ring and excretory pore situated at about 52 and 65 percent respectively of oesophageal length, behind anterior end. Somatic setae sparse, confined to caudal region, 4-6µm long. Tail, 12-12.9 cloacal diameter long in male; tapers gradually.

Male. Spicules slender, semicircularly curved with distinct proximal cephalisation; 1.4-1.5 cloacal diameter long. Cuticularisation of the spicules more pronounced at their proximal halves than at their distal halves. Gubernaculum single with paired long and slender dorso-caudally directed apophyses, 8-9µm long. Eleven tubular precloacal supplements present; they extend to a length of 190-200µm anterior to the cloacal opening. The posterior-most supplement lies at 37-39µm anterior to the cloacal opening. A protruding, strong, ventral hyalin seta, 1.5-2µm long present; situated at 19-22µm anterior to the cloacal opening i.e. on level with the proximal ends of the spicules.

Discussion

The present specimens closely conform with the original description of the species provided by Lorenzen (1969) in all major respects. But, they are on the whole bigger. Also, some differences in the length and proportion of the tail and of the cephalic setae, and in the position of the precloacal hyalin seta could be seen when one scrutinizes this description with the original. These could be regarded as intra-species differences consequent to regional differences.

Occurrence

A rare species found only in the Firth of Clyde material collected in April 1975 from low water mark. This species was originally reported by Lorenzen (1969) from the North Sea salt marshes along the west coast of Schleswig-Holstein.

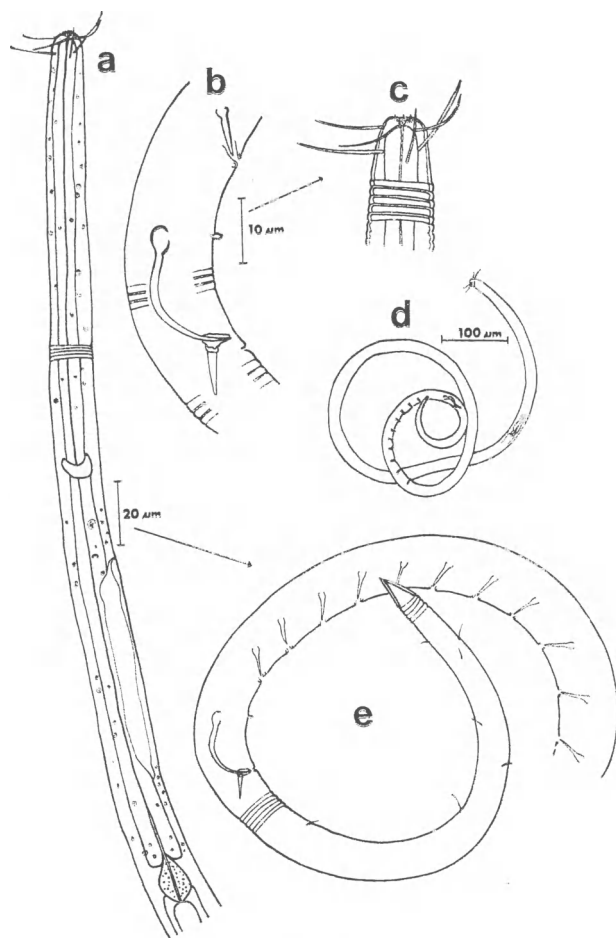


FIG. 2

Stephanolaimus spartinae Lorenzen, 1969

- a: Oesophageal region of ♂; b: spicular apparatus of ♂;
 c: head region of ♂; d: ♂ entire;
 e: posterior region of ♀;

GENUS *STEPHANOLAIMUS* Ditlevsen, 1918

The genus *Stephanolaimus* Ditlevsen, 1918 has been revised by Jensen (1976) who provides a key to the five species of the genus valid at that time, viz., *S. elegans* Ditlevsen, 1918, *S. flevensis* Stekhoven, 1935, *S. paraeflevensis* Gerlach, 1953, *S. spartinae* Lorenzen, 1969 and *S. gandavensis* Jensen, 1976. Two more species (including the new species described here) i.e. *S. bicoronatus* Boucher and Helléouët, 1977 and *S. longispiculum* sp. nov. have been added to the list and these are placed in the revised key to the genus given below.

The terminology adopted by Jensen (1976) to indicate the three crowns of cephalic sense organs (De Coninck, 1965) i.e. a) first circle of 6 internal labial papillae/setae, b) second circle of 6 external labial papillae/setae and c) third circle of 4 cephalic setae is more appro-

priate considering their origin and location (significant from an evolutionary point of view) than the useage by various authors as a) labial papillae/setae b) first circle of cephalic setae and c) second circle of cephalic setae respectively.

Key to the genus *Stephanolaimus* Ditlevsen, 1918

A. With internal labial setae and cephalic setae, but, without, external labial organs (6+0+4) ... *S. elegans* Ditlevsen, 1918 (36-44 precloacal tubules).

B. With all three crowns of cephalic sense organs, i.e. internal labial papillae/setae, external labial setae and cephalic setae (6+6+4).

1. Spicules (measured as chord) less than 2 cloacal diameter long

a) Lateral subcephalic setae present; more than 1 head diameter long

i) Somatic papillae absent; external labial setae and cephalic setae are almost equal in length, less than 2 head diameter long

— Cuticle with strong annulations. ... *S. spartinae* Lorenzen, 1969 (9-11 precloacal tubules)

— Cuticle with fine striations ... *S. bicoronatus* Boucher and Helléouët, 1977

ii) Somatic papillae present; external labial setae short and only 1/5th of the length of cephalic setae; cephalic setae more than 2 head diameter long

(3 head diameter long) ... *S. gandavensis* Jensen, 1976 (26 precloacal tubules)

b) Lateral subcephalic setae absent or not easily perceptible

... *S. flevensis* Stekhoven, 1935 (12-14 precloacal tubules)

2. Spicules (measured as chord) more than 2 cloacal diameter long

a) Cuticular annulations faint and scarcely perceptible;

cephalic setae 2.3 times longer than the external labial setae ... *S. paraflevensis* Gerlach, 1953 (6-7 precloacal tubules)

b) Cuticular annulations coarse and very pronounced;

cephalic setae 1.3 times longer than the external labial setae ... *S. longispiculum* sp. nov. (12-13 precloacal tubules)

LEPTOLAIMUS (TUBULAIMUS) AMPULLACEUS (Warwick, 1970)

Alekseev and Rassadnikova, 1977 (Fig. 3)

Material studied: 2 ♂♂, B.M. (N.H.) Reg. No. 1978.10.1.

Measurements

♂ ₁	—	150	M	812	L = 964μm; a = 60.3; b = 6.4; c = 6.3
	4.5	14	16	15	Spicule = 16μm
♂ ₂	—	155	M	840	L = 1008μm; a = 56.0; b = 6.5; c = 6.0
	5	18	18	17	Spicule = 18μm

Description

Cuticle distinctly striated; striations start on level with the cephalic setae and extend to the tail tip. Cuticular pores, each containing a small seta present laterally, especially in the cervical and caudal regions. Lips indistinct labial organs absent. Anterior extremity of the head heavily cuticularised. Buccal cavity narrow and tubular. Four submedian cephalic setae $5.5-7\mu\text{m}$ ($1.2-1.4$ head

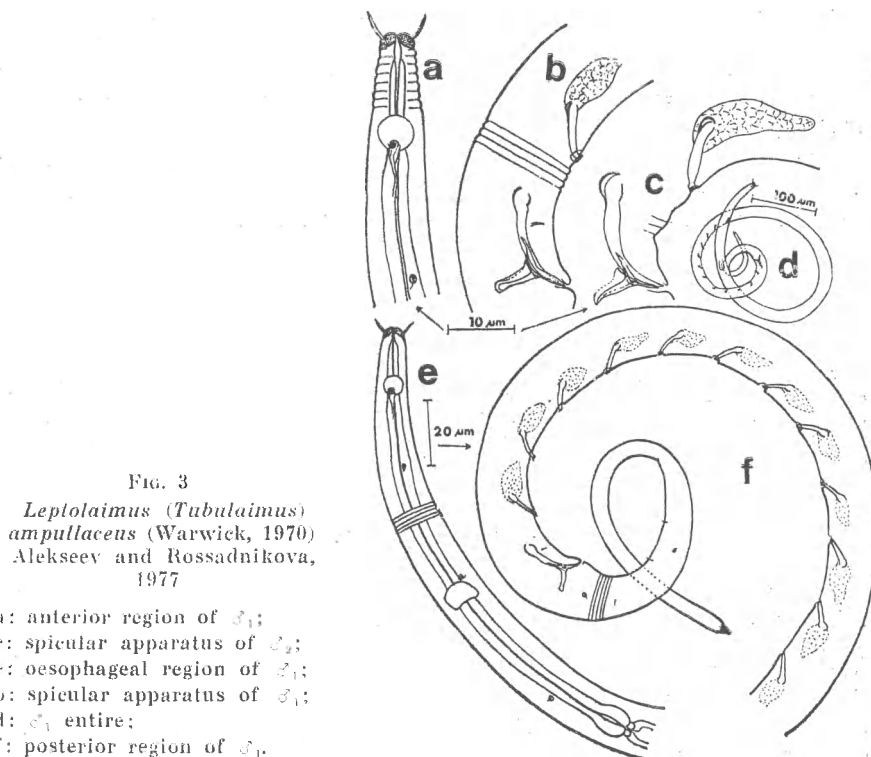


FIG. 3

Leptolaimus (Tubulaimus) ampullaceus (Warwick, 1970)
Aleksseev and Rossadnikova,
1977

- a: anterior region of δ_1 ;
- c: spicular apparatus of δ_2 ;
- e: oesophageal region of δ_1 ;
- b: spicular apparatus of δ_1 ;
- d: δ_1 entire;
- f: posterior region of δ_1 .

diameter) long. Amphids circular, $5-6\mu\text{m}$ diameter (63-71 percent of corresponding body diameter); situated at $11-12\mu\text{m}$ (2.4 head diameter) behind anterior end. Amphidial nerve distinct; enters posteriorly. Nerve ring situated at 50-52 percent of oesophageal length behind anterior end. Excretory pore indistinct. Oesophagus enlarged at the base, forming a pyriform basal bulb. Tail 10 cloacal diameter long in male.

Male. Spicules paired, equal, distinctly cephalated proximally and pointed distally; 1.1 cloacal diameter long. Gubernaculum consists of a single, elongate and slender piece lying between the spicules; possesses a pair of slender, dorsal apophyses, $7\mu\text{m}$ long. 9-12 tubular precloacal supplements present; each $9-11\mu\text{m}$ long, cephalated proximally and dentate distally, enters a pear-shaped ampulla proximally. The distally dentate nature of the tubules is obvious only when they are protruded outside the body (Fig. 3b) and is concealed

when they are withdrawn into the body (Fig. 3c), apparently because of their densely thickened cuticular exits.

Discussion

Close agreement can be found between the present specimens and the original description of the species by Warwick (1970). However, it becomes obvious from the present specimens that the pre-cloacal tubules are distally dentate and that they give the appearance of simple, non-dentate tubules when they are withdrawn into the body as was illustrated by Warwick (1970-Fig. 6B and 6C, page 152). Hence, statements regarding dentate and non-dentate nature of the pre-cloacal tubules in the species of *Leptolaimus* should be examined carefully.

The genus *Leptolaimus* De Man, 1876 has been recently revised by Alekseev and Rassadnikova (1977) and the present species has been included by them under subgenus *Tubulaimus*.

Summary

Stephanolaimus longispiculum sp. nov., *S. spartinae* Lorenzen, 1969 and *Leptolaimus (Tubulaimus) ampullaceus* (Warwick, 1970) Alekseev and Rassadnikova, 1977 are described on the basis of specimens encountered in the material collected from polluted intertidal sand in Scotland. A revised key to *Stephanolaimus* Ditlevsen, 1918 is given.

Acknowledgements

This work was carried out under the auspices of the Marine Laboratory, Department of Agriculture and Fisheries for Scotland, Aberdeen, Britain, as part of my Ph. D. thesis (Aberdeen University, 1976). My sincere thanks are due to Dr. A.D. McIntyre (Marine Laboratory, D.A.F.S., Aberdeen) and to Dr. R.M. Warwick (Institute for Marine Environmental Research, Plymouth, Britain) for their valuable guidance during this study.

I am grateful to the Ministry of Education and Social Welfare, Government of India for awarding me a National Scholarship for Studies Abroad during the tenure of this study.

REFERENCES

- ALEKSEEV, V.M. and RASSADNIKOVA, I.V., 1977. — A new species and taxonomic analysis of the genus *Leptolaimus* (Nematoda, Araeolaimidae). (Russian) *Zoologicheskij Zhurnal*, Moscow, 56 (12), pp. 1766-1774.
- BOUCHER, G. et HELLÉOUËT, M.-N., 1977. — Nématodes des sables fins infralittoraux de la Pierre Noire (Manche occidentale). III. Araeolaimida et Monhysterida. *Bull. Mus. nat. Hist. nat. Paris*, 3^e série 427, Zool. 297, pp. 85-122.
- DE CONINCK, L.A., 1965. — Classe des Nématodes — Systématique des Nématodes et sous-classe des Adenophorea. *Traité de Zoologie*, éd. Grassé, 4 (2), pp. 586-681.
- DITLEVSEN, H.J., 1918. — Marine freelifving nematodes from Danish waters. *Vidensk. Meddr dansk naturh. Foren.* 70, pp. 147-214.
- GERLACH, S.A., 1953. — Die Nematodenbesiedlung des Sandstrandes und des Küstengrundwassers an der italienischen Küste. I. Systematischer Teil. *Arch. Zool. ital.* 37, pp. 517-640.

- GERLACH, S.A. and RIEMANN, F., 1973. — The Bremerhaven Checklist of Aquatic Nematodes. A catalogue of Nematoda Adenophorea excluding the Dorylaimida. *Veroff. Inst. Meeresforsch. Bremerh. Suppl.* 4 (1), pp. 1-404.
- JENSEN, P., 1976. — Free-living marine nematodes from a sublittoral station in the North Sea off the Belgian coast. *Biol. Jb. Dodonaea*, 44, pp. 231-255.
- LORENZEN, S., 1969. — Freilebende Meeresnematoden aus dem Schlickwatt und den Salzwiesen der Nordseeküste. *Veroff. Inst. Meeresforsch. Bremerh.* 11, pp. 195-238.
- STEKHÖVEN, J.H. SCHUURMANS, 1935. — Nematoda: Systematischer Teil, Nematoda errantia. In Grimpe, G. and E. Wagler, *Die Tierwelt der Nord- und Ostsee* (Leipzig) 1935, 5b, pp. 1-173.
- WARWICK, R.M., 1970. — Fourteen new species of free-living marine nematodes from the Exe estuary. *Bull. Br. Mus. nat. Hist. (Zool.)* 19, pp. 137-177.