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TYLENCHORHYNCHUS PARATRIVERSUS SP. N. AND COMMENTS ON THREE OTHER SPECIES OF THE GENUS (NEMATODA: BELONOLAIMIDAE)

by
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Summary. *Tylenchorhynchus paratriversus* sp. n. from Mexico is described. The species is characterized by four incisures, conical to almost funnel shaped female tail and bursa not reaching male tail end. New populations of *T. ancorastyletus*, *T. mexicanus* and *T. microphasmis* are reported. *T. pini* is synonymized with *T. microphasmis*.

The nematodes were obtained from soil samples by decanting and sieving, and then finally extracted on sieves with filter paper. Specimens were killed with 4% hot formalin, fixed in formalin, and then processed to glycerin by evaporation of methanol from the glycerin-methanol mixture at 40°C. Measurements were taken with an ocular micrometer at magnification 1000x. All measurements are expressed in micrometers.

TYLENCHORHYNCHUS PARATRIVERSUS sp. n. (Figs 1 and 2)

Measurements

Paratype females (n = 11), L = 762 (701-819), oesophagus = 143 (128-151), tail = 45 (38-55), a = 25 (23-26), b = 5.3 (5-5.7), MB = 54 (52-57), c = 17 (14.1-20.8), c' = 2.5 (2.2-2.9), V = 55 (54-57), stylet = 22.8 (20.5-23).

Paratype males (n = 8), L = 758 (722-790), oesophagus = 146 (141-154), tail = 44 (41-47), a = 27 (26-29), b = 5.2 (4.9-5.5), MB = 54 (52-57), c = 17.4 (15.2-19), c' = 2.2 (2-2.3), stylet = 21 (20.5-21.5).

Holotype female, L = 737, oesophagus = 132, tail = 41, a = 30, b = 5.6, MB = 56, c = 17.9, c' = 2.7, V = 51, stylet = 23.

Description

Body slightly ventrally arcuate. Lateral field about 6-7 μm wide, starting between stylet and median bulb level, with four incisures, the outer ones crenated. Deirids ab-

sent. Cuticle 1.5-2 μm thick, annulation very distinct, annulus width at the level of anterior spermatheca 1.6 (1.4-2) μm . Head 7-8 μm wide, bears 3-4 annuli, offset or continuous with body outline. Labial plate separated from first annulus, as seen from lateral and dorsal view of head. Cephalic framework not very refractive, extending posteriorly from basal plate for 2 or 3 annuli. Stylet cone not needle-like, 50-55 percent of stylet length, knobs more or less anchor shaped. Dorsal oesophageal gland orifice about 1-2 μm posterior to knobs. Median bulb large, almost rounded, posterior bulb rather elongated and offset from intestine. Excretory pore 114 (104-124) μm from anterior end, at the level of junction of isthmus and basal bulb, excretory duct passes through hemizonid in all examined specimens. Fasciculi present.

Female. Vulva in small vulval cavity bordered laterally with dikes, each about 1.5-2 annuli long. Small double epiptygma present. Spermatheca rounded, axial, filled with sperm of about 2 μm in diameter. Post-anal intestinal sac present or absent. Tail conical to almost funnel shaped, with 32 (27-38) annuli. Phasmids about 2 μm in diameter, located at 22 (10-35) percent of tail length posterior to anus. Hyaline posterior part of tail 10-12 μm long, tip variously rounded. Some debris from soil attached to tail tip of most examined females, males and juveniles.

Male similar to female except for sexual apparatus. Spicules bent, with velum, 31 (28-33) μm long. Gubernaculum moveable, 16-17 μm long, variously hooked at anterior end and with membranous outgrowths surrounding spicules at posterior end. Caudal alae large, bilobed, starting anteriorly to spicules, not reaching tail end. Tail end filamentous, sometimes the posterior part may be invisibly broken.

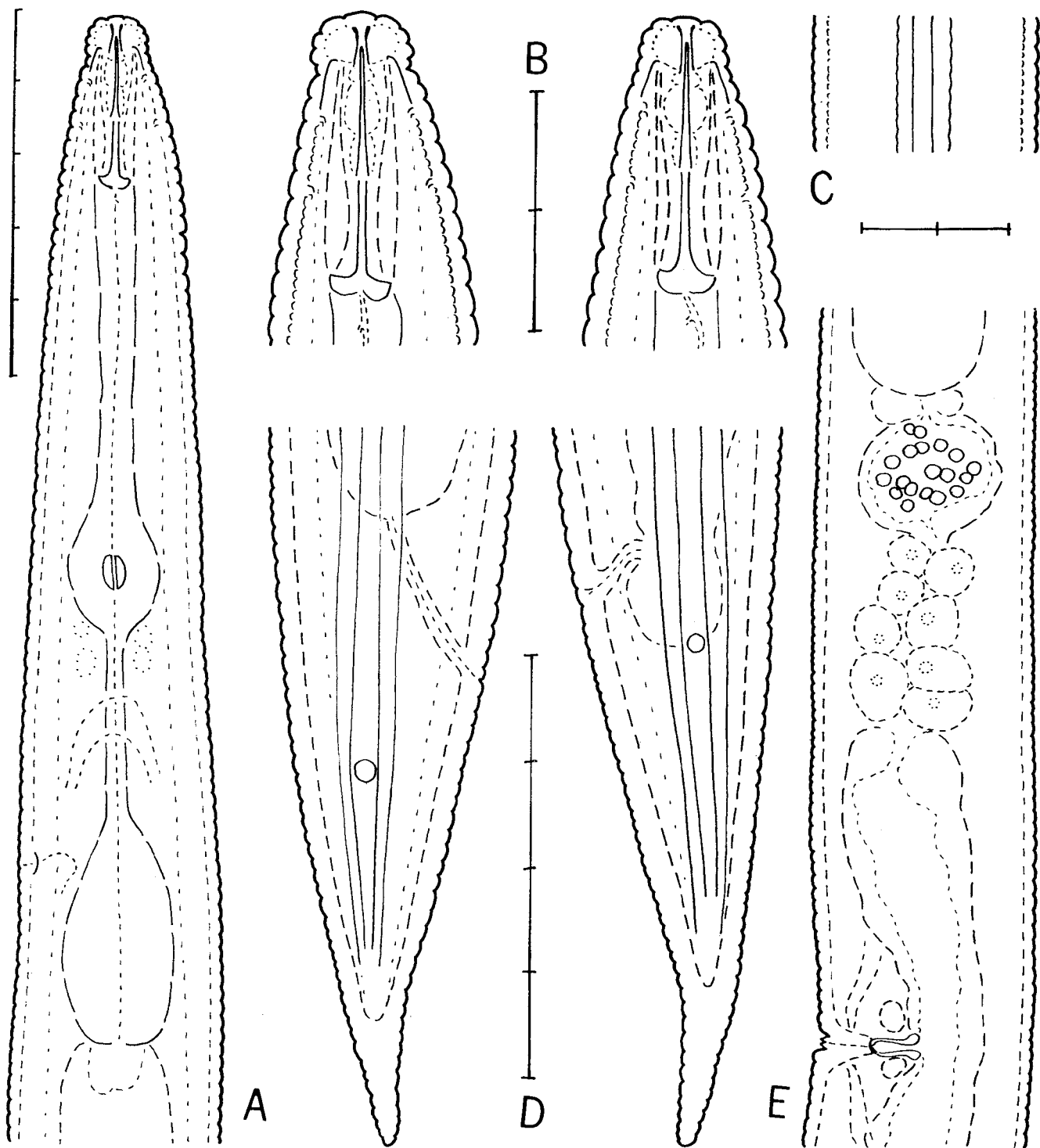


Fig. 1 — *Tylenchorhynchus paratriversus* sp. n. female: A, oesophageal region; B, variation of head; C, lateral field; D, variation of tail; E, part of reproductive system. Smallest unit of scale bars = 10 μ m.

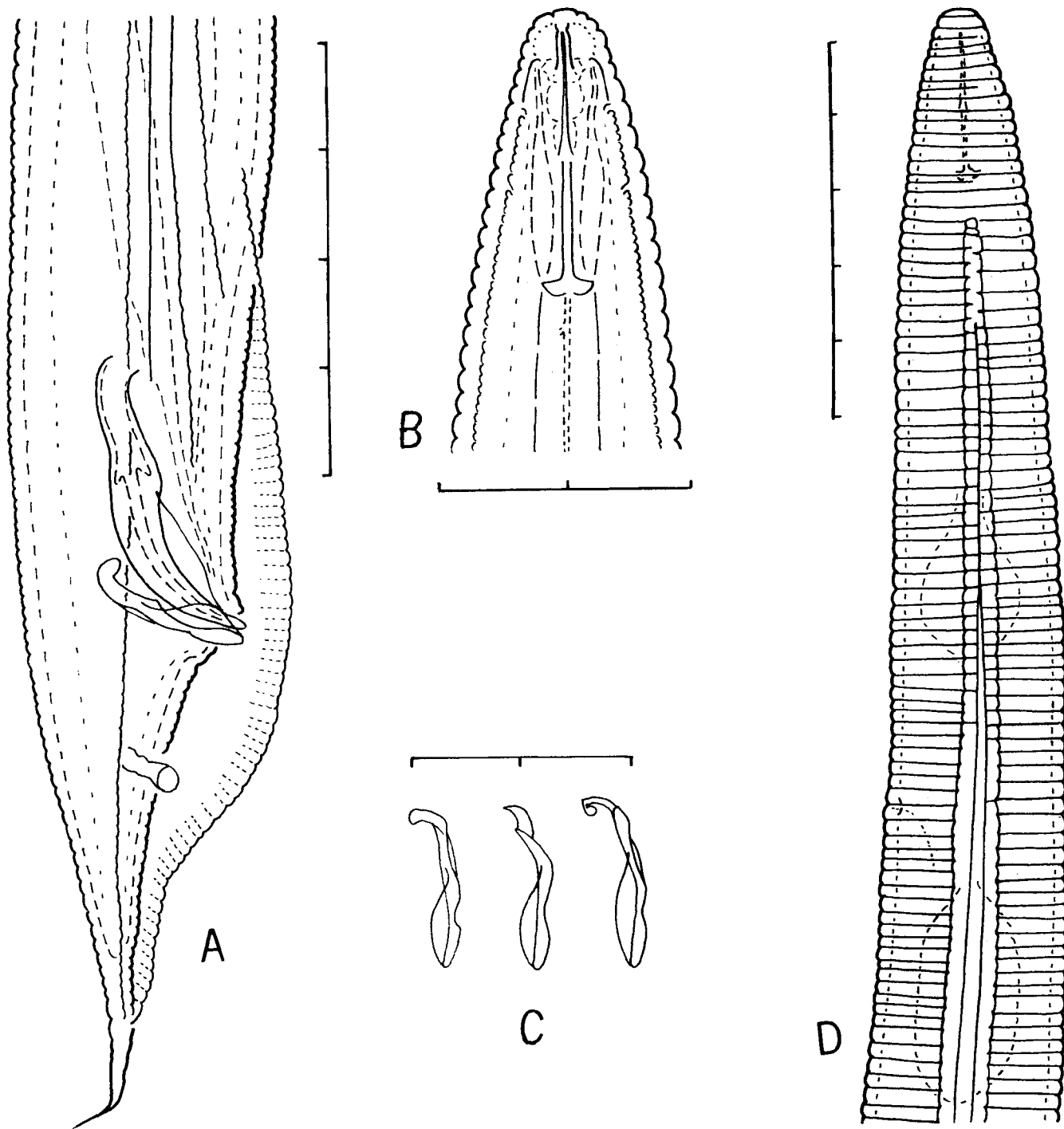


Fig. 2 — *T. paratriversus* sp. n. male: A, posterior region; B, head; C, variation of gubernaculum; D, anterior region showing beginning of lateral field. Smallest unit of scale bars = 10 μ m.

Type locality

Mexico, Zempoala, State of Puebla. Found in clay soil with high organic matter, from moist meadow near a lake. Collected in April 1985 by L.S. Jankiewicz.

Type specimens

Holotype and paratypes (9 females and 8 males) in the nematode collection of the Instytut Zoologii PAN, Wilcza 64, Warszawa, Poland. Two females paratypes and one male paratype with the author.

Relationships

T. paratriversus differs from all species of the genus but *T. aduncus* de Guiran, 1967 by conical tail of female. The new species differs from *T. aduncus* by shape of stylet knobs, number of annuli on head and tail, stylet and spicule length, size of phasmids and male bursa (in *T. aduncus* stylet knobs are rounded to posteriorly directed, head bears 4-5 annuli and tail 19-27 annuli, stylet 18-20 μm , spicules 22-25 μm , phasmids are small, bursa reaches male tail tip).

Knobloch (1975) described an abnormal population of *T. mexicanus* Knobloch et Laughlin, 1973 with conical tail end. *T. mexicanus* differs from *T. paratriversus* because of the cephalic sclerotization, stylet cone length in relation to total stylet length, male tail and number of tail annuli. Typically *T. mexicanus* has conical tail with bluntly rounded terminus.

Because of female tail shape and male bursa not reaching tail end, *T. paratriversus* may be compared with *Triversus* Sher, 1974. However, this genus is diagnosed as having labial disc fused with first labial annulus and needle-like stylet cone (Fortuner and Luc, 1987). Also, all known *Triversus* species have three incisures on lateral field.

TYLENCHORHYNCHUS ANCORASTYLETUS

Ivanova, 1983

(Fig. 3 A-E)

Measurements

Females (n = 8), L = 595 (573-616), oesophagus = 110 (107-115), tail = 33 (29-37), a = 31 (29-34), b = 5.4 (5.2-5.5), MB = 51 (48-52), c = 18 (15.8-20.4), c' = 2.7 (2.4-3), V = 57 (55-58), stylet = 18.5 (18-19).

Males (n = 6), L = 610 (551-678), oesophagus = 112 (108-118), tail = 36 (33-39), a = 31 (30-34), b = 5.4 (4.9-5.9), MB = 50 (49-51), c = 17.1 (14.3-18.3), c' = 2.6 (2.3-2.9), stylet = 18-18.5.

Description

Body of relaxed females slightly ventrally arcuate, that of males more bent posteriorly. Lateral field with four incisures. Cuticular annulation very distinct, mean annulus width 2 (1.6-2.3) μm . Head with 3-4 annuli, narrower than adjacent body, sometimes offset by slight constriction. Head width 6-7 μm . Cephalic framework conspicuous, refractive, does not extend posteriorly from basal plate. Stylet cone length equals that of shaft, knobs concave and directed anteriorly. Median bulb large, oval in outline. Hemizonid one annulus long. Excretory pore 94 (88-106) μm from anterior end, usually opposite posterior bulb, sometimes at level of posterior part of isthmus. Vagina with swollen walls and small double epiptygma. Female tail with 14 (9-19) annuli, terminus unstriated, hyaline terminal part of tail 4.5 (3-6) μm long. Anterior phasmid at 28 (21-36) percent, and the posterior one at 36 (29-43) percent of tail length from anus. Male with slightly crenated bursa. Spicules 19 (18-20) μm long, ventrally bent, with small velum. Gubernaculum 9-10 μm long, anteriorly hooked. Both phasmids at the same level, 40 (33-45) percent of tail length. Hyaline posterior part of tail 7 (6-8) μm long. Bursa reaches tail tip.

Remarks

The examined specimens fit well the detailed description by Ivanova (1983) and the present description increases the known limits of morphological variability. *T. ancorastyletus* is similar to many species of the genus, but can be differentiated by the refractive cephalic skeleton. The specimens were collected from soil near Alhasseka, Syria, which is a new geographical record of the species previously known from Pamir Mountains only.

TYLENCHORHYNCHUS MEXICANUS

Knobloch et Laughlin, 1973

(Fig. 3 F-H)

Measurements

Females (n = 9), L = 722 (605-768), oesophagus = 134 (113-149), excretory pore = 111 (91-136), tail = 35 (30-38), tail annuli = 16 (12-20), phasmids % tail = 22 (12-38), a = 30 (26-32), b = 5.4 (5.1-6), MB = 55 (53-57), c = 20.4 (19.1-23.1), c' = 2.1 (1.8-2.4), h = 6 (4-7), m = 49 (47-50), stylet = 21 (19.5-23).

Males (n = 2), L = 690-709, oesophagus = 127-134, excretory pore = 103-107, tail = 42-46, phasmids % tail = 27-33, spicule = 24-25, gubernaculum = 14, a = 28-33, b = 5.2-5.6, MB = 52-55, c = 15.3-16.3, c' = 2.4-2.8, h = 9, m = 48-51, stylet = 20.5-21.

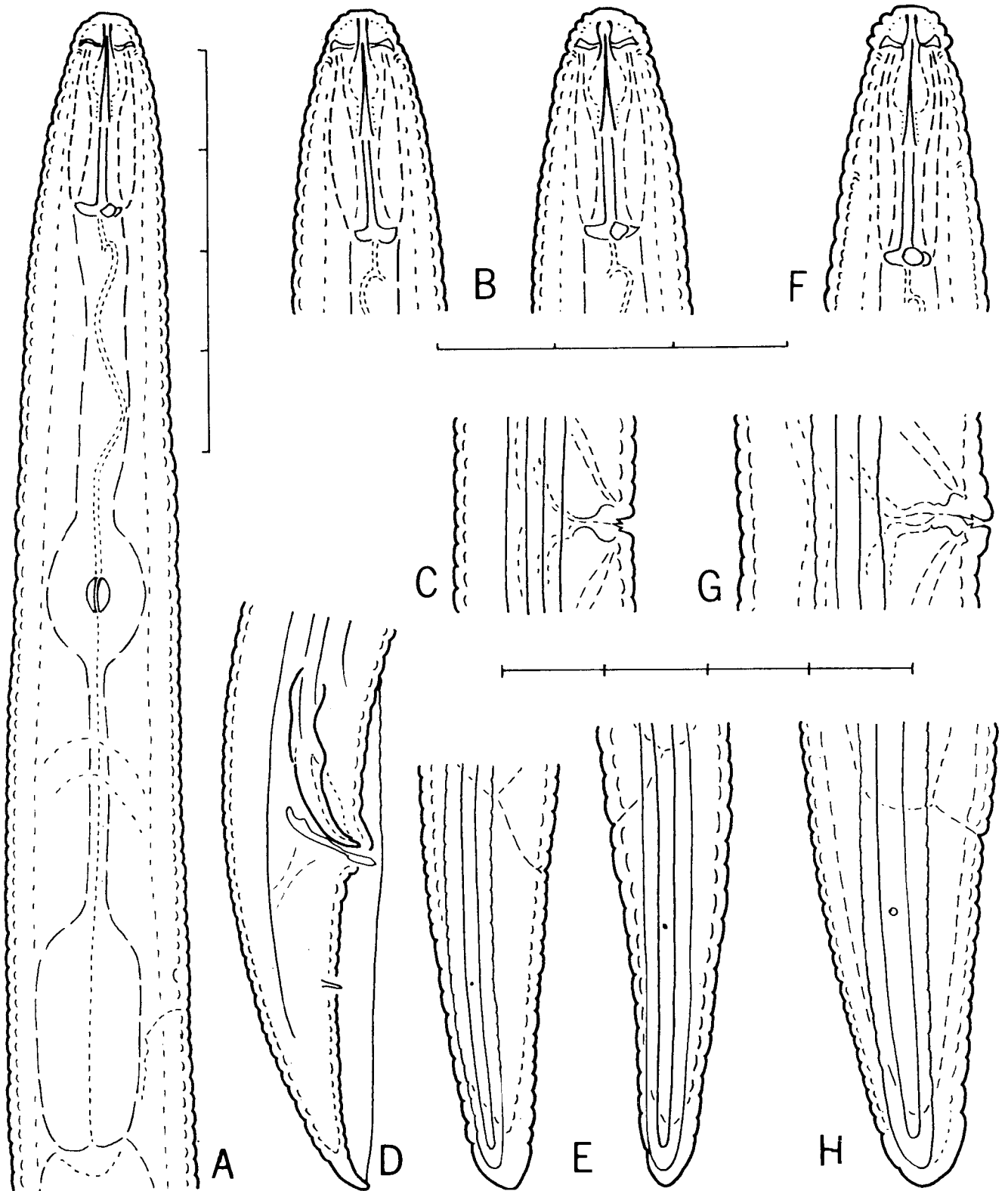


Fig. 3 — *T. ancorastyletus*: A, anterior region; B, variation of head; C, vulva; D, male tail; E, variation of female tail; *T. mexicanus*: F, head; G, vulva; H, female tail. Smallest unit of scale bars = 10 μm.

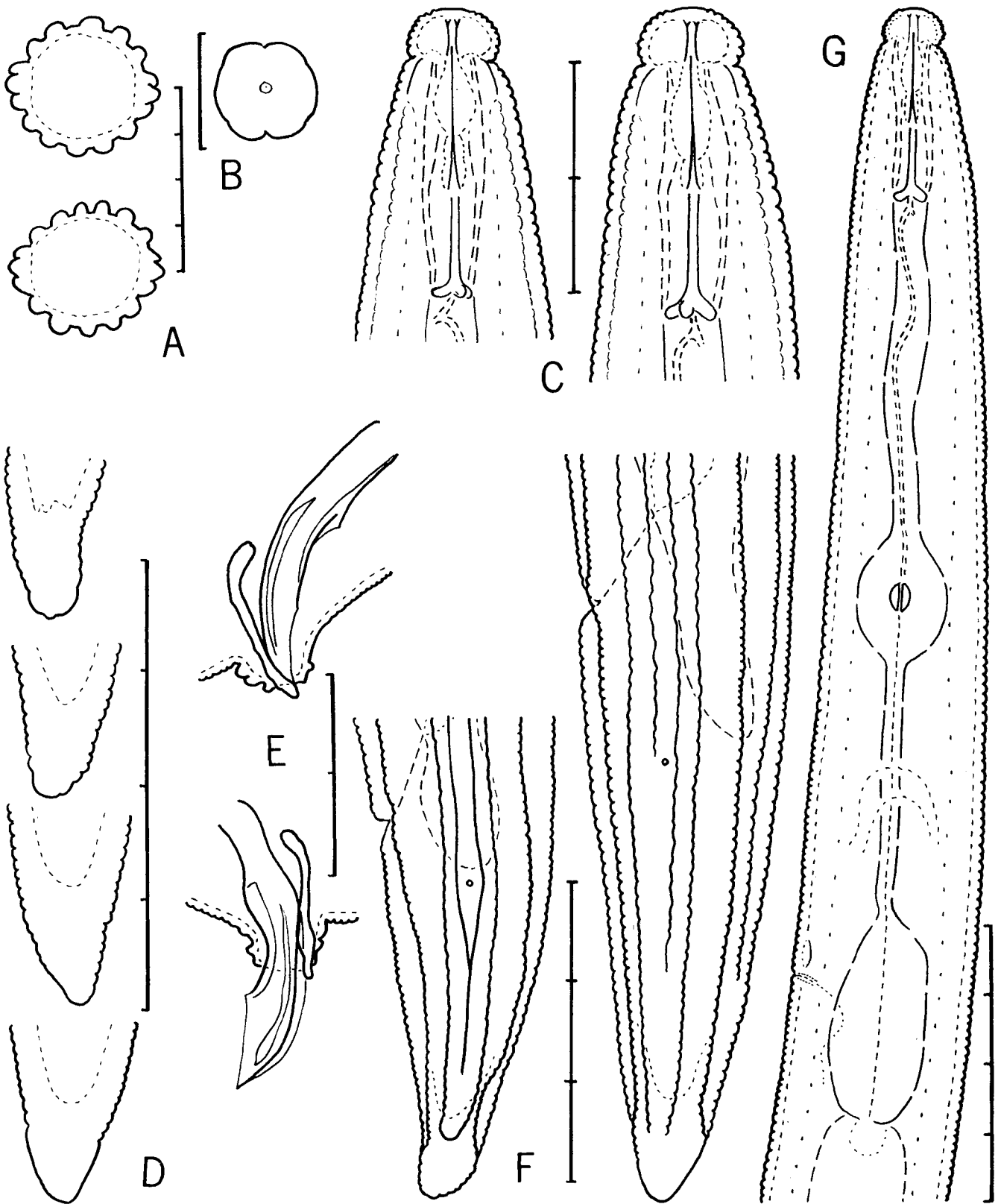


Fig. 4 — *T. microphasmis*: A, cross section through two females near mid-body; B, face view of head; C, variation of head; D, variation of tail terminus; E, spicules and gubernaculum; G, anterior region. Smallest unit of scale bars = 10 μ m.

Remarks

The above measurements of specimens from Mont Alban, Oaxaca, Mexico, fit well with those of Knobloch and Laughlin (1973) and Knobloch (1975). The only observed difference is in the position of median bulb, which was reported as MB = 71 in the original description. This value is so unusual as compared with other *Tylenchorhynchus* species that it should be regarded as a printing error.

Examination of the reported specimens supplements the known descriptions with the following:

- deirids have not been seen in any of the specimens;
- small, double epiptygma present.

TYLENCHORHYNCHUS MICROPHASMIS

Loof, 1959
(Fig. 4)

= *T. pini* Kulinich, 1985, syn. n.

Measurements — see Table I.

Description

Body more or less ventrally arcuate, sometimes almost O shaped. Cuticular annuli mostly 0.8-0.9 μm wide, total

variation observed 0.6-1.1 μm . Cuticle covered by longitudinal ridges, usually are five dorsal and five ventral ridges excluding lateral fields, these ridges may either divide or join. Lateral field with three ridges separated by four incisures. Two central incisures usually join each other posterior to phasmids, occasionally remain separated. Lateral field starts at stylet cone level, ends almost at tail tip. Deirids absent. Head 7-9 μm wide, separated by deep groove, bears 6-9 fine annuli. Face view shows distinct dorsal and ventral groove on head, the sublateral grooves barely marked. Labial disc thin, not seen when nematodes viewed laterally. Cephalic framework delicate, not refractive. Stylet very thin, cone needle-like, 55 (52-59) percent of total stylet length, knobs elongated and directed obliquely posteriad, sometimes most outer part of knobs slightly bent anteriorly. Median bulb large, almost rounded, thickenings of lumen walls 4 μm long. Posterior bulb offset from intestine, 43 (37-48) percent of post-corpus long. Excretory pore from the level of posterior part of isthmus to the level of cardia. Fasciculi present.

Female. Vulva without distinct epiptygma. Spermatheca rounded, axial, filled with sperms of fusiform shape. Post-anal intestinal sac present or absent, its lumen never visible. Phasmids very small, pore like, although larger just below cuticular surface, located 22 (9-42) percent of tail length posterior to anus. Posterior hyaline part of tail 9.5

TABLE I - Measurements of *Tylenchorhynchus microphasmis* from Poland.

	Chechlo n = 10	Kaluszyn n = 8	Gdynia n = 6	Bukowno n = 4	Bolimów n = 3	Sitki n = 2	Polaniec n = 2	Chechlo n = 2	Kaluszyn n = 2	Bukowno n = 4	Sitki n = 2
Body length (μm)	1000 890-1114	905 786-1027	807 766-866	867 811-904	758 721-783	835-885	1008-1038	954-978	856-894	838 794-931	776-870
Oesophagus (μm)	169 163-180	154 148-164	136 126-151	152 145-157	144 136-150	144-149	148-154	164-169	149-161	150 149-152	153-158
Tail (μm)	66 58-71	53 46-66	45 39-50	58 57-59	50 48-54	42-56	56-62	64-72	59-62	62 59-66	55-60
Tail annuli	52 47-56	49 44-61	47 38-57	50 47-54	47 44-51	39-45	50-55				
a	28 26-31	33 30-35	29 27-31	26 25-27	26 25-27	34	33	31-32	28-36	31 29-35	34-35
b	5.9 5.2-6.5	5.8 5.3-6.6	5.9 5.7-6.5	5.7 5.5-5.8	5.2-5.3	5.8-5.9	6.5-7.0	5.8	5.6-5.7	5.2-6.2	4.9-5.7
MB	54 51-57	53 51-55	58 56-60	55 54-57	54 53-56	54	56	55	52-53	54 53-55	53-54
c	15.2 12.5-17.3	17.2 15.6-18.7	18.0 16.2-20.5	15.1 14.3-16.0	15.2 14.9-15.8	15.9-19.8	16.3-18.7	13.6-14.9	14.5-14.6	12.8-14.1	14.2-14.6
c'	2.9 2.6-3.4	2.9 2.6-3.0	2.3 2.2-2.7	2.6 2.4-2.8	2.6-2.7	2.6-3.2	2.8-2.9	3.0	3.3-3.4	2.7 2.6-2.9	2.9
V	54 52-55	55 53-56	54 52-56	53-54	54-55	54-55	53				
Stylet (μm)	26.2 26-27	24.0 23-25	23.2 22-25	24.5 24-25	23-24	24-25	26-27	27-28	24	23.8 23-25	24-26
Spicule								30-32	27-30	28 26-29	26-31
Gubernaculum (μm)								19	16	15-18	15-17

(7-12) μm long. Tail tip mostly unstriated, sometimes with few striae, rarely completely annulated.

Male similar to female except for sexual apparatus. Spicules bent, velum not seen. Gubernaculum moveable, crossier shaped, posteriorly with cuticular outgrowths surrounding spicules from dorsal side. Bursa large, striated, reaches tail end. Phasmids located 27 (17-36) percent of tail length. Anterior and posterior cloacal lips with hypopygmata.

Remarks

T. microphasmis belongs to the species grouped under *Dolichorhynchus* (Mulk et Jairajpuri, 1974), the genus synonymised with *Tylenchochynchus* (Cobb, 1913) by Fortuner and Luc (1987). However, *T. microphasmis* and some other species do not fit their diagnosis of *Tylenchorhynchus* because of the distinct dorsal and ventral grooves on head and lack of spicular velum. *Tylenchochynchus* needs to be revised, generic criteria reconsidered and species regrouped.

T. pini is considered identical with *T. microphasmis* because detailed descriptions of both species and examination of numerous specimens from Poland showed no differences between the two species.

T. judithae Andrassy, 1962 described from two females is very similar to *T. microphasmis*. Apparent differences are length of stylet and shape of knobs. Stylet of *T. judithae* is 21 μm , knobs are small and rounded. All other differences

mentioned by Andrassy (1962) as tail end striation and number of cuticular longitudinal ridges are within observed limits of *T. microphasmis* variability.

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