

The Genus *Coslenchus* SIDDIQI, 1978 (Tylenchidae : Nematoda) from
Japan. I. Record of *C. costatus* and Description of a New Species

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The Genus *Coslenchus* SIDDIQI, 1978 (Tylenchidae: Nematoda) from Japan. I. Record of *C. costatus* and Description of a New Species

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Coslenchus costatus and *C. japonicus* sp. n. were described and illustrated from Japan. Infra-specific variations of four Japanese populations of *C. costatus* were discussed comparing with the description of the species by ANDRÁSSY and showed that there found no differences strict enough to recognize them as being independent from the *C. costatus*, while a few characters within the description of the species were altered based on the Japanese specimens. *C. japonicus* sp. n. was related to *C. franklinae* in having a few head annules, head continuous to body contour, much reduced postuterine sac, however, it was readily distinguished from the latter by having 18 to 21 longitudinal ridges, slightly spaced opening of dorsal oesophageal gland from spear base, generally pre-vulval phasmids, and fewer body annules. *Jpn. J. Nematol.* 14: 28-39 (1984).

SIDDIQI⁹⁾ assembled four species of the *Tylenchus* (*Aglenchus*) BASTIAN, 1865 (ANDRÁSSY, 1954)¹⁾ and/or the *Aglenchus* (ANDRÁSSY, 1954) MEYL, 1961⁷⁾ into a new genus *Coslenchus*, considering their longitudinal ridges around the body as a discriminative character of the genus. Of the Tylenchidae (sensu ANDRÁSSY²⁾), both the present genus and the *Campbellenchus* WOUTS, 1978¹²⁾ have similar character of the cuticle. The *Coslenchus* is, however, readily distinguished from the *Campbellenchus* by having shorter spear and body annules being borne in a normal manner. The *Aglenchus* is clearly a close relative of the *Coslenchus* in having developed vulval flaps, four incisures on the lateral fields, straight tail, and so on. However, this genus simply has weak body annulation and completely lacks longitudinal ridges around the body.

In addition to these features, it was given in the definition of the *Coslenchus* of SIDDIQI⁹⁾ that the rounded basal knobs, coarsely annulated body cuticle, vagina at right angle to body axis, rudimentary postuterine sac, phasmids near vulva in female, and elongate-conoid to filiform tail. Some authors erroneously stressed above character-state** of the vagina as a conclusive difference between the *Coslenchus* and their new genera which show considerable affinity with the former in general appearances (MAQBOOL⁶⁾; SIDDIQI & KHAN¹¹⁾). However, the vaginal character-state itself is hardly a key character in the *Coslenchus*, since this character-state is not merely common to the family in general, but is a variable character in the genus as being emended by ANDRÁSSY³⁾ as "in most cases directed slightly anteriorly". It is noteworthy that when SIDDIQI⁹⁾ stressed this character in the "relationship" of the present genus, he did so simply to distinguish

* Laboratory of Nematology and Soil Zoology, Division of Microbiology, National Institute of Agro-Environmental Sciences, Kannondai 3-1-1, Yatabe, Tsukuba, Ibaraki 305, Japan.

** In the usual taxonomical usage, the term "character" may involve two different concepts; 1) the special portion of the organism (or taxon) which can be identified or homologized with those of the related organisms and is selected to bear good difference in form or nature enough to be used in the taxonomical action on the organism; 2) the specific form or nature in the special portion of the organism of above definition, which is often differently observed when the taxon differs. We strictly distinguished the latter concept from the usual usage and after some taxonomists applied the term "character-state" to denote it. However, in this work also, the term "character" when used, refers the usual taxonomical concept as involving above the two.

his new genus from the *Aglenchus*, but not to discriminate it from among the genera.

Since the election of the genus, species of the *Coslenchus* have greatly increased. After SIDDIQI⁹⁾ added six new species to the genus, ANDRÁSSY³⁾ extensively revised the genus, where the 20 species including eight new species and two new combinations of the genus were treated. BRZESKI¹⁹⁾ described a new species, *C. polonicus* from Poland. Further six species (five by SIDDIQI & KHAN¹⁰⁾ and one by BAJAJ & BHATTI⁴⁾) were described from India. In our taxonomical survey on the Japanese plant-parasitic nematodes as well, we could find several populations of the genus. We identified most of them with *C. costatus* (DE MAN, 1921) SIDDIQI, 1978 and determined a single population out of them to be new to science. They were the first record of the *Coslenchus* from Japan, and were described in this paper.

The *Coslenchus* thus enriched to include 28 species of the world has come to the largest genus of all the genera of the Tylenchidae. As a result, inevitably, definition of the genus, which was once elaborately emended by ANDRÁSSY³⁾, is coming slightly apart from the genus as such. Again, it is also urgent need to rearrange the previously suggested genera which are similar to the *Coslenchus*. We will deal with these problems in a separate report.

The specimens examined in this study were killed by gentle heat, fixed by TAF fixative and mounted in glycerine after slow dehydration.

COSLENCHUS COSTATUS (DE MAN, 1921) SIDDIQI, 1978
(Fig. 1 A-G, Fig. 2 A-I)

DIAGNOSTICS AND DISCUSSION

We examined eight populations of the *Coslenchus* from four different locations in Japan and came to conclusion that they should belong to a single species *C. costatus*, although we noted considerable differences in the characters among them.

Throughout the populations, we could commonly observe the slightly offset heat, bearing three or four annules; 2.4 to 3.3 μ m wide annules at mid-body; in most cases 14 or 15 longitudinal ridges; one annule (rarely one and half) long hemizonid; rather broad lateral fields (about 1/4 or more of body diameter), crenate on margin; and pyriform and slightly oblique vagina.

On the above character-states the Japanese populations are consistent with *C. costatus* (DE MAN, 1921) SIDDIQI, 1978 in the redescription of the species by ANDRÁSSY³⁾ (in this section wherever the word "ANDRÁSSY" is used, it refers exclusively to his description of this species).

On the other hand, they show some disagreement to the ANDRÁSSY. The postuterine sac was described as practically absent in the ANDRÁSSY. Whereas the populations collected from both Yotsukaicho City in Chiba Prefecture (Fig. 1) and Zentsuji City in Kagawa Prefecture have those ranging from 13 to 27% of vaginal body diameter. In the same populations further, we observed the wider or 5.5 to 8.0 μ m long vulval flaps (5.0 to 5.5 (misprint?) μ m long in the ANDRÁSSY), and fewer number of annules from vulva to anus (27 to 34) than in the ANDRÁSSY (31 to 42).

Above all the unique population of the species is from Mt. Aso (Fig. 2). States of the several characters are peculiar to this population though some of them partially overlap with the ANDRÁSSY as in: the larger body of 515 to 600 μ m long (460 to 570 μ m long in the ANDRÁSSY); annules from anterior body end to anus 179 to 192 (164 to 188 in the ANDRÁSSY); spear knobs lying at the seventh or eighth body annule (at the sixth or seventh in the ANDRÁSSY); 14 to 16 longitudinal ridges (14 or 15 in the ANDRÁSSY); vulval flaps of 1.5 to 2.5 annule long (2.5 to 3.5 annule long in the ANDRÁSSY); and slightly shorter rectum which is shorter than anal body diameter (as long as anal body diameter in the ANDRÁSSY).

The populations from Nishigoshi-chô in Kumamoto Prefecture also deviates from the ANDRÁSSY in having narrower grooves on the lateral fields (which almost give impression of bearing three incisures) and tail terminus which is often pointedly or hair-likely observed.

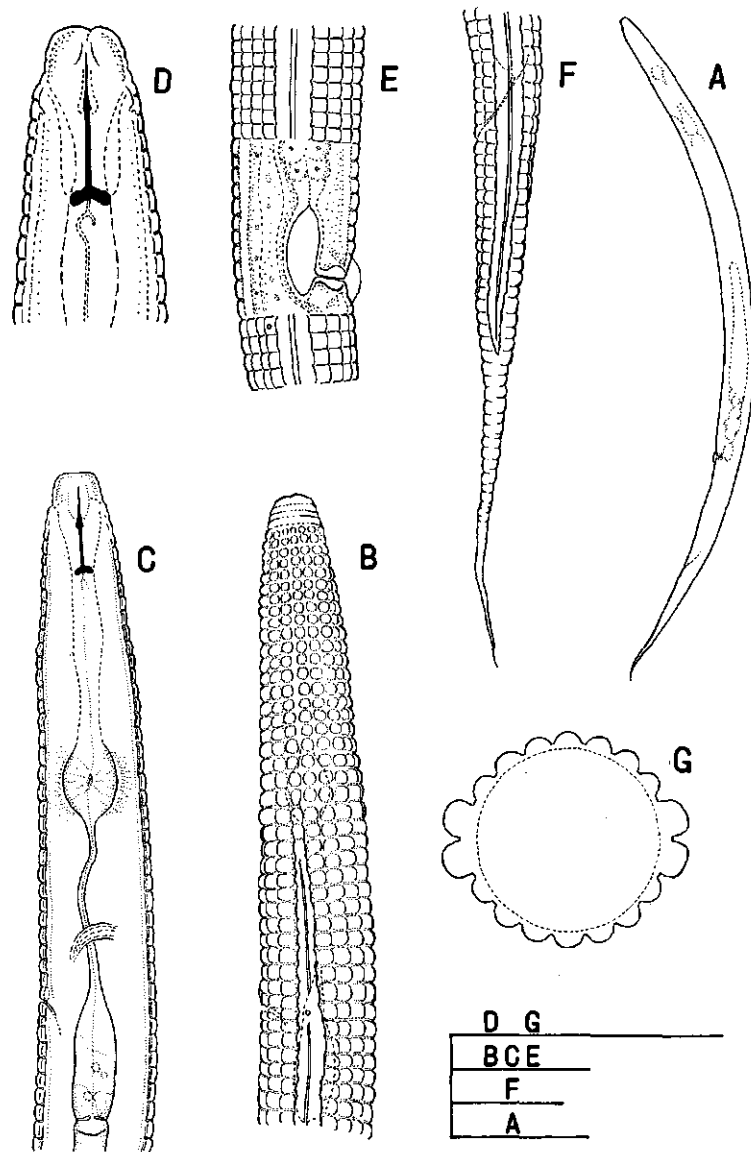


Fig. 1. *Coslenchus costatus* from Yotsukaïdo, Chiba. Female: A, general view; B, oesophageal region, surface view; C, *do.*, inner view; D, anterior body end; E, vulval region; F, tail; G, cross section at mid-body. Scale: A=100 μ m; B-G=20 μ m.

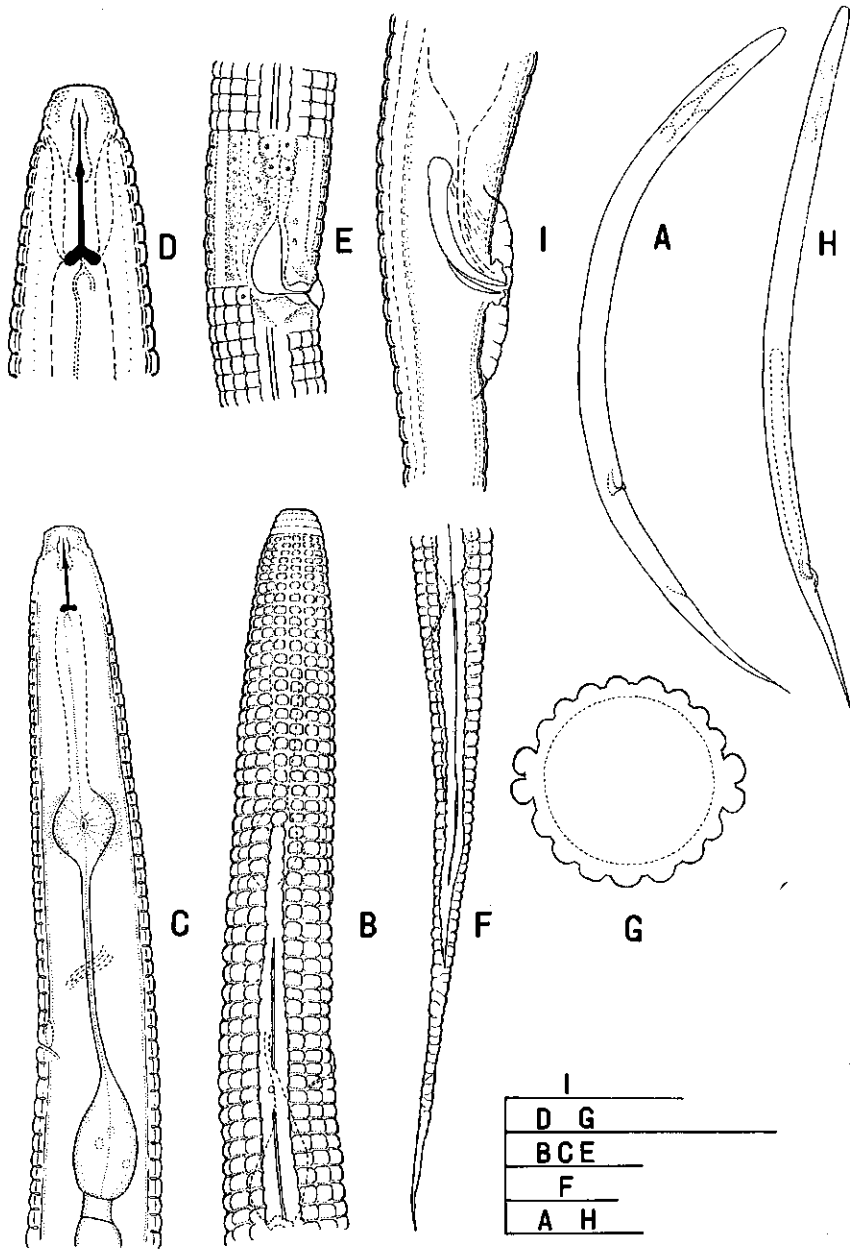


Fig. 2. *Coslenchus costatus* from Kusaneri, Mt. Aso. Female: A, general view; B, oesophageal region, surface view; C, *do.*, inner view; D, anterior body end; E, vulval region; F, tail; G, cross section at mid-body. Male: H, general view; I, cloacal region. Scale: A, H=100 μ m; B-G, I=20 μ m.

Table 1. Measurements and morphological character-states of *C. costatus* from Japan

Populations (n)	ANDRÁSSY 1982 (?)	Yotsukaïdo Chiba(20)	Zentsuji Kagawa(10)	Kusasenri Mt. Aso(22)	Nishigoshi Kumamoto(21)
1) L (μm)	460-570	474-546 (515 \pm 21)	435-584 (501 \pm 44)	515-600 (560 \pm 20)	493-558 (529 \pm 18)
2) a	25-32	24.2-34.5 (28.5 \pm 2.9)	25.6-32.4 (27.5 \pm 1.8)	25.8-30.1 (28.7 \pm 1.2)	22.5-32.3 (27.1 \pm 2.7)
3) b	4.6-6.1	5.0-6.0 (5.5 \pm 0.3)	5.3-6.0 (5.5 \pm 0.3)	5.1-5.9 (5.5 \pm 0.2)	5.0-6.1 (5.5 \pm 0.3)
4) c	4.5-6.0	5.1-7.5 (5.5 \pm 0.6)	5.2-5.6 (5.4 \pm 0.2)	4.2-6.0 (5.2 \pm 0.4)	4.7-5.7 (5.1 \pm 0.3)
5) c'	8-12	6.3-12.4 (10.2 \pm 1.7)	5.3-9.7 (8.6 \pm 1.2)	7.6-10.6 (9.1 \pm 0.8)	8.3-15.2 (10.9 \pm 1.7)
6) V (%)	61-67	64.1-70.7 (66.3 \pm 1.7)	64.6-66.4 (65.5 \pm 0.6)	64.0-67.3 (65.7 \pm 0.8)	64.0-66.9 (65.1 \pm 0.7)
7) spear (μm)	11-12	10.0-12.5 (11.4 \pm 0.7)	11.1-13.4 (12.0 \pm 0.8)	11.5-12.5 (12.2 \pm 0.4)	11.0-12.8 (11.9 \pm 0.6)
8) body annule width (μm)	2.2-2.6	2.4-3.3 (2.8 \pm 0.2)	2.5-3.0 (2.7 \pm 0.2)	2.3-2.9 (2.6 \pm 0.2)	2.3-2.7 (2.5 \pm 0.1)
9) ROes	43-52	38-49 (43 \pm 3)	35-45 (42 \pm 3)	47-54 (50 \pm 2)	38-49 (45 \pm 2.5)
10) Rex	38-45	34-39 (36 \pm 1.7)	35-39 (37 \pm 1.3)	40-44 (42 \pm 0.8)	37-41 (39 \pm 1.5)
11) annules from head to vulva	133-152	126-153 (134 \pm 7)	120-142 (130 \pm 7)	146-157 (153 \pm 3)	136-153 (143 \pm 3)
12) RVan	31-42	27-34 (31 \pm 2)	27-37 (31 \pm 3)	30-35 (34 \pm 1)	30-35 (32 \pm 1)
13) annules from head to anus	164-188	155-183 (165 \pm 7)	150-178 (161 \pm 9)	179-192 (187 \pm 4)	168-179 (175 \pm 3)
14) lateral fields width (μm)	5-5.5	4.0-6.3 (5.1 \pm 0.6)	3.2-5.6 (4.7 \pm 0.7)	4.3-6.5 (5.3 \pm 0.6)	4.1-6.1 (5.0 \pm 0.6)
15) head diameter (μm)	6	6.6-7.2 (6.9 \pm 0.2)	6.1-7.1 (6.6 \pm 0.4)	6.5-7.6 (7.0 \pm 0.2)	6.5-8.1 (7.2 \pm 0.5)
16) cardial body diameter (μm)	-	15.3-18.3 (17.1 \pm 0.8)	16.0-18.3 (17.4 \pm 0.8)	17.5-20.5 (19.1 \pm 1.1)	16.0-21.0 (17.7 \pm 1.2)
17) mid-body diameter (μm)	-	15.0-22.9 (18.3 \pm 2.2)	16.0-20.2 (18.2 \pm 1.3)	17.5-22.5 (19.7 \pm 1.4)	16.7-23.5 (19.6 \pm 1.9)
18) vaginal body diameter (μm)	-	15.0-20.0 (17.1 \pm 1.5)	16.3-19.8 (17.6 \pm 1.3)	16.0-21.0 (17.9 \pm 1.4)	14.2-21.5 (17.3 \pm 1.7)
19) anal body diameter (μm)	-	8.0-11.5 (9.3 \pm 1.0)	9.2-14.8 (10.9 \pm 1.7)	10.0-14.0 (11.7 \pm 1.1)	6.1-11.2 (9.5 \pm 1.3)
20) oesophagus length (μm)	85-105	90-101 (93.8 \pm 2.6)	83-96 (89.6 \pm 4.1)	96-109 (101.6 \pm 3.0)	88-104 (96.4 \pm 3.6)
21) median bulb length (μm)	9-12	10.0-11.0 (10.3 \pm 0.5)	8.7-11.9 (10.4 \pm 1.0)	10.0-13.5 (11.6 \pm 1.1)	9.0-12.0 (10.5 \pm 0.7)
22) isthmus length (μm)	-	25.4-32.5 (27.1 \pm 2.2)	20.3-26.4 (24.5 \pm 2.1)	17.3-31.5 (27.0 \pm 3.4)	24.0-32.5 (27.5 \pm 2.5)
23) basal bulb length (μm)	-	16.3-19.3 (17.6 \pm 0.8)	16.0-18.3 (17.3 \pm 0.8)	14.2-28.5 (21.0 \pm 2.5)	16.5 \pm 20.5 (18.3 \pm 1.1)
24) excretory pore from head (μm)	-	73.0-84.0 (80.3 \pm 3.6)	69.6-83.8 (75.4 \pm 4.2)	78.5-86.5 (81.8 \pm 2.3)	79.5-85.5 (82.4 \pm 1.9)
25) postuterine sac length (μm)	-	2.5-4.1 (3.4 \pm 0.6)	2.5-3.5 (2.9 \pm 0.4)	1.0-3.0 (2.0 \pm 0.7)	1.0-4.0 (2.6 \pm 0.7)
26) vulval flaps length (μm)	5-5.5	5.5-8.0 (6.6 \pm 0.7)	5.5-6.5 (6.0 \pm 0.4)	4.1-6.1 (5.3 \pm 0.6)	6.0-8.1 (7.0 \pm 0.8)

Table 1. (Continued)

Populations (n)	ANDRÁSSY 1982 (?)	Yotsukaido Chiba(20)	Zentsuji Kagawa(10)	Kusasenri Mt. Aso(22)	Nishigoshi Kumamoto(21)
27) gonad length (μm)	—	99–162 (132 \pm 15)	111–163 (n=4)	125–185 (143 \pm 19)	104–211 (148 \pm 25)
28) vulva-anus distance (μm)	65–91	71.2–87.5 (80.2 \pm 5.0)	68.1–105.7 (81.4 \pm 11.0)	77.5–93.5 (85.0 \pm 4.3)	75.0–90.5 (81.7 \pm 4.2)
29) rectum length (μm)	—	6.0–13.0 (10.2 \pm 1.9)	9.5–14.2 (11.5 \pm 1.9)	7.0–12.0 (9.4 \pm 1.4)	9.0–13.0 (10.9 \pm 1.1)
30) tail length (μm)	92–110	63.0–102.7 (94.1 \pm 9.9)	78.3–103.7 (91.6 \pm 7.4)	96.5–114.0 (106.7 \pm 4.9)	92.5–117.5 (104.3 \pm 6.6)
31) longitudinal ridges	14–15	14–15	14–15	14–16	14–15
32) lateral fields (14/17 (%))	ca.25	22–30 (28 \pm 2)	20–29 (25 \pm 3)	23–30 (27 \pm 2)	21–30 (25 \pm 2)
33) middle groove on lateral fields	wide	wide	wide	wide	narrow
34) head to body contour	slightly offset	slightly offset	slightly offset	slightly offset	slightly offset
35) head annules	4	3–4	3–4	4	3–4
36) spear knob in body annule	6–7th	6–7th	5–7th	7–8th	6–7th
37) spear (7/15)	1.8–2	1.5–1.9 (1.6 \pm 0.15)	1.5–1.9 (1.8 \pm 0.1)	1.6–1.8 (1.75 \pm 0.05)	1.4 \pm 1.8 (1.7 \pm 0.2)
38) cardial body (16/15)	2.3–2.9	2.4–2.7 (2.5 \pm 0.1)	2.3–3.0 (2.6 \pm 0.2)	2.5–2.9 (2.7 \pm 0.2)	2.0–3.0 (2.5 \pm 0.2)
39) ant. oes./ post. oes.(%)	52–53	50.5–54.2 (52.3 \pm 1.0)	51.7–56.5 (53.7 \pm 1.5)	50.5–55.5 (52.4 \pm 1.3)	49.1–54.9 (52.6 \pm 1.3)
40) isthmus (22/23)	ca. 1.5	1.4–1.9 (1.5 \pm 0.15)	1.2–1.5 (1.4 \pm 0.1)	0.7–1.6 (1.3 \pm 0.2)	1.1–1.9 (1.5 \pm 0.2)
41) deirid to ex. (in annule)	1–5 post.	2 ant. to 3 post.	same level to 2 post.	2 ant. to 1 post.	same level to 1 post.
42) hemizonid (in annule)	1	1	1–1.5	1–1.5	1–1.5
43) phasmid to v. (in annule)	1–5 post.	same level to 5 post.	1–4 post.	same level to 4 post.	2 ant. to 4 post.
44) rectum (29/19 (%))	100	59–148 (111 \pm 23)	69–119 (102 \pm 18)	56–110 (80 \pm 14)	86–126 (109 \pm 10)
45) vulval flaps (26/8)	2.5–3.0	1.8–3.0 (2.3 \pm 0.3)	2.0–2.5 (2.2 \pm 0.1)	1.5–2.5 (2.1 \pm 0.4)	2.3–3.3 (2.8 \pm 0.3)
46) vagina shape	pyriform	pyriform	pyriform	pyriform	pyriform
47) vagina to body axis	slightly oblique	slightly oblique	slightly oblique	slightly oblique	slightly oblique
48) gonad (27/17)	7–8	5.7–8.3 (7.2 \pm 0.6)	4.9–9.7 (n=4)	6.2–8.8 (7.4 \pm 0.8)	6.0–9.7 (7.6 \pm 1.0)
49) gonad (27/1 (%))	25–36	19.2–30.5 (25.5 \pm 2.7)	19.0–35.0 (n=4)	21.7–32.2 (25.5 \pm 2.9)	20.2–40.0 (28.1 \pm 4.6)
50) postuterine sac (25/18 (%))	ca. 0	13–27 (20 \pm 4)	13–21 (17 \pm 3)	5–18 (11 \pm 4)	6–24 (15 \pm 5)
51) tail (30/28)	1.1–1.4	0.8–1.4 (1.2 \pm 0.1)	0.9–1.3 (1.1 \pm 0.1)	1.1–1.4 (1.3 \pm 0.1)	1.1–1.5 (1.3 \pm 0.1)
52) tail terminus	hair-like	hair-like	hair-like	hair-like	hair-like or pointed

Figures show minimum and maximum values. Those of mean and standard deviation are shown in parentheses.

We compared with the character-states ranges between the representatives of the populations from four locations, and showed that most of them overlapped one another and consequently came to continuous through the populations (Table 1). Indeed the population from Mt. Aso shows extensive deviation of the character-states from the ANDRÁSSY but this fact scarcely support the assumption that this population become a valid new species. Its deviations from the ANDRÁSSY are not necessarily as large as the differences usually observed between the species of the *Coslenchus*. The postuterine sac has been taken as a significant and useful character for the species of the genus. The prominent postuterine sac of the populations from the two locations either do not become differences of the populations from the *C. costatus*, since this character clearly varies among the populations. To our regret, ANDRÁSSY³⁾ neglected to show the limits of length in the postuterine sac of this species. It is enough for us to remember here that SIDDIQI⁹⁾ had described it as "less than 1/4 body-width long" in the description of the Neotype of *C. costatus*.

Tail terminus is also variable character: as in those from Nishigoshi, it varies even in the same populations. Concerning this character, SIDDIQI⁹⁾ was also partially true to the fact when he described it as having "a pointed tip".

We recognized that above variations of the character-states among the populations did not fall into the inter-specific, but into the infra-specific ones. And we concluded from above discussion on the character-state variations that these populations were real *C. costatus*.

MEASUREMENTS

For female readers refer to Table 1.

Male (n=1): L=511 μ m; a=26.5; b=5.0; c=5.1; c'=9.6; T=29.7%, spear=13 μ m; annule width at mid-body=2.2 μ m; ROes=56; Rex=45; annules from anterior body end to anus=197; lateral field width=5.1 μ m; head diameter at base=6.3 μ m; body diameter at cardia=17.3 μ m; oesophagus length=103.0 μ m; median bulb length=12 μ m; basal bulb length=18.5 μ m; isthmus length=31.5 μ m; head to excretory pore=78.3 μ m; testis length=151.5 μ m; spicule=16.3 μ m; gubernaculum=7.0 μ m; bursa=22.4 μ m; tail=100.5 μ m.

DESCRIPTION

Based on the Japanese populations, description of the *C. costatus* is given below.

Body weakly curved ventrally (Figs. 1A, 2A). Annules of cuticle moderately wide in mid-body region. Cuticle provided around the body with 14 or 15, rarely 16, longitudinal ridges excluding lateral fields (Figs. 1G, 2G). Lateral fields originating behind neck (Figs. 1B, 2B), crenate on margins, 22 to 30% of body diameter (Figs. 1E, 2E), with middle groove generally spaced (with four incisures). Head slightly offset, with three or four annules (Figs. 1D, 2D). Body at cardia 2.0 to 3.0 times as wide as head base. Spear 1.4 to 1.9 times head diameter at base, with rounded basal knobs lying in the fifth to eighth neck annule (Figs. 1D, 2D). Oesophagus (from head to cardia) moderately long; anterior part (from anterior body end to posterior margin of median bulb) slightly longer than posterior; 49.1 to 56.5% of entire oesophagus length (Figs. 1C, 2C). Median bulb rounded oval; basal bulb elongate pyriform (Figs. 1C, 2C). Isthmus varying in length, 0.7 to 1.9 times as long as basal bulb. Excretory pore varying in position, mostly being opened at the level of anterior portion of basal bulb (Figs. 1C, 2C). Deirids in the level from two annules anterior to three annules posterior of excretory pore (Figs. 1B, 2B). Hemizonid one to one and half annule long (Figs. 1C, 2C). Vulva slightly sunken in body; vulval flaps well developed, 1.5 to 3.3 annule long (Figs. 1E, 2E). Vagina pyriform, slightly oblique (Figs. 1E, 2E). Gonad varying in length, 4.9 to 9.7 times mid-body diameter and 19.0 to 40.0% of body length. Postuterine sac prominent, varying in length within the limit of 5 to 27% of corresponding body diameter (Figs. 1E, 2E). Spermatheca empty. Phasmids in the level from two annules anterior to four annules posterior of vulva (Figs. 1E, 2E). Rectum 56 to 148% of anal body diameter, originating dorsally to ventro-medially from base of intestine (Figs. 1F, 2F). Tail

varying in length, 5.3 to 15.2 times anal body diameter and 0.9 to 1.5 times vulva-anus distance; terminus generally hair-like, rarely pointed (Figs. 1F, 2F).

Male (Single male is available) : Characteristics of male generally agrees with female except for reproductive system and follows. Body weakly acuate; tail straight (Fig. 2H). Annules lower and narrower than in female. Number of annules in head region three. Lateral fields 26% of body diameter. Head hardly offset. Body at cardia 2.8 times as wide as head. Spear 2.1 times head diameter at base, with rounded basal knobs lying in the ninth body annule. Anterior part of oesophagus slightly longer than posterior, 51.5% of entire oesophagus length. Isthmus 1.7 times basal bulb length. Excretory pore being opened near posterior half region of isthmus. Deirids at the equal level of excretory pore. Hemizonid 1.5 annule long. Testis 29.7% of entire body length and 7.8 times the widest body diameter (Fig. 2H). Spicules acuate, basal portions rounded swollen; remaining portions of equal width near pointed apical portions; 1.6 times anal body diameter (Fig. 2I). Gubernaculum distinct (Fig. 2I), crescent-shaped in lateral view, 42.9% of spicule length. Cloacal lips protruding, with two and one papillae-like lobes on anterior and posterior lips (Fig. 2I). Bursa arising near base of spicules, with 10 crenations, 1.3 times anal body diameter and 22.3% of tail length (Fig. 2I). Tail with 53 annules, 9.6 times anal body diameter.

SPECIMENS EXAMINED (LOCALITY AND HABITAT)

20 females, Yotsukaido city, Chiba Prefecture (Honshu, Japan), 19. x. 1981 (N. MINAGAWA), soil around the *Artemisia* sp. and *Allium macrostemmn* BUNGE; 13 females, Do., 19. x. 1981 (N. MINAGAWA), *Morus alba* L.; 19 females, Do., 19. x. 1981 (N. MINAGAWA), *Miscanthus sinensis* ANDERSS.; 10 females, Do., 19. x. 1981 (N. MINAGAWA), *Sasa* sp., *Castanea crenata* SIEB. et ZUCC.

10 females, Zentsuji city, Kagawa Prefecture (Shikoku, Japan), 11. iii. 1982 (N. MINAGAWA), *Miscanthus sinensis* ANDERSS.

26 females, 1 male, Kusasenri, Mt. Aso, Kumamoto Prefecture (Kyushu, Japan), 19. x. 1979 (N. MINAGAWA), *Cirsium suffultum* (MAXIM.) MATSUM.

8 females, Nishigoshi-chô, Kumamoto Prefecture (Kyushu, Japan), 22. iii. 1979 (N. MINAGAWA), *Diospyros kaki* THUNB.; 21 females, Do., 12. xii. 1979 (N. MINAGAWA), *Cedrus deodara* (ROXB.) G. DON ex LONDON.

COSLENCHUS JAPONICUS sp. n.

(Fig. 3 A-I)

MEASUREMENTS

Holotype, female: L=355 μ m; a=28.0; b=4.4; c=4.6; c'=9.7; V=63.0%; spear=11.1 μ m.

Females (n=22) : L=343-448 (401 \pm 26; mean \pm standard deviation) μ m; a=23.6-28.8 (26.8 \pm 1.4) ; b=4.1-5.4 (4.8 \pm 0.7) ; c=4.4-4.9 (4.7 \pm 0.2) ; c'=7.5-11.6% (9.7 \pm 1.0) ; V=61.4-70.8% (64.5 \pm 2.3) ; spear=9.5-13.0 (10.9 \pm 0.8) μ m; annule width at mid-body=1.9-2.5 (2.2 \pm 0.2) μ m; ROes=42-50 (45 \pm 3) ; Rex=35-42 (38 \pm 2) ; annules from anterior body end to vulva=121-132 (125 \pm 4) ; RVan=26-33 (29 \pm 2) ; annules from anterior body end to anus=148-163 (154 \pm 5) ; lateral field width=3.0-4.3 (3.4 \pm 0.4) μ m; head diameter at base=5.0-6.1 (5.7 \pm 0.4) μ m; body diameter at cardia=13.2-15.1 (14.1 \pm 0.6) μ m; oesophagus length=77.3-88.5 (81.9 \pm 2.7) μ m; median bulb length=8.0-10.0 (9.1 \pm 0.7) μ m; basal bulb length=12.3-17.8 (15.8 \pm 1.4) μ m; isthmus length=18.3-25.4 (21.7 \pm 2.3) μ m; head to excretory pore=61.5-71.0 (67.7 \pm 3.0) μ m; rectum=5.0-7.0 μ m; vulval flaps length=4.0-6.2(5.4 \pm 0.7) μ m; gonad length=70.0-138.5(99.6 \pm 14.9) μ m; vulva anus distance=51.9-67.1 (61.3 \pm 3.7) μ m; tail=73.2-98.6 (87.5 \pm 6.4) μ m.

Males (n=20) : L=341-416 (382 \pm 22) μ m; a=27.7-32.9 (29.7 \pm 1.4) ; b=4.3-5.2 (4.7 \pm 0.2) ; c=3.9-4.7(4.4 \pm 0.2) ; c'=11.3-14.8(12.7 \pm 0.9) ; T=27.9-40.3% (34.7 \pm 3.8) ; spear=10.0-13.0(11.6 \pm 0.9) μ m ; annules width at mid-body=1.7-2.1 (2.0 \pm 0.1) μ m ; ROes=42-51 (46 \pm 2) ; Rex=35-42 (38 \pm 2) ; annules from anterior body end to anus=146-162 (154 \pm 5) ; lateral field width=2.0

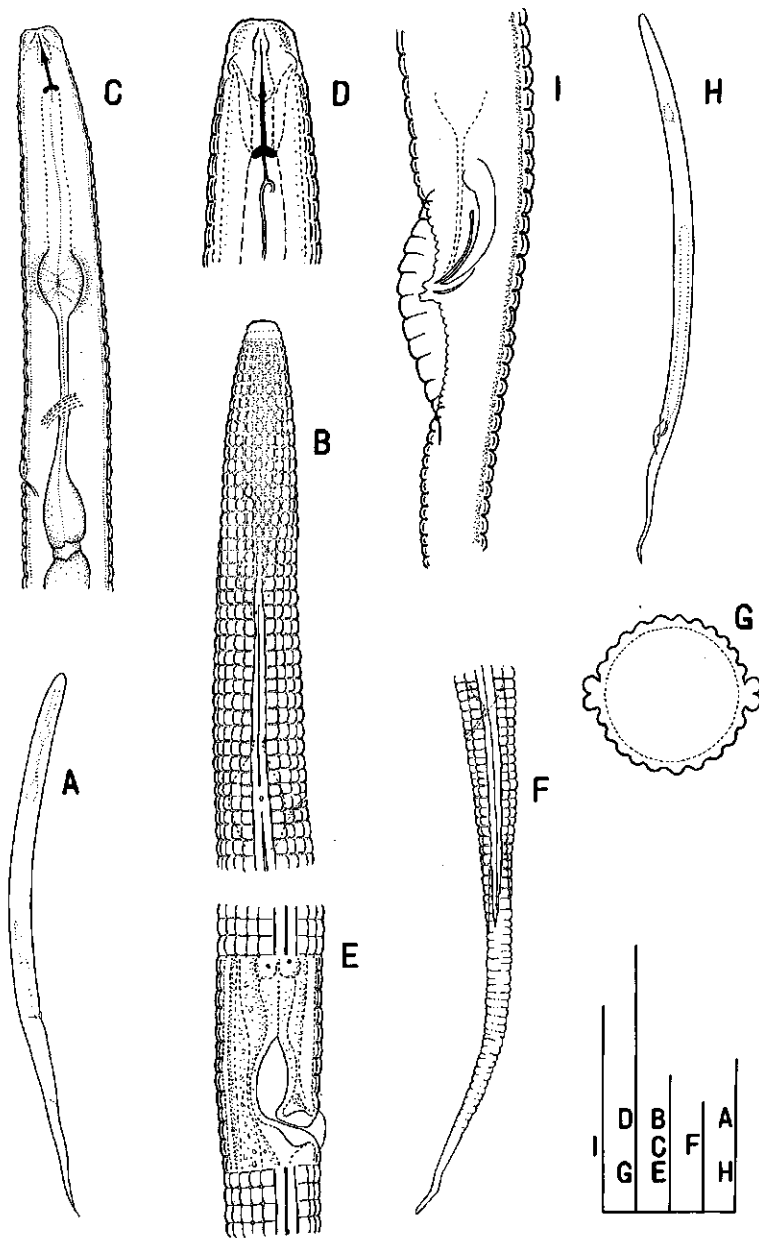


Fig. 3. *Costenchus japonicus* sp. n. Female: A, general view; B, oesophageal region, surface view; C, *do.*, inner view; D, anterior body end; E, vulval region; F, tail; G, cross section at mid-body. Male: H, general view; I, cloacal region. Scale: A, H=100 μ m; B-G, I=20 μ m.

3.0(2.7±0.3) μm ; head diameter at base=5.3-6.5(5.9±0.3) μm ; body diameter at car dia=11.2-13.3(12.3±0.6) μm ; oesophagus length=73.2-91.5(80.8±4.3) μm ; median bulb length=7-10(8.7±0.9) μm ; basal bulb length=10.5-21.5(14.1±2.7) μm ; isthmus length=15.0-30.5(24.4±3.9) μm ; head to excretory pore=60.0-70.0(65.8±2.6) μm ; testis length=102.0-160.5(132.1±15.1) μm ; spicule=11.0-14.0(12.1±0.8) μm ; gubernaculum=4.5-7.5(5.1±0.9) μm ; bursa=21.0-29.0(25.5±2.0) μm ; tail=81.4-94.5(87.2±4.3) μm .

DESCRIPTION

Female: Body straight to slightly curved ventrally (Fig. 3A). Annules low and narrow. Cuticle thin, with 18 to 21 longitudinal ridges excluding lateral fields (Fig. 3G). Lateral field 19 to 25% (22±2) of body diameter; hardly crenate on margins; practically with three incisures (middle groove on lateral field is so narrow that the four incisures give impression to be three) (Fig. 3B, E, G). Head continuous to body contour, bearing two (occasionally three) inconspicuous annules (Fig. 3D). First several body annules behind neck also indistinct (Fig. 3C-D). Body at cardia 2.2 to 2.9 (2.5±0.2) times as wide as head base. Spear 1.8-2.2 (1.9±0.1) times head diameter at base, basal knobs rounded, lying in the seventh to eighth body annule; opening of dorsal oesophageal gland about 2 μm separated from base of spear (Fig. 3D). Cephalic framework cuticularized. Anterior portion of oesophagus slightly longer than posterior one, 52.0 to 60.1% (54.6±2.2) of entire oesophagus length (Fig. 3C). Median bulb rounded oval; basal bulb pyriform (Fig. 3C). Isthmus varying in length, 1.1 to 2.0 (1.4±0.2) times as long as basal bulb (Fig. 3C). Excretory pore mostly lying at anterior portion of basal bulb (Fig. 3C). Deirids opposite to excretory opening (Fig. 3B). Hemizonid two annule long (Fig. 3C). Vulva slightly sunken in body, vulval flaps well developed, and 1.7 to 3.2 (2.5±0.4) annule long (Fig. 3E). Vagina pyriform, inclined anteriorly (Fig. 3E). Gonad varying in length, 4.8 to 9.1 (6.7±1.0) times mid-body diameter and 20.3 to 34.1% (24.9±3.1) of body length. Postuterine sac practically absent (Fig. 3E). Spermatheca packed with minute globular sperms. Phasmids inconspicuous, from four annule anterior to equal level of vulva. Rectum shorter than anal body diameter, 61 to 87% (70±10) of the latter, originating medially from base of intestine (Fig. 3F). Tail 7.5 to 11.6 (9.7±1.0) times anal body diameter and 1.3 to 1.6 (1.4±0.1) times vulva-anus distance; evenly tapering to fine, rounded or pointed tip (Fig. 3F).

Male (n=20): Agrees with the female except for reproductive systems and following characteristics. Comparing with female, these are given as follows: Body almost straight; tail sub-sinuate (Fig. 3H). Annules narrower. Head wider, with two or three, usually indistinct annules. Lateral fields narrower, 17 to 23% (21±2) of body diameter. Body at cardia 1.8 to 2.2 (2.1±0.1) times as wide as head. Spear slightly longer than female. Anterior portion of oesophagus somewhat longer than posterior one, 39.5 to 46.0 (42.4±2.1) μm long and 50.3 to 54.0% (52.4±1.1) of entire oesophagus length. Basal bulb short; isthmus generally long, 0.7 to 2.4 (1.8±0.5) times as long as basal bulb. Excretory pore lying about the level of border between isthmus and basal bulb. Hemizonid one and half to two annule long. Testis 8.8 to 12.2 (10.3±1.2) times body diameter (Fig. 3H). Spicules curved ventrally, basal portion swollen and offset; remaining portion evenly tapering to pointed apex; 1.5 to 2.2 (1.8±0.4) times anal body diameter (Fig. 3I). Gubernaculum crescent-shaped in lateral view, 36.4 to 67.0% (40.5±5.6) of spicule length, indistinct (Fig. 3I). Cloacal lips protruding, with papilla-like lobes on anterior and posterior lips, the latter more robust and longer than the former (Fig. 3I). Bursa arising near the base of spicules, with 12 to 16 (14±1) crenations, 3.2 to 4.8 (3.7±0.4) times anal body diameter and 25.8 to 35.6% (29.2±2.5) of tail length (Fig. 3I). Tail with about 40 annules, 11.3 to 14.8 (12.7±0.9) times anal body diameter.

DIAGNOSTICS AND RELATIONSHIP

Coslenchus japonicus sp. n. can be related to *C. franklinae* SIDDIQI, 1981 in the gross characteristics: much smaller body (less than 500 μm); hardly offset head with two or three

annules; spear knobs lying in the seventh to eighth body annule; narrow annule at mid-body (1.9 to 2.5 μm); 35 to 42 annules from anterior body end to excretory pore; 42 to 50 annules from anterior body end to cardia; relatively numerous longitudinal ridges (more than 16); hemizonid about two annule long; smoothly bordered lateral fields; absent or rather short postuterine sac; pyriform vagina; well developed vulval flaps (two to three annules long); and hardly hair-like tail terminus. However, this new species is distinguished from it by having fewer annules from vulva to anus (26 to 33) than in *C. franklinae* (30 to 37); fewer annules (148 to 163) from anterior body end to anus (163 to 186 in *C. franklinae*); larger number (18 to 21) of longitudinal ridges (16 to 18 in *C. franklinae*); very narrow middle groove on lateral field (separated in *C. franklinae*); more inclined vagina; almost completely absent postuterine sac (rudimentarily present in *C. franklinae*); phasmids from four annule anterior to equal level of vulva (usually two to four annule behind vulva in *C. franklinae*); shorter rectum about 3/4 anal body diameter (more than 1 in *C. franklinae*); and rounded or pointed tail terminus (always pointed in *C. franklinae*). Further, opening of dorsal oesophageal gland of this species is slightly spaced from the base of spear, although ANDRÁSSY³⁾ gave in the generic description that "orifice of dorsal oesophageal gland close to spear base". This character may be useful to distinguish this species from the most species of the genus.

TYPE HABITAT AND LOCALITY

Soil around the *Orixa japonica* THUNBERG, Hikinuma, Shiobara-chô, Tochigi Prefecture (Honshu, Japan).

TYPE MATERIAL

Holotype (female) and paratypes (females and males) were collected by one of the authors, N. MINAGAWA, in July, 1982. Holotype slide is deposited in the NIAES, Yatabe, Ibaraki Prefecture, Japan. Some paratypes have been sent to the following institutes (specimen): United States Department of Agriculture Nematode Collection, Beltsville, Maryland, USA (5 females, 5 males); University of California Nematode Survey Collection, Davis, California, USA (3 females, 3 males); Department of Nematology, Rothamsted Experimental Station, Harpenden, Hertfordshire, England (3 females, 3 males); and Department of Nematology, Landbouwhogeschool, Wageningen, The Netherlands (3 females, 3 males). The remaining paratypes are deposited in the NIAES.

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LITERATURE CITED

- 1) ANDRÁSSY, I. (1954) Revision der Gattung *Tylenchus* BASTIAN, 1865. Acta Zool. Acad. Sci. Hung. 1, 5-42.
- 2) ANDRÁSSY, I. (1976) *Evolution as a basis for the systematization of nematodes*. Pitman Publishing, London, 288 pp.
- 3) ANDRÁSSY, I. (1982) The genera and species of the family Tylenchidae ÖRLEY, 1880 (Nematoda): The genus *Coslenchus* SIDDIQI, 1978. Acta Zool. Acad. Sci. Hung. 28, 193-232.
- 4) BAJAJ, H. K. & D. S. BHATTI (1983) *Coslenchus polygyrus* (Tylenchidae, Tylenchida) a new species from Haryana, India. Indian J. Nematol. 13, 223-225.
- 5) BRZESKI, M. W. (1982) Taxonomy of *Ottolenchus* HUSAIN & KHAN, and description of *Coslenchus polonicus* sp. n. (Nematoda: Tylenchidae). Revue Nématol. 5, 71-77.
- 6) MAQBOOL, M. A. (1983) Description of *Paktylenchus tuberosus* gen. n., sp. n. (Nematoda: Tylenchidae) from Pakistan. J. Nematol. 15, 76-79.
- 7) MEYL, A. H. (1961) Die freilebenden Erd- und Süßwassernematoden (Fadenwürmer). In: *Die*

Tierwelt Mitteleuropas, I, 5a, 1-164.

- 8) SIDDIQI, M. R. (1978) The unusual position of the phasmids in *Coslenchus costatus* (DE MAN, 1921) gen. n., comb. n. and other Tylenchidae (Nematoda: Tylenchida). *Nematologica* **24**, 449-455.
- 9) SIDDIQI, M. R. (1981) Six new species of *Coslenchus* SIDDIQI, 1978 (Nematoda: Tylenchidae). *Nematologica* **26**, 432-447.
- 10) SIDDIQI, A. U. & E. KHAN (1983a) Taxonomic studies on Tylenchidae (Nematoda) of India: I. Description of five new species of *Coslenchus* SIDDIQI, 1978. *Indian J. Nematol.* **12**, 291-302.
- 11) SIDDIQI, A. U. & E. KHAN (1983b) Taxonomic studies on Tylenchidae (Nematoda) of India: II. Description of two new species of *Cosaglenchus* gen. n. along with proposition of a new subfamily Aglenchinae. *Indian J. Nematol.* **12**, 303-311.
- 12) WOUTS, W. M. (1977) Campbellenchinae (Nematoda: Tylenchidae), a new subfamily from Campbell Island, with a description of two new species. *N. Z. J. Zool.* **4**, 213-216.

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和文摘要

邦産 *Coslenchus* 属線虫の分類 I. *C. costatus* の記録及び 1 新種の記載

水久保隆之・皆川 望

邦産の *C. costatus* と *C. japonicus* (新種) を記載し図示した。国内 4 産地 (熊本県西合志町, 阿蘇山, 香川県善通寺市, 及び千葉県四街道市) から得られた *C. costatus* には, いずれも ANDRÁSSY による本種の記載範囲から形質状態が多少逸脱する傾向があった。しかし, それらはこれら個体群を *C. costatus* から独立種として扱うに足る差異ではないと判断された。*C. japonicus* (新種) は, 頭部の体環数が少なく, 頭部と体部が連続的で, 後部子宮嚢の退化が著しい等の諸点から, *C. franklinae* に近縁と認められるが, 後者とは体表に 18~21 本の縦走隆起を裝い, 体環数が少なく, 背部食道腺開口部が口針節球からやや離れており, 幻器が概して陰門より前方に位置することにより区別できる。