

NEW AND LITTLE KNOWN MARINE NEMATODES FROM A SCOTTISH SANDY BEACH

by

Richard M. Warwick (*)

Dove Marine Laboratory, Cullercoats, Northumberland, England

and

Howard M. Platt (**)

Department of Zoology, Queen's University, Belfast, N. Ireland.

Résumé

Treize espèces de Nématodes marins libres de la plage de sable de Firemore Bay, Wester-Ross, Ecosse, sont décrites. Parmi ces espèces, nous proposons un nouveau genre, *Gairleanema*, avec l'espèce-type *G. anagremilae* gen. et sp. nov. Onze autres sont de nouvelles espèces attribuables aux genres existants : *Odon-tophora exharena* sp. nov., *Theristus (Daptonema) gelana* sp. nov., *Cobbia cale-donia* sp. nov., *Gonionchus inaequalis* sp. nov., *Xyala smo* sp. nov., *Siphonolaimus ewensis* sp. nov., *Metachromadora (Bradylaimus) scotlandica* sp. nov., *Micro-laimus acinaces* sp. nov., *Dasy-nemella albaensis* sp. nov., *Rhabdodemia imer* sp. nov. et *Trileptium parisetum* sp. nov. Une espèce (*Trefusia zostericola* Allgén, 1933), jusqu'ici peu connue est redécrite.

INTRODUCTION

In July 1971, a study of the meiofauna of the sandy beach at Firemore Bay (Gaineahm Smo), Loch Ewe, Wester-Ross, Scotland, was undertaken. The location, physical characteristics and macro-faunal population of this beach are described by McIntyre and Elef-theriou (1968). Several workers will collaborate in the subsequent publication of the ecological results but we here take the opportunity of describing the new, or in one case poorly known, nematode species which were found during the investigation.

Descriptions have been made from glycerine mounts and the type material is deposited at the British Museum (Natural History). Curved structures such as spicules have been measured as the chord and not the curve. Following convention, we have given both Filip-

(*) Present address: Institute for Marine Environmental Research, 13-14 St James Terrace, Citadel Road, Plymouth, PL1 3AX, Devon, England.

(**) Present address: British Antarctic Survey, Monks Wood Experimental Station, Abbots Ripton, Huntingdon, England.

jev's formula and de Man's ratios as a prelude to each description. The application of both these conventions is outlined by Vitiello (1969).

Family AXONOLAIMIDAE

ODONTOPHORA EXHARENA sp. nov.

(Fig. 1)

Material studied

Syntypes : 1 ♂ and 1 ♀, B.M. (N.H.) Reg. Nos. 1972: 331.

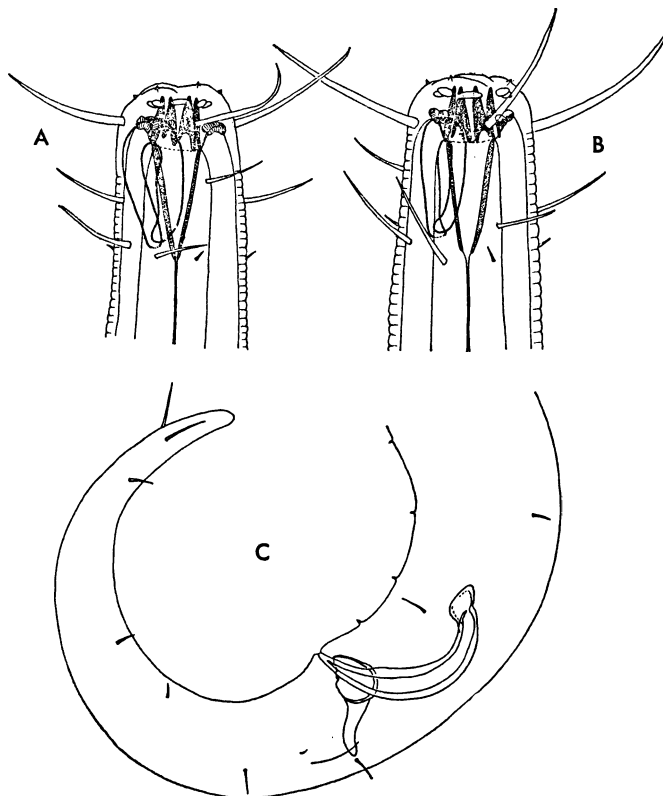


FIG. 1

Odonthophora exharena sp. nov.

A: male head; B: female head; C: male tail.

Body formulae and ratios

♂ :	—	144	M	2,167	
	15	23	23	24	2,280 μm; a = 99.1; b = 15.8; c = 20.2;
					Spicule = 30 μm
♀ :	—	162	1,360	2,180	
	15	23	28	18	2,300 μm; a = 82.1; b = 14.2; c = 19.2;
					V p. 100 = 59.1

Description

Cuticle with fine transverse striation. Six labial papillae small and indistinct. Four cephalic setae 19-21 μm . Subcephalic setae in two whorls. Four setae 9-11 μm long in submedian positions about half way down the length of the amphids. Second whorl of four 11-13 μm sublateral setae and four 2.5 μm submedian setae just posterior to amphids. Buccal cavity typical of the genus. Odontia 7 μm long; posterior portion of buccal cavity conical, 13 μm long. Amphids in form of a large open loop 16 μm long and 7.5 μm wide. Oesophagus with no posterior bulb, nerve ring 102-104 μm from anterior. Somatic setae up to 13 μm long rather sparsely scattered down length of oesophagus, middle region of body virtually naked. Tail conical in both sexes, 4.7 cloacal diameters long in male and 6.7 anal diameters in female.

Male: Spicules paired, uniformly arcuate, cephalated proximally and pointed distally. Gubernaculum with paired dorsal apophyses, 19 μm long. Small papilliform pre-cloacal supplements indistinct, but there appear to be only four.

Female: Ovaries paired, symmetrical, opposed and not reflexed.

Discussion

Odontophora exharena sp. nov. is distinguished from other members of the genus by the combination of very large amphids, long cephalic setae and the arrangement of subcephalic setae.

Family MONHYSTERIDAE

THERISTUS (DAPTONEMA) GELANA sp. nov.

(Fig. 2)

Material studied

Syntypes: 3 ♂♂, B.M. (N.H.) Reg. Nos. 1972: 332-333.

Body formulae and ratios

♂ :	—	253	M	960	
	23	38	38	30	1,095 μm ; a = 28.8; b = 4.3; c = 8.2;
					Spicule = 45 μm
♂ :	—	260	M	950	
	24	39	39	30	1,080 μm ; a = 27.7; b = 4.2; c = 8.2;
					Spicule = 46 μm
♂ :	—	241	M	805	
	22	37	37	30	915 μm ; a = 24.7; b = 3.8; c = 8.5;
					Spicule = 44 μm

Description

Cuticle distinctly transversely striated. Six internally striated lips and six $2\mu\text{m}$ long labial setae. Six $16\text{--}17.5\mu\text{m}$ cephalic setae, four $14\mu\text{m}$ submedian cephalic setae and occasionally a third seta of intermediate length ($16\mu\text{m}$) may be distinguished in the submedian groups. All three setae in these submedian groups are usually difficult to distinguish as they are regularly closely applied to one another. There are eight files of long fine cervical and somatic setae; $35\text{--}65\mu\text{m}$ cervically, $50\text{--}65\mu\text{m}$ in the middle regions and $5\text{--}35\mu\text{m}$ caudally. Paired terminal setae $25\text{--}35\mu\text{m}$.

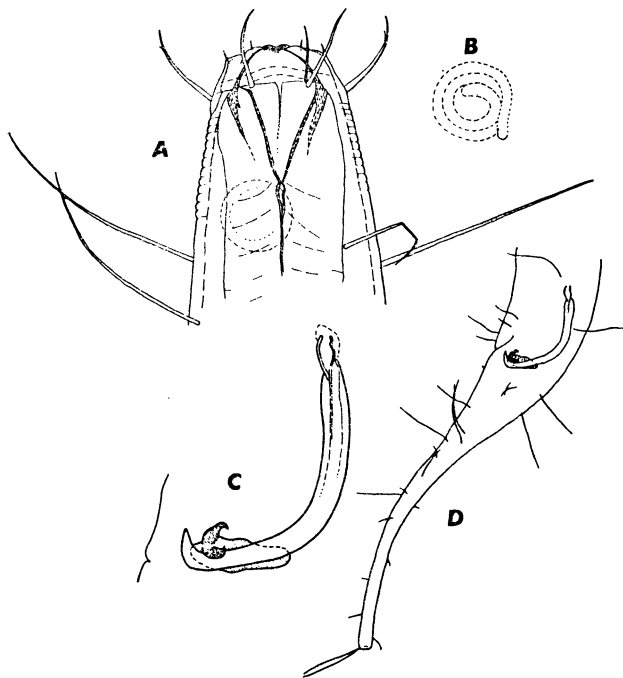


FIG. 2

Theristus (Daptonema) gelana sp. nov.

A: male head; B: amphid of another male; C: lateral view of spicules and gubernaculum; D: male tail.

Buccal cavity conical, unarmed. Amphid situated $25\mu\text{m}$ from the anterior, $13\text{--}14\mu\text{m}$ wide, with a corresponding body diameter of $29\text{--}30\mu\text{m}$. In most specimens the structure of the amphid is very indistinct, but in one specimen was seen as a relatively distinct spiral structure of 2.5 turns (Fig. 2 B). Oesophagus lacks a posterior bulb. Tail conical in anterior part, then cylindrical; $3.7\text{--}4.5$ cloacal body diameters long.

Male: Spicules paired, equal, with a distal hook; 1.5 cloacal body diameters long. The gubernaculum is an inter-spicular plate bearing complicated pincer-like lateral pieces.

Discussion

We have experienced some difficulty in the generic placing of this species. If we use the criteria of Wieser (1956), it should be placed with *Paramonhystera* or *Promonhystera* because of the indistinct thin-walled amphids. However, in both these genera the males have long slender spicules. Furthermore, all species of *Paramonhystera* with long somatic setae have these confined to a single circle just behind the amphids (subgenus *Leptogastrella* Cobb, 1920), and all species of *Promonhystera* have very long labial setae. Hopper (1968) transfers *Promonhystera albigensis* Riemann, 1966 to the subgenus *Daptonema* of the genus *Theristus* on the basis of the structure of the male genital apparatus alone. He argues that this species has a gubernaculum similar to the group centred around *Theristus* (*Daptonema*) *beutschlii*, for which he provides a key. The present species also has a gubernaculum similar to other members of this group, and we therefore provisionally place it with *Daptonema*. The fact that other short spiculed species are found in the group adds weight to this argument. The only other species in the group with somatic setae longer than the corresponding body diameter is *T. (D.) albigensis*, which is immediately distinguished from *T. (D.) gelana* by its long slender spicules.

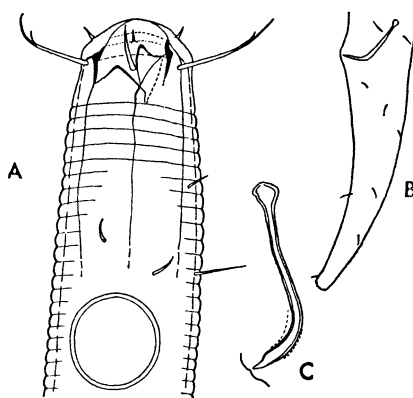
COBBIA CALEDONIA sp. nov.

(Fig. 3)

Material studied

Holotype: 1 ♂, B.M. (N.H.) Reg. No. 1972:334.

FIG. 3

Cobbia caledonia sp. nov.A: male head; B: male tail;
C: lateral view of spicules.

Body formulae and ratios

♂ :	—	216	M	925
	14	20	22	20

1,000 μ m approx. ?; a = 45; b = 4.6; c = 14 ?;Spicules = 25 μ m

Description

Cuticle distinctly striated. Labial setae 2.5 μm . Six longer cephalic setae 15 μm ; four shorter submedian cephalic setae 11 μm . Somatic setae relatively short (5-10 μm) and sparse. Buccal cavity contains three lightly cuticularised teeth, the dorsal one extending further anteriorly than the two subventral ones. Amphid 34 μm from anterior, 11 μm wide and 12 μm long, corresponding body diameter 18 μm . Tail conical but most probably broken, the long flagellum found in many similar species having been lost.

Male: Spicules paired, equal, cephalate proximally. Gubernaculum a very lightly cuticularised and indistinct structure lying parallel to the distal portion of the spicules.

Discussion

A key to the genus is given by Wieser (1959). This species belongs to the group in which the dorsal tooth is longer than the subventral. It is distinguished from other members of the group mainly by the size and position of the amphid and also by the combination of the lengths of the labial setae, cephalic setae and spicules as outlined in the following table:

Character	<i>C. caledonia</i> sp. nov	<i>C. dentata</i> Gerlach, 1953	<i>C. urinator</i> Wieser, 1959	<i>C. trefusiaformis</i> de Man, 1907
Body length	approx. 1000 μm	1000 μm	1590 μm	2000 μm
Labial setae length	2.5 μm	6 μm	6 μm	4 μm
Cephalic setae length ¹ (δ) . .	15 μm (1.1)	22-26 μm (1.5)	25 μm (1.3)	25.5 μm (1.1)
Amphid from the anterior ² .	34 μm (2.4)	22-26 μm (1.5)	25 μm (1.3)	— (1.5)
Width of amphid ³	11 μm (61)	10 μm (50)	8.5 μm (33)	8.7 μm (33)
Spicule length ⁴	25 μm (1.3)	20 μm (1.0)	36 μm (1.1)	40 μm (1.0)

1 length as fraction of head diameter in parenthesis

2 length as fraction of head diameter in parenthesis

3 width as percentage body diameter in parenthesis

4 length as a fraction of the cloacal diameter in parenthesis.

GONIONCHUS INAEQUALIS sp. nov.

(Fig. 4)

Material studied

Syntypes: 1 δ and 1 φ , B.M. (N.H.) Reg. Nos. 1972: 335.

Body formulae and ratios

δ :	—	377	M	1,127	
	21	34	35	31	
					1,375 μm ; a = 39.3; b = 3.6; c = 5.5;
					Spicule = 34 + 46 μm
φ :	—	477	M	1,247	1,360
	22	37	42	39	30
					1,680 μm ; a = 40.0; b = 3.5; c = 5.3;
					V p. 100 = 74.

Description

Cuticle transversely striated; no lateral differentiation observed. Six well-developed lips, each with a characteristic triangular flange. Labial setae 4-4.5 μm , seemingly situated on conical extensions of the labial cuticle. Six 22-26 μm cephalic setae plus ten other 7-11 μm setae (four submedian pairs and two lateral). Four short 5 μm sub-cephalic setae are situated a short distance behind the cephalic setae. Eight files of cervical setae begin level with the amphids and are most

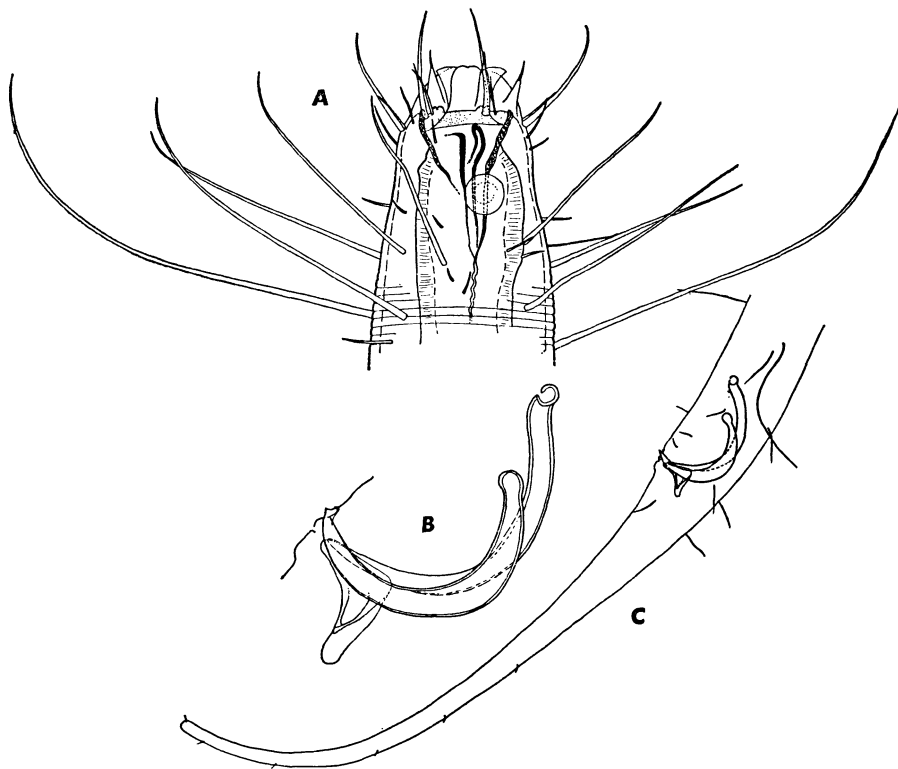


FIG. 4
Gonionchus inaequalis sp. nov.

A: male head; B: lateral view of spicules and gubernaculum; C: male tail.

numerous in the region immediately behind the amphid; length 7-140 μm , i.e., up to 400 p. 100 of the corresponding body diameter. Somatic setae as far as the anus or cloaca are spaced 60-120 μm apart longitudinally and are 250-300 p. 100 of the corresponding body diameter in length. Caudal setae only sparse and short; long terminal setae apparently absent.

Around the widest part of the buccal cavity is a narrow cuticularised band, which has six short double pegs extending anteriorly into the bases of the lips. Two subventral cuticularised flanges are present in the buccal cavity. The circular amphid is rather indis-

tinct, in the male 7 μm (28 p. 100 of the corresponding body diameter) wide and 22 μm from the anterior; in the female 9 μm (33 p. 100 of the corresponding body diameter) wide and 21 μm from the anterior. The long tapering tail is 8.0 cloacal body diameters long in the male and 10.5 anal body diameters in the female.

Male: Spicules paired, unequal; the right 1.5 cloacal body diameters long and the left 1.1 cloacal body diameters. Both are cephalate proximally. Paired dorsal gubernacular apophyses 11 μm long.

Female: Ovary single, anterior. Eggs $90 \times 35 \mu\text{m}$.

Discussion

Cobb (1920) describes *Gonionchus villosus*, which has two submedian plate-like onchia, "terminal flaps... hinged to the lips" and long slender somatic setation. Although the illustration he gives is rather poor, the description is sufficient for the present species to be placed in this genus. *G. inaequalis* sp. nov. is distinguished from the type by the possession of unequal spicules and gubernacular apophyses.

XYALA SMO sp. nov.

(Fig. 5)

Material studied

Syntypes: 2 ♂♂ and 2 ♀♀, B.M. (N.H.) Reg. Nos. 1972: 336-337.

Paratype: 1 ♂, personal collection of R.M.W.

Body formulae and ratios

♂ :	—	311	M	1,176	
	19	29	31	25	1,356 μm ; a = 43.7; b = 4.4; c = 7.5;
					Spicule = 30 μm
♂ :	—	306	M	1,013	
	19	29	30	23	1,319 μm ; a = 44.0; b = 4.3; c = 7.5;
					Spicule = 29 μm
♀ :	—	360	993	1,207	
	22	30	31	24	1,407 μm ; a = 47.4; b = 4.1; c = 5.6;
					V p. 100 = 67.5
♀ :	—	316	900	1,097	
	21	29	31	23	1,310 μm ; a = 42.3; b = 4.1; c = 6.1;
					V p. 100 = 68.5

Description

Cuticle transversely striated and also marked with longitudinal files of cuticular blocks. Anteriorly these blocks carry characteristic dumbbell shaped excrescences the height of which gradually reduces posteriorly until approximately half way along the length of the oesophagus they are no longer visible. The number of longitudinal

files in the head region is 32, reducing to about 24 in the middle region of the body and 20 in the cloacal or anal region.

The mouth is surrounded by six characteristic high and rather hyaline lips which bear short 3-4 μm labial setae. At the anterior end of the somewhat conical buccal cavity six V-shaped cuticular ridges extend forwards into the lips. There are 6 pairs of unequal cephalic setae, 24-28 μm and 18-21 μm in length. The tips of these setae have a withered appearance. There are four very short sub-

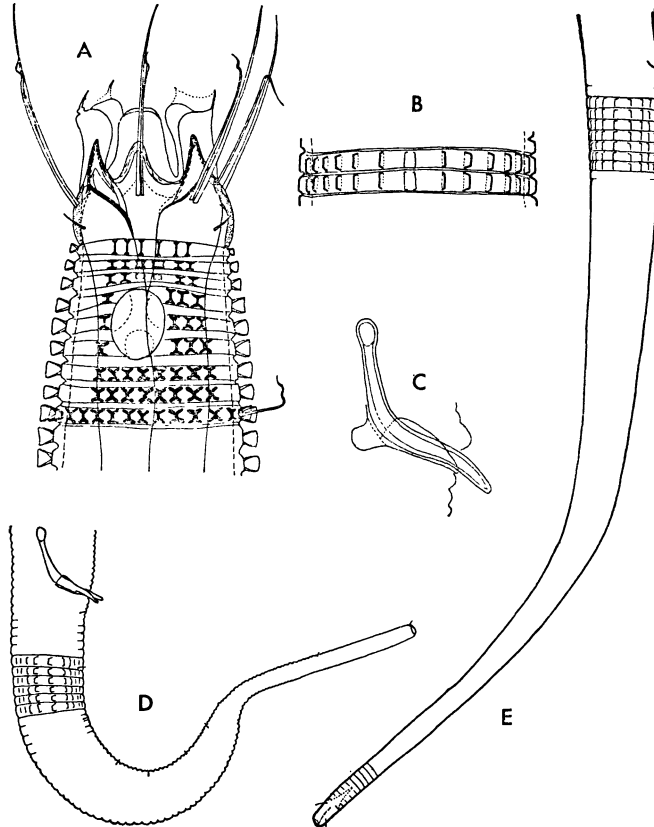


FIG. 5

Xyala smo sp. nov.

A: male head; B: cuticular pattern at base of oesophagus; C: lateral view of spicules and gubernaculum; D: male tail; E: female tail.

median setae on the head just posterior to the cephalic setae. There are a few scattered setae in the cervical region, up to 29 μm in length. The amphids are thin walled and somewhat ovoid, 7 μm wide in the male and 6 μm in the female, and are situated 25-31 μm from the anterior. The corresponding body diameter is 23 μm in the male and 26 μm in the female. The oesophagus is cylindrical throughout its length, with no posterior bulb. The tail is of a different shape in the two sexes. In the male it is 7.2-7.6 cloacal body diameters long, with the anterior two thirds tapering and the posterior third cylin-

drical. In the female it is 9.3-11.0 anal body diameters long and more evenly tapered throughout its length. In addition the male tail bears 2 subventral rows of short ($4\mu\text{m}$) setae.

Male: The spicules are paired, equal, 1.2-1.3 cloacal body diameters long. They are sharply bent in the middle and cephalate proximally. The gubernaculum is in the form of an inter-spicular plate with a weakly cuticularised dorsal apophysis.

Female: There is a single anterior ovary, but the details of its structure are not clear.

Discussion

Currently two other species are referred to this genus; *Xyala striata* Cobb, 1920 and *X. exigua* Wieser, 1956. *X. smo* is distinct from these on many points, among which may be noted the head structure, relative lengths of labial and cephalic setae, cuticular pattern and shape of the tail.

Family SIPHONOLAIMIDAE

SIPHONOLAIMUS EWENSIS sp. nov.

(Fig. 6)

Material studied

Syntypes: 2 ♂♂, B.M. (N.H.) Reg. Nos. 1972: 338.

Paratypes: 5 Juveniles, personal collection of R.M.W.

Body formulae and ratios

♂ :	—	270	M	3,788	
	17	33	37	39	3,910 μm ; a = 106; b = 14.5; c = 32.1;
					Spicule = 63 μm
♂ :	—	260	M	4,237	
	17	35	37	39	4,370 μm ; a = 117; b = 16.8; c = 32.9;
					Spicule = 56 μm

Description

Cuticle transversely striated. Ten cephalic setae; submedian pairs $18-22\mu\text{m} + 5\mu\text{m}$, lateral setae $9\mu\text{m}$. Circle of 6 subcephalic setae level with anterior border of amphids, $17\mu\text{m}$ long. Amphids thick walled, circular, $17-18\mu\text{m}$ diameter (62-71 p. 100 of corresponding body diameter), attachment of amphidial nerve prominent. Buccal cavity with axial spear $56-63\mu\text{m}$ long. Posterior half of oesophagus dilated. Nerve ring 42-46 p. 100 of oesophagus length from anterior. Intestine full of opaque black granules. Setae sparse on mid-body region, becoming more numerous on the male tail. Tail conical, 3.1-3.4 cloacal body diameters long.

Male: Spicules 1.4-1.6 cloacal body diameters long, arcuate, cephalate proximally and with weakly cuticularised ventral alae. The dorso-caudal apophysis of the gubernaculum is 27-30 μm long. On either side of the gubernaculum there is a well cuticularised lateral swelling with a cup-shaped distal end. There are six prominent setose pre-cloacal supplements.

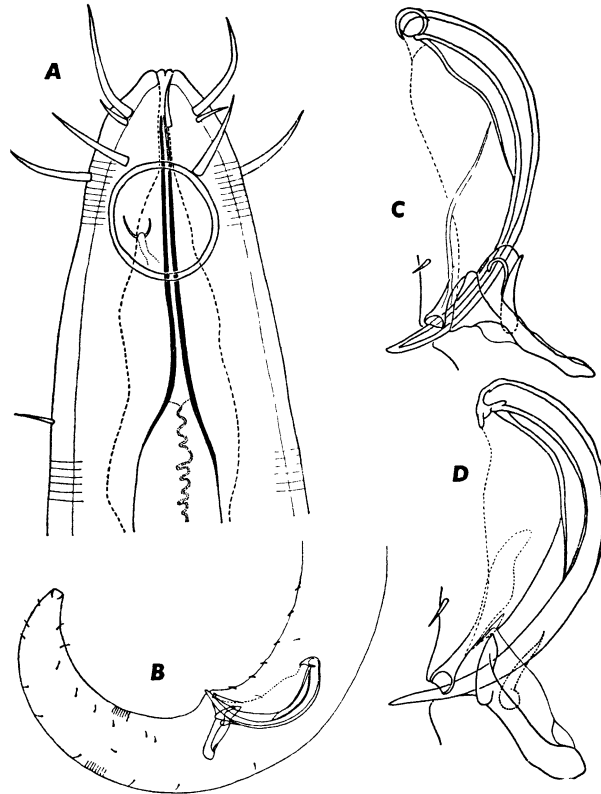


FIG. 6

Siphonolaimus ewensis sp. nov.

A: male head; B: male tail; C, D: spicules and gubernaculum of two males.

Discussion

Siphonolaimus ewensis sp. nov. is closest to *S. cobbi* Riemann, 1966. This latter species, however, has a very differently shaped gubernaculum lacking cup-shaped lateral pieces. Several other features which may be used to separate the two species are set out below.

S. cobbi

spicule 38.5 μm
tail 2.3 anal body diameters
c = 60
spear length 36 μm
3 supplements

S. ewensis

spicule 56-63 μm
tail 3.1-3.4 anal body diameters
c = 32.1-32.9
spear length 56-62 μm
6 supplements

Family SPIRINIDAE

METACHROMADORA (BRADYLAIMUS) SCOTLANDICA sp. nov.

(Fig. 7)

Material studied

Syntypes : 3 ♂♂, B.M. (N.H.) Reg. Nos. 1972: 339-340.

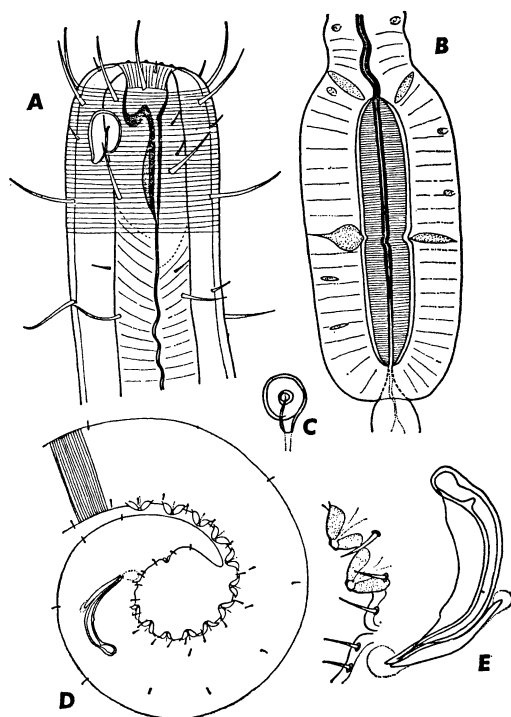


FIG. 7

Metachromadora (Bradylaimus) scotlandica sp. nov.

A: male head; B: oesophageal bulb; C: lateral view of amphid; D: male tail; E: lateral view of spicules and gubernaculum.

Body formulae and ratios

♂ :	—	178	M	1,473
	24	32	40	35

1,570 μ m; a = 39.3; b = 8.8; c = 16.2;Spicule = 31.5 μ m

♂ :	—	175	M	1,075
	23	36	21	32

1,140 μ m; a = 36.8; b = 6.5; c = 17.5;Spicule = 34.5 μ m

♂ :	—	200	M	1,183
	23	36	33	34

1,270 μ m; a = 38.5; b = 6.4; c = 14.7;Spicule = 36 μ m

Description

Cuticle with fine transverse striation. Six labial setae 3-4 μ m long. Cephalic setae comprise an anterior circle of four and a slightly

more posterior circle of six 12.5-14 μm setae. There are a few short scattered setae (4-5 μm) level with the amphids, and more posteriorly two circles each of 6-7 setae, about equal to the cephalic setae in length. Setae are sparse and short on the remainder of the body. The amphids form a single open loop 8.5-9 μm wide, the corresponding body diameter being 27-29 μm . The buccal cavity contains a large, hollow, strongly cuticularised dorsal tooth, opposed by two very small subventral projections. The oesophagus has an elongate posterior bulb 59-68 μm long and 27-31 μm wide. The bulb has a thick cuticular lining which is divided in the middle by a constriction. The tail is conical, 2.0-2.8 cloacal body diameters long. Unstriated tail tip 17 μm long.

Male: Spicules paired, equal, arcuate, slightly cephalate proximally and with ventral alae. They are about 1 cloacal body diameter in length. Gubernaculum 19-23 μm , crescentic. There are 11-13 pre-cloacal supplements each consisting of a conical elevation of the cuticle with a narrow duct leading to the interior. The supplements are less outstanding when the posterior part of the body is not ventrally bent. The anteriormost supplement is 127-206 μm in front of the cloaca. The tail bears a ventral supplement, 21-37 μm behind the cloaca, which is of the same structure as the pre-cloacal supplements. Two subventral files of short setae are present on the posterior part of the body, commencing at about the level of the anterior supplement.

Discussion

Wieser & Hopper 1967 provide a useful key to the subgenera and species of *Metachromadora*. The present species is closest to *M. gerlachi* (Gerlach, 1955) Wieser & Hopper, 1967. However, in *M. gerlachi* there is no tail supplement and the spicules are square ended and not roundly cephalate. Furthermore, the two species have a different arrangement of cephalic setae, and the oesophageal bulb in *M. gerlachi* is 82 μm long (as opposed to 59-68 μm in *M. scotlandica*) with its cuticular lining divided into two completely separate sections.

Family MICROLAIMIDAE

MICROLAIMUS ACINACES sp. nov.

(Fig. 8)

Material studied

Syntypes : 3 ♂♂, B.M. (N.H.) Reg. Nos. 1972: 341.

Body formulae and ratios

♂ :	—	139	M	953	
	13	29	30	24	

1,150 μm ; a = 38.5; b = 8.3; c = 11.9;
Spicule = 27 μm

δ :	—	109	M	825
	13	28	29	22

1,010 μm ; a = 34.8; b = 9.3; c = 11.9;

Spicule = 28 μm

δ :	—	134	M	1,022
	13	27	29	24

1,095 μm ; a = 37.8; b = 8.2; c = 15.0;

Spicule = 28 μm

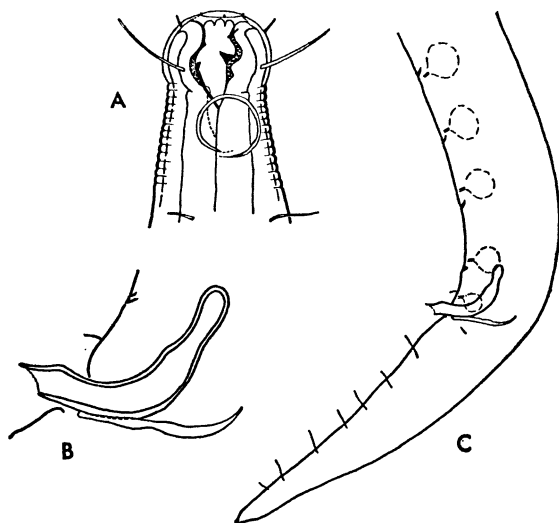


FIG. 8

Microlaimus acinaces sp. nov.

A: male head; B: lateral view of spicules and gubernaculum; C: male tail.

Description

Cuticular striations commence just anterior to the amphids. Head cuticle is restricted posterior to the cephalic setae. Six 2-2.5 μm and four 11-12 μm cephalic setae in two circles. Four 7-8 μm cervical setae behind amphids. Caudal setae, in male, in two subventral files; 7-8 μm long. Buccal cavity well developed with a large dorsal and two smaller subventral teeth. Peribuccal tissue well developed. Amphids situated 10-11 μm from anterior, 8 μm wide; corresponding body diameter 13-14 μm . Oval posterior oesophageal bulb about 19 \times 25 μm . Tail conical, 3.0-4.0 cloacal body diameters long.

Male: Spicules paired, equal and sickle-shaped; 1.1-1.3 cloacal body diameters long. Paired gubernaculum 21-22 μm long, proximally spoon-shaped. Four small preanal supplements present. There are two files of nine subventral pre-cloacal cuticularised ducts which emanate from subcuticular glands.

Discussion

This species belongs to Gerlach's (1950) group A on the basis of the well developed buccal cavity. It is probably closest to *M. paraborealis* Allg n, 1940 *sensu* Gerlach, 1950, on the basis of the size and position of the amphids and presence of postanal setae. The two species differ, however, in the length of the cephalic and postanal setae, the length of the gubernaculum and the form of the spicules. *M. acinaces* is further characterised by the presence of pre-cloacal supplements and subventral glands.

Family DASYNEMELLIDAE

DASYNEMELLA ALBAENSIS sp. nov.

(Fig. 9)

Material studied

Syntypes: 1 ♂ and 2 ♀♀, B.M. (N.H.) Reg. Nos. 1972: 342-343.

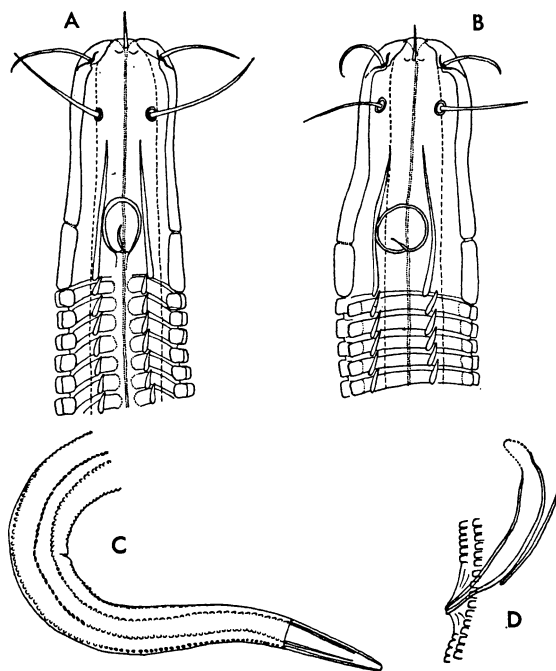


FIG. 9

Dasynemella albaensis sp. nov.

A: male head; B: female head; C: female tail; D: lateral view of spicules and gubernaculum.

Body formulae and ratios

♂ :	—	204	M	1,483	
	13	19	22	20	1,610 μm; a = 73.2; b = 7.9; c = 12.7;
					Spicule = 24 μm
♀ :	—	179	765	1,336	
	13	21	27	17	1,430 μm; a = 53.0; b = 8.0; c = 11.5;
					V p. 100 = 53.5
♀ :	—	203	780	1,378	
	14	21	29	21	1,500 μm; a = 51.7; b = 7.4; c = 12.3;
					V p. 100 = 52.0

Description

Cuticle marked by coarse transverse striations and bears longitudinal files of obliquely orientated cuticular flanges. There are 8 files on the anterior and posterior parts of the body, 10 on the middle region and 6 near the tail tip. No setae on the general body surface. Cuticle in the head region markedly thickened forming a cephalic capsule 27-32.5 μm long and 17-18 μm wide at its base. Capsule unstriated but bears eight cuticular ribs which extend forwards from its base. The capsule is slightly constricted posterior to the cephalic setae, and is pierced by median pores at the level of the amphids. An anterior circle of six 7-10 μm cephalic setae and more posteriorly four 10-15 μm cephalic setae. The head diameters given in the above formulae are measured at the level of these posterior setae. Buccal cavity absent. Amphids form a closed loop and are oval in outline (5 μm wide) in the male, but circular (6-6.5 μm wide) in the female. Amphids 15-22 μm from anterior. Oesophagus narrow, cylindrical, no posterior bulb. Tail conical, 5.8-7.3 anal or cloacal body diameters in length. Unstriated tip 22.5-31 μm long, with six cuticular ribs extending two thirds of the way down its length.

Male: Spicules 1.2 cloacal diameters long, rather weakly cuticularised especially at the proximal end. Gubernaculum a weakly cuticularised plate 15 μm long.

Female: Because of the thick body cuticle, details of the female reproductive system are not clearly visible.

Discussion

This species is distinguished by the position and form of the amphids, the lengths of the cephalic setae and the cuticular pattern. Riemann (1966) describes a species of *Dasynemella* which is almost certainly identical with *D. albaensis*. However, he had no males and was unable to determine the form of the amphids, and for these reasons did not feel justified in establishing a new species.

Family OXYSTOMINIDAE

TREFUSIA ZOSTERICOLA Allgén, 1933 (Fig. 10)

Material studied

1 ♂.

Body formulae and ratios

♂ :	—	330	M	3,331	
	23	30	30	30	3,550 μm ; a = 118.0; b = 10.8; c = 16.2;
					Spicule = 55 μm

Description

Six $14\text{ }\mu\text{m}$ jointed cephalic setae. Subcephalic setae $9\text{ }\mu\text{m}$, situated posterior to amphid ($36\text{ }\mu\text{m}$ from anterior). Two lateral setae $34\text{ }\mu\text{m}$ and $52\text{ }\mu\text{m}$ behind amphids. Amphid $24\text{ }\mu\text{m}$ from anterior, maximum width $6\text{ }\mu\text{m}$ (corresponding body diameter $24\text{ }\mu\text{m}$). Tail 7.3 cloacal diameters long.

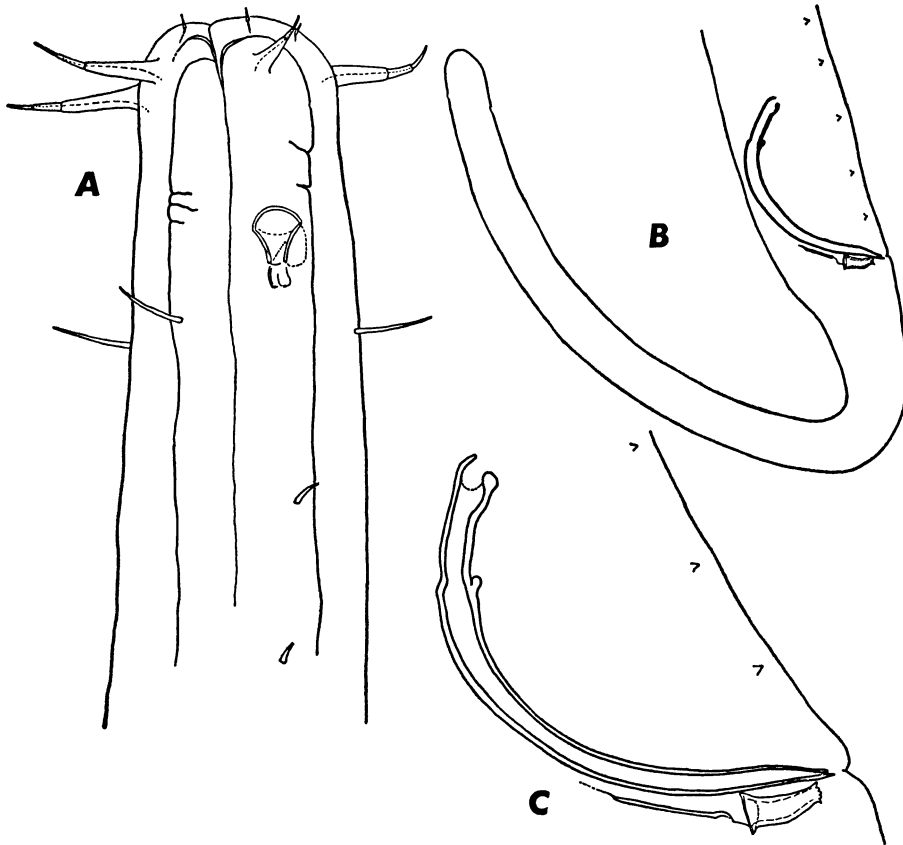


FIG. 10

Trefusia zostericola Allgén, 1933

A: male head; B: male tail; C: lateral view of spicules and gubernaculum.

Male: Spicules paired, equal, slightly cephalate proximally; 1.8 cloacal diameters long. Gubernaculum a slender rod with two well developed lateral pieces. Pre-cloacal supplements present.

Discussion

An excellent discussion and key to this genus is given by Riemann (1966a). This species is characterised by the elongate spicules, the tail length and the position of the subcephalic setae. Only Allgén

has described and recorded *T. zostericola* previously; his figures are rather poor, but sufficient to allow the present specimen to be equated with it.

Family ENOPLIDAE

GAIRLEANEMA ANAGREMILAE gen. et sp. nov.
(Fig. 11)

Material studied

Syntypes 2 ♂♂, B.M. (N.H.) Reg. Nos. 1972: 344-345.

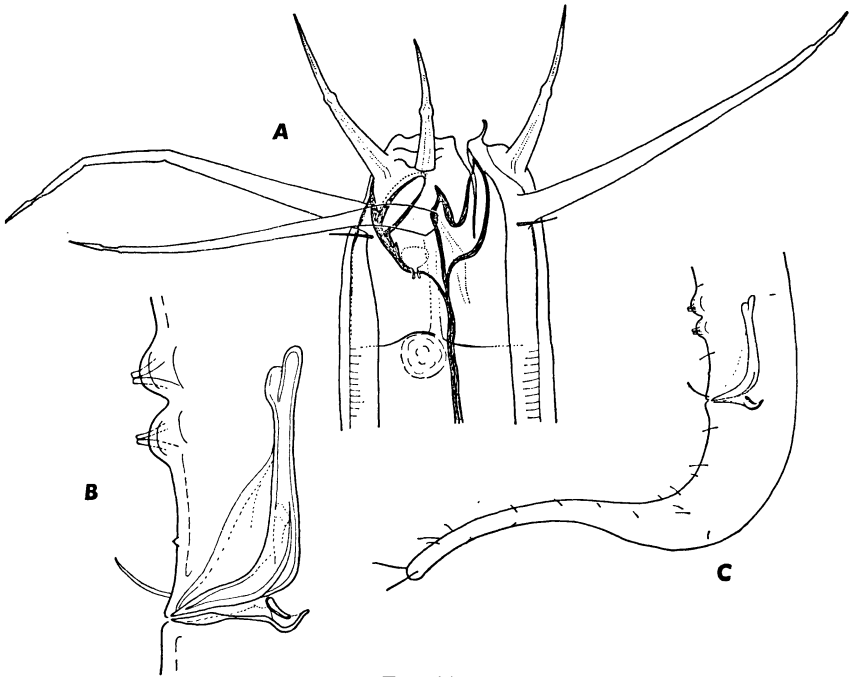


FIG. 11
Gairleanema anagremilae gen. et sp. nov.
A: male head; B: lateral view of spicules and gubernaculum; C: male tail.

Body formulae and ratios

♂ :	—	350	M	1,803	
	32	39	44	38	1,985 μm; a = 45.1; b = 5.7; c = 10.9;
					Spicule = 52 μm
♂ :	—	330	M	1,742	
	34	39	41	38	1,890 μm; a = 46.1; b = 5.7; c = 12.8;
					Spicule = 53 μm

Description

Cuticle with rather indistinct transverse striation. Mouth surrounded by three high lips each with a pair of 28-30 μm labial setae. The labial setae have bulbous swelling about half way along their length. Ten cephalic setae; six longer ones 68-69 μm with a thin section near the tip; four shorter 7 μm . There are a few short (up to 4.5 μm) setae scattered on the anterior cervical region. Caudal setae and two subventral 17 μm terminal setae present, but other somatic setation apparently lacking. Cephalic capsule weakly developed with its posterior border indistinct. Buccal cavity with a pointed heavily cuticularised dorsal onchium pierced by a duct which leads into the oesophageal musculature. Two subventral teeth less strongly cuticularised, with rounded tips. Amphids situated just behind lateral cephalic setae, indistinct but with the point of junction of the amphidial nerve prominent. There is a small (7-8 μm diameter) circular area of unstriated cuticle situated laterally just behind the cephalic capsule. Oesophagus cylindrical, 22-25 μm wide at its base. Nerve ring 144-150 μm from anterior. Tail 3.9-4.8 cloacal diameters long, posterior half cylindrical.

Male: Spicules 1.4 cloacal diameters long, equal, L-shaped, cephalate proximally and with broad ventral alae. Gubernaculum paired, 21 μm long, with hooked dorsal apophyses. There is a ventral pre-cloacal seta 11.5-13 μm long, a small ventral papilla 12.5-13 μm in front of the cloaca and two large rounded mammilate protuberances in front of this. The posterior protuberance is 32 μm in front of the cloaca and the anterior 43-48 μm in front of the cloaca. The nipples are pierced by fine pores.

Discussion

Gairleanema gen. nov. is probably closest to *Saveljevia* Filipjev, 1927, which has well developed onchia and vestigial or reduced mandibles. This latter genus is poorly known, since all its species (*S. curvidens* Filipjev, 1927; *S. kolaensis* Filipjev, 1927; *S. xiphonchus* Filipjev, 1927; *S. hastata* Wieser, 1953; *S. cornuta* Gerlach, 1956) are described from females or juveniles only. However, each of these species has cephalic setae which are considerably shorter than one head diameter, simple non-bulbous labial setae, and most importantly the dorsal onchium is small or reduced. None of these features pertain in *Gairleanema*, in which the dorsal onchium is large and more heavily cuticularised than the subventral ones. *Gairleanema* is further distinguished from other genera of the Enoplidae by the unique structure of its pre-cloacal supplements, which in other genera are almost always single, tubular and cuticularised. The relationship between *Gairleanema* and *Saveljevia* cannot be elucidated until males of the latter genus are found. The generic diagnosis of *Gairleanema* is as follows:

Enoplidae; mandibles absent; dorsal onchium not reduced in size; labial setae with bulbous swellings; pre-cloacal supplements mammilliform.

RHABDODEMANIA IMER sp. nov.
(Fig. 12)

Material studied

Holotype: 1 ♂, B.M. (N.H.) Reg. No. 1972: 346 plus 1 ♀ in very poor condition and not used in description.

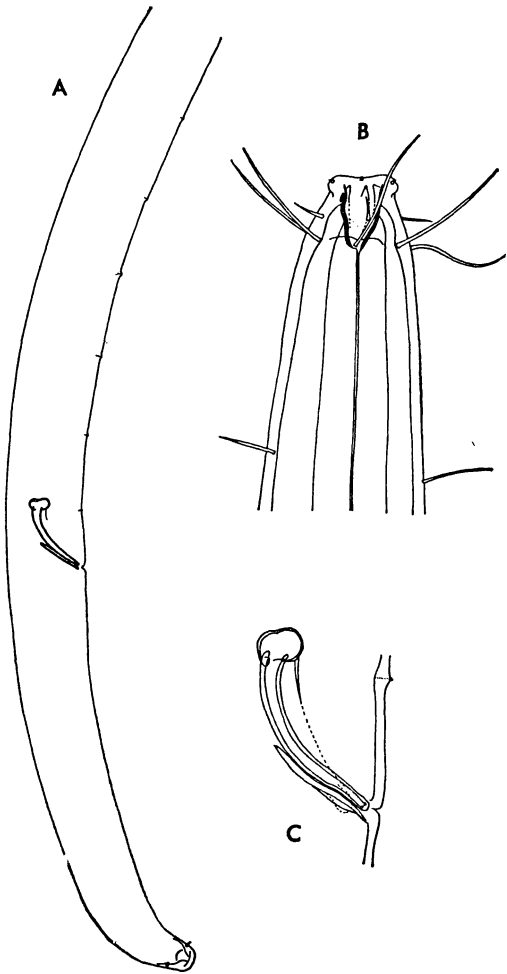


FIG. 12
Rhabdodemania imer sp. nov.
A: male tail; B: male head;
C: lateral view of spicules and gubernaculum.

Body formulae and ratios

♂:	—	370	M	2,820	
	10	23	24	24	2,960 μm; a = 123.3; b = 8.0; c = 21.1;
					Spicule = 26 μm

Description

Cuticle smooth. Six swollen rounded lips each with a small labial papilla. Cephalic setae in two separate circles, anterior four $4\text{ }\mu\text{m}$, posterior six $16.5\text{ }\mu\text{m}$. Head diameter at level of longer setae $12.5\text{ }\mu\text{m}$. Buccal cavity conical, appears to contain three weakly developed teeth at its anterior end. Four $8\text{ }\mu\text{m}$ cervical setae some distance posterior to head, but otherwise body naked. Oesophagus cylindrical, nerve ring $172\text{ }\mu\text{m}$ from anterior. Tail cylindrical for most of its length, 5.8 cloacal diameters long.

Male: Spicules paired, equal, 1.1 cloacal diameters long, roundly cephalate at the proximal end and with rather indistinct ventral alae. Gubernaculum rod-shaped, $14\text{ }\mu\text{m}$ long. Six small papillose pre-cloacal supplements more or less equally spaced, the anteriormost $147\text{ }\mu\text{m}$ in front of the cloaca.

Discussion

The only other species with cephalic setae longer than one head diameter are *R. coronata* Gerlach, 1952 and *R. illgi*, Wieser, 1959. In *R. coronata* both sets of cephalic setae are of the same length. *R. illgi* is described from females only, but is much larger than *R. imer* in all dimensions, the buccal armature is more highly developed and the tail is only 3.3 anal diameters long.

TRILEPTIUM PARISETUM sp. nov.

(Fig. 13)

Material studied

Holotype: 1 ♂, B.M. (N.H.) Reg. No. 1972: 347.

Body formulae and ratios

$$\begin{array}{rcccl} \text{♂} : & \frac{\text{---}}{25} & \frac{72}{37} & \frac{M}{39} & \frac{3,715}{41} \end{array} \quad \begin{array}{l} 3,880\text{ }\mu\text{m}; a = 99.5; b = 5.4; c = 23.5; \\ \text{Spicule} = 35\text{ }\mu\text{m} \end{array}$$

Description

Cuticle with faint transverse striation. Mouth surrounded by three relatively low lips each bearing a pair of stout conical labial setae $7\text{ }\mu\text{m}$ long. Six long and four short cephalic setae situated near the posterior end of the cephalic capsule, 53 and $15\text{ }\mu\text{m}$ long. The cephalic capsule is lightly punctated round the bases of these setae. Six pairs of subcephalic setae just posterior to capsule, $35 + 17\text{ }\mu\text{m}$ long. Ten pairs of cervical setae more posteriorly, $36 + 12\text{ }\mu\text{m}$ long (one long and one short in each pair). Short setae ($9\text{--}19\text{ }\mu\text{m}$) scattered sparsely down oesophagus length; remainder of body virtually naked. Mandibles and onchia set well forward in buccal cavity. All three of about equal size. The mandibles are quite small with a solid appea-

rance, whilst the onchia are relatively large. Oesophagus cylindrical, nerve ring 163 μm from anterior. Tail 4.0 cloacal diameters long, anterior half conical and posterior half cylindrical.

Male: Spicules paired, equal, slender and non-cephalate, only 0.85 cloacal diameters long. Gubernaculum 14 μm long, in two halves, each terminating distally in a small plate bearing two lateral projections. Pre-cloacal supplement single, cuticularised, tubular, 12 μm long and situated 49 μm in front of the cloaca.

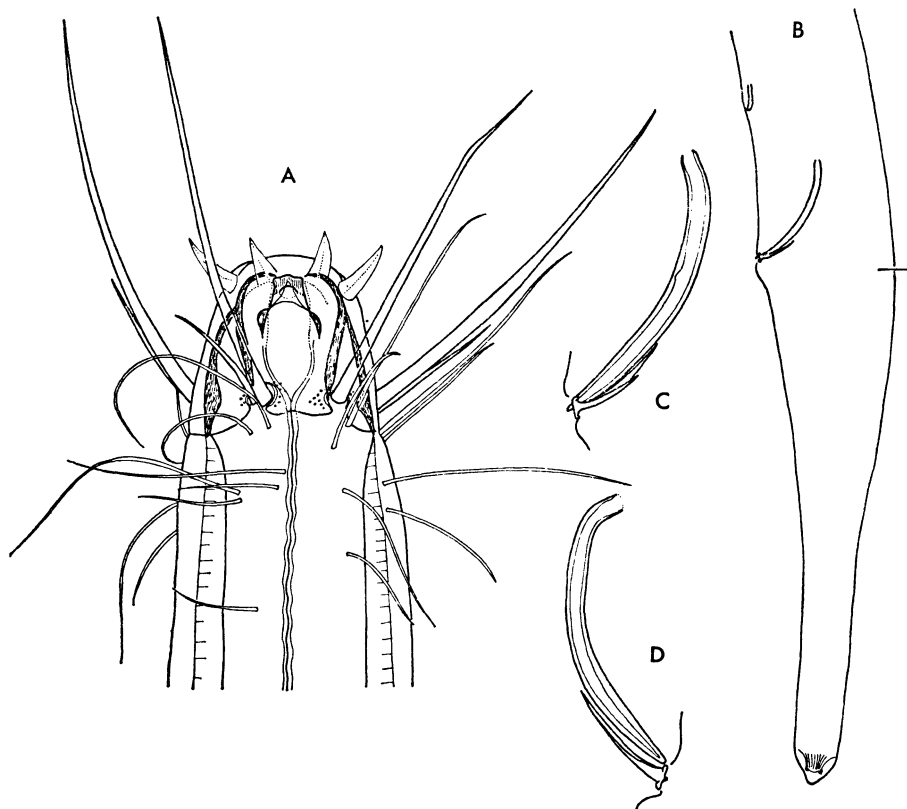


FIG. 13

Trileptium parisetum sp. nov.

A: male head; B: male tail; C: lateral view of left spicule and gubernaculum; D: lateral view of right spicule and gubernaculum.

Discussion

This species is closest to *T. longisetosum* Inglis, 1966. It differs from this species principally in the arrangement of setae on the head, the form of the gubernaculum and shape of the tail.

Acknowledgement

We would like to thank Mr. A.D. McIntyre for providing laboratory space and equipment at Loch Ewe during our visit.

Summary

Thirteen species of freeliving marine nematodes from the sandy beach at Firemore Bay, Wester-Ross, Scotland, are described. Amongst these we have proposed one new genus, *Gairleanema*, with the type species *G. anagremilae* gen. et sp. nov. Eleven others are new species referable to existing genera: *Odontophora exharena* sp. nov., *Theristus (Daptonema) gelana* sp. nov., *Cobbia caledonia* sp. nov., *Gonionchus inaequalis* sp. nov., *Xyala smo* sp. nov., *Siphonolaimus ewensis* sp. nov., *Metachromadora (Bradylaimus) scotlandica* sp. nov., *Microlaimus acinaces* sp. nov., *Dasynemella albaensis* sp. nov., *Rhabdodemanina imer* sp. nov., and *Trileptium parisetum* sp. nov. One species (*Trefusia zostericola* Allgén, 1933) is redescribed, since it was hitherto poorly known.

Zusammenfassung

Dreizehn Arten von freilebenden Meeres-Nematoden, von dem sandigen Strand in Firemore Bay, Wester-Ross, Schottland, sind hier beschrieben. Unter diesen befindet sich eine neue Gattung, *Gairleanema*, die wir vorgeschlagen haben, mit der Type *G. anagremilae* gen. et sp. nov. Elf andere Arten sind neu, beziehen sich aber auf existierende Genera: *Odontophora exharena* sp. nov., *Theristus (Daptonema) gelana* sp. nov., *Cobbia caledonia* sp. nov., *Gonionchus inaequalis* sp. nov., *Xyala smo* sp. nov., *Siphonolaimus ewensis* sp. nov., *Metachromadora (Bradylaimus) scotlandica* sp. nov., *Microlaimus acinaces* sp. nov., *Dasynemella albaensis* sp. nov., *Rhabdodemanina imer* sp. nov. und *Trileptium parisetum* sp. nov. Eine Art (*Trefusia zostericola* Allgén, 1933) ist wieder neu beschrieben, da dieselbe bisher nur wenig bekannt war.

REFERENCES

- ALLGÉN, C.A., 1933. — Freilebende Nematoden aus dem Trondheimsfjord. *Capita zool.*, 4(2), pp. 1-162.
- ALLGÉN, C.A., 1940. — Über einige norwegische marine Tiefennematoden. *Folia zool. hydrobiol.*, 10, pp. 258-281.
- COBB, N.A., 1920. — One hundred new nemas. (Type species of 100 new genera). *Contr. Sci. Nemat.*, 9, pp. 217-343.
- FILIPJEV, I.N., 1927. — Les Nématodes libres des mers septentrionales appartenant à la famille des Enoplidae. *Arch. Naturgesch.*, 91A, pp. 1-216.
- GERLACH, S.A., 1950. — Die Nematoden-Gattung *Microlaimus*. *Zool. Jb. Syst.*, 79, pp. 188-208.
- GERLACH, S.A., 1952. — Nematoden aus dem Küstengrundwasser. *Abh. math.-naturw. Kl. Akad. Wiss. Mainz.*, Jg. 1952, No. 6, pp. 1-58.
- GERLACH, S.A., 1953. — Die Nematodenbesiedlung des Sandstrandes und des Küstengrundwassers an der italienischen Küste. *Arch. Zool. ital.*, 37, pp. 519-640.
- GERLACH, S.A., 1955. — Zur Kenntnis der freilebenden marinen Nematoden von San Salvador. *Z. wiss. Zool.*, 158, pp. 249-303.
- GERLACH, S.A., 1956. — Diagnosen neuer Nematoden aus dem Kieler Bucht. *Kieler Meeresforsch.*, 12, pp. 85-109.
- HOPPER, B.E., 1968. — Marine nematodes of Canada. I. Prince Edward Island. *Can. J. Zool.*, 46, pp. 1103-1111.
- INGLIS, W.G., 1966. — Marine nematodes from Durban, South Africa. *Bull. Br. Mus. nat. Hist. (Zool.)*, 14, pp. 79-106.
- DE MAN, J.G., 1907. — Sur quelques espèces nouvelles ou peu connues de Nématodes libres habitant les côtes de la Zélande. *Mém. Soc. Zool. France*, 20, pp. 33-90.
- MCINTYRE, A.D. and ELEFThERIOU, A., 1968. — The bottom fauna of a flatfish nursery ground. *J. mar. biol. Ass. U.K.*, 48, pp. 113-142.
- RIEMAN, F., 1966. — Die interstitielle Fauna im Elbe-Aestuar. Verbreitung und Systematik. *Arch. Hydrobiol.*, Suppl. 31, pp. 1-279.
- REMANN, F., 1966a. — Die Gattung *Trefusia* de Man, 1893 (Enoplida : Oxystominidae). *Veröff. Inst. Meeresforsch. Bremerh.*, 10, pp. 1-29.

- VITIELLO, P., 1969. — Linhomoeidae (Nematoda) des vases profondes du Golfe du Lion. *Téthys*, 1, pp. 493-527.
- WIESER, W., 1953. — Freelifving marine nematodes I. Enoploidea. Reports of the Lund University Chile Expedition 1948-49. *Acta Univ. Lund. N.F.*, 49 (6), pp. 1-155.
- WIESER, W., 1956. — Freelifving marine nematodes III. Axonolaimoidea and Monhysteroidea. Reports of the Lund University Chile Expedition 1948-49. *Acta Univ. Lund. N.F.*, 53(13), pp. 1-115.
- WIESER, W., 1959. — Freelifving marine nematodes and other small invertebrates of Puget Sound beaches. *Univ. Wash. Publs Biol.*, 19, pp. 1-179.
- WIESER, W. and HOPPER, B.E., 1967. — Marine nematodes of the East Coast of North America I. Florida. *Bull. Mus. comp. Zool. Harv.*, 135, pp. 239-344.

Note added in proof

During the period in which this paper was in press, Ward (1972) has described two species of *Xyala* from Liverpool Bay. His *X. longicaudata* is clearly identical with *X. smo* and is thus the preferred name, *X. smo* becoming a nomen nudum.

REFERENCE: WARD, A.R., 1972. — Two new species of *Xyala* (Nematoda, Monhysteroidea) from sublittoral sediments in Liverpool Bay. *Mar. Biol.*, 13 (2), pp. 176-178.