

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

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Three previously known nematodes are redefined on the basis of observations of living and fixed animals from the macrophytes of the brackish waters in the southern archipelago of Finland: *Chromadorina erythrophthalma* (G. Schneider, 1906), *Punctodora ratzeburgensis* (Linstow, 1876) and *Chromadorita tenuis* (G. Schneider, 1906). The redescrptions of *Chromadorina erythrophthalma* and *Chromadorita tenuis* are the first from the type locality since the original descriptions. *C. tenuis* and *P. ratzeburgensis* are common inhabitants on 11 macrophytes and are found on these in great abundance.

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### 1. Introduction

Preliminary results have shown that the macrophytes in the brackish waters close to Tvärminne Zoological Station, in the southern Finnish archipelago, harbour a characteristic and abundant nematode fauna in the summer months (Jensen, in prep.). The present paper deals with the necessary morphological definitions of three species. Moreover, two of them are here redescribed for the first time on the basis of animals from the original locality.

### 2. Material and methods

The nematodes were collected from the surfaces of 11 macrophytes: *Ceramium tenuicorne*, *Chorda filum*, *Cladophora glomerata*, *Enteromorpha intestinalis*, *Fucus vesiculosus*, *Furcellaria fastigiata*, *Potamogeton pectinatus*, *P. perfoliatus*, *Pylaiella littoralis*, *Ranunculus baudotis* and *Rhodomela confervoides subfusca*.

Individuals of each nematode 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 at high magnification under a Leitz Dialux microscope

with a  $\times 100$  apochromatic immersion objective, n.a. 1.32. All drawings were made with a camera lucida.

The numbered slides 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). For details of the brackish-water region see Niemi (1975).

### 3. Descriptions

***Chromadorina erythrophthalma*** (G. Schneider, 1906)

Figs. 1—6.

Syn. *Chromadora erythrophthalma* G. Schneider, 1906, see Wieser (1954); *Prochromadora oerleji* (De Man, 1880) sensu Filipjev, 1930, see Gerlach (1951).

#### Material

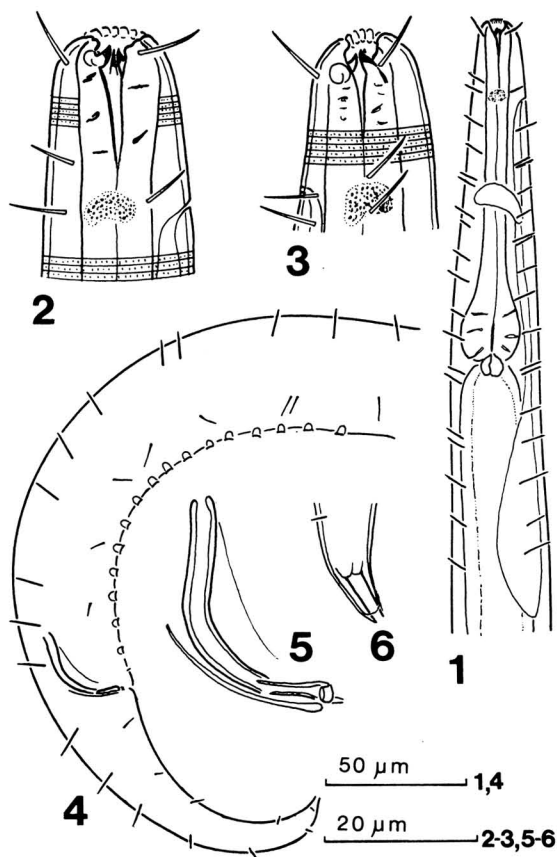
*Ranunculus baudotis* (Tvärminne Zoological Station, 1.5 m): 12 July 1978; 3 males, 4 females.

*Pylaiella littoralis* (500 m north of Storgadden, 3 m): 21 July 1978; 3 males ( $\sigma_1$  Slide No. Tv 131 b1 SF) and 9 females ( $\sigma_2$  Slide No. Tv 131 b3 SF,  $\sigma_3$  Slide No. Tv 131 b2 SF,  $\sigma_4$  Slide No. Tv 131 b4 SF).

*Pylaiella littoralis* (Kvarnskärsgrunden, 0.5 m): 23 July 1978; 3 males and 4 females.

*Rhodomela confervoides subfusca* (500 m north of Storgadden, 12 m): 21 July 1978; 1 male and 3 females.

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Figs. 1—6. *Chromadorina erythrophthalma* (G. Schneider, 1906). Lateral views (right: 1—2, 4—6 of ♂; left: 3 of ♀); 1, oesophageal region; 2—3, head; 4, posterior region of body; 5, copulatory apparatus; 6, tip of tail.

#### Measurements

♂ <sub>1</sub>	L = 0.86 mm					
a	= 21	—	61	119	M	740
b	= 7.3	14	25	29	41	32
c	= 7.4					
						856 µm

♀ <sub>1</sub>	L = 0.82 mm					
a	= 19	—	58	114	384	682
b	= 7.2	14	25	30	44	25
c	= 6.1					
						816 µm

#### Males

Cuticle annulated with each annulus punctated. Lateral fields slightly enlarged. Somatic setae in four submedian rows, very transparent, 8—10 µm long, but shorter on the tail (Figs. 1, 4). Red-brown ocelli present 20—22 µm posterior to front end (Figs. 1—2). Amphids situated at level of cephalic setae, weakly sclerotized, oval in outline, at deeper focus spiralized (Fig. 2). Only four cephalic setae 8 µm long recognized of the cephalic sense organs (Fig. 2). Buccal cavity

deep, dorsal sector more sclerotized than other sectors; vestibulum striated; three teeth present, dorsal tooth slightly larger than subventral teeth (Fig. 2). Oesophagus enlarged around buccal cavity, then cylindrical and posteriorly enlarged to a bulb (Fig. 1). Cardia small; nerve ring situated at 50 % of oesophagus. Renette cell large, situated behind the cardia; excretory pore at level of ocelli (Figs. 1—2).

Gonad single, outstretched, directed anteriorly. Copulatory apparatus with two equal spicules, 32 µm long and curved; gubernaculum consisting of a slender sclerotized rod in submedian position and a pair of lateral tubes, distally recurved (Figs. 4—5). A single seta is present ventrally 8 µm in front of the cloaca and followed by a series of 14—16 supplements, the anterior-most lying about 145 µm from the cloaca (Fig. 4). A single male had only 11 supplements, i.e. the first four and last seven (first supplement is nearest to cloaca). Tail slender, 3.5—4 times anal diameter; spinneret protruding, slightly asymmetrical (Fig. 6).

#### Females

Similar to the males in most respects (Fig. 3). Tail 5—5.5 times as long as anal diameter. A single female was covered with slender bacteria (see Jensen 1979: Fig. 8).

Reproductive system didelphic-amphidelphic, ovaries opposite and reflexed.

#### Discussion

G.Schneider in 1906 described *Chromadorina erythrophthalma* on the basis of animals from the Tvärminne area, but as *Chromadora erythrophthalma*, and in 1926 reported it again from here. The present redescription is the first since then for material from Tvärminne and I have no hesitation about the identification. The species is the only representative of the genus found in the area. At low magnification it may be confused with the coexisting *Punctodora ratzeburgensis* (see below).

#### *Punctodora ratzeburgensis* (Linstow, 1876)

Figs. 7—14.

Syn. *Chromadora ratzeburgensis* Linstow, 1876 see Filipjev (1929).

#### Material

*Pylaiella littoralis* (500 m north of Storgadden, 3 m); 21 July 1978; 9 males (♂, Slide No. Tv 131 b7 SF, ♂<sub>2</sub> Slide No. Tv 131 b5 SF) 3 females (♀<sub>1</sub> Slide No. Tv 131 b8 SF) and 5 juveniles.

Additional material includes more than 200 specimens from other macrophytes in the area, collected in July 1978.

## Measurements

♂ <sub>1</sub>	L = 0.76 mm						
	a = 22	—	56	110	M	656	
	b = 7.8	11	26	30	34	24	756 μm
	c = 7.6						
♀ <sub>1</sub>	L = 0.81 mm						
	a = 18	—	63	124	372	667	
	b = 6.5	11	32	40	46	22	810 μm
	c = 5.7						

## Males

Cuticle annulated with each annulus punctated. Lateral fields slightly enlarged. Somatic setae in four submedian rows, 5–6 μm long, but shorter on the tail (Figs. 7, 10). Red-brown ocelli present 20–22 μm from front end (Figs. 7–8). Amphids situated at level of cephalic setae, weakly sclerotized, slightly oval, at deeper focus spiralized (Fig. 8). Six small labial papillae present at front end and four cephalic setae, 7 μm long (Fig. 8). Buccal cavity strongly sclerotized, 28 μm deep and with one large dorsal tooth opposite a ventral depression; posteriormost portion tubular (Figs. 7–8). At junction with oesophageal lumen the surrounding musculature is interrupted; musculature around buccal cavity smooth; posterior portion of oesophagus enlarged to a conspicuous bulb with strongly sclerotized internal walls (Fig. 7–8). Cardia small; nerve ring at 57 % of oesophageal length. Renette cell large, situated behind

cardia; excretory pore situated 5 μm behind cephalic setae (Figs. 7–8).

Gonad single, outstretched and directed anteriorly. Copulatory apparatus with slender, curved spicules 26 μm long; a pair of tubular elements, distally recurved, I recognize as accessory pieces (Figs. 10–11). Two preanal supplements present as weakly sclerotized, cup-shaped structures (Fig. 10). In three males (out of 114 observed) there are three supplements (Fig. 13). Spinneret protruding and asymmetrical (Fig. 12).

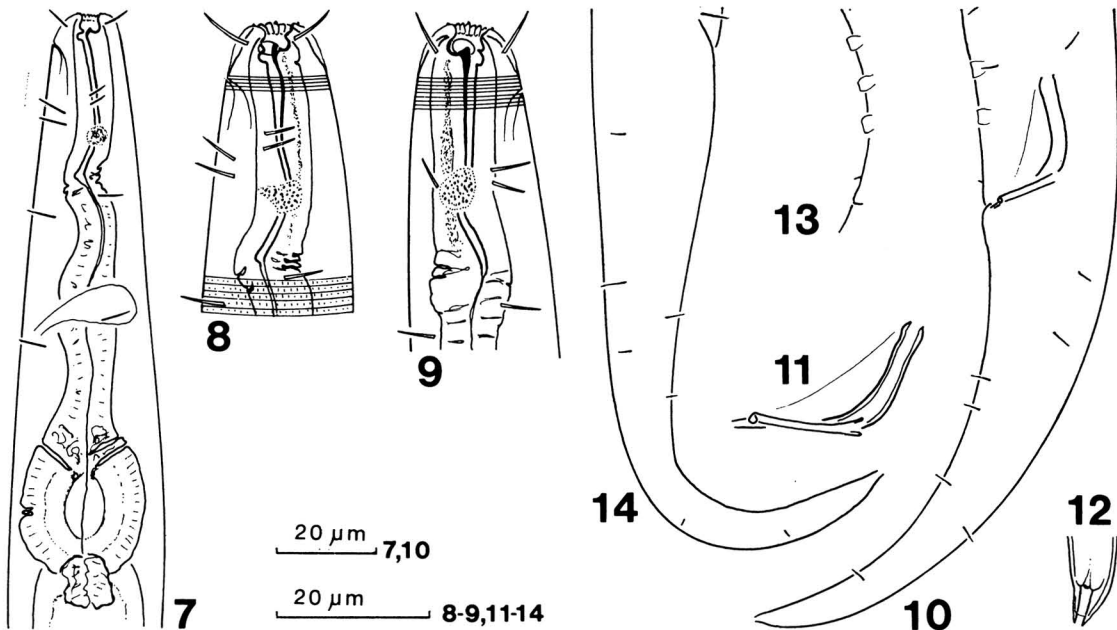
## Females

Similar to the males in most respects (Fig. 9); The tail is longer and more slender (Fig. 14). Reproductive system didelphic-amphidelphic with ovaries opposite and reflexed.

## Discussion

The present redescription of *Punctodora ratzeburgensis* (Linstow, 1876) is the first on the basis of animals from the Tvärminne area. G. Schneider (1926) briefly reported its occurrence there, and so did Gerlach (1953).

At low magnification the species may be confused with the coexisting *Chromadorina erythrophthalma* (see above), but the posterior portion of the oesophagus is much more strongly



Figs. 7–14. *Punctodora ratzeburgensis* (Linstow, 1876). Lateral views (right: 9, 14 of ♀<sub>1</sub>; left: 7–8, 10–12 of ♂<sub>1</sub>); 7, oesophageal region; 8–9, head; 10, posterior region of body; 11, copulatory apparatus; 12, tip of tail; 13, preanal supplements of ♂<sub>2</sub>; 14, tail.

developed in *P. ratzeburgensis* and the males have only two or three preanal supplements. *P. ratzeburgensis* is the only representative of the genus in the Baltic.

### *Chromadorita tenuis* (G. Schneider, 1906)

Figs. 15—22.

Syn. *Chromadora tenuis* G. Schneider, 1906 see Filipjev (1922)

#### Material

*Potamogeton perfoliatus* (Byviken, 2 m): 18 July 1978; more than a thousand individuals ( $\delta_1$  Slide No. Tv 126 aa SF,  $\varphi_1$  Slide No. Tv 126 ab SF, 5 males and 5 females on Slide No. Tv 126 ac SF).

Additional material as thousands of individuals from other macrophytes in the Tvärminne area, collected in July 1978.

#### Measurements

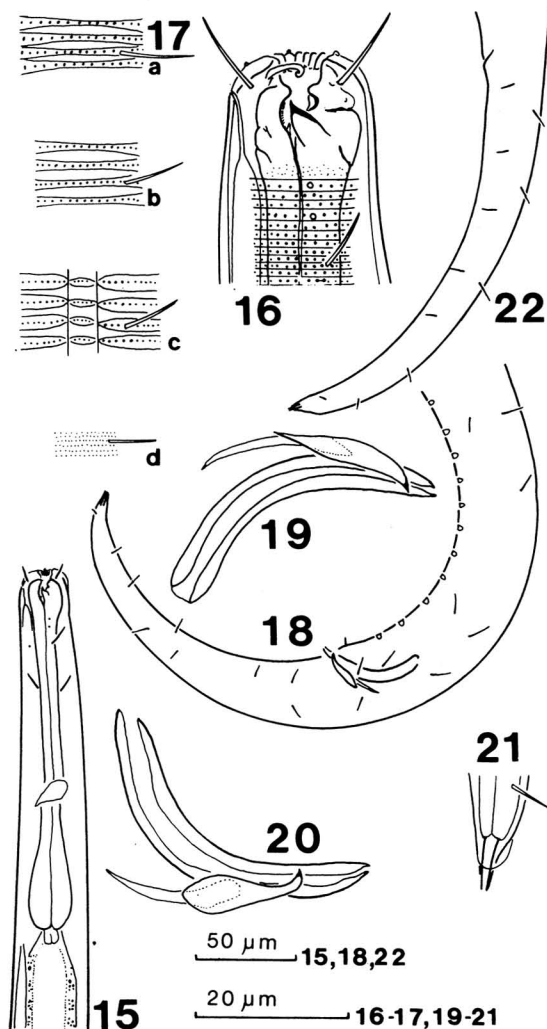
$\delta_1$ L = 1.23 mm						
a = 34	—	92	146	M 1083		
b = 8.4	19	26	34	36	31	1226 $\mu$ m
c = 8.4						

$\varphi_1$ L = 1.40 mm						
a = 30	—	102	169	663	1216	
b = 8.2	21	30	32	46	26	1400 $\mu$ m
c = 7.6						

#### Males

Body slender, attenuated towards the ends. Body length 860  $\mu$ m — 1410  $\mu$ m, but mostly between 1150  $\mu$ m — 1250  $\mu$ m. Body in cross section slightly oval with enlarged lateral fields 10—12  $\mu$ m wide owing to the expanded cortical layer (Fig. 17); in the largest (? oldest) specimens the lateral fields are narrower (Fig. 17 c). The lateral fields cover the body from the posterior region of the oesophagus to the tail. Cuticle punctated in rows with distinctly visible annulation in the lateral fields where the annules become progressively narrower (Fig. 17). Somatic setae in four sublateral rows, slender and transparent, 8—10  $\mu$ m long, but broken setae may occur (Figs. 15—16). Amphids situated between cephalic setae, weakly sclerotized and transversely flattened (Fig. 16). Cephalic sense organs as six small labial papillae and four slender cephalic setae 11—13  $\mu$ m long (Fig. 16). Head surrounded by a weakly sclerotized cap (Figs. 15—16). Vestibulum striated; buccal cavity with dorsal sector most prominently sclerotized; it consists of one large dorsal tooth, two subventral teeth and minute denticles at the ventral border (Figs. 15—16). Oesophageal musculature enlarged around the buccal cavity, elsewhere cylindrical with a slightly enlarged posterior portion (Figs. 15—16). Cardia small; nerve ring at about 60 % of oesophageal length. Renette cell long and slender, situated behind cardia; excretory pore apparently just behind cephalic setae at border of head capsule (Figs. 15—16).

Gonad single, outstretched and directed anteriorly. Copulatory apparatus consisting of paired undifferentiated and bent spicules 38—45  $\mu$ m long; gubernaculum as a cap with apophyses dorsally directed and promi-



Figs. 15—22. *Chromadorita tenuis* (G. Schneider, 1906). Lateral views (right: 20 of  $\delta_2$ ; left: 15—17 a, 18—19, 21 of  $\delta_1$ ; 17 b, 22 of  $\varphi_1$ ; 17 c of  $\varphi_2$ ; 17 d of a juvenile); 15, oesophageal region; 16, head (broken somatic setae indicated by a circle); 17, lateral fields at midbody; 18, posterior region of body; 19—20, copulatory apparatus; 21, tip of tail; 22, tail.

nently sclerotized distally (Figs. 18—20). Ventrally and anteriorly to cloaca a series of 11 cup-shaped supplements in the cuticle (Fig. 18); exceptionally 9, 10 or 12 supplements. Tail slender, 4—4.5 times anal diameter (Fig. 18); spinneret protruding and asymmetrical (Fig. 21).

#### Females

Similar to males in most respects. Tail longer and more slender, i.e. 6—7 times anal diameter (Fig. 22). Reproductive system didelphic-amphidelphic with ovaries opposite and reflexed. Vagina mostly protruding.

### Juveniles

Similar to adults in most respects. Lateral fields are lacking and in the smallest juveniles the cuticular ornamentation consists of closely spaced dots (Fig. 17 d); body circular in cross section.

### Discussion

In 1906 G. Schneider described *Chromadorita tenuis* on the basis of animals from the Tvärminne area, but as *Chromadora tenuis*, and reported it again in 1926 and 1927 from the same region. The present redescription is the first since then of animals from the original locality, and I have no hesitation about the identification. The species may occasionally be found among detritus on the sea bottom from where G. Schneider and most other authors found their specimens; however, its true habitat is on the macrophytes in the region (as for the two other species here redescribed), at least in the summer months (Jensen, in prep.).

*C. tenuis* may be confused with *C. fennica* Jensen, 1979; these two species differ mainly in the number and configuration of preanal supplements and in the microhabitats.

In the present material of *C. tenuis* the body length varies considerably in the adults (860  $\mu\text{m}$  — 1410  $\mu\text{m}$ ). The most extreme difference in body length is found between populations living on *Potamogeton pectinatus* and *P. perfoliatus*

growing in the same bay (Byviken), only a few hundred metres from each other. Any explanation of this fact is at the moment speculative; it could be an indication of adult growth, as in some other free-living nematodes (see review by Geraert 1979); it should be noted, however, that the descriptions are based on animals taken from quite different sites in the region, i.e. 11 macrophytes, growing under different temperature regimens and probably covered with unequal qualities and quantities of the epiphytes that serve as food sources for the nematodes.

The differences observed in the width and ornamentation of the lateral fields in the majority of adults as compared with the smallest juveniles and the largest adults (Fig. 17 a—d) might result from a growth pattern as documented for other groups of nematodes by Geraert (1979), for example (see also Gerlach 1951; Gerlach & Meyl 1957); statistics on the above observations are being prepared.

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