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Description of the Marine Free-Living Nematode *Chromadora lorenzeni* n. sp. with Notes on its Microhabitats

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With 13 Figures (Eingegangen am 1. April 1980)

Abstract

The marine free-living nematode *Chromadora lorenzeni* n. sp. is described. Its most pronounced differentiating characters against other known species of the genus are the males having three to four closely spaced preanal supplements and a peculiar subcuticular ornamentation in the lateral fields along the cloacal region; the presence of subventral alae along the preanal supplements has not been observed before.

These observations are based on animals from sublittoral sandy bottoms in the Sound (Denmark) and in the North Sea (Belgian Coast and German Bight). Animals from the Sound mostly inhabit the uppermost cm of the sediment, where they constitute more than 50% of the total nematode number and they are found there in densities up to 50 individuals per ml sediment. In the Sound it avoids the borrows and feces of the lugworm *Arenicola marina*.

A) Introduction

Of the more than 4000 free-living aquatic nematodes recorded (Gerlach & Riemann 1973/74) it is of ecological interest to know the most abundant ones and those which play a major role in the food web. Frequently reported species does not necessary represent abundant species, so as seldomly reported species could turn out to be abundant, but e.g. endemic ones or with a difficult detectable microhabitat Moreover, there still exist many species described as one population, which in reality is a species-complex constitution of two or more species (see e.g. in Jensen, 1979 a and b: *Sabatieria pulchra* and *Chromadorita fennica*); arguments for the opposite case might also be found in the literature (see e.g. Lorenzen 1974).

Here a new marine free-living nematode *Chromadora lorenzeni* its morphological characters are described and the present study further proves it to be a common inhabitant in sandy sublittoral bottoms in the Sound, Denmark and in the North Sea. Its abundances in the sediment is figured and described.

B) Material and Techniques

Present animals of *Chromadora lorenzeni* n. sp. derive from three regions in North West European waters:

1. The northern part of the Sound, Denmark (56° 06′ 01″ N; 12° 30′ 01″ E; 15...16 m depth; fine sand at the marginal distribution area of the lugworm *Arenicola marina*; collected 1978–1979.

2. North Sea off the Belgian Coast at station M 14 (51° 50′ 50″ N; 02° 51′ 08″ E); 32...40 m depth; medium sand with only 0.25% or less silty-clay fraction; collected 8 to 11 January 1973.

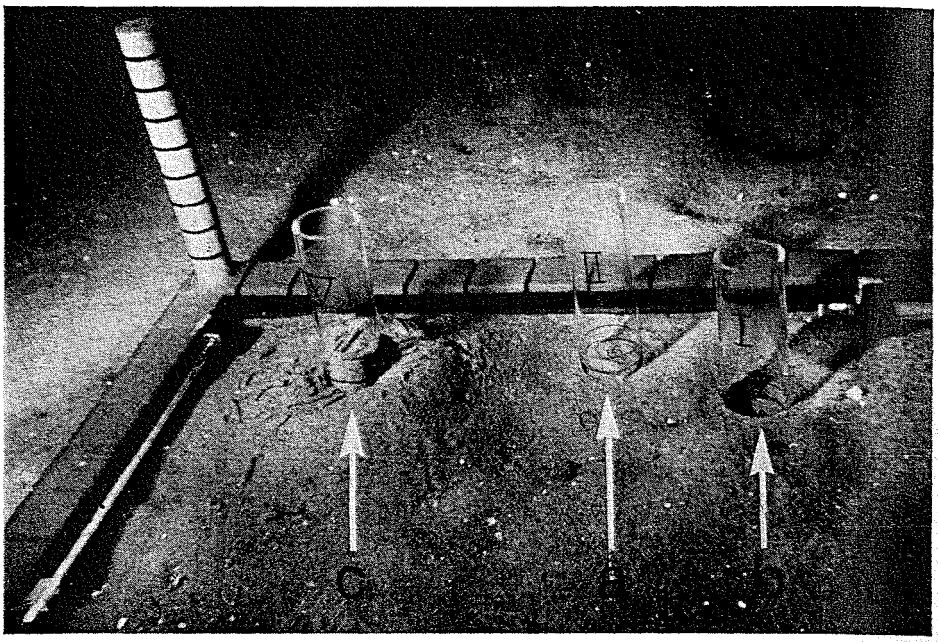

Fig. 1. Underwater photography of sampling benthic nematodes in and outside the borrows of the lugworm *Arenicola marina*. The Sound, Denmark, 15 m depth. (a: outside the borrow, b: cone at the head shaft, c: feces at the tail shaft; figured horizontal scale = 4 cm)

3. North Sea off the German Bight at Titanium Waste Disposal Area near Helgoland; coarse to medium sand (for further details, see LORENZEN 1974).

Sediment samples from the North Sea localities were taken with a Van Veen grab. Sediment cores from the Sound were collected by scuba diving; once the diver recognized the feces from *Arenicola marina* three PCV tubes, 8 cm^2 in opening, were pushed 10...20 cm in the sediment:

a) outside the borrow of the lugworm, b) in the cone at the head shaft, c) in the feces at the tail shaft (Fig. 1, 13). The sediment cores were afterwards sectioned in 1 cm vertical slides. The feces was raised up to 5 cm above the sediment surface, the sediment of the head shaft was about 5 cm below.

The specimens were studied after fixation in 4% formalin and mounted in glycerol. The fixed animals were studied in detail at high magnification using a Leitz Dialux microscope with a 100× apochromatic oil imersion objective, n. a. 1.32 and a Leitz Ortholux microscope with Nomarski Interference -contrast equipment. All drawings were made with a camera lucida.

For abbreviations and values used in the formula, see JENSEN (1979 a).

C) Description

Chromadora lorenzeni n. sp. (Fig. 2–13)

Material:

The Sound, Denmark; more than a thousand individuals (holotype, male Slide Nr. 200 a; paratype, female Slide Nr. 200 b; paratypes 3 males, 3 females and 3 juveniles Slide Nr. 200 c deposited in the Zoological Museum, University of Copenhagen, Denmark); the remaining material is in my own collection.

North Sea off the Belgian Coast; 87 individuals (1 male Slide Nr. 433; 1 female Slide Nr. 434 deposited in the Institute of Zoology, State University of Ghent, Belgium so as the remaining material).

North Sea off the German Bight; 1 male and 1 female borrowed from Dr. S. LORENZEN, University of Kiel, Federal Republic of Germany.

Measurements:

$\hat{\sigma}_1$	L = 1.22 mm	a = 41		b = 7.6		c = 9.5	
		—	97	160	M	1092	1220 µm
		15	28	30	30	28	
♀1	L = 1.18 mm	a = 36		b = 6.9		c = 8.1	
		—	97	170	546	1031	1177 µm
		15	27	30	33	21	

Adults: Body slender, attenuated towards the ends; in cross section slightly oval with enlarged lateral fields (Fig. 3–4). Males with enlarged body, subventrally in the cloacal region (Fig. 4, 9–10). The lateral fields cover the body from the head to the tail region. Cuticle punctate with dots in transverse rows, laterally an annulation is distinct (Fig. 5–7). In the head region and on the tail the lateral fields consist of two rows of coarse dots (Fig. 2), elsewhere of four rows of coarse dots (Fig. 5, 7); the males shows a characteristic subcuticular pattern in the lateral fields in the cloacal and tail region (Fig. 6). Somatic setae in four sublateral rows, very slender and transparent, 6...8 µm long (Fig. 5). Additional subventral setae insert the tail. Ampids situated between the cephalic setae, weakly sclerotized and loop-shaped (Fig. 2). Cephalic sense organs as six papillae on the lips and four slender cephalic setae 7 µm long (Fig. 2).

Vestibulum striate. Buccal cavity with one dorsal tooth; other teeth not observed (Fig. 2). Oesophagus posteriorly dilated to a pear-shaped bulb (Fig. 8). Nerve ring situated at 60% of the oesophageal length. Renette cell long and slender (Fig. 8); excretory opening not observed, but in some individuals an ampulla-like structure may be found in the ventral region of the head.

Female reproductive system with two ovaries, opposite and reflexed; spermathecae present. Male reproductive system with one testis, outstretched and directed anteriorly. Copulatory apparatus with two equal sickle-shaped spicules, proximally enlarged and distally tapering; they measure 36...38 µm around the arc, 26...28 µm from tip to tip, i.e. one anal diameter (Fig. 9–11). Gubernaculum plate-shaped, distally enlarged and with a tooth-like structure (Fig. 11). Ventrally and anterior to the cloaca is inserted four conical supplements in a characteristic 1 + 3 configuration (Fig. 10); sometimes the first supplement (posteriormost one) cannot be observed (Fig. 9).

Spinneret asymmetrical with the dorsal sector oblique (Fig. 12).

Juveniles: resembles the females; they are relatively thicker than the adults.

D) Discussion

The herein studied populations of animals from the Sound and two North Sea localities all represent one species *Chromadora lorenzeni* n. sp.

The peculiar subcuticular lateral fields in the males of *C. lorenzeni* n. sp. (Fig. 6) separates it from all other *Chromadora* species; a rather similar pattern has only been depicted and described in one other chromadorid *Prochromadorella attenuata*

(GERLACH 1952) by RIEMANN (1966) and LORENZEN (1971). Another differentiating character is the presence of three to four closely spaced preanal supplements (Fig. 9–10); future studies on chromadorids may provide evidences whether the herein depicted subventral alae along each side of the preanal supplements (Fig. 4, 9–10) are unique or have been overlooked in the past.

LORENZEN (1974) reports the above species as *Chromadora kreisi* Stekhoven and Adam, 1931 (pro *Chromadora exigua* Kreis, 1929 homonym to *Chromadora exigua Ditlevsen*, 1926); however, neither KREIS' nor STEKHOVEN and ADAM'S material included males. Comparing the present females with the descriptions of KREIS and STEKHOVEN and ADAM there are at least six different features: total body size, length of tail, length of cephalic setae, presence of somatic setae, large excretory gland

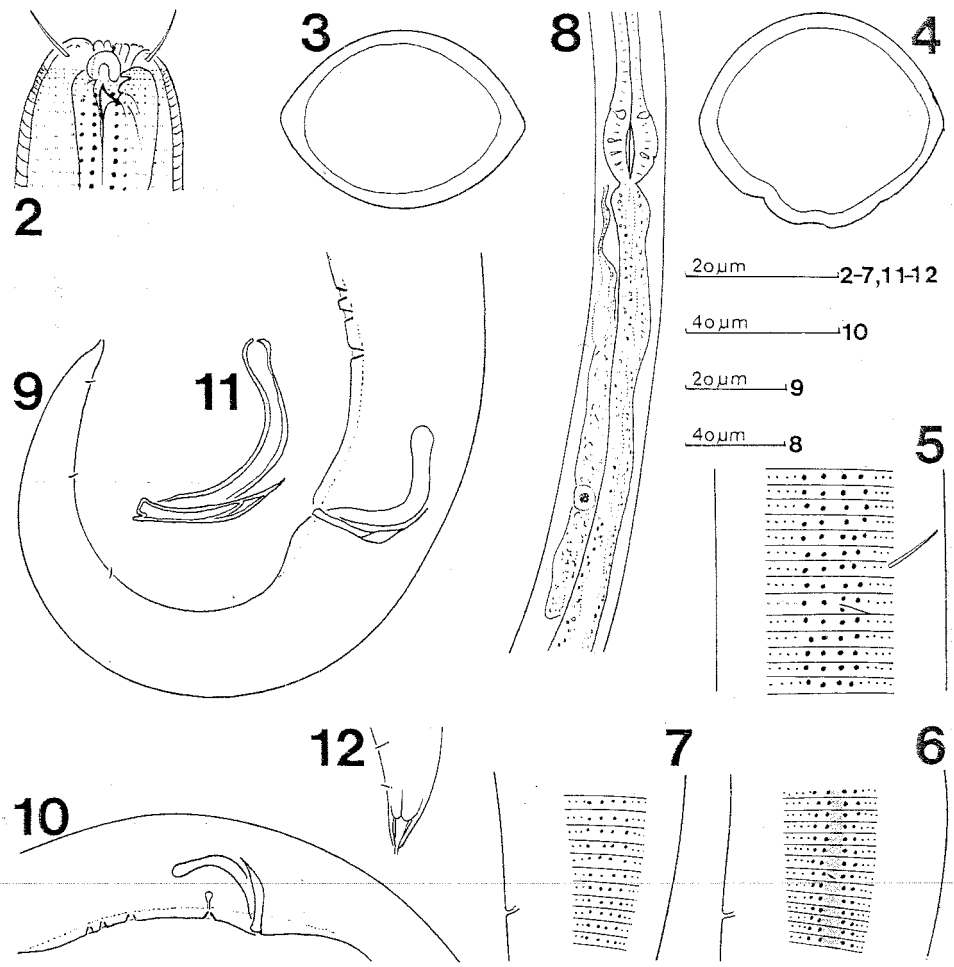

Fig. 2–12. *Chromadora lorenzeni* n. sp.
Left lateral views of a male: 2, 5–6, 8–9, 12; of another male: 10–11; of a female: 7; cross sections of a male: 3–4. 2. Head 3. Midbody 4. Cloacal region 5. Posterior oesophageal region 6. Cloacal region 7. Anal region 8. Oesophageal-intestinal junction 9. Posterior end of the body 10. Cloacal region 11. Copulatory apparatus 12. Tail end

cell and shape of the tail tip. I feel it too hazardous to define present species as *C. kreisi* since even the females show these differences. *C. kreisi* is better recorded as a species inquirenda because the description is based on females only.

E) Habitat and Distribution

Present large comparative material of *Chromadora lorenzeni* n. sp. reveals that it inhabits sublittoral marine, sandy sediments in the North Sea and in the Sound, Denmark. Based on sediment cores by scuba diving from the Sound it is evident that it here inhabits the uppermost cm of the sediment, where 80...94% of its population is concentrated with densities between 40 and 50 individuals per ml sediment, which equals 50...59% of the total nematode fauna in this layer (Fig. 13). Single individuals are found down to 5 cm depth. *C. lorenzeni* n. sp. is less abundant in the sediment connected with the borrows of the lugworm *Arenicola marina* (Fig. 13). Here its population is also found in highest densities in the uppermost cm layer, however, only consisting of 12...14% of the total nematode numbers, and with only 12 respective one individual per ml of sediment. Moreover, the feces and

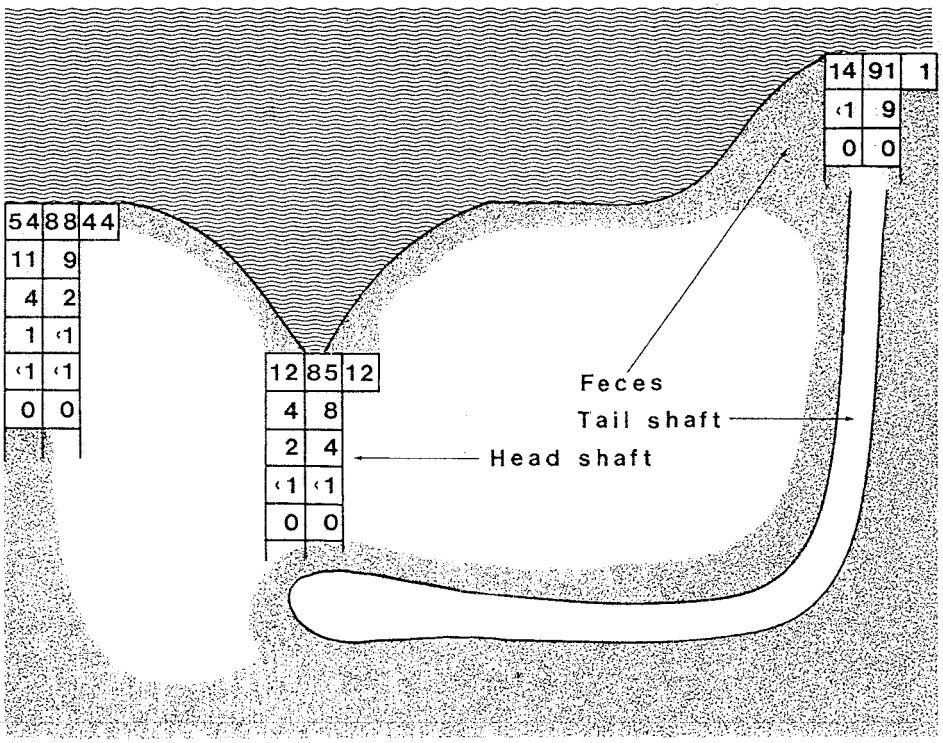

Fig. 13. Horizontal and vertical distribution of the marine nematode *Chromadora lorenzeni* n. sp. outside and alongside the borrow of the lugworm *Arenicola marina*. Figures in each first column indicate its percentage abundance of the total nematode numbers; second column indicates percentage abundance of its population numbers; third column shows its individual numbers per ml in the uppermost cm of the sediment. All figures are average values of 6 replicate cores of each 8 cm^2 in opening. Northern part of the Sound, Denmark, 15 m depth, collected in June 1979

the tail shaft of the lugworm is a less attractive microenvironment for the nematode. No indication was found of animals migrating down into the oxygen-rich microenvironment in the pocket sand in front of the lugworm.

It is concluded that at least in the Sound *C. lorenzeni* n. sp. its microhabitat is the uppermost sandy sediments, rich in oxygen, water and microflora. A small-scaled change in sediment composition, herein examplified with the borrows and feces of *Arenicola marina* (Fig. 1), is significantly reflected in the densities of the nematode. Present findings are only recognizable with a proper scuba diving sample-technique.

F) Acknowledgements

Thanks are due to my colleague Dr. SIEVERT LORENZEN borrowing me comparative material and fruitful comments; diving assistance and underwater-photography by IB AAGAARD and the patience of the crew of the vessel "Ophelia" is greatly acknowledged.

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Note: References to all literature prior to 1973 may be found in GERLACH and RIEMANN (1973–1974).

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