

# A New Species of *Chromadorina* (Nematoda: Chromadoridae) Discovered in a Laboratory Aquarium

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(Received 10 October 2000; Accepted 1 May 2001)

A species of marine nematode, *Chromadorina hiromii* sp. nov., is described based on cultured specimens found in an aquarium containing medusae and polyps of *Aurelia aurita* (Linnaeus, 1758). The native habitat of the species is unknown, but certainly somewhere on the Pacific coast of Central Japan. *Chromadorina hiromii* resembles *C. cervix* (Wieser, 1951) and *C. bergensis* (Allgén, 1932) but differs from them in having a robust gubernaculum with well-cuticularized lateral pieces and five or six precloacal supplements in the male. *Chromadorina hiromii* is the second species of the genus known from Japan, the first being *C. inversa* Wieser, 1955, which was described from a single female collected at Shirahama. An examination of topotypic male specimens of *C. inversa* is required to understand its relationship to *C. hiromii*.

**Key Words:** Nematoda, marine, taxonomy, *Chromadorina hiromii*, new species, aquarium, Japan, western Pacific.

## Introduction

Small marine nematodes were discovered in a laboratory aquarium holding medusae and polyps of *Aurelia aurita* (Linnaeus, 1758) in the Graduate School of Bioresource Sciences, Nihon University. They were taken from within diatom colonies growing on the walls of the aquarium and successfully cultured by the junior author. Taxonomic study of the cultured specimens resulted in the conclusion that they were representatives of a previously unknown species of *Chromadorina* Filipjev. They must have entered the aquarium either with the medusae collected near Yokohama in Tokyo Bay, or with seawater taken from the shore at Jogashima Island, Miura Peninsula, Central Japan. Considering their habitat in the aquarium and the fact that they fed on diatoms added to the culture medium (Nakamura, unpublished observation), it is probable that they inhabit coastal substrata as free-living nematodes. We tried to get wild specimens of this species from the shore in front of the Kanagawa Prefectural Fisheries Research Institute, from where the aquarium's seawater had been pumped, but none could be found there. As a result, the present paper describes the new species of *Chromadorina* based on

cultured specimens, which were descended from individuals occurring in the aquarium. The life history of the new species, based on cultured specimens, will be reported elsewhere, and field surveys will be continued in the hope of locating its native habitat.

### Materials and Methods

The nematodes found in the aquarium were cultured using a liquid medium (Tsujino *et al.* 1997) and the diatom *Cylindrotheca* sp. The examined specimens were fixed in 4% formalin in seawater and mounted in anhydrous glycerin between two coverslips on H-S slides (Shirayama *et al.* 1993). Morphometric data were obtained from camera lucida drawings. Data regarding bilaterally paired structures are generally given as "right; left" in the text and table. The ranges and means  $\pm$  standard deviations of the data are given in the text.

The type specimens are deposited in the Zoological Museum, Division of Biological Sciences, Graduate School of Sciences, Hokkaido University, Sapporo, Japan (ZIHU).

The following abbreviations are used in this paper: a=ratio of body length to maximum body diameter; abd=body diameter at level of cloacal (anal) opening; amp d=diameter of amphid; b=ratio of body length to esophageal length; c=ratio of body length to tail length; cbd=corresponding body diameter; cs=length of cephalic setae; ep=distance from excretory pore to head end; eso=length of esophagus; eso bd=body diameter at level of posterior end of esophagus; gub=length of gubernaculum; hd=head diameter; L=body length; mbd=maximum body diameter; nr=distance from nerve ring to head end; pcs n=number of precloacal supplements; ps=distance from pigment spots to head end; spic arc=spicule length measured on arc; spic ch=spicule length measured on chord; t=tail length; V=position of vulva as a percentage of body length from head end; v=distance from vulva to head end; vbd=body diameter at level of vulva; vg=distance from ventral gland to head end.

### Taxonomic Account

#### *Chromadorina hiramii* sp. nov.

(Table 1 and Figs 1–9)

**Type specimens.** Five males and 5 females. Holotype: male (slide no. ZIHU 1388). Paratypes: 4 males (ZIHU 1389–1392) and 5 females (ZIHU 1393–1397).

**Type locality.** Pacific coast of Central Japan. Type specimens are descended from individuals transported into an aquarium with either seawater taken from Jogashima Island, Miura Peninsula, or medusae of *Aurelia aurita* collected near Yokohama in Tokyo Bay.

**Measurements.** Table 1. Holotype: L=643  $\mu$ m, a=33.8, b=6.2, c=8.9. Males (n=5): L=633–670 (652 $\pm$ 14)  $\mu$ m, a = 33.8–35.3 (34.6 $\pm$ 0.6), b=6.1–6.4 (6.2 $\pm$ 0.1), c=8.9–9.2 (9.0 $\pm$ 0.1). Females (n=5): L=628–741 (669 $\pm$ 48)  $\mu$ m, a=28.5–32.2 (30.8=1.4), b=6.1–6.9 (6.6 $\pm$ 0.3), c=6.7–7.3 (6.9 $\pm$ 0.2), V=44.5–46.6 (45.7 $\pm$ 0.8)%.

**Description.** *Male* (Holotype; n=5). Body slender, of almost equal diameter

Table 1. Measurements of *Chromadorina hiromii* sp. nov.

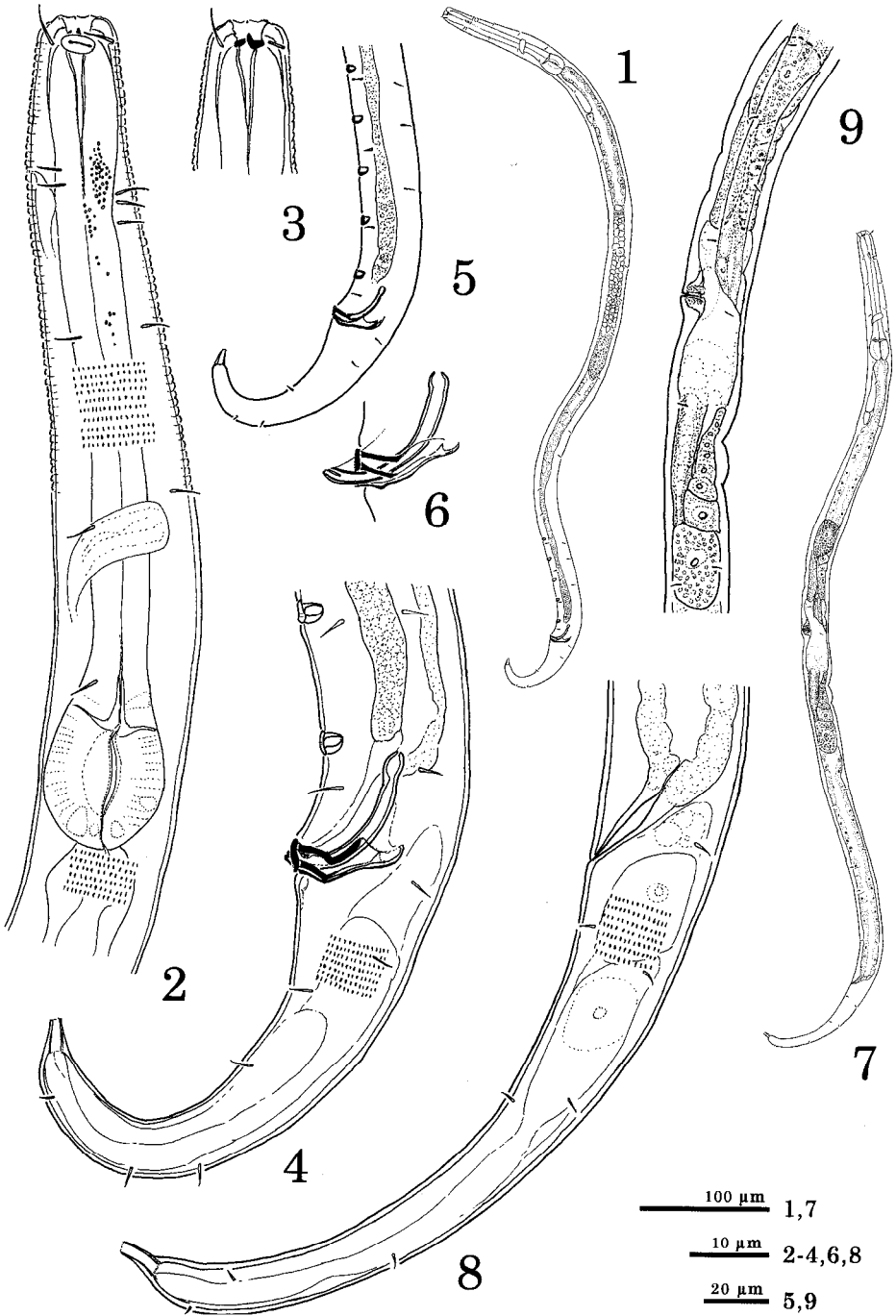
Variable	Males					Females				
	ZIHU 1389	ZIHU 1388*	ZIHU 1390	ZIHU 1391	ZIHU 1392	ZIHU 1393	ZIHU 1394	ZIHU 1395	ZIHU 1396	ZIHU 1397
L ( $\mu\text{m}$ )	633	643	655	657	670	628	639	643	696	741
a	35.1	33.8	34.5	34.1	35.3	31.4	30.4	32.2	31.6	28.5
b	6.1	6.2	6.2	6.3	6.4	6.7	6.1	6.4	6.8	6.9
c	8.9	8.9	9.1	8.9	9.2	6.9	6.7	6.9	7.3	6.9
V (%)						46.2	46.6	46.0	45.4	44.5
cs ( $\mu\text{m}$ )	5.4	5.1	5.2	5.6	5.9	6.6	5.9	5.9	6.1	5.6
hd ( $\mu\text{m}$ )	10.5	10.5	9.9	9.9	10.0	10.2	10.2	10.7	10.7	11.4
amp d ( $\mu\text{m}$ )	3.8;3.1	4.1;4.2	—;3.1	3.3;3.6	3.6;3.6	3.3;3.6	3.8;3.3	—;3.8	3.6;3.3	—;3.8
ps ( $\mu\text{m}$ )	16;15	17;16	16;15	15;18	15;15	17;18	16;17	16;15	16;17	18;16
ep ( $\mu\text{m}$ )	18	19	—	18	20	15	18	18	19	18
nr ( $\mu\text{m}$ )	61	61	61	62	62	56	60	61	62	63
eso ( $\mu\text{m}$ )	104	104	106	105	105	94	104	100	102	108
eso bd ( $\mu\text{m}$ )	17	18	17	16	19	18	18	18	19	22
vg ( $\mu\text{m}$ )	146	144	145	145	163	133	144	132	142	156
mbd ( $\mu\text{m}$ )	18	19	19	19	19	22	21	20	22	26
v ( $\mu\text{m}$ )						290	298	296	316	330
vbd ( $\mu\text{m}$ )						20	21	20	22	26
pcs n	6	5	5	5	5					
spic arc ( $\mu\text{m}$ )	22;22	23;22	22;22	22;23	25;25					
spic ch ( $\mu\text{m}$ )	18;20	20;18	18;20	19;19	21;22					
gub ( $\mu\text{m}$ )	12;13	15;14	14;14	11;12	15;17					
t ( $\mu\text{m}$ )	71	72	72	74	73	91	96	93	94	107
abd ( $\mu\text{m}$ )	17	18	17	17	18	15	14	15	16	17

\* Holotype; —, unsuitable for measurements.

throughout, but tapering gradually from level of nerve ring to head end and narrowing abruptly in tail region (Fig. 1). Cuticle homogeneous, annulated with transverse rows of slightly elongated dots; lateral differentiation absent. Somatic setae distributed throughout body, 5  $\mu\text{m}$  long at maximum.

Head end (Fig. 2) blunt, with 2 circles of sensilla; 6 labial sensilla papilliform but inconspicuous; 4 cephalic sensilla setiform, 0.5 (0.5–0.6) hd long. Five cervical setae at level of pigment spots; 2 ventro-sublateral setae slightly anterior to 3 dorso-sublaterals. Amphids transversely oval in outline, located at level of cephalic setae, 39; 40 (30–40, 35.3 $\pm$ 3.4) % of hd in diameter; structure of external aperture indistinct. Brownish pigment granules in longitudinally elongate clusters situated 1.6; 1.5 (1.4–1.8, 1.6 $\pm$ 0.1) hd from anterior end; additional pigment granules sparsely dispersed posteriorly. Buccal cavity (Fig. 3) equipped with solid dorsal tooth and 2 smaller subventral teeth. Esophagus slightly swollen anteriorly; esophageal bulb oval with plasmatic interruptions, 23  $\mu\text{m}$  long and 15  $\mu\text{m}$  wide; cardia indistinct. Distance from anterior margin of nerve ring to head end 59 (58–59, 58.6 $\pm$ 0.6) % of esophageal length. Excretory pore obscure, 1.8 (1.7–2.0, 1.8 $\pm$ 0.1) hd from head end, with large, slender gland cell situated ventrally behind esophageal bulb; small cell lying posterior to slender gland cell.

Reproductive system monorchic. Testis outstretched, right of intestine, ex-



Figs 1-9. *Chromadorina hiromii* sp. nov. 1-6, Male (1-5, holotype ZIHU 1388; 6, ZIHU 1391): 1, entire body; 2, anterior region; 3, head; 4, tail and copulatory apparatus; 5, posterior region; 6, spicule and gubernaculum. 7-9, Female (ZIHU 1396): 7, entire body; 8, tail; 9, reproductive system. All figures, left lateral view.

tending to level of 1.1 (1.0–1.1,  $1.1 \pm 0.1$ ) esophageal lengths from posterior end of esophagus; anterior end of germinal zone obscure. Spicules (Figs 4, 6) paired, slender, arcuate, with proximal cephalation and blunt distal end, 1.3; 1.2 (1.2–1.4,  $1.3 \pm 0.1$ ) abd long on arc or 1.1; 1.0 (1.0–1.2,  $1.1 \pm 0.1$ ) on chord; ventral velum present but obscure. Gubernaculum well-cuticularized with wavy dorsal fringe, 0.7; 0.6 (0.5–0.7,  $0.6 \pm 0.1$ ) of spicule length on arc; distal parts of lateral pieces distinct and directed ventrad. Five (5–6) cup-shaped precloacal supplements arranged at almost regular intervals, anteriormost and posteriormost ones situated 4.6 (3.7–4.9,  $4.5 \pm 0.5$ ) and 0.8 (0.6–0.9,  $0.8 \pm 0.2$ ) abd from cloaca, respectively (Fig. 5).

Tail conoid, curved ventrad, 4.0 (4.0–4.4,  $4.2 \pm 0.1$ ) abd long; spinneret about 5  $\mu\text{m}$  long. Three caudal glands in tandem.

**Female** (n=5). Similar to male in general characteristics (Fig. 7). Amphids 31–37 ( $33.8 \pm 2.1$ ) % of hd in diameter. Anterior margin of pigment spots 1.4–1.8 ( $1.6 \pm 0.1$ ) hd from head end. Distance from anterior margin of nerve ring to head end 58–61 ( $59.5 = 1.5$ ) % of esophageal length. Excretory pore 1.5–1.8 ( $1.7 \pm 0.1$ ) hd from head end.

Reproductive system amphidelphic (Fig. 9). Ovaries opposed, antidromous; anterior ovary on right of intestine, and posterior on left; both germinal ends situated dorso-laterally. Vulva anterior to middle of body; distance from vulva to flexure of anterior and posterior ovaries 11.6–13.6 ( $12.5 \pm 0.8$ ) % and 10.5–14.7 ( $12.5 \pm 1.9$ ) % of body length from vulva, respectively (Fig. 7). Vagina well developed with thick cuticular walls, 31–38 ( $34.1 \pm 2.7$ ) % of cbd.

Tail (Fig. 8) gradually tapering, longer than in male, 5.9–6.9 ( $6.3 \pm 0.4$ ) abd long.

**Differential diagnosis.** *Chromadorina hiromii* sp. nov. resembles *C. cervix* (Wieser, 1951) and *C. bergensis* (Allg en, 1932), among the species having 5–12 precloacal supplements in the key of Wieser (1954), in body length (630–740  $\mu\text{m}$ ) and length of the cephalic setae (0.5–0.6 hd long). However, *C. hiromii* differs from them in having a robust gubernaculum with well-cuticularized lateral pieces and five or six precloacal supplements in the male. In contrast, *C. cervix* and *C. bergensis* both have a rather simple gubernaculum without prominent lateral pieces, and they have seven and eight precloacal supplements, respectively (Wieser 1951; Allg en 1932). *Chromadorina cervix* is also different from the present species in having a slight constriction beginning just posterior to the cephalic sensilla and in lacking pigment spots.

**Remarks.** *Chromadorina hiromii* sp. nov. is the second species of the genus described from Japan, next to *C. inversa* Wieser, 1955 from Shirahama-cho, Wakayama Prefecture. *Chromadorina inversa* was insufficiently described by Wieser (1955) on one female alone, with his note; "My single specimen agrees fully with material I have found in the Mediterranean." According to his redescription based on one male and three females from the Mediterranean (Wieser 1956), *C. inversa* clearly differs from *C. hiromii* in having no precloacal supplements in the male and the two ovaries peculiarly reflexed to the dorsal and ventral sides respectively in the female. However, it is uncertain whether the specimens treated as *C. inversa* from Japan and the Mediterranean are truly conspecific, because male specimens of the species are still unknown from Japan. An examination of topotypic male specimens of *C. inversa* is required to clarify the taxonomic problem posed by *C. inversa* itself as well as the relationship between *C. hiromii* and Japanese *C. inversa*.

**Etymology.** The new species is named in honor of Prof. Juro Hiromi of the Graduate School of Bioresource Sciences, Nihon University, who contributes to the advance of marine nematology in Japan as a supervisor of graduate students studying meiobenthos.

### Acknowledgements

We wish to thank the staff of the Kanagawa Prefectural Fisheries Research Institute for providing seawater for our laboratory work as well as facilities for collecting phytal and sediment samples around the institute.

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