

Chromadorita ceratoserolis sp. n. (Chromadoridae), a Free-Living Marine Nematode Epibiotically on the Isopod *Ceratoserolis trilobitoides* from Antarctica

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Summary. *Chromadorita ceratoserolis* sp. n. is described. Specimens were found amongst eggs in the marsupium of the marine benthic isopod *Ceratoserolis trilobitoides* from Antarctic sea waters (233–728 m depth).

Introduction

While isolating eggs from the marsupium of formalin-fixed females of the large benthic isopod *Ceratoserolis trilobitoides* (Eights 1833) (Serolidae), Dr. J. Wägele of the Oldenburg University (FRG) came across copepods, parasitic isopods and nematodes. He passed the latter to me; an examination revealed that they all belong to a new species, which will be described below. Type material is deposited in the nematode collection of the Institut für Meeresforschung, Bremerhaven, FRG, identified by the NSIMB registration numbers. Measurements are given as a standardized formula, where numbers above and below the fraction line refer to body length and body width (in μm), respectively, at the anterior end of the body, at the end of the pharynx, at the middle of the body (M: $\sigma\sigma$ and juv.) or at the vulva ($\varnothing\varnothing$), and at the anus. The subsequent measurement refers to the total body length.

$$a = \frac{\text{body length}}{\text{max. body width}}; \quad b = \frac{\text{body length}}{\text{pharynx length}};$$

$$c = \frac{\text{body length}}{\text{tail length}};$$

Spic. = length of the spicules measured as the chord;
V = position of the vulva as percentage of the total body length.

Material

Chromadorita ceratoserolis sp. n. (Fig. 1 a–m)

Material Studied. σ_1 (holotype, NSIMB No. 508 a), \varnothing_1 , \varnothing_2 (each NSIMB No. 508 b), plus another 19 $\sigma\sigma$, 9 $\varnothing\varnothing$, 4 juv.: from the mar-

supium of a female of *Ceratoserolis trilobitoides*, 75°51.1'S, 34°24.5'W, 682–728 m depth, 22 February 1984 (leg. Voß). σ_2 , σ_3 , plus another 5 $\sigma\sigma$ (all NSIMB No. 509): from the marsupium of a female of *Ceratoserolis trilobitoides*, 77°18.4'S, 41°25.8'W, 650 m depth, 5 February 1985 (leg. Wägele). juv.₁ (stage 1), 6 $\sigma\sigma$, 4 $\varnothing\varnothing$, plus another 15 juv.: from the marsupium of a female of *Ceratoserolis trilobitoides*, 77°14.8'S, 41°06.6'W, 669 m depth, 18 February 1983 (leg. Wägele).

Further specimens were found in the marsupium of females of *Ceratoserolis trilobitoides* collected from 75°31.1'S, 57°51.7'W (526–536 m depth, 6 February 1984) and 77°07.5'S, 48°35.8'W (233 m depth, 14 February 1984).

Measurements

$$\sigma_1: \frac{- 290 \text{ M } 3250}{26 \ 31 \ 35 \ 38} \ 3450 \ \mu\text{m}; \ a = 91; \ b = 11.9; \ c = 17.3; \\ \text{Spic.} = 44 \ \mu\text{m}$$

$$\sigma_2: \frac{- 270 \text{ M } 2460}{26 \ 30 \ 32 \ 36} \ 2620 \ \mu\text{m}; \ a = 73; \ b = 9.7; \ c = 16.4; \\ \text{Spic.} = 41 \ \mu\text{m}$$

$$\sigma_3: \frac{- 260 \text{ M } 2780}{23 \ 34 \ 34 \ 39} \ 2940 \ \mu\text{m}; \ a = 75; \ b = 11.3; \ c = 18.4; \\ \text{Spic.} = 41 \ \mu\text{m}$$

$$\varnothing_1: \frac{- 300 \ 1680 \ 3570}{24 \ 30 \ 37 \ 26} \ 3800 \ \mu\text{m}; \ a = 103; \ b = 12.7; \ c = 16.5; \\ V = 44\%$$

$$\varnothing_2: \frac{- 300 \ 1800 \ 3780}{27 \ 32 \ 35 \ 26} \ 3990 \ \mu\text{m}; \ a = 114; \ b = 13.3; \ c = 19.0; \\ V = 45\%$$

$$\text{juv.}_1(1): \frac{- 170 \text{ M } 1060}{15 \ 19 \ 21 \ 15} \ 1160 \ \mu\text{m}; \ a = 55; \ b = 6.8; \ c = 11.6$$

Description

Adults

Cuticle with transverse rows of punctations: rods over most of the body, but dots at the anterior end of the body (Fig. 1 c, d). Cuticle laterally not differentiated except in the cloacal region of males where the lateral cuticle is differentiated into a longitudinal field (1.5–2.5 μm wide and about 230 μm long) appearing rather homogeneous (Fig. 1 g–i). Only few somatic setae present of maximum 10 μm length.

Anterior end provided with 6+6+4 cephalic sensilla at three different levels, those of the anteriormost circle being minute and those of the second and third circle being 6 and 12 μm long, respectively. The transverse, narrow fovea of the amphids lies ventrally of the canalis.

Buccal cavity provided with a strong dorsal tooth, two rather small subventral teeth and two subventral fields of minute denticles. An apophysis extends from the dorsal tooth into the pharyngeal tissue. Twelve well developed rugae present in the labial region. Pharynx with pronounced musculature around the dorsal tooth and without posterior bulb.

Ventral gland behind the pharynx, on the ventral side of the gut. It opens through a short, ventral, free-standing tube between the first two circles of cephalic sensilla. *Males*. One testis present, to the right side of the gut. Spicules of equal shape. Gubernaculum consisting of an unpaired distal and a paired proximal half. About 20 μm anterior to the cloaca there is an indistinct preanal papilla. From about 75 to 95 μm anterior to the cloaca, the cuticle is ventrally thinner than further before and behind. In the middle part of the tail, the ventral cuticle is conspicuously thickened over a distance of 35–40 μm . *Females*. Two reflexed ovaries present, the anterior one right and the posterior left of gut. Vulva conspicuously cuticularized. Vagina with paired cuticularized parts.

Juveniles

Several juveniles of different stages were present; the youngest probably belonging to stage 1. Even at this stage, the opening of the ventral gland lies at the level of cephalic sensilla, but the exact location could not be identified without ambiguity. In individuals of stage 1, the posterior 12% of the pharynx contain more muscular fibres than the remainder of the pharynx.

Differential Diagnosis

Within the Chromadoridae, *Chromadorita ceratoserolis* belongs to the Hypodontolaiminae, because the apophysis of the dorsal tooth extends into the pharyngeal tissue. Within this subfamily, the cuticle lacks lateral differentiation in *Chromadorita* and *Innocuonema*. The present species is placed in the former genus, because the ornamentation of the cuticle differs only slightly between different regions of the body.

C. ceratoserolis (L = 2.62–3.99 mm, a = 73–114) is the most slender and one of the longest chromadorid species. To date, a body length of more than 3 mm has only been known from *Austranema colesi* Inglis 1968 (L = 2.27–3.58 mm, a = 33–50), *A. shirleyae* Coles 1965 (L = 3.02–4.12 mm, a = 38–58), *Euchromadora ezoensis* Kito 1977 (L = 2.38–3.05 mm, a = 20–40), and *Parapinnanema harveyi* Warwick and Coles 1975 (L = 3.75–3.86 mm, a = 57–69), which all belong to the subfamily Euchromadorinae. Within the subfamily Hypodontolaiminae, *Neochromadora angelica* Riemann

1976 (L = 1.98–2.06 mm, a = 31–41) has been the longest species known to date, and within *Chromadorita* it has been *C. fennica* Jensen 1979 (L = 1.26–1.55 mm, a = 15–27).

As in most species of the Chromadoridae, a posterior pharyngeal bulb is present in nearly all species of *Chromadorita*. It is very indistinct in *C. leptopharynx* Wieser 1954 and lacking in *C. ceratoserolis*. Since first stage juveniles of the latter have a pharynx in which the posterior 12% are distinctively provided with more muscular fibres than the remaining part, it is concluded that the ancestor of *C. ceratoserolis* possessed a posterior bulb.

Unique within the family is the sexual dimorphism in the structure of both the ventral and lateral cuticle in the pre- and postanal region.

Small buccal denticles are also known from other species of *Chromadorita*.

Within *Chromadorita*, the ventral pore also lies in the region of the cephalic sensilla in *C. guidoschneideri* (Filipjev 1930), *C. phareta* Ott 1972 and *C. tenuis* (G. Schneider 1906), but it is not situated on a free-standing tube. Within the Chromadoridae, the latter feature has, as yet, only been reported from *Punctodora exochopora* Hopper 1963.

In summary, *C. ceratoserolis* is distinguished from the other *Chromadorita* species by its large size, its slenderness, the lack of a posterior pharyngeal bulb, the sexual dimorphism in the structure of both the ventral and lateral cuticle of the pre- and postanal region, the opening of the ventral gland through a free-standing tube, and its epibiotic way of life.

Discussion

Apparently, *Chromadorita ceratoserolis* is a regular epibiont of *Ceratoserolis trilobitoides*, since it was the only nematode species found in the marsupium of the isopod and was found on females (but not on males and juveniles) of *C. trilobitoides* from five different stations collected in three different years. It is not known what *C. ceratoserolis* feeds on.

Including the new species, 15 species of adeno-phorean nematodes are known to live epibiotically on marine, fresh water and terrestrial crustaceans all belonging to the Peracarida or Decapoda (see Table 1). Since only few attempts have been made in the past to look specifically for epibiotic nematodes of crustaceans, many more species may be expected to be found living on crustaceans.

During the course of evolution, one epibiotic nematode species living on some unknown crustacean species that served (or still serves?) as food for baleen whales appears to have become adapted to live on baleen plates of whales. This is *Odontobius ceti* Roussel de Vauzème 1834 (Monhysteridae), which is closely related to certain species of *Gammarinema* living epibiotically on peracarid crustaceans (see Lorenzen 1986).

Table 1. Free-living species of Nematoda Adenophorea living epibiotically on crustaceans

Nematode species	Host and biotope	References
Chromadoridae		
<i>Chromadorina astacicola</i> (W. Schneider 1932)	Gill-chambers of <i>Astacus</i> sp. and <i>Cambarus</i> sp. (Decapoda, Astacura), limnetic, W. Germany	W. Schneider (1932) Wieser (1968)
<i>Chromadorina majae</i> Wieser 1968	Gill-chambers and between eggs of <i>Maja squinado</i> (Decapoda, Brachyura), marin, Mediterranean	Wieser (1968)
<i>Chromadorita ceratoserolis</i> sp. n.	Between eggs in the marsupium of <i>Ceratoserolis trilobitoides</i> (Isopoda), marin, Antarctic	present paper
Monhysteridae		
<i>Gammarinema cambari</i> (Allen 1933)	Gill-chambers of <i>Cambarus acuminatus</i> and <i>C. blandingii</i> (Decapoda, Astacura), limnetic, USA	Allen (1933) Chitwood (1935)
<i>Gammarinema cardisomae</i> Riemann 1968	Gill-chambers of <i>Cardisoma guanhumi</i> (Decapoda, Brachyura), marin supralittoral, Caribbean	Riemann (1968)
<i>Gammarinema gammari</i> Kinne and Gerlach 1953	On <i>Gammarus locusta</i> , <i>G. oceanicus</i> , <i>G. salinus</i> and <i>G. zaddachi</i> (Amphipoda), marin, Baltic and Bering Sea	Kinne and Gerlach (1953) Belogurov et al. (1978) Lorenzen (1986)
<i>Gammarinema ligiae</i> Gerlach 1967	On <i>Ligia oceanica</i> (Isopoda), marin supralittoral, Baltic and Helgoland (FRG)	Gerlach (1967) Lorenzen (1986)
<i>Gammarinema mesidotaea</i> Belogurov, Kulikov and Russkikh 1978	On <i>Mesidotaea entomon</i> (Isopoda), Shantar Islands (Pacific coast of USSR), marin	Belogurov et al. (1978)
<i>Gammarinema paratelphusae</i> (Farooqui 1967)	Gill-chambers of <i>Paratelphusa</i> sp. (Decapoda, Brachyura), limnetic, Maharashtra, India	Farooqui (1967)
<i>Monhystera cameroni</i> Steiner 1958	On <i>Mysis stenolepis</i> , <i>M. mixta</i> (Mysidacea), <i>Crangon septemspinosus</i> , <i>Pandalus borealis</i> , <i>P. montagui</i> (all Decapoda, Natantia), gulf of St. Lawrence (North Atlantic coast of USA).	Steiner (1958)
<i>Monhystrium inquilinus</i> Riemann 1969	Gill-chambers of <i>Cardisoma guanhumi</i> (Decapoda, Brachyura), marin supralittoral, Caribbean	Riemann (1969)
<i>Monhystrium transitans</i> Cobb 1920	Gill-chambers of <i>Gecarcinus ruricola</i> and <i>G. lateralis</i> (Decapoda, Brachyura), marin supralittoral, Caribbean	Cobb (1920) Riemann (1970, as <i>M. aff. transitans</i>)
<i>Monhystrium wilsoni</i> (Baylis 1915)	Gill-chambers of <i>Gecarcinus ruricola</i> (Decapoda, Brachyura), marin supralittoral, Caribbean	Baylis (1915) Cobb (1920)
<i>Tripylum carcinicola</i> (Baylis 1915)	Gill-chambers of <i>Gecarcinus ruricola</i> and <i>Cardisoma guanhumi</i> , marin supralittoral, Caribbean	Baylis (1915) Cobb (1920) Riemann (1970) Chitwood (1935, <i>T. c. calkensis</i>)
Leptolaimidae		
<i>Camacolaimus monhystera</i> Gerlach 1967	Gill-chambers of <i>Coenobita scaevola</i> (Decapoda, Anomura), marin supralittoral, Red Sea	Gerlach (1967)

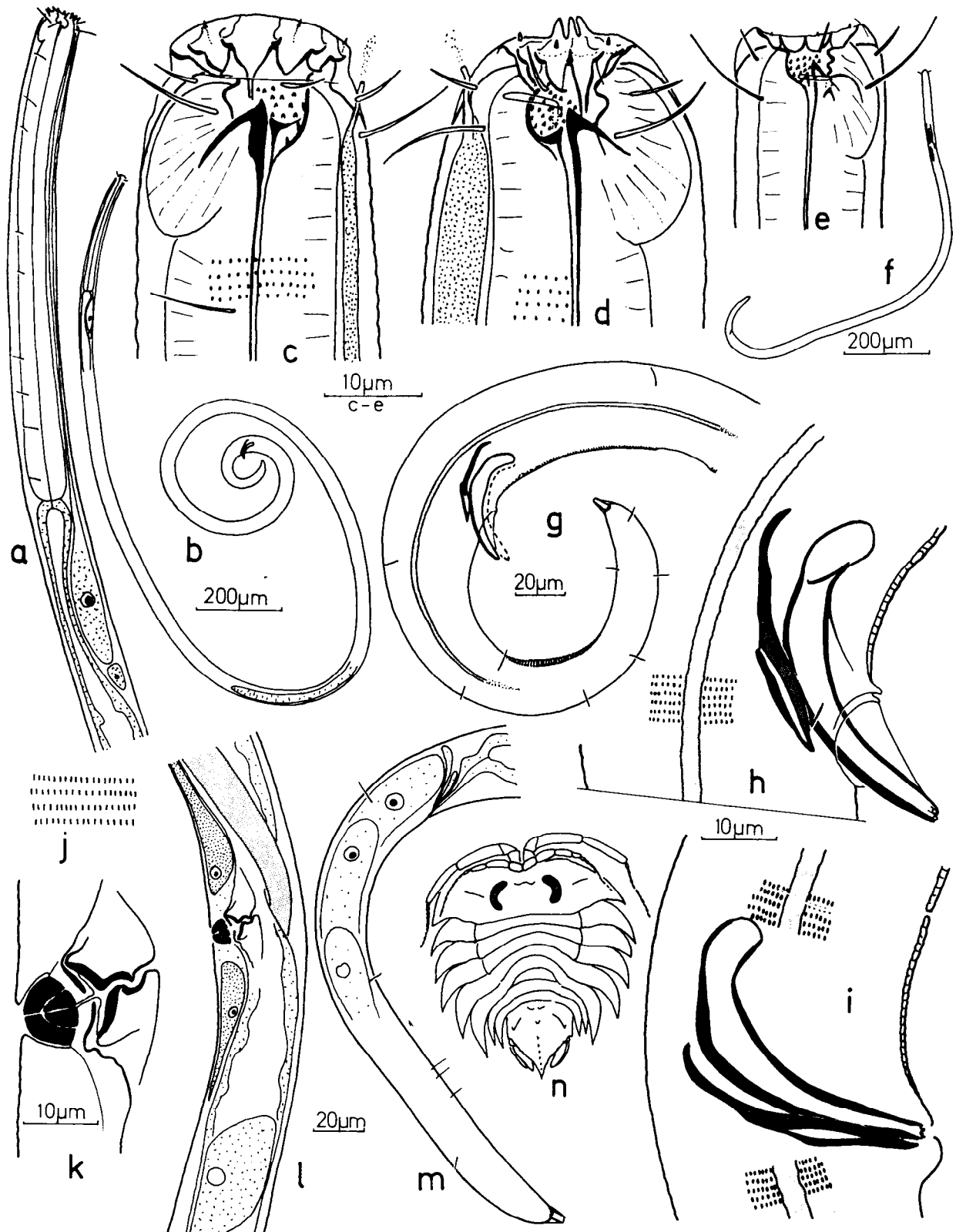


Fig. 1. *Chromadorita ceratoserolis* (a–m) and its host *Ceratoserolis trilobitoides* (n). *a* anterior end of σ₁; *b* whole body of σ₁; *c* head of σ₁; *d* head of σ₃; *e* head of juv.₁ (I); *f* whole body of juv.₁; *g* posterior region of σ₁; *h* spicular apparatus of σ₂; *j* cuticular ornamentation in the middle body region of σ₁; *k* vulva and vagina of ♀₁; *l* vulvar region of ♀₁; *m* tail of ♀₂; *n* manka stage (about 15 mm long) of *Ceratoserolis trilobitoides*; females are very similar in form and about 70 mm long and very flat (drawing prepared by Wägele)