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## THE GENUS *COSLENCHUS* SIDDIQI, 1978 (NEMATA: TYLENCHIDAE) FROM IRAN

by

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**Summary.** Seven species belonging to the genus *Coslenchus* were found in soil samples collected from the rhizosphere of plants in cultivated or natural habitats in western Iran. *C. japonicus* Mizukubo *et* Minagawa, 1984 and *C. polygyrus* Bajaj *et* Bhatti, 1983 were found for the first time since their descriptions. These species, along with *C. multigyryrus* Siddiqi, 1981, *C. franklinae* Siddiqi, 1981 and *C. polonicus* Brzeski, 1982, are new records for Iran. LM and SEM show the variable number of longitudinal lines in the lateral field of the first two species. Also the number of longitudinal ridges varies from 26 to 30 in *C. polygyrus*, and 19 to 26 in *C. polonicus*.

A survey of the family Tylenchidae in several parts of western Iran has revealed the occurrence of seven species of *Coslenchus* in the Hamadan Province. Only three species of this genus have already been identified; *C. costatus* (de Man, 1921) Siddiqi, 1978 from Karaj, Lahijan and Tonekabon (Kheiri, 1972); *C. pycnocephalus* Siddiqi, 1981 in croplands of Moghan in the north-west, and *C. rhombus* Andrassy, 1982 in the rhizosphere of Pistachio in Rafsanjan, in the south-east (unpublished studies). The first two species along with five others were found in the Province.

### Materials and methods

Soil samples were collected from the rhizosphere of natural and agricultural plants in the Hamadan Province (1993). Nematodes were extracted by the centrifugal-flotation method, killed and fixed by hot FP 4:1 (formaldehyde and propionic acid), and processed to anhydrous glycerine. The nematodes were mounted

on aluminium slides with cover slips and examined by light microscopy (LM) and scanning electron microscopy (SEM).

### Result and discussion

#### *COSLENCHUS JAPONICUS* Mizukubo *et* Minagawa, 1984

(Fig. 1-3)

Females (n = 11): L = 525 ± 40 (475-600) µm; a = 34 ± 1.7 (32-37); b = 5.8 ± 0.6 (4.9-6.7); c = 4.2 ± 0.2 (3.9-4.5); c' = 12 ± 1.1 (10-15); V = 61 ± 0.9 (60-63); V' = 80 ± 0.8 (78.5-81.5); stylet = 11-12 µm; oesophagus = 91 ± 7.5 (80-105) µm; MB = 46 ± 1.7 (42-49); tail = 125 ± 13.6 (108-154) µm; V-a = 78.5 ± 6.9 (69-92) µm; T/V-a = 1.6 ± 0.2 (1.3-1.8); annulation = 2.2 ± 0.2 (1.9-2.6) µm; Rex = 40 ± 2 (34-43); Roes = 48 ± 4 (43-58); RV = 154 ± 5 (147-162); RVan = 37 ± 3 (33-45); Ran = 191 ± 8 (183-207).

Males (n = 2): L = 530-550 µm; a = 31-41; b = 6.2-6.5; c = 4-4.1; c' = 13.2-15.9; T = 33 (n=1);

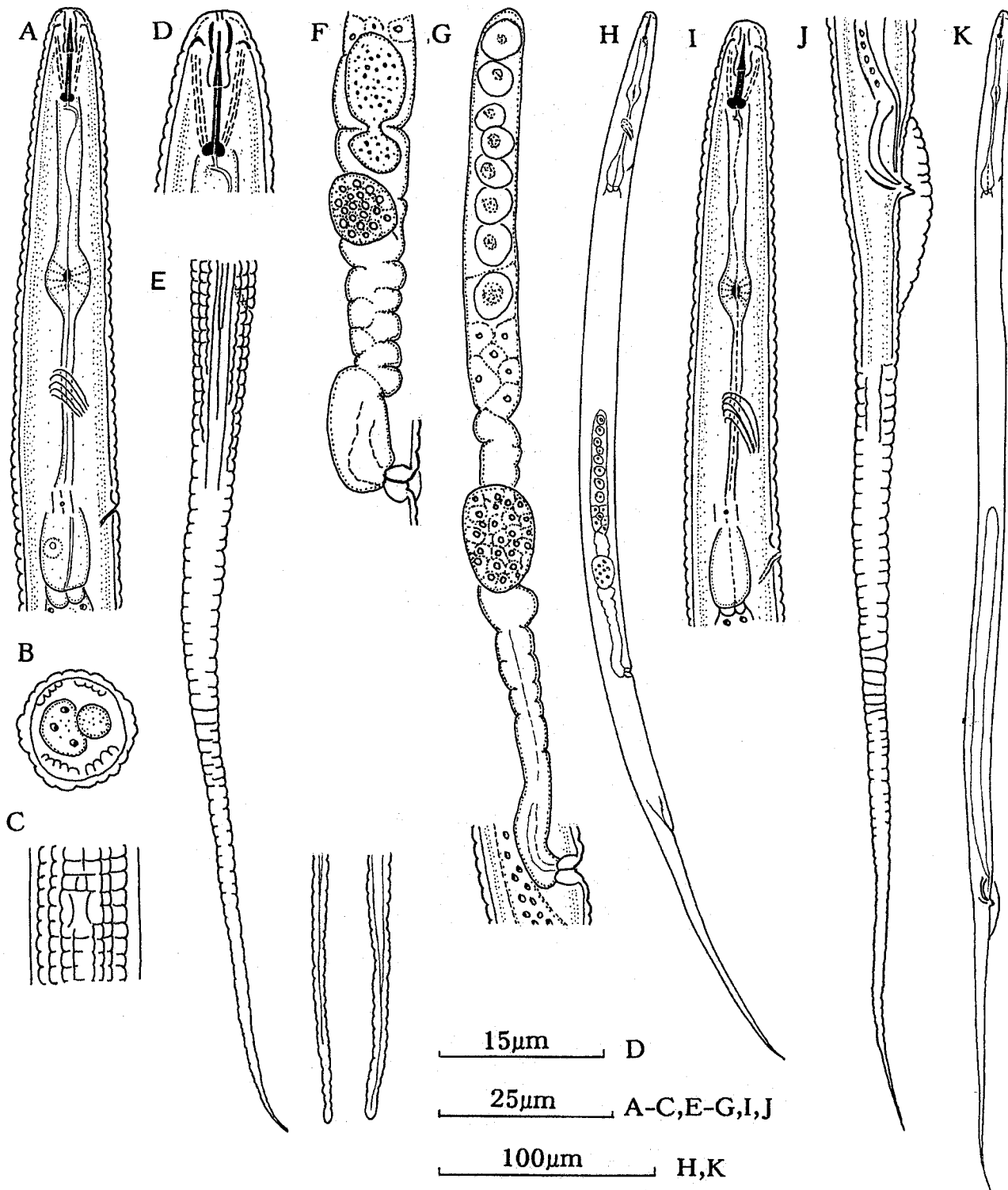


Fig. 1 - *Coslenchus japonicus*, A-H, female; A, oesophagus region; B, cross section at mid-body; C, ventral view of vulva; D, anterior end; E, tail and its variation at the end; F-G, reproductive system; H, general view. I-K, male; I, oesophagus region; J, bursa region and tail; K, general view.

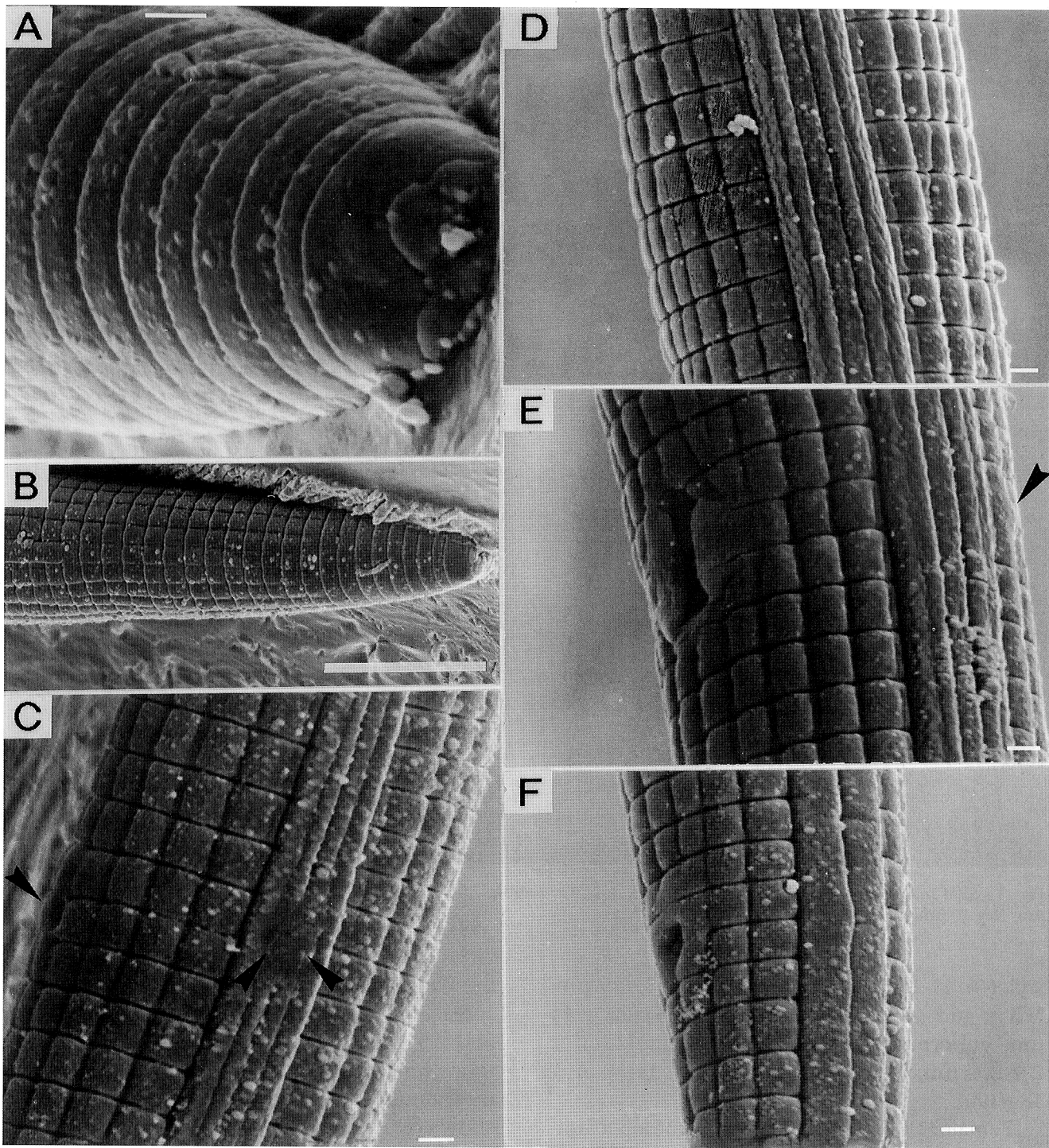


Fig. 2 - SEM micrographs of *C. japonicus* female; A, dorso-lateral view of head; B, anterior region; C, deirid and excretory pore; D, lateral field at mid body; E, lateral field at vulva; F, anus. Bars on A, C-F = 1  $\mu$ m; B = 10  $\mu$ m.

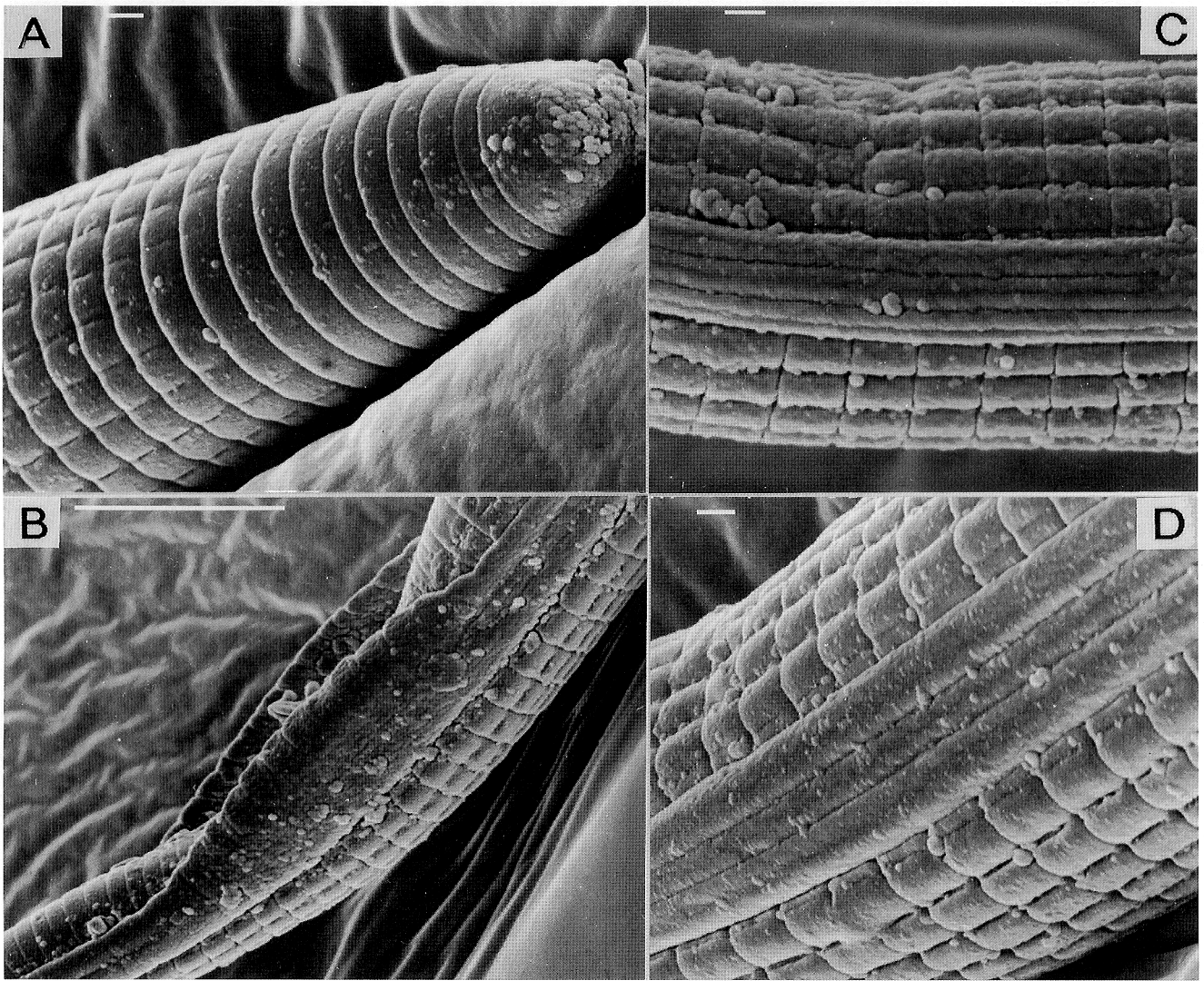


Fig. 3 - SEM micrographs of *C. japonicus* male; A, anterior region; B, bursa region; C & D, lateral field. Bars on A, C, D = 1 µm; B = 10 µm.

stylet = 11-11.5 µm; oesophagus = 85-86 µm; MB = 46.5-47; tail = 131-138 µm; spicula = 14 µm; gubernaculum = 4.5-6 µm; annulation = 2.2-2.4 µm; Rex = 39-40; Roes = 44; Ran = 184-190.

Female: Body slightly curved ventrally. Cuticle with flat annulation and 18-22 (mostly 19) longitudinal ridges, excluding lateral fields. Lateral field with four lines, equally or unequally spaced, the outer ones crenated. SEM micrographs show some faint and irregular lines in

the bands so it seems that there are 5 or 6 incisions in the lateral field. Head 5-6.5 µm wide and 2.5-3 µm high, continuous with body contour, truncate-rounded bearing 2-3 inconspicuous annuli; frame-work lightly sclerotized. SEM shows two or three small bands on the anterior end followed by 7-8 bigger annuli, and after these the ridges start. Stylet with the anterior part smaller (about 41%) than the posterior part; knobs rounded, very well developed. Dorsal oesophageal gland orifice near the base

of stylet. Oesophagus with well developed oval median bulb; isthmus narrow, as half of procorpus diameter; terminal bulb pyriform. Excretory pore situated at  $73 \pm 4.8$  (69-87)  $\mu\text{m}$  from the anterior end, opposite the beginning of terminal bulb. Hemizonid two annuli long, usually precedes the excretory pore; deirids at the same level. Cells of oesophago-intestinal valve form a disc surrounded by intestinal tissue.

Female genital apparatus only anteriorly developed; post-uterine sac virtually absent or only slightly developed. Spermatheca offset, round or elongated, filled with minute globular sperms. Vagina straight with very thick walls (pyriform), perpendicular to body axis or slightly inclined anteriorly. Vulva sunken in body with epiptygmata; vulval flaps well developed, about two annuli long. A small phasmid-like structure is present, dorsal of the lateral field from a few annuli anterior to a few annuli posterior to vulva. Tail narrow conical, evenly tapering to a rounded or pointed end. Longitudinal lines stop at first half of tail; annulation finer, less distinct in second half of tail, disappears towards the end.

Male is similar to female except for genital apparatus. Spicula small, slightly curved ventrally. SEM shows no striation on the head, lateral field with four incisures. There is one faint line in each band in some parts of lateral field. The inner incisures disappear in the cloacal region. Gubernaculum crescent-shaped. Cloacal lips present, the posterior one more robust and longer than the anterior. Cloacal alae well developed, crenated, arising near the base of spicula, continuing about two or more times the spicula length posteriorly.

## Discussion

This population comes close to *Coslenchus siddiqii* Andr assy, 1982, *C. multigyryrus* Siddiqi, 1981 and *C. japonicus* Mizukubo *et* Minagawa,

1984. It differs from the first by more anterior median bulb and longer tail and having male; MB = 53-54, tail = 94-95  $\mu\text{m}$  versus MB = 42-49, tail = 108-154  $\mu\text{m}$ , and male absent in *C. siddiqii*.

In comparing with the original description and several populations of *C. multigyryrus* (Brzeski, 1987 and Geraert and Raski, 1988), most of characters and measurements are similar, but there are some differences in longitudinal ridges, presence of male and vulva. *C. multigyryrus* has 22 (Siddiqi, 1981), 25 (Geraert and Raski, 1988), or 24-25 (our population) ridges, but this population has 18-22 (mostly 19) ridges. Male is absent and spermatheca is empty. Previous SEM micrographs show vulva in *C. multigyryrus* has thick and well-offset lips that laterally are enveloped by vulval flaps; in our population vulva is more sunken, vulval lips are smaller and vulval flaps differ.

This population is related to *C. japonicus* by body size, head shape, stylet length, cuticle with 18-21 longitudinal ridges, thick and pyriform vagina, sunken vulva with well developed lateral vulval flaps, and having males. However, there are some differences between this population and *C. japonicus*. In this population body is more attenuated, V-a distance and tail are longer, RV and Ran have higher values, and lateral fields have four lines spaced equally. In *C. japonicus*  $a = 27 \pm 1.4$  (24-29);  $V-a = 61 \pm 3.7$  (52-67)  $\mu\text{m}$ ; tail =  $87 \pm 6$  (73-99)  $\mu\text{m}$ ;  $RV = 125 \pm 4$  (121-132);  $Ran = 154 \pm 5$  (148-163), and lateral field practically has three incisures (middle ridge is so narrow that the four incisures appear to be three), versus  $a = 34 \pm 1.7$  (32-37);  $V-a = 78.5 \pm 6.9$  (69-92)  $\mu\text{m}$ ; tail =  $125 \pm 13.6$  (108-154)  $\mu\text{m}$ .

**Habitat and locality.** Type material of *C. japonicus* was collected from the soil around *Orixa japonica* in Honshu, Japan. This population was found in the rhizosphere of walnut, *Juglans nigra* L. in Tuysarkan (Chorzin), Hamadan Province.

***COSLENCHUS POLONICUS* Brzeski, 1982**

(Figs. 4; 5 A-H)

Females (n = 10): L =  $615 \pm 29$  (570-680)  $\mu\text{m}$ ; a =  $33 \pm 1.8$  (30-35); b =  $6 \pm 0.4$  (5.7-6.9); c =  $5.3 \pm 0.3$  (4.8-5.8); c' =  $10.2 \pm 0.9$  (8.9-11.6); V =  $65 \pm 1$  (63.5-67); V' =  $80 \pm 1$  (78-82); stylet =  $13 \pm 0.7$  (11-14)  $\mu\text{m}$ ; oesophagus =  $103 \pm 4.4$  (97-110)  $\mu\text{m}$ ; MB =  $44 \pm 2.1$  (39-47); tail =  $116 \pm 6.9$

(106-125)  $\mu\text{m}$ ; V-a =  $97.7 \pm 7$  (85-110)  $\mu\text{m}$ ; T/V-a =  $1.2 \pm 0.1$  (1.1-1.4); annulation =  $2.2 \pm 0.2$  (1.2-2.4)  $\mu\text{m}$ ; Rex =  $51 \pm 4$  (44-59); Roes =  $57 \pm 5$  (50-65); RV =  $195 \pm 20$  (172-226); RVan =  $50 \pm 4$  (44-59); Ran =  $245 \pm 23$  (216-282).

Male not found.

Body straight after killing, fixing and mounting in glycerine. Cuticle thick with flat annuli, not deeply indented, and 19-26 (mostly 22) lon-

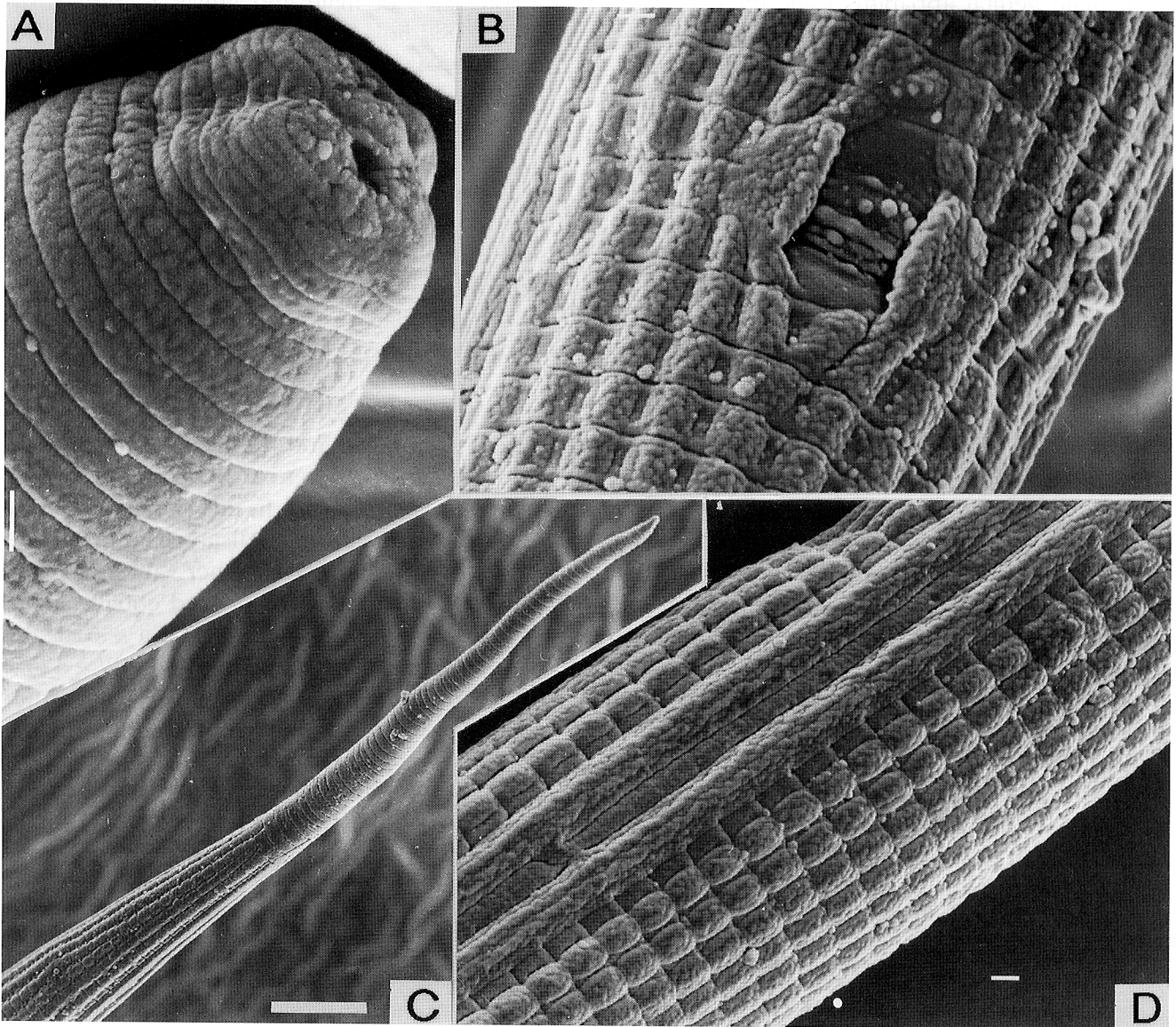


Fig. 4 - SEM micrographs of *C. polonicus* female; A, dorso-lateral view of head; B, ventral view of vulva; C, tail; D, lateral field. Bars on A, B, D = 1  $\mu\text{m}$ ; C = 10  $\mu\text{m}$ .

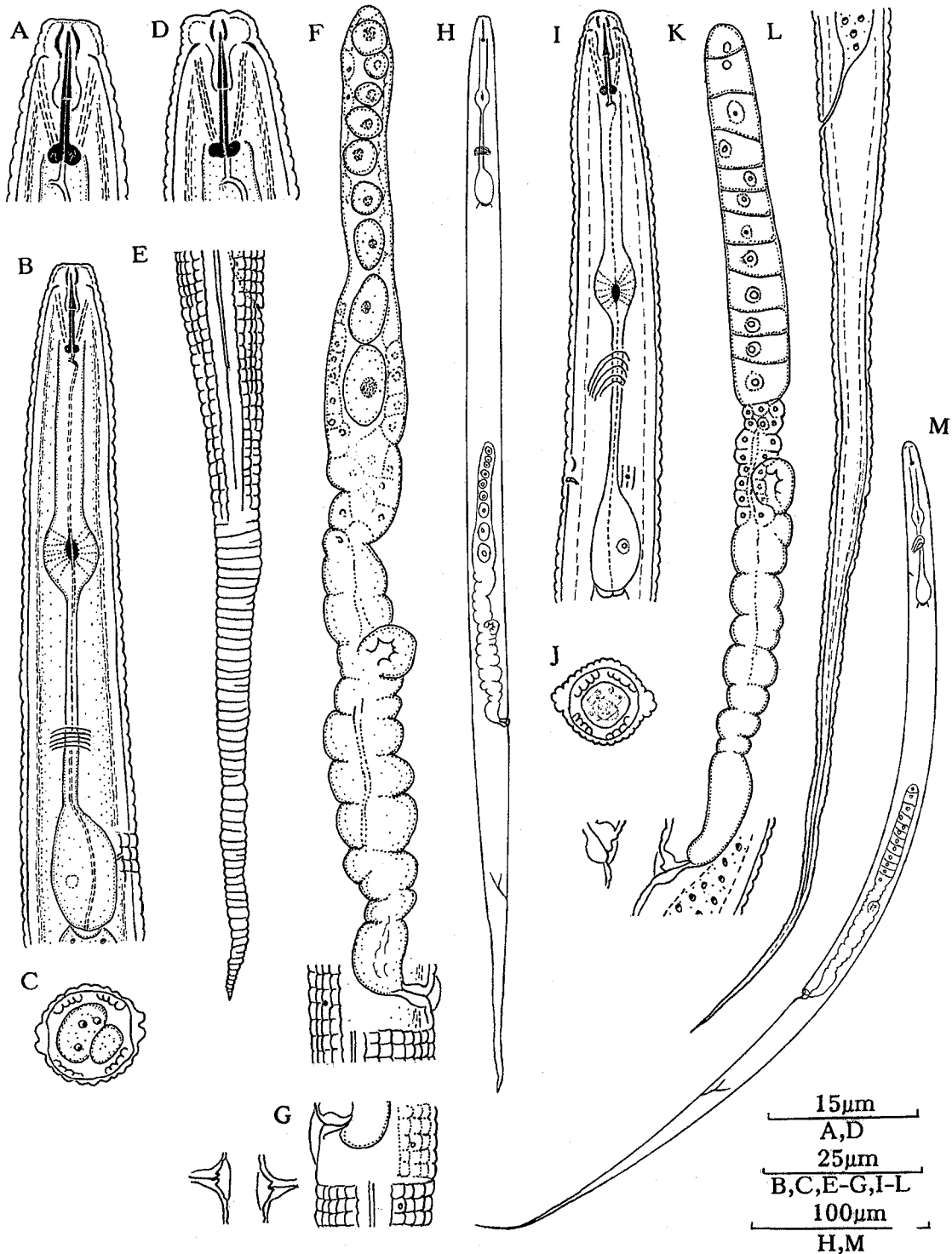


Fig. 5 - *C. polonicus* female, A-H; A, lateral view of head; B, oesophagus region; C, cross section at mid body; D, dorso-ventral view of head; E, tail; F, reproductive system; G, vagina and phasmid-like structure; H, general view. *Coslenchus polygyrus*, female, I-M; I, oesophagus region; J, cross section near the beginning of ovary; K, reproductive system; L, tail; M, general view.

itudinal ridges at the middle of body. The ridges start 8 or 9 annuli after the head. Lateral field with four incisures, not equidistant (middle ridge is so narrow that the four incisures appear to be three). SEM shows two longitudinal bands separated by a narrower sunken area. SEM shows head indented dorsoventrally with four or five annuli, continuous with body contour in lateral view but slightly offset dorso-ventrally. Stylet robust with rounded knobs, anterior part about 44% of total length. The orifice of dorsal oesophageal gland near base of stylet. Procorpus wide; median bulb well developed, ovate; isthmus narrow; posterior bulb about two times as long as median bulb. Excretory pore situated at first half of posterior bulb,  $92 \pm 5.2$  (83-101)  $\mu\text{m}$  from anterior end. Deirids slightly posterior to excretory pore. Oesophago-intestinal valve small.

Genital tract short, offset spermatheca without sperm, uterus with very small posterior sac. Vagina short but thick and perpendicular to body axis, or slightly inclined anteriorly. Vulva at the level of body surface or slightly sunken with epiptygmata (more distinct when vulva is sunken) and lateral membranes two to three annuli long. Phasmid-like structure situated on dorsal of lateral field, 2-6 annuli posterior to vulva. Tail narrow conical; annulation on tail irregularly continuing to tail end.

## Discussion

This population closely corresponds to the original description of *C. polonicus* Brzeski, 1982 and a population from Colorado, USA (Geraert and Raski, 1988), but it shows some differences. It is thicker, V-a is shorter and as a result T/V-a is bigger, annuli are narrower. The values  $a = 41$ (37-43), T/V-a = 0.9 (0.8-1.0), annulation = 2.8 (2.4-3.3)  $\mu\text{m}$  in the original and  $a = 51$  (43-56), T/V-a = 0.96 (calculated) in Colorado population. Also the number of longitudinal ridges varies from 19 to 26 (versus 26 in

original description and 22 in Colorado population). It seems that the variation in the number of longitudinal ridges is intraspecific, and as other differences are not significant this population is considered as *C. polonicus*.

**Habitat and locality.** This population was found in moist soil on natural grassland in Gangnameh, Hamadan (near summit of Alvand Mountain).

## *COSLENCHUS POLYGYRUS* Bajaj et Bhatti, 1983

(Figs. 5 I-M; 6)

Females (n = 5): L =  $545 \pm 30$  (495-575)  $\mu\text{m}$ ; a =  $33.5 \pm 2.2$  (30-36); b =  $6.1 \pm 0.2$  (5.9-6.4); c =  $4.1 \pm 0.3$  (3.7-4.6); c' =  $14 \pm 0.9$  (13-16); V =  $60 \pm 0.8$  (58-61); V' =  $79 \pm 1$  (78-80); stylet =  $11 \pm 0.6$  (10.5-12)  $\mu\text{m}$ ; oesophagus =  $89 \pm 4.4$  (81-94)  $\mu\text{m}$ ; MB =  $48 \pm 3.1$  (44.4-53.4); tail =  $134 \pm 15.3$  (115-153)  $\mu\text{m}$ ; V-a =  $84 \pm 4.1$  (78-90)  $\mu\text{m}$ ; T/V-a =  $1.6 \pm 0.2$  (1.3-1.9); annulation =  $2.4 \pm 0.2$  (2-2.7)  $\mu\text{m}$ ; Rex =  $38 \pm 1$  (36-39); Roes =  $45 \pm 2$  (42-48); RV =  $147 \pm 4$  (142-150); RVan =  $36 \pm 3$  (32-41); Ran =  $181 \pm 5$  (175-189).

Male not found.

Body slightly curved after killing, fixing and mounting in glycerine. Cuticle with flat annuli, transverse striae deep, 26-30 longitudinal ridges excluding the lateral field. Cross section of three specimens showed lateral fields elevated with three equally or unequally spaced ridges. SEM of another specimen showed lateral field made of two ridges and three incisures, and there are some interrupted and irregular faint lines in the ridges. Head not or slightly offset, 5-6  $\mu\text{m}$  wide and 2.5-3  $\mu\text{m}$  high. SEM shows four small annuli on the anterior end, followed by five wider ones and then the longitudinal ridges start.

Stylet thin with rounded knobs; anterior part about 43% of total length. The orifice of dorsal oesophageal gland near base of stylet. Median



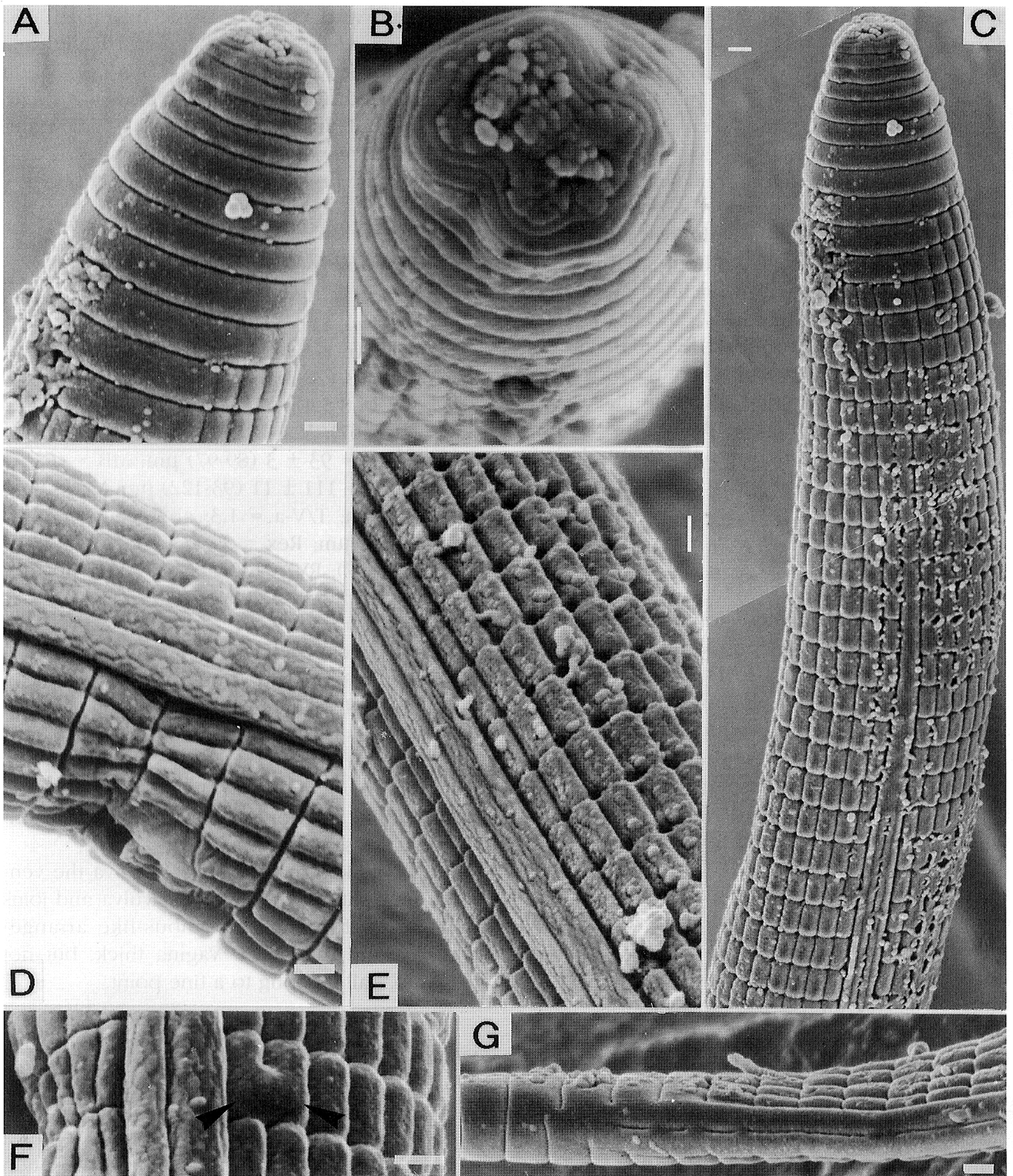


Fig. 6 - SEM micrographs of *C. polygyrus* female; A, lateral view of head; B, face view; C, anterior region; D, lateral field at vulva; E, lateral field at mid body; F, phasmid-like structure at vulva; G, anterior part of tail. Bars on A-G = 1  $\mu$ m.

bulb oval; isthmus long and narrow; excretory pore  $74.2 \pm 4.8$  (66-80)  $\mu\text{m}$  from the anterior end, at the beginning of basal bulb; hemizonid about one annulus long, just anterior to excretory pore. Deirids at same level. Basal bulb pyriform about two times as long as median bulb.

Genital tract only anteriorly developed; virtually no postvulval uterine sac. Oocytes in single row; oviduct consists of eight rows of cells. Spermatheca offset, small, without sperm. Vagina with thick wall, swollen, inclined anteriorly. Vulva sunken completely inside the body, with epiptigmata and surrounded by small lateral flaps, the latter at level of body surface or lower, about two annuli long. Phasmid-like structures indistinct. Tail long and filiform, usually pointed, sometimes finely rounded; annulation fine, disappearing towards the posterior.

## Discussion

This population comes close to *Coslenchus multigyryus* Siddiqi, 1981 and *C. polygyrus* Bajaj et Bhatti, 1983. It differs from *C. multigyryus* in having higher number of longitudinal ridges, and different vulva. In *C. multigyryus* cuticle has 22-25 longitudinal ridges, and SEM shows vulva in *C. multigyryus* with thick and well-offset lips that are laterally enveloped by vulval flaps; in our population vulva is more sunken, vulval lips are smaller and vulval flaps are different (Geraert and Raski, 1988). The morphometric characters are completely similar to *C. polygyrus*, but the original description shows unstriated head, three lines in lateral field, long post-uterine vulval sac, and oocytes not arranged in a single row. It seems that the original description is not complete and the nematode was not well drawn, e.g. genital tract shows more than one row of oocytes in the ovary, spermatheca was not shown, and vulva without lateral membranes. Nevertheless, this population is considered as *C. polygyrus* but it is necessary to study the original material.

**Habitat and Locality.** Type material found in soil around the roots of citrus in Panjuwana village, district of Sirsa, India. This population was collected from rhizosphere of alfalfa, *Medicago sativa*, L. in Nahavand (Geny Abad), Hamadan Province.

This is the first record since its description.

## *COSLENCHUS RHOMBUS* Andrassy, 1982

(Fig. 7 F-M)

Females (n = 5): L =  $565 \pm 38$  (498-606)  $\mu\text{m}$ ; a =  $30 \pm 1.8$  (28-33); b =  $6.1 \pm (5.6-6.6)$ ; c =  $5.1 \pm 0.2$  (4.8-5.4); c' =  $10 \pm 0.6$  (9.5-11); V =  $66 \pm 1$  (64-67); V' = 81-82; stylet = 11-12  $\mu\text{m}$ ; oesophagus =  $93 \pm 3$  (89-97)  $\mu\text{m}$ ; MB =  $46 \pm 1$  (45-48); tail =  $111 \pm 11$  (93-122)  $\mu\text{m}$ ; V-a =  $86 \pm 7$  (74-94)  $\mu\text{m}$ ; T/V-a = 1.3; annulation =  $2.4 \pm 0.2$  (2.0-2.6)  $\mu\text{m}$ ; Rex =  $39 \pm 1$  (36-40); Roes =  $44 \pm 2$  (40-47); RV =  $162 \pm 5$  (155-170); RVan =  $40 \pm 2$  (38-42); Ran =  $202 \pm 7$  (193-211).

Male not found.

Body cuticle with 7+7 longitudinal ridges, excluding lateral field. Lateral field consists of three lines. Labial region 6.5-7.0  $\mu\text{m}$  wide at base and 3.0-3.5  $\mu\text{m}$  high, bearing three or four annuli. Anterior part of stylet 36-41% of total stylet length. Excretory pore located at 76-84  $\mu\text{m}$  from the anterior end. Deirid and hemizonid are at the same level.

Vulva sunken in the body. At vulva the ventral ridge splits anteriorly to the vulva and joins posteriorly, forming a rhombus-like arrangement around the vulva. Vagina thick, but not pyriform. Tail tapering to a fine point.

## Discussion

This population with the rhombus-like arrangement of the ventral ridge around the vulva closely corresponds to the original description and to a Californian population (Geraert and Raski, 1988).

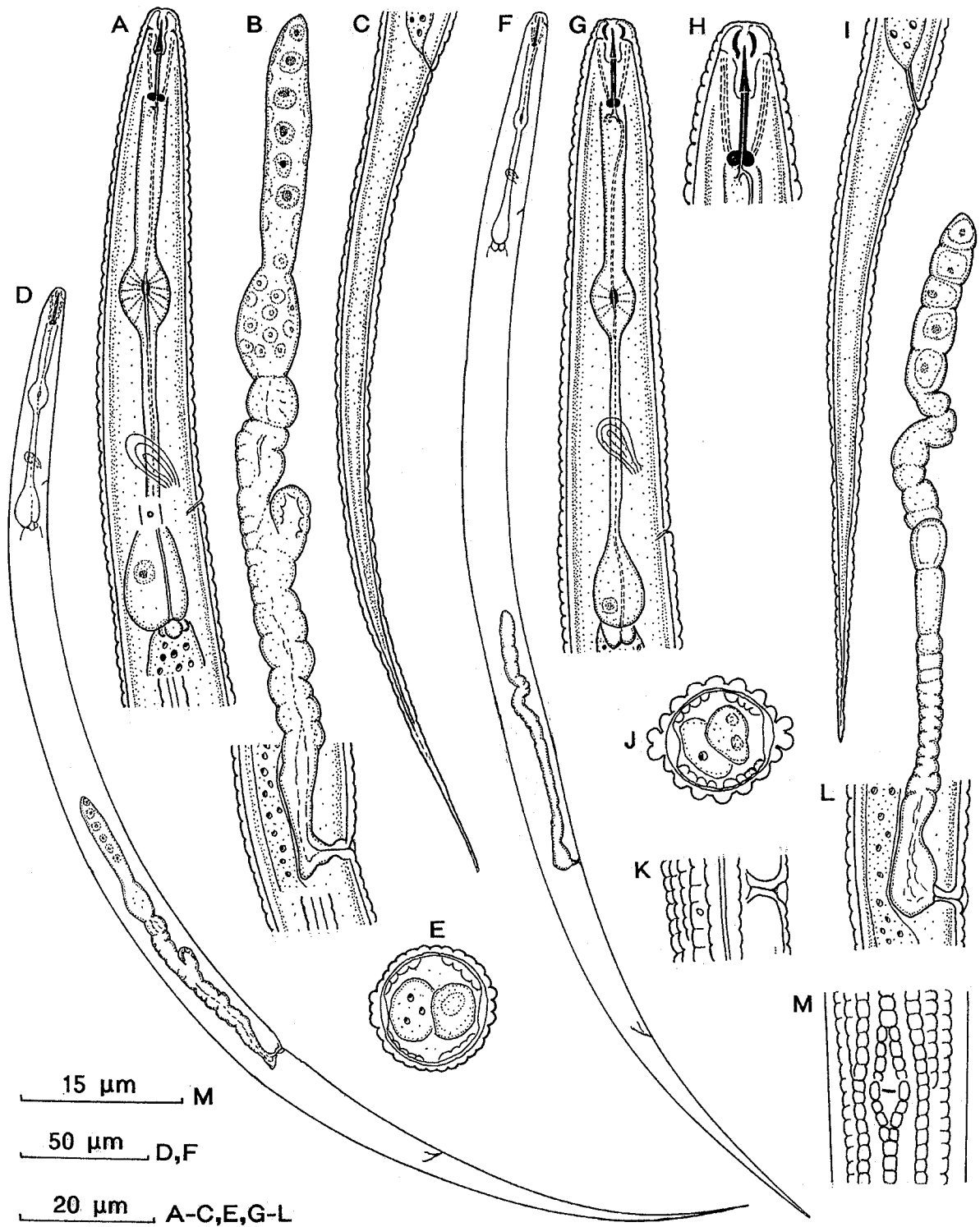


Fig. 7 - *C. multigyrtus* female, A-E; A, anterior region; B, reproductive system; C, tail; D, general view. *Coslenchus rhombus*, female, F-M; F, general view; G, oesophagus region; H, anterior region; I, tail; J, cross section; K, lateral view of vulva; L, reproductive system; M, ventral view of vulva.

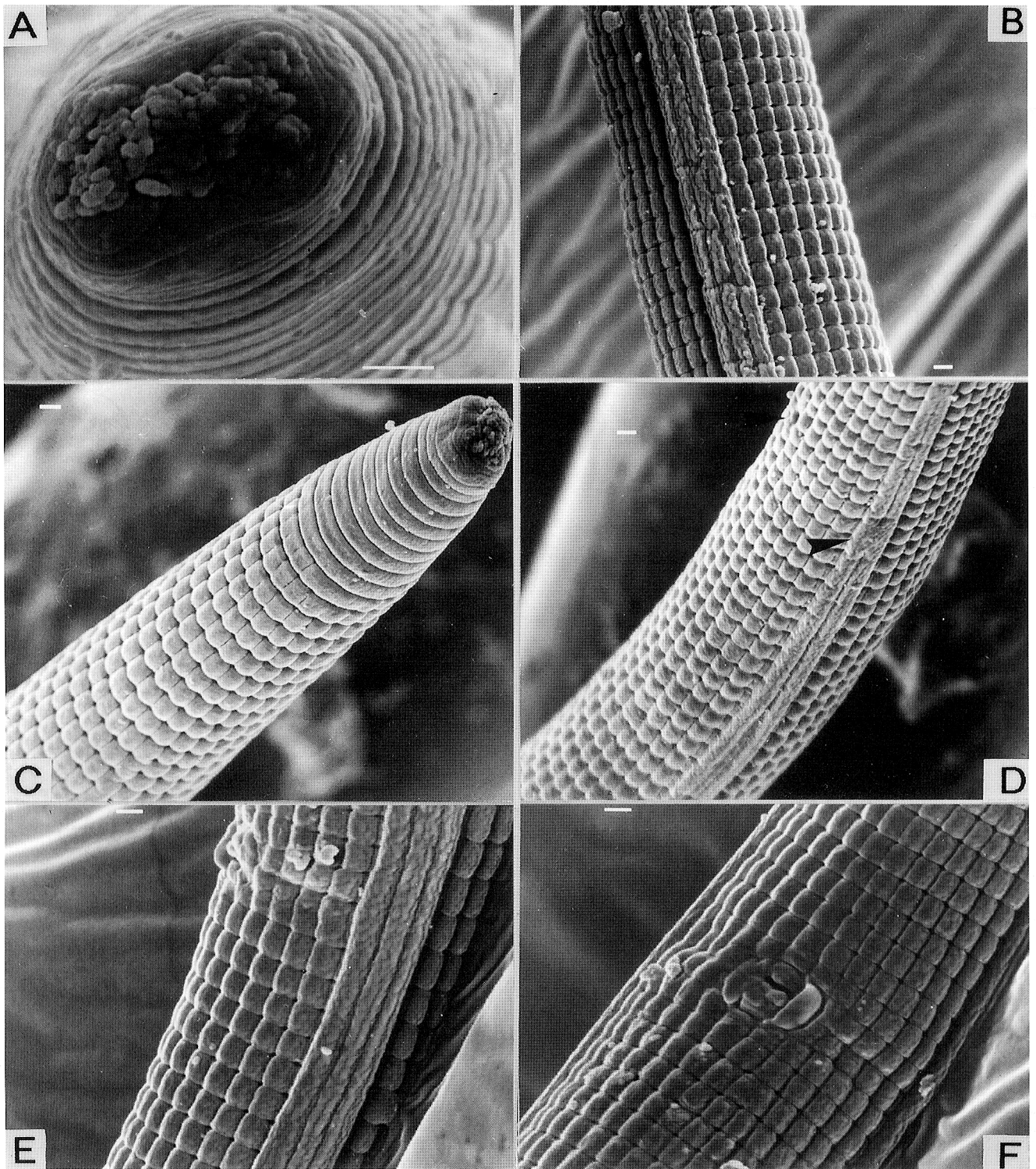


Fig. 8 - SEM micrographs of *C. multigyrus* female; A, face view; B, lateral field; C, anterior region; D, deirid and excretory pore; E, lateral view of vulva; F, ventral view of vulva. Bars on A-F = 1  $\mu$ m.

**Habitat and Locality.** This population was found in the soil around *Equisetum arvensis* L. in Hamadan.

### ***COSLENCHUS MULTIGYRUS* Siddiqi, 1981**

(Figs. 7 A-E; 8)

Females (n = 2): L = 510-520  $\mu\text{m}$ ; a = 30-33; b = 5.6-5.8; c = 3.9-4.1; c' = 15.0-15.5; V = 61-62; V' = 80-81; stylet = 11  $\mu\text{m}$ ; oesophagus = 88-92  $\mu\text{m}$ ; MB = 45.5-49; tail = 128-132  $\mu\text{m}$ ; V-a = 74-79  $\mu\text{m}$ ; tail/V-a = 1.6-1.8; annulation = 1.8-2  $\mu\text{m}$ ; Rex = 40-42; Roes = 48-52; RV = 161-163; RVan = 37-44; Ran = 198-207.

Male not found.

Longitudinal ridges of cuticle 12+12-13 excluding lateral fields, close to each other separated only by grooves or narrow spaces. Two ventral ridges near the vulva joined each other. Lateral fields 3.8-4  $\mu\text{m}$  wide about 24% of corresponding body width, with four equidistant incisures. SEM picture shows three small annuli on the cephalic region, the second one is wider than the others, longitudinal ridges started 8 or 9 annuli behind head. Deirids and excretory pore situated at 72-74  $\mu\text{m}$  and 72  $\mu\text{m}$  from the anterior end, respectively.

Vulva is a narrow cavity with thick and well-offset lips, being laterally enveloped by low vulval flaps, two annuli long. Vagina is thick. Postvulval uterine sac short, 3.5-8.0  $\mu\text{m}$  long, 0.2-0.5 times vulval body width; Spermatheca empty. Tail filiform, with attenuated terminus.

### **Discussion**

The specimens are close to *Coslenchus siddiqii* Andrassy, 1982 and *C. multigyryrus* Siddiqi, 1981. They differ from the first by the lateral fields showing four incisures, longer tail, and smaller vulval flaps (three incisures in the lateral fields, tail = 94-95  $\mu\text{m}$ , and lateral-vulval flaps prominent, three annuli long in *C. siddiqii*). Our

specimens correspond with the descriptions of Siddiqi (1981), Brzeski (1987), and Geraert and Raski (1988) descriptions.

**Remarks.** Except for the difference in the number of longitudinal ridges, the other characteristics of *C. multigyryrus* and *C. franklinae* Siddiqi, 1981 are the same. The first species has 8-9 ridges but *C. multigyryrus* has 11+11 (Siddiqi, 1981) or 12+13 (Geraert and Raski, 1988), 12+12-13 (our population) ridges. Our specimens were separated from each other on the basis of this character.

**Habitat and locality.** These specimens were found together with a specimen of *C. franklinae* in soil around grapevine (*Vitis vinifera* L.) in Tuysarkan (Davood Olya), Hamadan Province.

### ***COSLENCHUS FRANKLINAE* Siddiqi, 1981**

(Fig. 9)

Female: L = 535  $\mu\text{m}$ ; a = 31.6; b = 5.7; c = 4.0; c' = 12.5; V = 59.5; V' = 79.5; stylet = 11.5  $\mu\text{m}$ ; oesophagus = 94  $\mu\text{m}$ ; MB = 46; tail = 135  $\mu\text{m}$ ; V-a = 81  $\mu\text{m}$ ; tail/V-a = 1.7; annulation = 2.1; Rex = 40; Roes = 51; RV = 157; RVan = 42; Ran = 199.

Male not found.

### **Discussion**

Body with 8+8 longitudinal ridges, excluding lateral field. SEM shows that lateral field consists of four incisures, two inner ones close together. Two outer bands are wider than the groove between. SEM shows a dorso-ventral indented labial plate. Cephalic region not offset. Tail filiform.

This specimens closely corresponds with the original description of *C. franklinae*, but there are differences in V ratio and tail length, V = 62-68 (64.5) and tail = 59-103  $\mu\text{m}$ . It is closer to

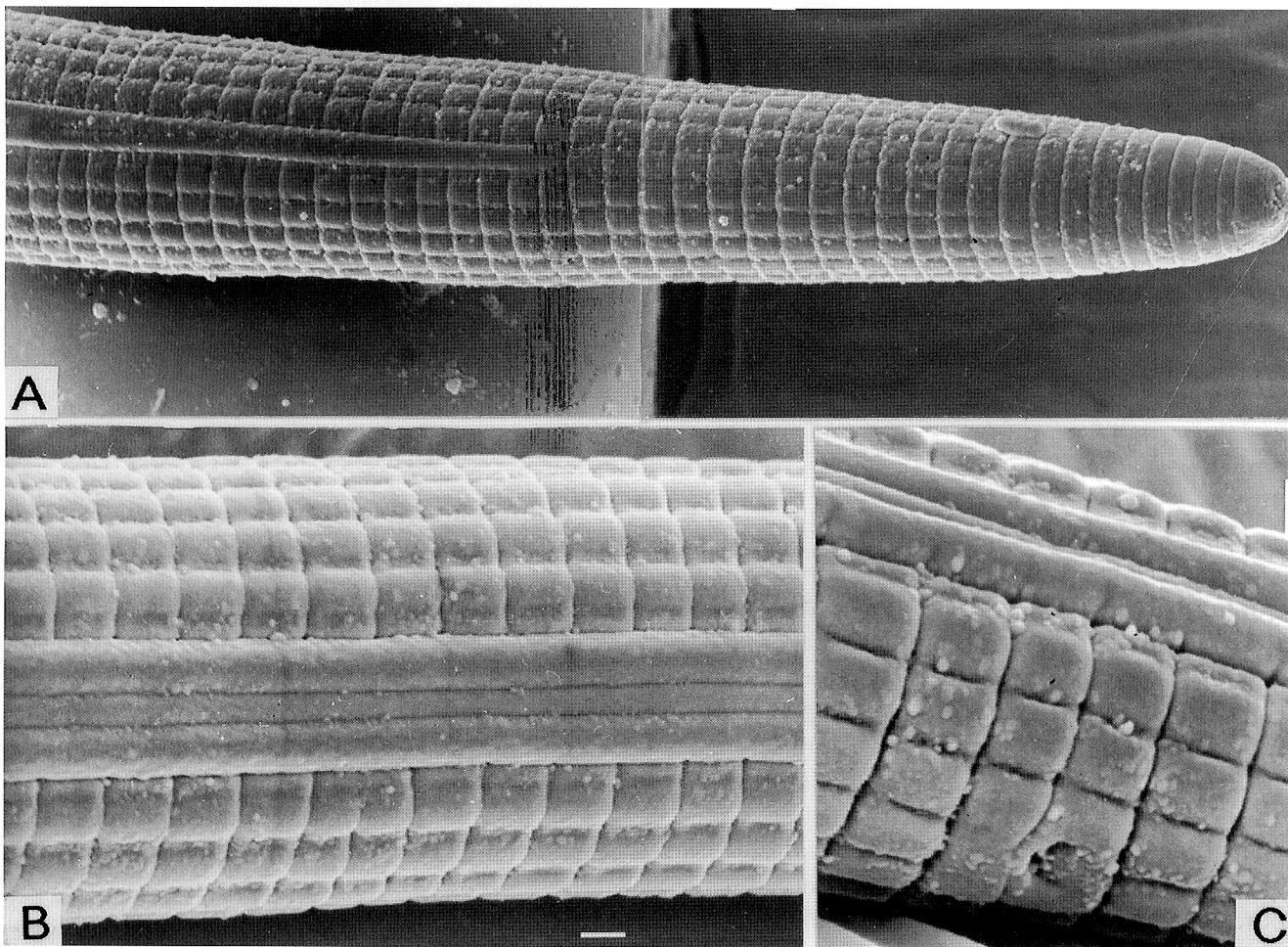


Fig. 9 - SEM micrographs of *C. franklinae* female; A, anterior region; B, lateral field; C, anus. Bars on A-C = 1  $\mu$ m.

Brzeski's description:  $V = 60-68$  and tail = 59-124  $\mu$ m. It seems that tail varies in this species, so we consider our specimen as *C. franklinae*.

***COSLENCHUS COSTATUS* (de Man, 1921)  
Siddiqi, 1978**

Females (n = 5):  $L = 495 \pm 11$  (480-505)  $\mu$ m;  $a = 27 \pm 0.9$  (26-29);  $b = 5.4 \pm 1.6$  (5.3-5.6);  $c = 4.4 \pm 0.4$  (4.0-5.0);  $c' = 11.6 \pm 1.1$  (10.3-13.1);  $V = 63 \pm 1.6$  (60-64.5);  $V' = 81 \pm 0.3$  (81-81.5); stylet =  $10.4 \pm 0.7$  (9-11)  $\mu$ m; tail =  $112 \pm 9$  (100-122)  $\mu$ m;  $V-a = 72 \pm 3$  (67-76)  $\mu$ m; tail/

$V-a = 1.6 \pm 0.6$  (1.3-1.8); annulation =  $2.0 \pm 1.1$  (1.9-2.2)  $\mu$ m;  $Rex = 40 \pm 1$  (39-41);  $Roes = 49 \pm 1$  (48-50);  $RV = 159 \pm 5$  (150-167);  $RVan = 38 \pm 1$  (36-39);  $Ran = 197 \pm 5$  (189-204).

Male not found.

Body cuticle with 7+7 longitudinal ridges excluding the lateral fields. Lateral field with four incisures, the middle groove much narrower than the outer bands. Head 6  $\mu$ m wide at base and 3  $\mu$ m high, with three or four annuli. Anterior part of stylet occupies 42-52% of total stylet length. Excretory pore situated at  $75.5 \pm 3$  (71-80)  $\mu$ m from anterior end. Deirid and hemizonid at the level of excretory pore. Spermatheca

empty, vagina pyriform, slightly oblique. Vulva sunken in the body, with 2.5-3 annuli long lateral flaps. Tail with very fine terminus.

## Discussion

This population corresponds with Andrassy (1982) description, but there are some differences in the number of annuli from the head to vulva and head to anus (133-152 and 164-188, respectively versus 150-167 and 189-204 in our population). It corresponds most closely with a population from Kusassenri, Japan (Mizukubo and Minagawa, 1984) that has 146-157 annuli from head to vulva and 179-192 from head to anus.

**Habitat and locality.** This species has already been found in Kara, Shasavar and Lahijan at the North of Iran (Kheiri, 1972). Our population was found in the soil around *Equisetum arvensis* L. and *Populus* sp. in Hamadan.

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