

## Nematodes from the brackish waters of the southern archipelago of Finland. Benthic species<sup>1</sup>

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One new and eight previously known nematodes are described and redefined on the basis of observations of living and fixed animals from the benthos of the brackish waters in the southern archipelago of Finland: *Chromadorita fennica* sp.n.; *Desmolaimus zeelandicus* De Man, 1880; *Sphaerolaimus balticus* G. Schneider, 1906; *Microaimus globiceps* De Man, 1880; *Calomicrolaimus honestus* (De Man, 1922); *Chromadorita guidoschneideri* (Filipjev, 1929); *Sabatieria pulchra* (G. Schneider, 1906); *Ethmolaimus pratensis* De Man, 1880; *Bathylaimus longisetosus* (Allgén, 1929).

The excretory system of *S. pulchra* shows sexual dimorphism, which is regarded as a generic character. This is the first report of the feature in a free-living nematode.

The occurrence of microorganisms adhering to the nematode cuticle is briefly described and bacteria figured.

The systematic position of *Ethmolaimus* is discussed.

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### 1. Introduction

Although the free-living aquatic nematode fauna in the southern Finnish archipelago has been described by G. Schneider (1906, 1926, 1927), Gerlach (1953) and Lorenzen (1972, 1977), there still remain questions concerning the characters of several species.

Of more than forty species known from the region (Gerlach, 1953; Keynäs & Keynäs, 1978; Jensen, 1979 b) this paper gives a definition of one new one and redefinitions of eight benthic species. Moreover, a preliminary study reveals for the first time that there is a distinct nematode association living on the aquatic plants in the brackish water, and other papers will give specific information on the species composition and ecological aspects of this association, and re-descriptions of some of the species (Jensen in prep.).

### 2. Material and methods

Individuals of each species were studied either living (narcotized in  $MgCl_2$ ), or dead (fixed in 4 % formalin), or both. The formalin-fixed specimens were mounted in glycerol.

The animals, whether narcotized or fixed, were studied in detail at high magnification using a Leitz Dialux microscope with a 100 × apochromatic oil immersion objective, n.a. 1.32. All drawings were made with a camera lucida. The numbered slides mentioned were deposited in the Zoological Museum of the University of Helsinki, Finland; the remaining material is included in my own collection.

For abbreviations and values used in the formula see Jensen (1976 a). For details of the brackish-water region and the sampling stations see Niemi (1973).

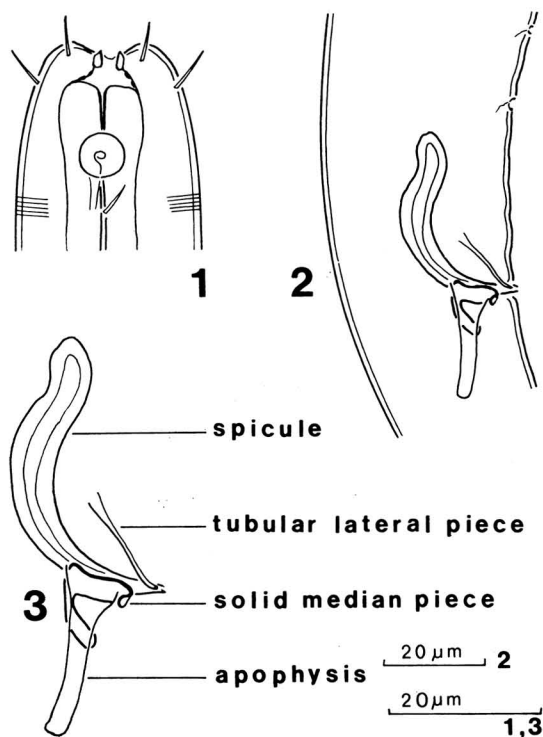
### 3. Descriptions

#### *Desmolaimus zeelandicus* De Man, 1880

Figs. 1—3

Syn. *Desmolaimus fennicus* G. Schneider, 1926 see Gerlach (1963); *Desmolaimus zeelandicus* sensu G. Schneider, 1906 see G. Schneider (1926).

<sup>1</sup> Report No. 603 from the Tvärminne Zoological Station, University of Helsinki, Finland.



Figs. 1—3. *Desmolaimus zeelandicus*. Right lateral views of male ( $\delta_1$ ); 1, head; 2, cloacal region; 3, copulatory apparatus.

#### Material

Krogarviken, 1 1/2 m, fine sediment with detritus; 7 December 1977: 5 males ( $\delta_1$ , slide No. Tv 121 bb SF), 5 females and 3 juveniles; 7 July 1978: 6 males, 5 females and 1 juvenile.

Henriksberg, 10 cm, decaying *Fucus vesiculosus* mixed with fine sediment (patches of white sulphur bacteria and purple bacteria (see Fenchel 1969: Fig. 71)); 7 July 1978: 12 males, 10 females and 6 juveniles.

Henriksberg, 1 1/2 m, medium-coarse sand with a little detritus; 7 July 1978: about 50 individuals.

#### Measurements

|            |               |    |    |     |    |              |
|------------|---------------|----|----|-----|----|--------------|
| $\delta_1$ | $L = 1.35$ mm |    |    |     |    |              |
|            | $a = 32$      | —  | 85 | 134 | M  | 1202         |
|            | $b = 10.1$    |    |    |     |    |              |
|            | $c = 9.1$     | 20 | 33 | 35  | 42 | 35           |
|            |               |    |    |     |    | 1350 $\mu$ m |

#### Males, females and juveniles

The present material is in full accord with the original description of De Man from the Netherlands and of G. Schneider from Krogarviken, Finland. The following details are new morphological characters of the species. In both adults and juveniles the amphids are circular in outline, but at deeper focus they describe a spiral with one turn (Fig. 1). The copulatory apparatus con-

sists of paired elements: gubernaculum with a prominently sclerotized base and a solid median piece; a slender sclerotized tube is distinct on each side of the spicules (Figs. 2—3). Anterior to the cloaca 11 small ventral supplements are inserted (Fig. 2). A few males from the decaying *Fucus vesiculosus* region had bacteria adhering to the cuticle in the cervical, cloacal and tail regions; they consisted of slender structures 15—20  $\mu$ m long and resembling setae, but very closely packed around the body (compare Fig. 8).

### *Sphaerolaimus balticus* G. Schneider, 1906

Figs. 4—8

#### Material

Krogarviken, 1 1/2 m, fine sediment with detritus; 2 December 1977: 1 male ( $\delta_1$ , slide No. Tv 121 d SF) and 3 females; 6 July 1978: 1 male ( $\delta_2$ , slide No. Tv 121 u SF) and 1 female.

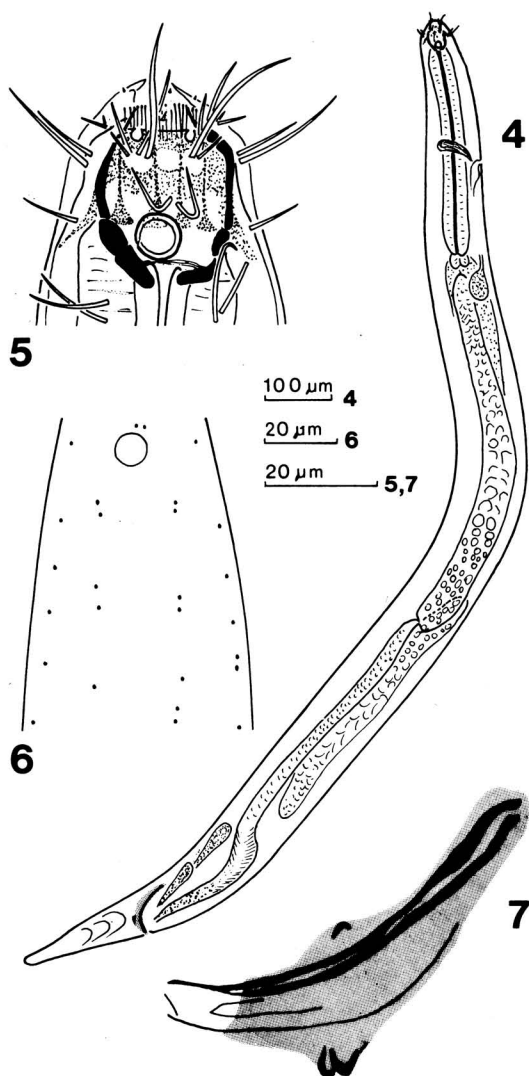
#### Measurements

|                 |               |    |     |     |      |              |
|-----------------|---------------|----|-----|-----|------|--------------|
| $\delta_1$      | $L = 1.66$ mm |    |     |     |      |              |
|                 | $a = 16$      | —  | 182 | 323 | M    | 1474         |
|                 | $b = 5.1$     |    |     |     |      |              |
|                 | $c = 8.8$     | 40 | 76  | 82  | 105  | 65           |
|                 |               |    |     |     |      | 1663 $\mu$ m |
| $\delta_2$      | $L = 1.60$ mm |    |     |     |      |              |
|                 | $a = 18$      | —  | 184 | 347 | M    | 1424         |
|                 | $b = 4.6$     |    |     |     |      |              |
|                 | $c = 9.1$     | 42 | 68  | 74  | 88   | 58           |
|                 |               |    |     |     |      | 1600 $\mu$ m |
| $\varnothing_1$ | $L = 1.90$ mm |    |     |     |      |              |
|                 | $a = 16$      | —  | 210 | 392 | 1348 | 1682         |
|                 | $b = 5.0$     |    |     |     |      |              |
|                 | $c = 8.6$     | 40 | 107 | 121 | 116  | 58           |
|                 |               |    |     |     |      | 1902 $\mu$ m |

#### Males

Cuticle striated; subcuticular ornamentation prominent on head (Fig. 5). Cephalic sense organs in two crowns as six internal labial papillae and 4—5  $\mu$ m posteriorly six external labial setae 2  $\mu$ m long with four cephalic setae 4  $\mu$ m long (Fig. 5). Subcephalic setae in eight groups, the four sublateral groups each consisting of four setae of uneven length (28  $\mu$ m, 19  $\mu$ m, 9  $\mu$ m and 3  $\mu$ m long), the four submedian groups of two setae each (20  $\mu$ m and 12  $\mu$ m). Somatic setae in eight longitudinal rows (four submedian, two subdorsal and two subventral) extending from behind amphids to tail region; they measure 16—18  $\mu$ m, but broken setae may occur (Figs. 5—6). Level with the amphids are inserted two pairs of submedian setae 10  $\mu$ m long, and 2—3  $\mu$ m in front of the amphids a pair of setae 13  $\mu$ m long are inserted ventro-sublaterally (Figs. 5—6). Amphids situated 25  $\mu$ m from anterior end, circular in outline and 7  $\mu$ m in diameter (16 % of body diameter).

Buccal cavity voluminous, with heavy sclerotized walls and anteriormost portion striated (Fig. 5). Oesophageal musculature surrounding posteriormost part of buccal cavity; oesophageal lumen prominently sclerotized (Figs. 4—5). Cardia small. Nerve ring at 52 % of oesophageal length. Renette cell at level of cardia; excretory pore opening just behind nerve ring (Fig. 4).



Figs. 4–7. *Sphaerolaimus balticus*. Lateral views of males (right: 4–5 of  $\delta_1$ ; left: 7 of  $\delta_2$ ); 4, total view; (somatic setae not depicted); 5, head; 6, pattern of somatic setae around and posterior to amphid; 7, copulatory apparatus.

Gonads diorchic, opposite and outstretched; in  $\delta_1$  the anterior branch is situated to the right of the intestine, the posterior branch to the left of it (Fig. 4); in  $\delta_2$  both testes lie to the left of the intestine; vas deferens situated to the right of the intestine, associated with ejaculatory gland cells posteriorly (Fig. 4). Copulatory apparatus embedded in a sclerotized pouch with distinct sclerotized elements (Fig. 7); it measures 80  $\mu\text{m}$ . No supplements observed.

Tail conical with short posterior portion ending in enlarged tip (Fig. 4). Subventral setae 5–6  $\mu\text{m}$  long; three subterminal setae 7  $\mu\text{m}$  long.

A very dense cover of bacteria 4–6  $\mu\text{m}$  long adhere ventrally to the cuticle anterior to the cloaca in  $\delta_2$  (Fig. 8).

#### Females

Differ from males in lengths of subcephalic setae and amphids. Subcephalic setae: sublaterally each group comprises three setae (25  $\mu\text{m}$ , 15  $\mu\text{m}$  and 12  $\mu\text{m}$  long), submedianly two setae (20  $\mu\text{m}$  and 18  $\mu\text{m}$  long). Anterior border of amphids situated 35  $\mu\text{m}$  from anterior end.

Gonad single, anteriorly directed and outstretched; postvulvar gland present.

#### Discussion

G. Schneider described and depicted *S. balticus* in 1906 and 1927 on the basis of animals from the Krogarviken region, where the present material was also taken. Even though both descriptions, and particularly the figures, are poor, I have no hesitation about my identification. *S. balticus* is the only representative of the genus found in the Finnish archipelago.

Since Schneider's reports, the species has often been recorded from north European waters and there is even a report from the east coast of the USA (Timm 1952); the present redescription is the first, however, to include information about the general and detailed structures.

The characters of *S. balticus* are in agreement with the emended diagnosis of the genus by Lorenzen (1978). One of the present males ( $\delta_2$ ) has an aberrant gonadal system with both testes on the same side (left) of the intestine.

The presence of microorganisms adhering to the nematode cuticle is of ecological interest. Unfortunately, only the pronounced associations have mostly been reported from the only taxa

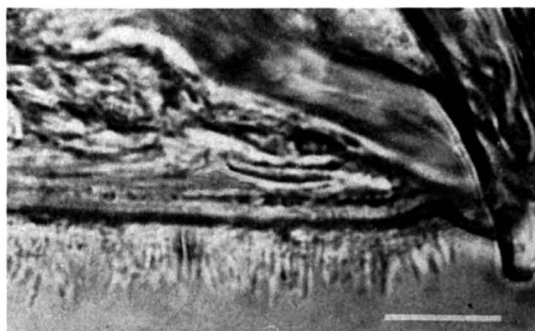


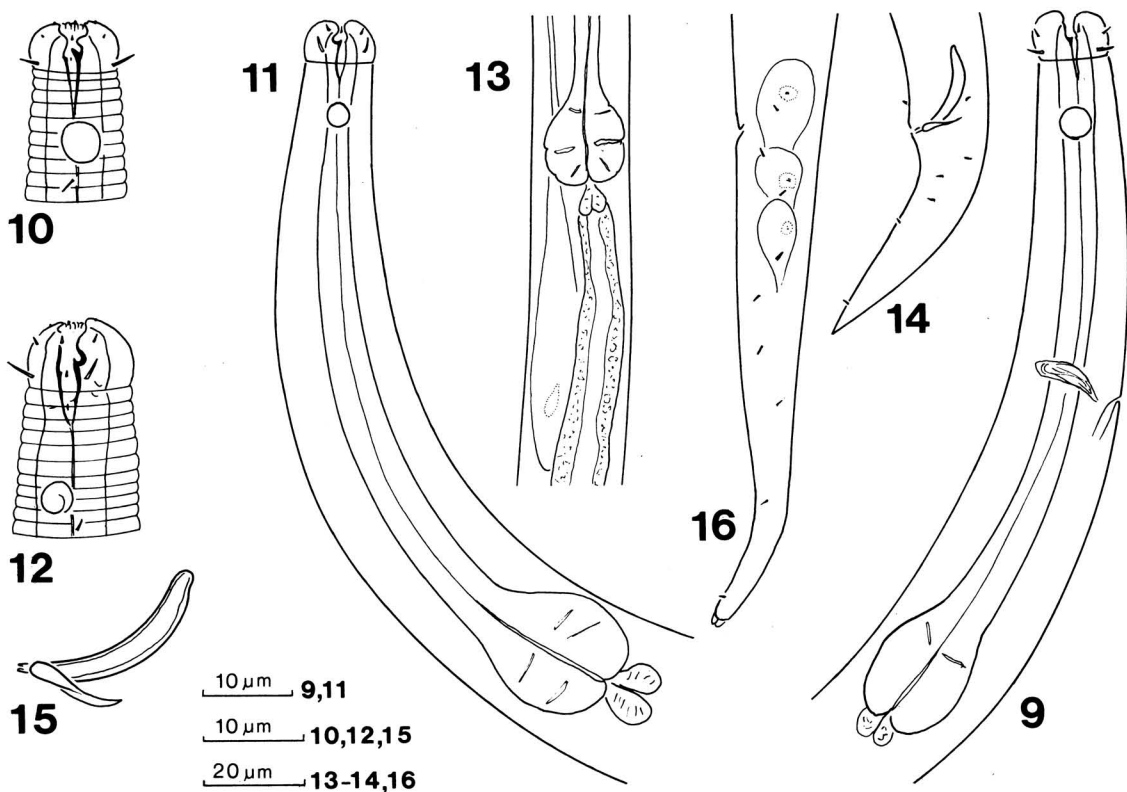
Fig. 8. *Sphaerolaimus balticus*. Left lateral view of male ( $\delta_2$ ); external association of bacteria on the cuticle, ventrally anterior to the cloaca. (scale = 10  $\mu\text{m}$ ).

known to harbour such a microflora, i.e. stilbonematids (Wieser, 1959; Hopper & Cefalu, 1973; Jensen, 1974). These associations seems to be of at least two quite different types: 1) *fortuitous*; 2) *symbiotic*.

The present reports of bacteria of different sizes adhering in different densities to the cuticle in different regions of some nematodes (see Fig. 8: *Desmolaimus zeelandicus*, *Sphaerolaimus balticus* and *Bathylaimus longisetosus*) are examples of what I regard as fortuitous phenomena, and probably also the presence of bacteria and *Suctorina* adhering to some specimens of *Sigmophor-anema litorale* (Jensen 1974: p. 78). In these nematodes the cuticle serves merely as a substrate for the microorganisms without physiological interactions, since only a few nematode specimens in a population show it and I never

observed differentiated cuticular structures (pores, papillae or tubular setae) at the sites where the microorganisms adhered.

In stilbonematids and related taxa there exist distinct and well-defined associations of specific bacteria on the cuticle of different nematode species (Wieser, 1959; Hopper & Cefalu, 1973), which I regard as obligate associations implying symbiosis. The adhering bacteria are either clumped or homogeneously distributed over the cuticle and probably correlated with the outlets of the hypodermal gland cells (see Jensen 1978 a: Fig. 2 and present study p. 157). The ecological and physiological nature of such symbiotic interactions between pro- and eukaryotes remains equivocal, but research on the subject is in progress (Jensen & Fenchel, in prep.).



Figs. 9—16. *Microlaimus globiceps*. Lateral views (right: 9, 11; left: 10, 12—16); 9, oesophageal region of male ( $\delta_2$ ); 10, head of male ( $\delta_1$ ); 11, oesophageal region of female ( $\varphi_2$ ); 12, head of female ( $\varphi_1$ ); 13, intestinal-oesophageal junction of female ( $\varphi_1$ ); 14, posterior end of male ( $\delta_2$ ); 15, copulatory apparatus of  $\delta_1$ ; 16, posterior end of female ( $\varphi_1$ ).

**Microlaimus globiceps** De Man, 1880

Figs. 9—16

**Material**

Pojoviken (Åminne), 0.5 m, medium sand; 24 August 1978: 7 males and 9 females. Storfjärden, 32 m, fine sediment; 2 December 1977: 2 males and 2 females.

Henriksberg, 10 cm, decaying *Fucus vesiculosus* mixed with fine sediment (patches of white sulphur bacteria and purple bacteria (see Fenchel 1969: Fig. 71)); 16 July 1978: 1 male and 4 females (♀<sub>1</sub>, slide No. Tv 123 a SF, together with male and other 3 females). Gulf of Finland (Ajax sampling station), 78 m, fine sediment; 2 July 1978: 1 male (♂<sub>1</sub>, slide No. Tv 122 oa SF) and 2 females.

**Measurements**

|                |             |    |    |     |     |        |
|----------------|-------------|----|----|-----|-----|--------|
| ♂ <sub>1</sub> | L = 0.52 mm |    |    |     |     |        |
|                | a = 23      | —  | 54 | 91  | M   | 448    |
|                | b = 5.7     |    |    |     |     | 516 μm |
|                | c = 7.6     | 8  | 18 | 20  | 22  | 16     |
| ♀ <sub>1</sub> | L = 0.75 mm |    |    |     |     |        |
|                | a = 29      | —  | 63 | 109 | 399 | 646    |
|                | b = 6.8     |    |    |     |     | 746 μm |
|                | c = 7.5     | 10 | 21 | 23  | 26  | 19     |

**Males**

Cuticle coarsely annulated; at midbody the annules measure up to 3 μm. Cephalic sense organs small, as six internal labial papillae, six external labial setose papillae and four cephalic setae 3 μm long (Fig. 10). Somatic setae 2 μm long in four longitudinal rows; a single pair of setae inserted just posterior to the amphids (Fig. 10). Amphids circular in outline with a tendency to spiralize; 4—5 μm in diameter or 40—42 % of body diameter; anterior border situated at 5th or 6th annule, i.e. 10 μm from anterior end (Figs. 9—10).

Buccal cavity heavily sclerotized with striated vestibulum; a distinct dorsal tooth and two subventral teeth present; dorsal sector more prominently sclerotized than other sectors (Fig. 10). Oesophageal musculature surrounds the buccal cavity; posterior portion expands to a large bulb (Fig. 9). Cardia small. Renette cell large and situated behind cardia; excretory pore opening at level of nerve ring or just behind. Nerve ring at 60 % of oesophageal length.

Gonads diorchic, opposite and outstretched. Copulatory apparatus distinctly sclerotized; spicules slightly curved, 19 μm long and without differentiations. Gubernaculum distally enlarged, with a fine insertion line giving the impression that it consists of two pieces, i.e. provided with an apophysis (Figs. 14—15). No preanal supplements observed. A single seta 2 μm long is situated ventrally 5 μm anterior to the cloaca (Fig. 14). Tail conical, 3—4 anal diameter long (Fig. 14).

**Females**

Differ from males in smaller and more posteriorly located amphids; these measure only 3 μm in diameter, i.e. 30 % of body diameter, with anterior border situated 12—15 μm from anterior end (Figs. 11—12). Tail longer and more slender than in males, about 5 times as long as anal diameter (Fig. 16).

Gonads amphidelphic-didelphic with ovaries opposite and outstretched; spermathecae present.

**Discussion**

I have no hesitation in identifying the present material as *Microlaimus globiceps* De Man 1880 (type species), which both G. Schneider (1906) and Gerlach (1953) described from the Finnish archipelago. De Man figures the terminal oesophageal bulb as nearly spherical and apparently with a sclerotized internal wall. This cannot be seen in the present material nor in specimens from the Netherlands (unpublished material from Dr. Bouwman and my own collections from there). In fact, the shape of the terminal bulb may vary somewhat (cf. Figs. 9, 11, 13), but the internal wall never has sclerotizations like those characteristic of the Molgolaimidae (previously regarded as representatives of Microlaiminae (see Jensen 1978a)).

**Calomicrolaimus honestus** (De Man, 1922)

Figs. 17—24

Syn. *Microlaimus honestus* De Man, 1922, see Jensen (1978).

**Material**

Storfjärden, 32 m, fine sediment; 2 December 1977: 3 males and 2 females.

Henriksberg, 1 1/2 m coarse — medium sand; 7 July 1978: 2 females.

Henriksberg, 32 m, medium sand; 7 July 1978: 2 males (♂<sub>2</sub>, slide No. Tv 122 daSF) and 2 females.

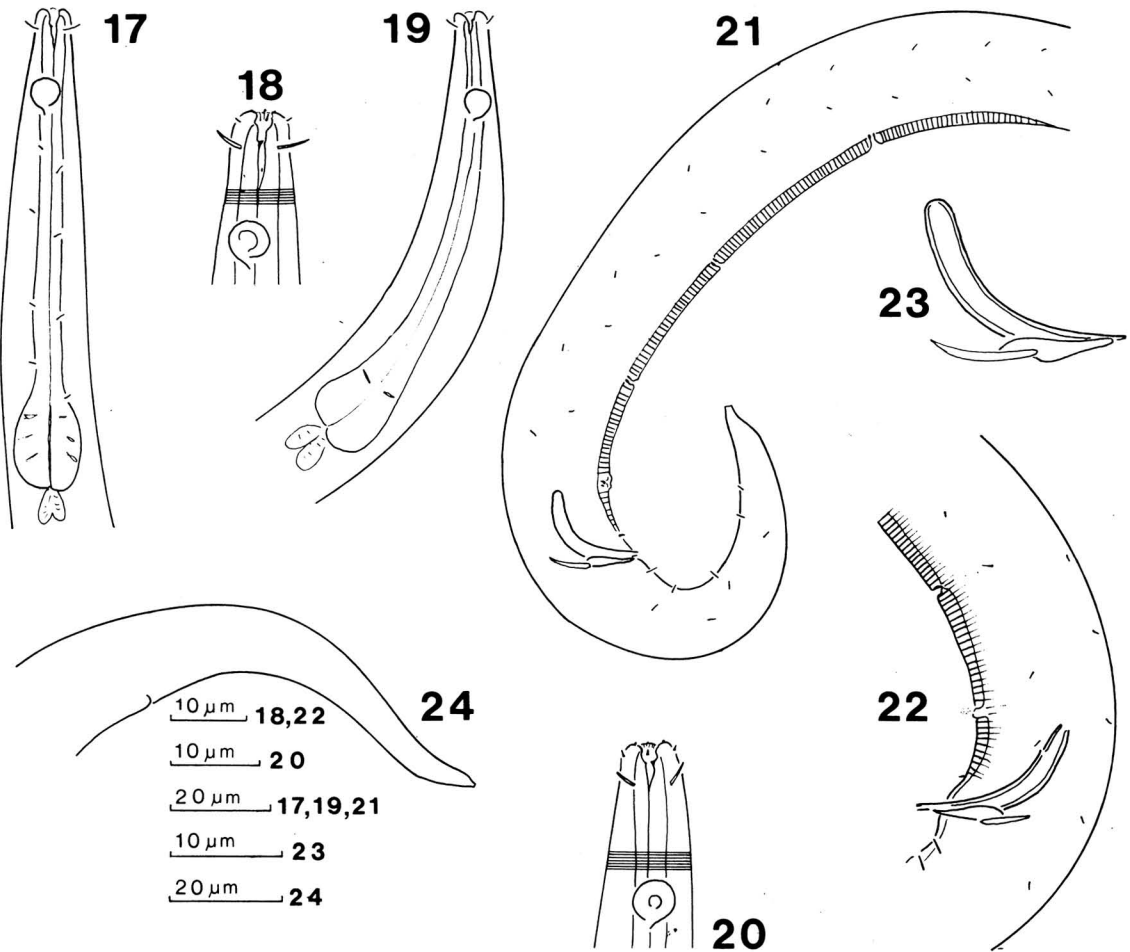
Gulf of Finland (Ajax sampling station), 79 m, fine sediment; 21 July 1978: 3 males (♂<sub>1</sub>, slide No. Tv 122 ob SF) and 2 females.

**Measurements**

|                |             |   |   |    |     |        |
|----------------|-------------|---|---|----|-----|--------|
| ♂ <sub>1</sub> | L = 0.72 mm |   |   |    |     |        |
|                | a = 31      | — | ? | 94 | M   | 643    |
|                | b = 7.6     |   |   |    |     | 716 μm |
|                | c = 9.8     | 8 | — | 19 | 23  | 20     |
| ♀ <sub>1</sub> | L = 0.69 mm |   |   |    |     |        |
|                | a = 33      | — | ? | 84 | 351 | 619    |
|                | b = 8.2     |   |   |    |     | 689 μm |
|                | c = 9.8     | 7 | — | 18 | 21  | 17     |

**Males**

Body with slender cervical region; body colour reddish brown. Cuticle very finely striated, but striation prominent ventrally anterior to cloaca, extending 150 μm (Figs. 21—22). Somatic setae 2—3 μm long, tubular and situated in four submedian rows; additional subventral rows on tail (Figs. 21—22). Cephalic sense organs as six internal labial papillae, six external labial setae about 1 μm long and four slender cephalic setae 3—4 μm long (Fig. 18). Amphids spiralized, 6 μm in diameter, i.e. 50 % of body diameter, with anterior border situated 15 μm from anterior end.



Figs. 17—24. *Calomicrolaimus honestus*. Lateral views (right: 17—18, 21, 23 of  $\delta_1$ ; left: 19—20, 24 of  $\phi_1$ ; 22 of  $\delta_2$ ); 17, oesophageal region; 18, head; 19, oesophageal region; 20, head; 21, posterior end; 22, cloacal region; 23, copulatory apparatus; 24, posterior end.

Buccal cavity distinctly sclerotized, narrow and with a dorsal tooth and two small subventral teeth; posterior portion with a small tip (Fig. 18). Oesophagus slender, anteriorly surrounding the buccal cavity, posteriorly enlarged into a bulb (Fig. 17). Cardia small. Nerve ring, renette cell and excretory pore not observed.

Gonads diorchic, opposite and outstretched. Spicules curved, 20—22  $\mu$ m long and undifferentiated. Gubernaculum consisting of two pieces (Figs. 21—23). Four or five preanal supplements present ventrally as depressions in the coarsely striated cuticle (Figs. 21—22). A single ventral seta inserted 4  $\mu$ m in front of cloaca (Figs. 21—22).

Tail conical, length 2 1/2 — 3 times anal diameter.

#### Females

Differ in having more slender tails, length 4—4 1/2 times anal diameter (Fig. 24). They lack the prominent

cuticular striation in front of the anal opening and the single seta anterior to the anus, and their amphids are slightly smaller, 4—5  $\mu$ m in diameter (Figs. 19—20).

Gonads didelphic-amphidelphic, ovaries opposite and outstretched; spermathecae present.

#### Discussion

Since neither De Man nor previous descriptions of *C. honestus* (De Man, 1922) described or figured males as having a distinctly striated-annulated ventral field anterior to the cloaca as in the present males (Figs. 21—22), the present material may in fact represent a new species. However, this is the only differentiating character I could find. Furthermore,



Gerlach's (1953) redescription was based on material from the same habitat (Henriksberg, 1 1/2 m) as parts of the present material, and he too failed to describe the above-mentioned ventral field. There thus exists an indication that the character has been overlooked in the past or more probably was considered an artefact. After an examination of specimens collected close to the type locality in the Netherlands (own collection) and of specimens from Dr. L. Bouwman's collection I have no hesitation about the identification.

In additional living material (adults) I could further demonstrate that the small and slender somatic setae are in fact tubular, by giving the animals osmotic stress (keeping them for a few minutes in tap-water), whereupon each somatic seta excreted a spherical bubble about 1/2  $\mu$ m in diameter. Such tubular setae are probably also present in other species of the family and related taxa, and are believed to be connected with the hypodermal gland cells (? excretory function) (see Jensen 1978 a: Fig. 2).

### *Chromadorita fennica* sp.n.

Figs. 25—31

#### Material

Vitsand, 1 1/2 m, medium sand; 24 July 1978: 12 males ( $\sigma_1$ , holotype, slide No. Tv 122 sa SF), 28 females ( $\varphi_1$ , paratype, slide No. Tv 122 ra SF).

Storfjärden, 5 m, fine sediment; 2 December 1977: 6 males, 14 females. Gulf of Finland (Ajax sampling station), 78 m, fine sediment; 21 July 1978: 4 males, 14 females.

Additional specimens from the Gulf of Finland (Izhorica); collected in 1924; determined and partly described by Dr. I. Filipjev (1930) under the name *Chromadorita leuckarti* (De Man, 1876): 14 specimens, of which 8 are males (slide No. N:F — 145; Zoological Institute of Leningrad, USSR).

#### Measurements

|            |               |    |     |     |    |              |
|------------|---------------|----|-----|-----|----|--------------|
| $\sigma_1$ | $L = 1.26$ mm |    |     |     |    |              |
|            | $a = 27$      | —  | 119 | 210 | M  | 1084         |
|            | $b = 6.8$     |    |     |     |    |              |
|            | $c = 7.7$     | 17 | 37  | 45  | 46 | 35           |
|            |               |    |     |     |    | 1262 $\mu$ m |

|             |               |    |     |     |     |              |
|-------------|---------------|----|-----|-----|-----|--------------|
| $\varphi_1$ | $L = 1.55$ mm |    |     |     |     |              |
|             | $a = 15$      | —  | 133 | 210 | 736 | 1340         |
|             | $b = 7.4$     |    |     |     |     |              |
|             | $c = 7.4$     | 20 | 45  | 50  | 61  | 45           |
|             |               |    |     |     |     | 1550 $\mu$ m |

#### Males

Body slender, attenuated towards the ends; in cross section slightly oval with lateral fields 15—18  $\mu$ m wide and enlarged owing to the expanded cortical layer (Fig.

27). The lateral fields cover the body from the posterior region of the oesophagus to the tail region. Cuticle punctate with dots in regular transverse rows; in the tail region and on the lateral fields annulation is distinct (Figs. 27, 30). Somatic setae in four sublateral rows, slender and transparent, 11—15  $\mu$ m long; however, some setae may be broken (Fig. 26); 1—3 somatic setae are sometimes inserted laterally in the cuticle just behind the head (Fig. 26). Amphids situated between the cephalic setae, weakly sclerotized and transversely flattened (Fig. 26). Cephalic sense organs in three crowns as six internal labial papillae, six external labial setae 1—2  $\mu$ m long and four slender cephalic setae 15  $\mu$ m long (Fig. 26).

Head surrounded by a transparent cuticular cap (Fig. 26). Vestibulum prominently striated. Buccal cavity with dorsal sector most prominently sclerotized, consisting of one large dorsal tooth, two small pointed subventral teeth and a large area of denticles (Fig. 26). Oesophageal musculature enlarged around the buccal cavity, elsewhere cylindrical with a slightly enlarged posterior portion; cardia small (Figs. 25—26). Nerve ring not observed. Excretory system apparently lying behind the cardia, but difficult to evaluate (Fig. 25). One slender, uninucleate gland cell is situated ventrally with its duct in the right subventral position; it contains very fine granules, but coarse granules are distinctly visible at the ventral margin in its anteriormost part. Posterior to this gland cell lies an oval cell with a content of spherical inclusions up to 5  $\mu$ m in diameter. In front of the uninucleate gland cell are at least three transparent cells in right subventral to submedian position with ducts directed anteriorly. No excretory pore was observed.

Gonad single, outstretched and directed anteriorly. Copulatory apparatus with paired elements consisting of undifferentiated and bent spicules 45—53  $\mu$ m long and ventral alae; gubernaculum a weakly sclerotized cap provided with a dorsally directed apophysis (Figs. 28—29). Ventrally and anterior to the cloaca is inserted a single seta followed by a series of seven supplements, each with a prominently sclerotized terminal disc (Fig. 28); the supplements have a characteristic "2 + 5" configuration, the first two being closely spaced (about 10  $\mu$ m) and situated in the region of the spicules, whereas the remaining five supplements are evenly spaced at 15—17  $\mu$ m intervals and lie more anteriorly.

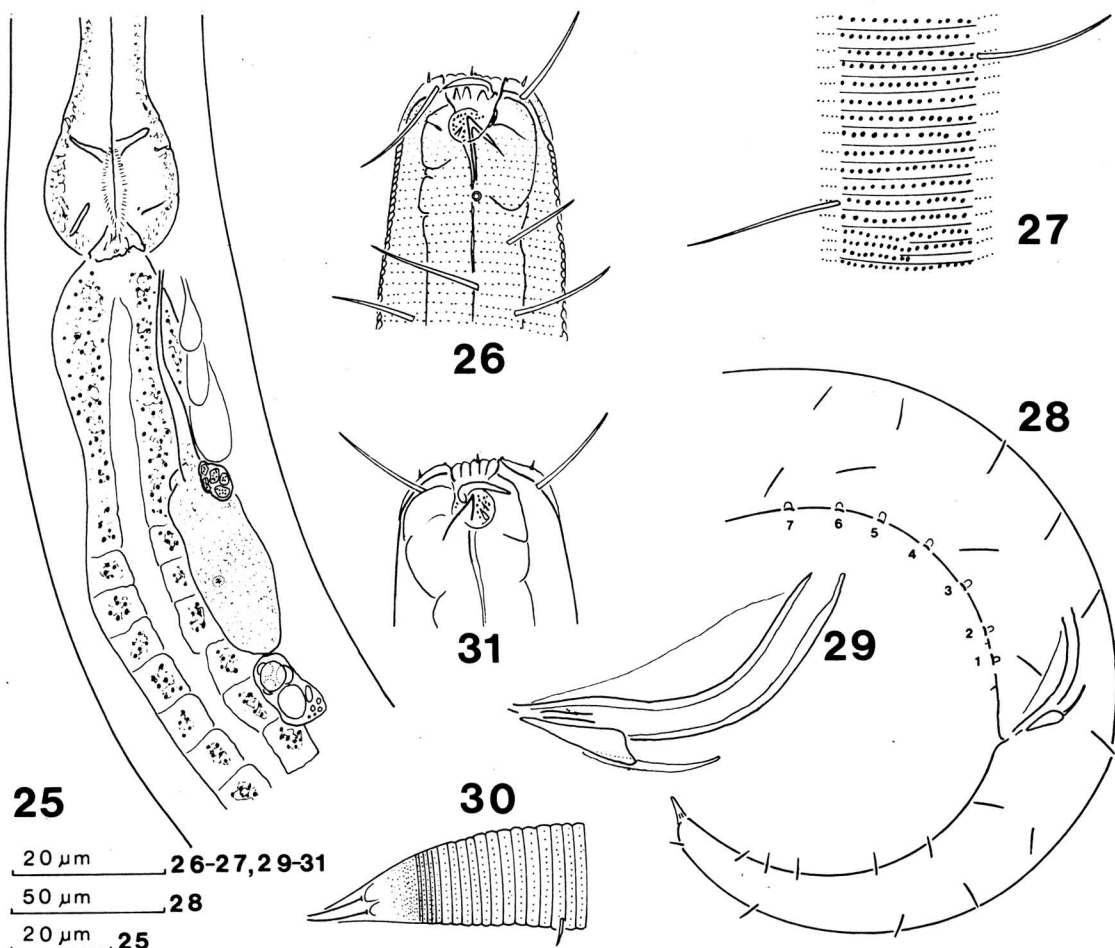
Spinneret asymmetrical and protruding (Figs. 28, 30).

#### Females

Similar to males; however, the single ventral seta anterior to the anus is lacking. The differences in the position of the amphids and cephalic sense organs (Fig. 31) compared with males (Fig. 26) are caused by the slightly protruding head of the male figured. Vaginal muscles not distinct. Reproductive system didelphic-amphidelphic with ovaries opposite and reflexed; spermathecae present.

#### Discussion

*Chromadorita fennica* sp.n. is closely related to *C. tenuis* (G. Schneider, 1906) (both coexisting in certain of the areas investigated, Jensen in prep.); only the males can be distinguished with certainty, and then in the configuration



Figs. 25—31. *Chromadorita fennica* sp.n. Lateral views (right: 31 of ♀<sub>1</sub>; 25, 30 of ♂<sub>2</sub>; left: 26—29 of ♂<sub>1</sub>); 25, intestinal-oesophageal junction; 26, head; 27, cuticular ornamentation at midbody; 28, cloacal region; 29, copulatory apparatus; 30, tail end; 31, head.

of preanal supplements: "2 + 5" vs. "11"; other differentiating characters between the two species are given in Jensen (in prep.). *C. fennica* can be separated from *Neochromadora izhorica* (Filipjev, 1929) by the simple cuticular ornamentation of the lateral fields, the degree of sclerotization of the buccal cavity, and the configuration of the preanal supplements.

The description of *C. leuckarti* (De Man, 1876) by Filipjev (1930) reveals that he probably confused his populations of *C. leuckarti* (fresh-water species) and of *C. fennica* sp.n. (brackish-water species) sampled respectively from the mouth of the Neva and the Gulf of Finland (compare Filipjev 1930: p. 32, Fig. 23 a-f with

the figures presented here). The reexamination of eight males (slide No. N:F—145, Zoological Institute of Leningrad, USSR) from Filipjev's collection confirms that these males have the same characteristic distribution of preanal supplements as in *C. fennica* sp.n.; other characters are also similar. *C. leuckarti* has eight equally spaced supplements.

#### ***Chromadorita guidoschneideri* (Filipjev, 1929)**

Figs. 32—39

##### *Material*

Pojoviken (Åminne), 1/2 m, medium sand; 24 August 1978: 28 males (♂<sub>1</sub>, slide No. Tv 134 a SF), 62 females (♀<sub>1</sub>, slide No. Tv 134 f SF).



*Measurements*

|                |             |    |     |     |    |     |         |
|----------------|-------------|----|-----|-----|----|-----|---------|
| ♂ <sub>1</sub> | L = 1.00 mm |    |     |     |    |     |         |
|                | a = 19      | —  | 110 | 159 | M  | 859 |         |
|                | b = 6.3     |    |     |     |    |     | 1000 μm |
|                | c = 7.1     | 20 | 33  | 39  | 52 | 35  |         |

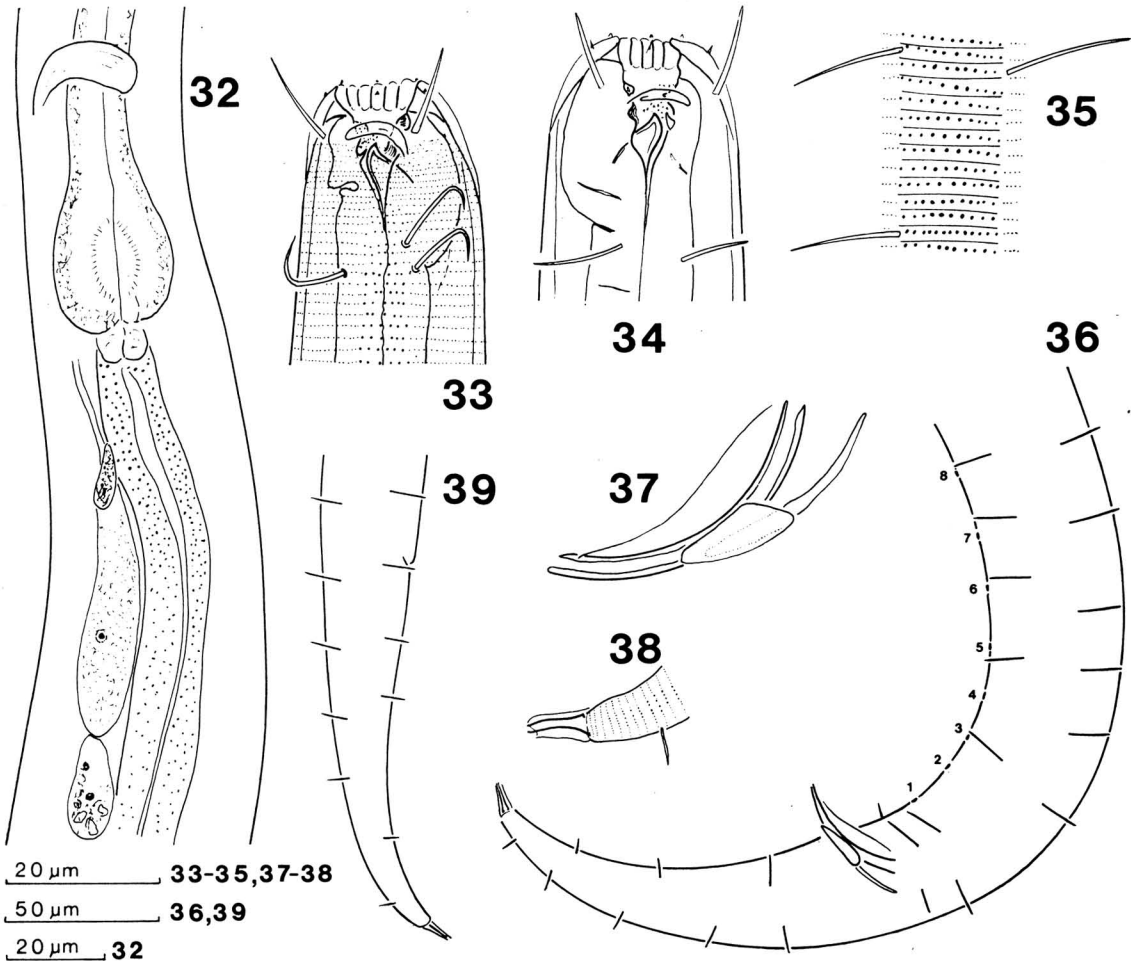
|                |             |    |     |     |     |     |         |
|----------------|-------------|----|-----|-----|-----|-----|---------|
| ♀ <sub>1</sub> | L = 1.01 mm |    |     |     |     |     |         |
|                | a = 19      | —  | 114 | 174 | 486 | 879 |         |
|                | b = 5.8     |    |     |     |     |     | 1012 μm |
|                | c = 7.6     | 21 | 40  | 49  | 53  | 31  |         |

*Males*

Body slender, attenuated towards the ends; in cross section slightly oval with expanded lateral fields 14—16 μm wide (Fig. 35). Cuticle annulated, each annule consisting of dots, especially large in the lateral fields

(Figs. 33, 35, 38). Somatic setae slender, 15—18 μm long and situated in four longitudinal rows, one on each side of the lateral fields (Figs. 33, 35). Cephalic sense organs in three crowns as six internal labial papillae, six external labial papillae and four slender cephalic setae 12—13 μm long (Fig. 33). Amphids located between cephalic sense organs; they are slit-like, but at deeper focus they describe a transverse spiral (Fig. 33).

Lips high, vestibulum prominently sclerotized and striate. Buccal cavity strongly sclerotized, especially in the dorsal sector; the anterior portion consists of plates; more posteriorly it bears one large dorsal tooth, two small subventral teeth and minute denticles (Fig. 33). Oesophageal musculature expanded around the buccal cavity, elsewhere cylindrical, but with an expanded bulb at posterior end; cardia small (Figs. 32—33). Excretory system complicated, with one large, slender gland cell situated ventrally behind the cardia; one



Figs. 32—39. *Chromadorita guidoschneideri*. Lateral views (right: 34, 39 of ♀<sub>1</sub>; left: 32—33, 35—38 of ♂<sub>1</sub>); 32, intestinal-oesophageal junction; 33, head; 34, head; 35, cuticular ornamentation at midbody; 36, cloacal region; 37, copulatory apparatus; 38, tip of tail; 39, tail.

oval cell lies anteriorly and another posteriorly to this gland cell (Fig. 32); excretory pore not observed.

Gonad single, outstretched and directed anteriorly. Spicules undifferentiated, slightly bent and 43–48  $\mu$ m long; ventral alae present; gubernaculum weakly sclerotized and provided with a dorsal apophysis (Figs. 36–37). Anterior to the cloaca and ventrally is inserted a small seta 3  $\mu$ m long and followed by a series of eight almost equally spaced supplements, each with a small terminal disc (Fig. 36).

Spinneret asymmetrical and protruding (Figs. 36, 38).

#### Females

Similar to males in most respects (Figs. 34, 39). The single ventral seta anterior to the anus is lacking.

Reproductive system didelphic-amphidelphic with ovaries opposite and reflexed; spermathecae present.

#### Discussion

The present redescription of *C. guidoschneideri* is in most respects in accord with the type description by Filipjev (1929, 1930) for material from the Gulf of Finland. Differences: the shape of the amphids, the presence of denticles and the actual dimensions of the lateral fields which I consider unimportant in describing a new species. *C. guidoschneideri* is distinguished from other related species by the high lips and configuration of preanal supplements.

#### *Sabatieria pulchra* (G. Schneider, 1906)

Figs. 40–55, Table 1

Syn. *Aphanolaimus pulcher* G. Schneider, 1906, see Riemann (1970).

#### Material

Krogarviken, 1 1/2 m, fine sediment with detritus; 2 December 1977: 36 males ( $\delta_1$ , slide No. Tv 121 bc SF, together with a female), 42 females and 64 juveniles; 7 July 1977: 58 males, 49 females ( $\delta_1$ , slide No. Tv 121 c SF) and 84 juveniles; 9 July 1977: 6 males, 6 females and 4 juveniles (all specimens on slide No. Tv 121 dd SF).

Storfjärden, 32 m, fine sediment; 7 December 1977: 8 males, 10 females and 14 juveniles.

Henriksberg, 1 1/2 m, coarse - medium sand; 7 July 1978: 2 males and 1 female.

Henriksberg, 12 m, medium sand; 7 July 1978: 4 males, 2 females.

Henriksberg, 22 m, medium sand; 7 July 1978: 22 males, 28 females and 14 juveniles.

Henriksberg, 32 m, medium sand; 7 July 1978: 9 males, 12 females and 15 juveniles.

Gulf of Finland (Ajax sampling station), 78 m, fine sediment; 21 July 1978: 82 males, 112 females, 156 juveniles.

#### Measurements (see also Table 1)

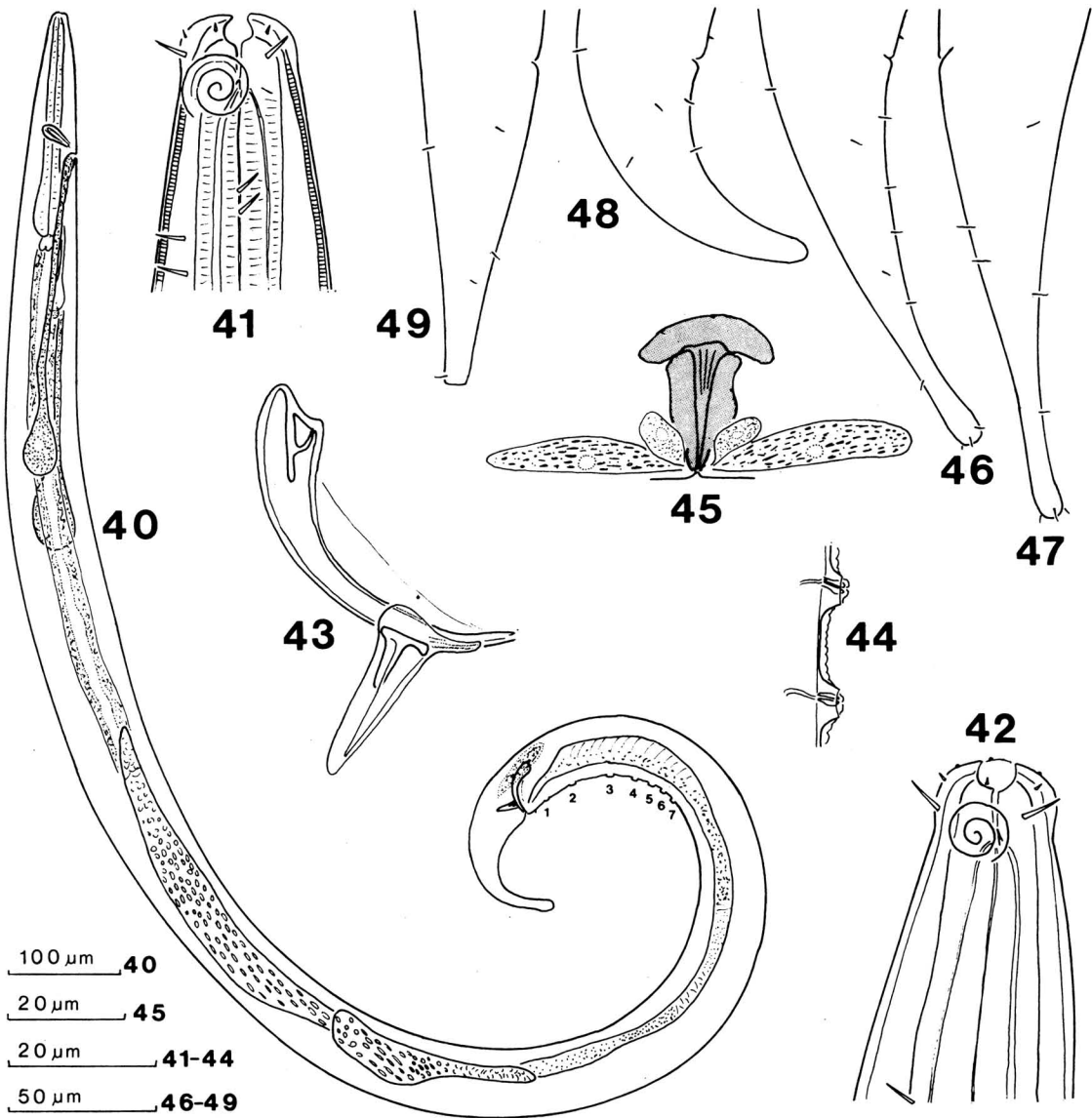
|            |               |    |     |     |      |      |              |
|------------|---------------|----|-----|-----|------|------|--------------|
| $\delta_1$ | $L = 1.88$ mm |    |     |     |      |      |              |
|            | $a = 28$      | —  | 113 | 197 | M    | 1740 |              |
|            | $b = 9.5$     |    |     |     |      |      | 1877 $\mu$ m |
|            | $c = 13.7$    | 15 | 41  | 50  | 66   | 49   |              |
| $\delta_1$ | $L = 1.94$    |    |     |     |      |      |              |
|            | $a = 23$      | —  | 138 | 208 | 1237 | 1792 |              |
|            | $b = 9.3$     |    |     |     |      |      | 1940 $\mu$ m |
|            | $c = 13.1$    | 17 | 48  | 57  | 84   | 45   |              |

#### Males

Body slender, attenuated towards the ends (Fig. 40); in cross section the body is circular with slightly enlarged lateral fields. Cortical layer of cuticle ventrally striate on tail and in region of preanal supplements (Fig. 44); cuticle smooth on head and tip of tail (Fig. 41); elsewhere the cuticle is punctate, owing to the rods present in the median layer (Fig. 41); on the lateral fields the punctation consists of larger dots in an irregular pattern. Somatic setae 4–5  $\mu$ m long in four longitudinal rows, each along the lateral fields; the first two setae in each row are closely spaced as a pair (Fig. 41); subventral and subdorsal rows of additional setae occur on the tail (Fig. 46). Amphids located in the neck region and describe a spiral with 2 3/4—3 turns (Fig. 41). Cephalic sense organs in three crowns as six internal labial papillae, six external labial setose papillae and four cephalic setae situated just anterior to amphids.

Anterior portion of buccal cavity cup-shaped with dorsal sector more distinctly sclerotized than other sectors; posterior portion tube-like and weakly sclerotized; a distinct sclerotized tip is inserted on the dorsal sector at the junction between the central and marginal oesophageal lumina (Fig. 41). Oesophageal musculature surrounds the posterior portion of the buccal cavity; posteriorly the oesophagus is slightly enlarged (Figs. 40, 50–51). Cardia small. The excretory system consists of three uninucleate gland cells, each with a duct: one pair of cells containing large granules is situated subventrally at about twice the oesophageal length from the anterior end (Figs. 40, 50–51); a single gland cell, i.e. the renette cell, with a weakly light-refractive content lies ventrally close behind the cardia, accompanied by two small subventral cells (these two latter cells are easily overlooked) (Figs. 40, 50–51). The ducts from all three enter a sclerotized ampulla (atrium) close to the cuticle and just behind the excretory pore (Figs. 51–52). No ducts were observed from the two small additional cells close to the ventral gland cell. The nerve ring is situated anterior to the excretory pore (Fig. 40).

Gonads diorchic, opposite and outstretched (Fig. 40); one of the males found had the germinative zone of the anterior testis reflexed. Copulatory apparatus with paired and bent spicules, proximally enlarged and distally tapering with additional sclerotized mouldings (Fig. 43); ventral alae present. Gubernaculum surrounding the spicules like a cuff, dorsocaudal apophyses present with a prominent sclerotized median piece (Fig. 43); a gland containing granules is situated laterodorsally (Fig. 40). Anterior to the cloaca a single seta is inserted on the cuticle and followed by a series of seven or eight supplements (5, 6 or 9 may exceptionally occur) resembling papillae raised above the cuticle (Figs. 40, 55). Each papilla has an oval disc with a central duct (Fig. 44).



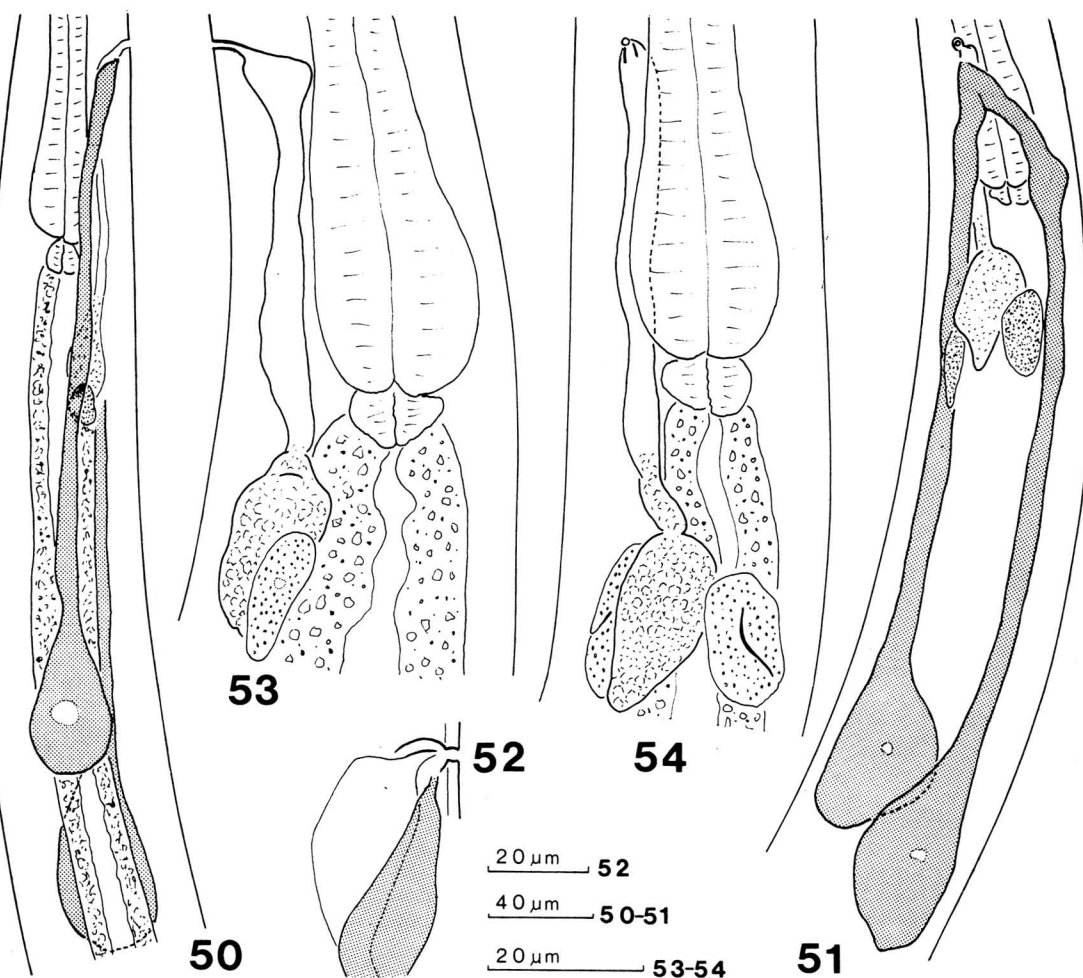
Figs. 40—49. *Sabatieria pulchra*. Lateral views (right: 40—41, 43—45, 47—48; left: 42, 46); 40, total view of male ( $\sigma_1$ , somatic setae not depicted); 41, head of male ( $\sigma_1$ ); 42, head of female ( $\rho_1$ ); 43, copulatory apparatus of  $\sigma_1$ ; 44, preanal supplements (living material); 45, vagina of  $\rho_1$ ; 46, tail of male ( $\sigma_1$ ); 47, tail of female ( $\rho_2$ ); 48, tail of male ( $\sigma_2$ , obviously broken); 49, tail of female ( $\rho_3$ , obviously broken).

Tail conical with posterior 1/3 cylindrical (Figs. 40, 46); tail tip enlarged, symmetrical and with three terminal setae; spinneret protruding. One male lacked the cylindrical portion (Fig. 48).

#### Females

For similarities to and differences from males in measurements, see Table 1. Compared with males, the females lack the striation ventrally on the tail cuticle and anterior to the anal opening; the first pair of

somatic setae in each row is lacking (Fig. 42); and so is the single seta anterior to the anus (Fig. 47, 51); the amphids describe a spiral with only 2 1/2 turns (Fig. 42). The excretory system lacks the two large granular gland cells far behind the oesophagus, but the ventral gland cell and its two associated cells seem to be similar to those of the males (Figs. 53—54); the duct joins the excretory system, opening into a dorsoventrally enlarged ampulla which leads to the excretory pore through a slender, sclerotized tube (Figs. 53—54).



Figs. 50—54. *Sabatieria pulchra*. Excretory systems; 50—51, position of cells and their ducts in males; 50, right lateral view of ♂<sub>2</sub>; 51, left subventral view of ♂<sub>3</sub>; 52, right lateral view of excretory pore of male (♂<sub>4</sub>); 53—54, location of cells, their ducts and excretory pore in females; 53, left lateral view of ♀<sub>1</sub>; 54, left subventral view of ♀<sub>4</sub>.

Reproductive system didelphic-amphidelphic with ovaries opposite and outstretched; spermathecae present. Vagina with sclerotized walls, prominently sclerotized distally (Fig. 45); vulvar glands present.

One female lacked part of the cylindrical tail portion (Figs. 47, 49).

#### Juveniles

Closely resembling the females; both the pattern of somatic setae and the excretory system are similar, at least in the largest juveniles.

#### Discussion

The redescription of *Sabatieria pulchra* (G. Schneider, 1906) given above is the first to be based on animals from the type locality in

Krogarviken since Schneider's description (1906, 1927), which contained rather poor figures. This is the only *Sabatieria* species found in the region so far. It has, however, been reported from several habitats in various parts of the world, and four other *Sabatieria* spp. are believed to be synonymous with *S. pulchra* (see Gerlach & Riemann 1973:292—293; Lorenzen 1974).

The statistical analysis of the present material reveals that the intraspecific variation of eleven adult characters is less than 10 %, as previously reported in other *Sabatieria* spp. (Jensen & Gerlach 1977; Jensen 1979 a); only the body diameter shows a greater variation due to the

developmental stages of the gonads. The number of preanal supplements shows little variation: 118 ind. with 8 suppl., 106 ind. with 7 suppl., three ind. had 5, 6 or 9 suppl. An analysis of the distance between the cloaca and the first supplement and the distances between the following supplements gives the following picture (Fig. 55):

1) The first three supplements anterior to the cloaca are more widely spaced than the following ones, regardless of the total number; the supplement closest to the cloacal opening is figured as number one.

2) The distance between supplements 3 and 4 is mostly intermediate compared with the distances between the posterior three and the anterior three or four supplements (occasionally one, two or five).

However, this arrangement is often obscured by the body curvature in this region (rather large standard deviations).

This study further reveals the existence of sexual dimorphism (see text and Table 1). The description of the sexual dimorphism of the excretory system in *S. pulchra* is to my knowledge the first report of such a significant difference in any free-living nematode. The possibility of sexual dimorphism in the region of the excretory pore was indicated in *Aegialoalaimus elegans* (Jensen 1978b: p. 230, Figs. 12–13). In six other *Sabatieria* spp. in my collection I find the situation similar to that described above in *S. pulchra*, but not in *S. hilarula* or in other representatives of Sabatierinae (*Laimella* and *Cervonema*) nor in members of the two other subfamilies of the Comesomatidae, i.e. Comesomat-

Fig. 55. The average distances between preanal supplements (pas) in *Sabatieria pulchra* from Krogarviken, southern archipelago of Finland. The bars indicate 1 SD.

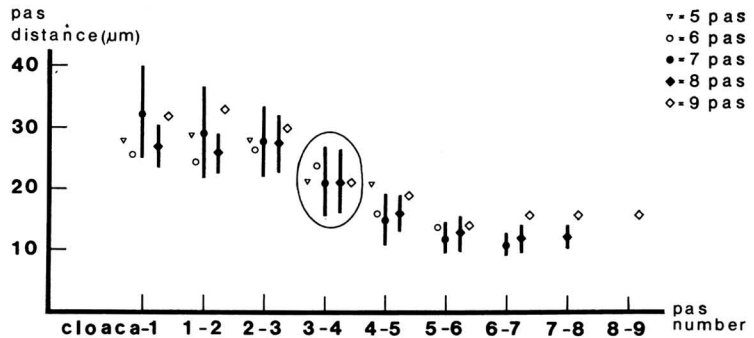


Table 1. Intraspecific variability of diagnostic characters of *Sabatieria pulchra* from Krogarviken, southern archipelago of Finland.  $\bar{x}$  = arithmetic mean; SD = standard deviation; CV % = coefficient of variability in per cent;  $X_{\max}$  and  $X_{\min}$  = highest and lowest values observed.

|              | body  | oes. | Length in $\mu\text{m}$ |            |           |       |       | Diameter in $\mu\text{m}$ |      |      |      |
|--------------|-------|------|-------------------------|------------|-----------|-------|-------|---------------------------|------|------|------|
|              |       |      | tail                    | ceph. set. | exc. pore | spic. | vulva | amph.                     | head | body | anal |
| <b>50 ♂♂</b> |       |      |                         |            |           |       |       |                           |      |      |      |
| $\bar{x}$    | 1724  | 195  | 147                     | 5.5        | 128       | 59    |       | 10.1                      | 16   | 65   | 44   |
| SD           | 147.2 | 14.9 | 13.1                    | 0.4        | 12.2      | 2.8   |       | 0.7                       | 0.5  | 7.2  | 4.1  |
| CV %         | 8.5   | 7.6  | 8.9                     | 7.8        | 9.5       | 4.7   |       | 6.5                       | 3.4  | 11.1 | 9.3  |
| $X_{\max}$   | 2057  | 228  | 171                     | 6          | 157       | 63    |       | 11                        | 17   | 81   | 52   |
| $X_{\min}$   | 1350  | 157  | 114                     | 4          | 107       | 50    |       | 9                         | 15   | 52   | 36   |
| <b>50 ♀♀</b> |       |      |                         |            |           |       |       |                           |      |      |      |
| $\bar{x}$    | 1981  | 217  | 166                     | 6.2        | 146       |       | 966   | 9                         | 17   | 73   | 42   |
| SD           | 196.0 | 16.6 | 10.8                    | 0.2        | 10.5      |       | 102.2 | 0.3                       | 1.0  | 10.3 | 4.1  |
| CV %         | 9.9   | 7.6  | 6.5                     | 3.4        | 7.2       |       | 10.6  | 3.6                       | 6.0  | 14.1 | 9.8  |
| $X_{\max}$   | 2350  | 228  | 185                     | 7          | 164       |       | 1142  | 9                         | 18   | 93   | 57   |
| $X_{\min}$   | 1642  | 200  | 135                     | 5          | 128       |       | 807   | 8                         | 15   | 58   | 39   |

inae and Dorylaimopsinae. Thus, this type of sexual dimorphism seems to be a generic character, and I am therefore not inclined to use this feature as an additional argument for removing the Comesomatidae from the Chromadorida as suggested by Riemann (1977: pp 263, 267) (see also Jensen 1979 a: p. 84). The two cells accompanying the ventral gland cell in *S. pulchra* may be coelomocytes, similar to the structures associated with the excretory system in *Anaplectus* (Allen & Noffsinger, 1968) and also found at the 2nd caudal gland cell in *Chromadorina germanica* (Lippens 1974) and *Microaimus ostracion* (Jensen 1976 b).

Riemann (1977) describes and discusses the excretory organ in *S. celtica* and figures a system similar to that described above for males of *S. pulchra*; however, his paper is based on males only (letter communication from Dr. F. Riemann) and thus the female and juvenile characters are not described.

This sexual dimorphism of the excretory system of *Sabatieria* indicates that males excrete additional product(s) (contents of subventral gland cells). However, it should be pointed out that the function of the ventral gland cell (both sexes) remains equivocal, although current opinion assumes it to be excretory (see review by Bird 1971).

### *Ethmolaimus pratensis* De Man, 1880

Figs. 56—62

#### Material

Pojoviken (Åminne), 1/2 m, medium sand; 24 August 1978: 18 males (♂<sub>1</sub>, slide No. Tv 134 j SF), 26 females (♀<sub>1</sub>, slide No. Tv 134 h SF).

#### Measurements

|                |             |    |    |     |     |         |
|----------------|-------------|----|----|-----|-----|---------|
| ♂ <sub>1</sub> | L = 1.20 mm |    |    |     |     |         |
|                | a = 24      | —  | 85 | 192 | M   | 1082    |
|                | b = 6.2     |    |    |     |     |         |
|                | c = 10.2    | 20 | 37 | 44  | 50  | 33      |
|                |             |    |    |     |     | 1200 μm |
| ♀ <sub>1</sub> | L = 1.10 mm |    |    |     |     |         |
|                | a = 21      | —  | 76 | 152 | 548 | 982     |
|                | b = 7.2     |    |    |     |     |         |
|                | c = 9.2     | 20 | 38 | 44  | 52  | 34      |
|                |             |    |    |     |     | 1100 μm |

#### Males

Body slender, attenuated towards the ends; in cross section slightly oval without distinct lateral expansions. Cuticle annulated with each annulus consisting of dots (Fig. 60). Somatic setae in four submedian rows (Fig. 56). Two kinds of setae present, small, blunt ones (2—4

μm long) and long, slender ones (10—13 μm long), mostly alternating in each row (Figs. 56, 58, 61). Cephalic sense organs with six small labial papillae around the mouth opening and close behind these four slender cephalic setae 7—8 μm long. Amphids of varying shape, circular, transverse or longitudinal oval with a tendency to spiralize; sometimes irregularities are present inside or outside the opening (Figs. 56—57, 60).

Vestibulum sclerotized and striated; anterior portion of buccal cavity cup-shaped, posterior portion cylindrical with irregularities at the junction to the oesophageal lumen; dorsal tooth prominent, two subventral teeth smaller and directed transversely (Figs. 56—57, 60). Oesophageal musculature expanded round the buccal cavity, then cylindrical, with posterior portion enlarged to a bulb; cardia drop-shaped (Fig. 56). Excretory gland cell slender and situated behind the cardia; excretory pore situated just anterior to oesophageal bulb (Fig. 56).

Gonads diorchic, opposite and outstretched. Copulatory apparatus with paired elements: spicules sickle-shaped, 48—53 μm long; ventral alae present; gubernaculum weakly sclerotized, guided laterally by a distinctly sclerotized tube which is irregularly enlarged proximally, and reversed distally (Figs. 58—59). Anterior to the cloaca and ventrally is inserted a 5-μm-long seta followed by a series of 15—17 large supplements, each with a prominent terminal disc (Fig. 58).

Spinneret symmetrical and protruding (Fig. 58).

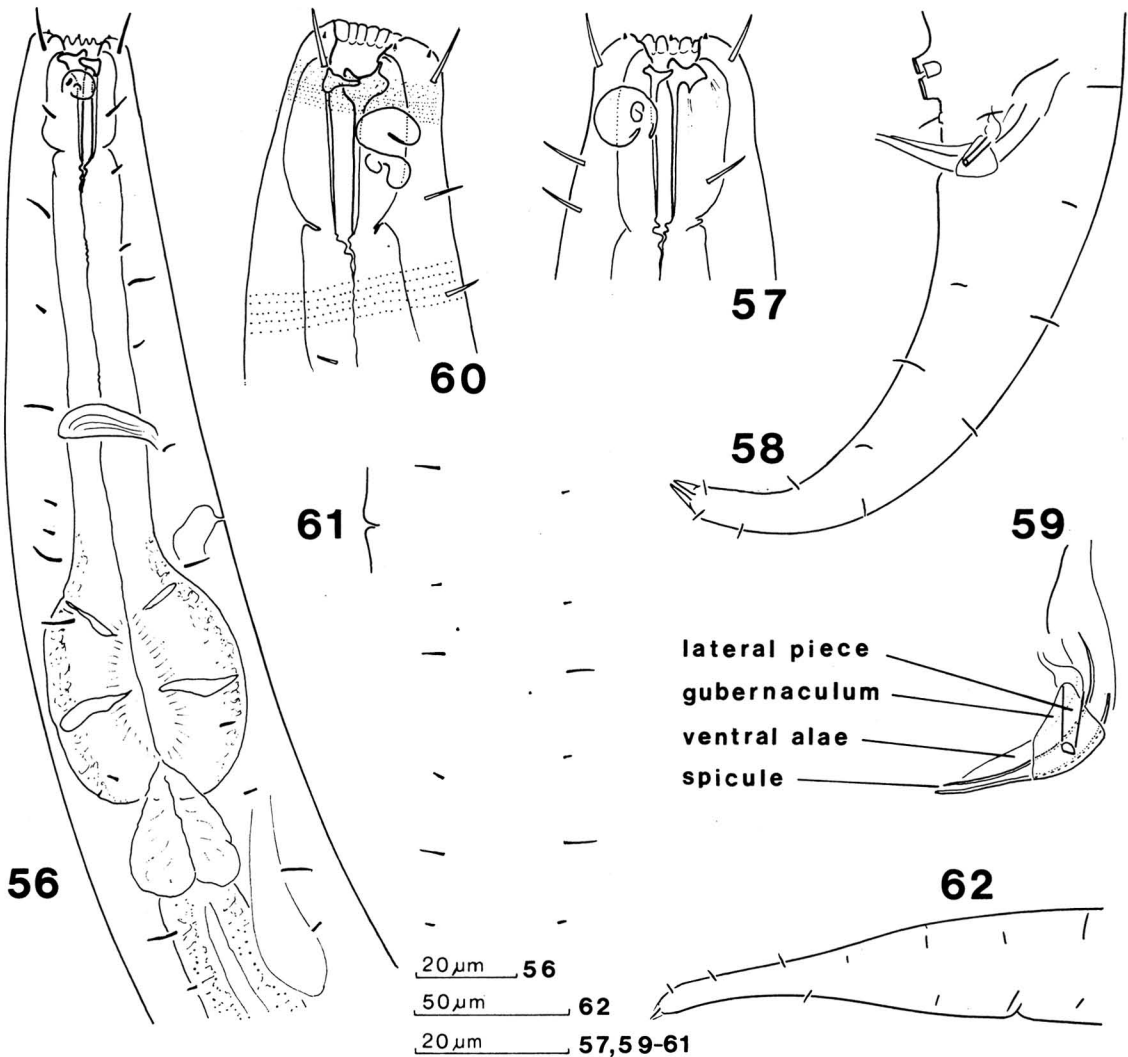
#### Females

Similar to males in most features (Figs. 56, 61—62). They lack the single ventral seta anterior to the anus.

Reproductive system didelphic-amphidelphic with ovaries opposite and reflexed.

### Discussion

Hirschmann (1952) revised the genus on the basis of several hundred individuals and concluded that there was only one true European species, i.e. *E. pratensis* De Man, 1886. The characters of the present material are mostly within the variation of that species. However, the present study has shown that both males and females have a very characteristic alternation of small blunt setae and large slender setae in four submedian rows along the body, in contrast to Hirschmann's statement that the somatic setae are variable. The dorsal tooth is definitely much larger than the two subventral ones as described and figured by G. Schneider for *E. revaliensis* G. Schneider, 1906 from Esthonia, USSR; however, Hirschmann figures all three as equally large (Hirschmann 1952: Figs. 6 a—b, 8 a—f). In describing the copulatory apparatus I draw attention to the lateral guiding pieces, which are not mentioned by Hirschmann; however, such structures can be recognized in Fig. 7 h of Hirschmann (1952).



Figs. 56–62. *Ethmolaimus pratensis*. Lateral views (right: 56, 61–62 of ♀<sub>1</sub>; left: 57–59 of ♂<sub>1</sub>; 60 of ♀<sub>2</sub>); 56, oesophageal region; 57, head; 58, posterior region of body; 59, copulatory apparatus; 60, head; 61, structures and pattern of somatic setae in vulvar region; 62, tail.

The systematic position of *Ethmolaimus* De Man, 1880 is problematic. Up to now it has been regarded as a Chromadoridae taxon (De Coninck 1965; Gerlach & Riemann 1973) but Andrassy (1976) raised it to family level within the Cyatholaimoidea. The structure of the male gonads (two testes) reveals that *Ethmolaimus* does not belong to the Chromadoridae (one testis). It is possible that *Ethmolaimus* or Ethmolaimidae is closely related to the Cyatholaimidae (see also Filipjev 1934); it cannot, however, be separated from the latter family by the character three

equal teeth (see above), as proposed by Andrassy (1976: p. 130).

#### **Bathylaimus longisetosus** (Allgén, 1929)

Figs. 63–70

##### *Material*

Henriksberg, 1 1/2 m, coarse - medium sand; 14 July 1978: 42 males (♂<sub>1</sub>, slide No. Tv 122 db SF), 63 females (♀<sub>1</sub>, slide No. Tv 122 e SF) and 53 juveniles.

Henriksberg, 12 m, coarse - medium sand; 14 July 1978: 23 males, 38 females and 59 juveniles.

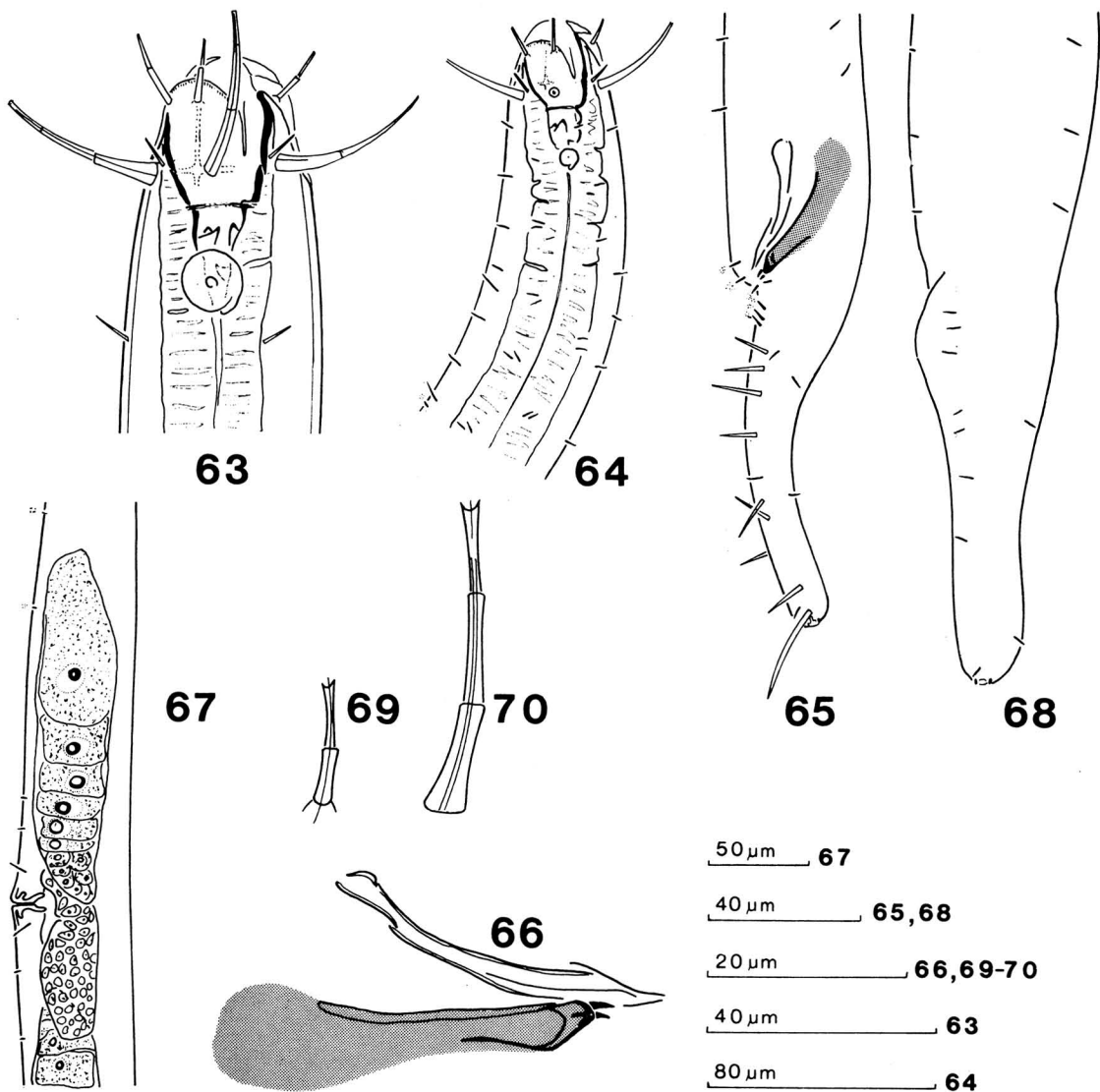


## Measurements

|                |             |    |     |     |     |      |         |
|----------------|-------------|----|-----|-----|-----|------|---------|
| ♂ <sub>1</sub> | L = 1.79 mm |    |     |     |     |      |         |
|                | a = 46      | —  | 105 | 298 | M   | 1698 |         |
|                | b = 6.0     |    |     |     |     |      | 1789 μm |
|                | c = 19.7    | 27 | 37  | 39  | 37  | 28   |         |
| ♀ <sub>1</sub> | L = 1.55 mm |    |     |     |     |      |         |
|                | a = 25      | —  | 107 | 308 | 847 | 1441 |         |
|                | b = 5.0     |    |     |     |     |      | 1546 μm |
|                | c = 15.2    | 34 | 48  | 60  | 61  | 38   |         |

## Males

Cuticle weakly striated, 1 1/2 μm thick; subcuticular vacuolation distinct. Somatic setae 5–6 μm long in eight longitudinal rows; cloacal lips with clusters of tubular setae 3–4 μm long and tail with additional setae 12–14 μm long in subventral rows and subterminally a single pair of setae 20–24 μm long (Figs. 64–65); in a few males two subventral rows of small tubular setae may be found between the oesophageal region and the cloaca. Amphids situated about 30 μm from anterior end, circular in outline, but at deeper focus spiralized; they



Figs. 63–70. *Bathylaimus longisetosus*. Lateral views (right: 66, of living material; left: 63, 65, of ♂<sub>1</sub>; 64, 67–68 of ♀<sub>1</sub>; 69–70 of male living material); 63, head; 64, anterior region of body; (only cross section of left lateral external labial seta depicted); 65, posterior region of body; 66, copulatory apparatus; 67, anterior branch of reproductive system; 68, posterior region of body; 69, internal labial seta (axid); 70, external labial seta (axid).

measure 10–11  $\mu\text{m}$  in diameter or 33 % of the body diameter (Fig. 63). Cephalic sense organs in two crowns as six internal labial setae 11–13  $\mu\text{m}$  long, and 9–10  $\mu\text{m}$  backwards six external labial setae 30–33  $\mu\text{m}$  together with four cephalic setae 5–6  $\mu\text{m}$  long (Fig. measure 10–11  $\mu\text{m}$  in diameter or 33 % of the body diameter (Fig. 63). Labial setae with enlarged bases, two- or three-jointed, with blunt, open ends (in some individuals the jointing is indistinct) (Figs. 69–70); these setae are tubular with the axial nerve extending beyond the blunt end, i.e. "axids" sensu Cobb (1925).

Buccal cavity triangular in cross section, each sector consisting of four plates (subdivision at level of second crown of cephalic sense organs. In longitudinal section the buccal cavity has sclerotized walls in a voluminous anterior portion and three sclerotized tooth-like structures in a narrower, posterior portion; at the junction with the oesophageal lumen, a weakly sclerotized tip is inserted into the dorsal margin (Fig. 63). The lips are deeply cut, weakly sclerotized and striate at their anterior ends. The oesophagus surrounds the buccal cavity; the oesophageal musculature has distinct interruptions. Nerve ring at 35 % of oesophagus length. No renette cell or excretory pore observed.

Gonads diorchic, opposite and outstretched. Copulatory apparatus with paired, slender spicules 34–37  $\mu\text{m}$  long; gubernaculum imbedded in a sclerotized pouch with distinct sclerotized mouldings, distally provided with two tooth-like structures (Figs. 66–67). No supplements observed.

Tail conical with posterior half cylindrical; tail distinctly constricted from the body by a ventral invagination at the cloacal opening (Fig. 65). Tail tip slightly enlarged; spinneret protruding.

Three males had bacteria 2–3  $\mu\text{m}$  long attached to the cuticle around the whole body in the cloacal and tail regions (compare Fig. 8).

#### Females

Differ significantly from the males in the amphids, somatic setae and tail. Amphids measure only 5–7  $\mu\text{m}$  in diameter, i.e. 13–16 % of body diameter (Fig. 64); sublateral rows of somatic setae in pairs in the oesophageal region (Fig. 64); additional tubular setae 1–2  $\mu\text{m}$  long occur in two rows very close to the ventral midline from the oesophageal region to about 60  $\mu\text{m}$  in front of the anus (Figs. 64, 67–68); these small tubular setae are seldom found in males. Subventrally the vulvar region bears two (rarely three or four) pairs of setae

10  $\mu\text{m}$  long; additional setae 4–5  $\mu\text{m}$  long may also be present, but close to the ventral midline (Fig. 67). Females lack clusters of tubular setae on the anal lips, and the somatic setae on the tail are shorter (Fig. 68). Tail distinctly thicker than in males (Fig. 68).

Reproductive system didelphic-amphidelphic with ovaries opposite and reflexed; spermathecae present (Fig. 67).

#### Juveniles

Have amphids that are smaller and situated more posteriorly than in adults.

#### Discussion

The *Bathylaimus longisetosus* (Allgén, 1929) described herein is in accordance with the description by Gerlach (1953) from the same region. New details are the structure of the cephalic sense organs, patterns and structures of the somatic setae, and details of the buccal cavity and copulatory apparatus.

The material has been compared with other *Bathylaimus* spp. from Danish waters and *B. capacosus* Hopper, 1962 (slide No. 53) from the brackish waters of Canada. *B. longisetosus* is a good species, but originally poorly described and depicted by Allgén; it is distinguished from the other related species by the ventral constriction at the cloacal opening in males. *B. longisetosus* is the only representative of the genus found in the Finnish archipelago.

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