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SPIRAL NEMATODES OF THE SUBFAMILY ROTYLENCHINAE
GOLDEN, 1971 (TYLENCHIDA: HOPLOLAIMIDAE) FROM INDIA

by

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During the survey of plant parasitic nematodes carried out in 1969-76 several species belonging to the genus *Helicotylenchus* Steiner, 1945 were found. Five of them considered to be new, are described here on the basis of the observations made on specimens fixed in hot 4% formalin and processed to glycerine by the slow method. All of the type specimens have been deposited in the Nematode Collection of the Department of Zoology, Aligarh Muslim University, Aligarh, India.

HELICOTYLENCHUS SHAKILI SP. N. (Fig. 1)

Paratype females (9): L = 0.6 (0.5-0.7) mm; a = 25 (22-27); b = 5.7 (5.2-6.5); b' = 4.2 (3.8-4.7); c = 32 (26-34); c' = 1.3 (1.2-1.5); V = ²⁴60²¹ (²¹⁻²⁶56-63¹⁸⁻²²); m = 53 (50-55); O = 41 (40-45).

Holotype female: L = 0.6 mm; a = 27; b = 5.5; b' = 4.0; c = 30; c' = 1.2; V = ²²63¹⁸; m = 55; O = 40.

Body forming a close spiral when fixed. Cuticle striations about 1 μ m apart at midbody. Lateral fields 1/5-1/4 of body-width, marked with four incisures in the middle. Lip region conical, marked with 4-5 annules. Cephalic framework sclerotized. Cephalids 1-2 annules

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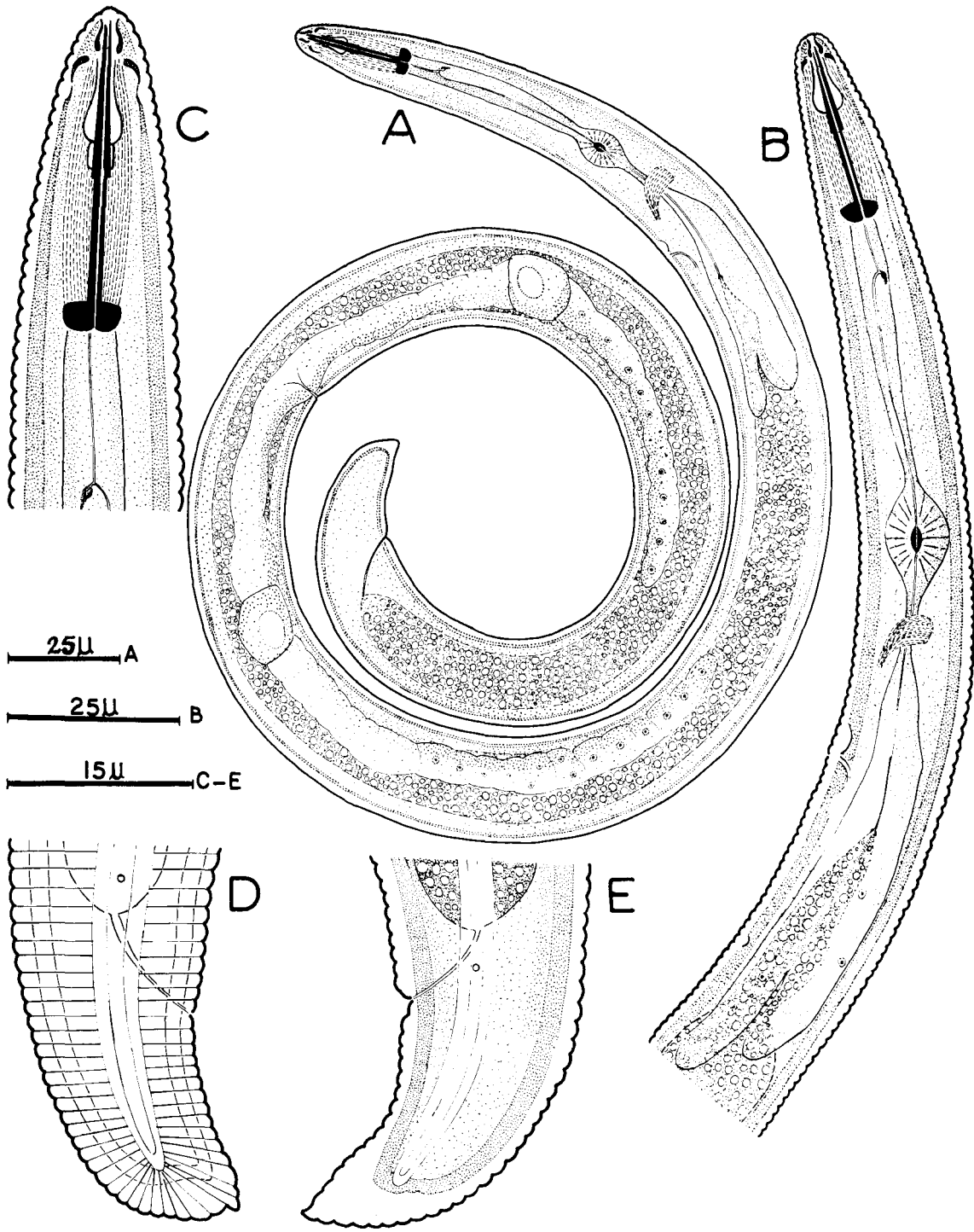


Fig. 1 - *Helicotylenchus shakili* sp. n., A, Entire female; B, Oesophageal region; C, Anterior end; D and E, Tails.

below lip region. Spear 25-27 μm long, metenchium slightly longer than telenchium, basal knobs 5-6 μm wide with flat to slightly sloping anterior surfaces. Orifice of dorsal oesophageal gland less than half spear length from spear base. Oesophagus typical, with procorpus measuring 35-40 μm , isthmus 12-15 μm and basal gland lobe 65-70 μm , longer than usual. Oesophago-intestinal junction near middle of basal lobe. Excretory pore 5-6 annules anterior to level of oesophago-intestinal junction and 96-109 μm from anterior extremity. Hemizonid 2-3 annules wide, 0-2 annules anterior to excretory pore, 93-104 μm from anterior extremity. Hemizonion 18-20 annules posterior to hemizonid. Nerve ring encircling middle of isthmus. Vulva a depressed transverse slit. Gonads paired, symmetrical; uterus with a proximal muscular part and a distal part ending in an empty spermatheca; ovary with a single row of oocytes. Phasmids 2-8 annules anterior to anal level. Tail marked with 15-16 annules, longer than one anal body-width, tapering to a point.

Male: Not found

Type habitat and locality: Soil around roots of maize (*Zea mays* L.) from Banikhet, Chamba (H.P.), India.

Type specimens: Holotype on slide H.A. 103/*Helicotylenchus shakili* sp. n./1 and paratypes on slides H.A. 103/*Helicotylenchus shakili* sp. n./2-4.

Differential diagnosis: *Helicotylenchus shakili* sp. n. closely resembles to *H. dihystra* (Cobb, 1893) Sher, 1961 and *H. serenus* Siddiqi, 1963. From the former it differs in having differently shaped spear knobs, a longer basal oesophageal gland lobe and a longer tail ending into a point (spear knobs slightly indented anteriorly, oesophageal gland lobe typical and tail of the size of anal body-width with a slight ventral projection in *H. dihystra*). From *H. serenus* it differs in having a shorter spear, differently shaped basal knobs, a longer basal oesophageal gland lobe, offset spermatheca and tail terminus tapering to a point (spear 27-30 μm , anteriorly indented basal knobs, spermatheca not offset and tail terminus hemispherical in *H. serenus*).

The new species is named after Dr. Shakil Ahmad.

HELICOTYLENCHUS PARAPTERACERCUS SP. N. (Fig. 2)

Paratype females (9): L = 0.6 (0.5-0.8) mm; a = 24 (20-32); b = 5.5 (5.1-6.2); b' = 4.8 (4.0-6.0); c = 38 (24-52); c' = 1.1 (0.8-1.5); V = ²¹64¹⁸ (¹⁹⁻²⁴61-68¹⁶⁻²¹); m = 50; O = 23 (19-25).

Holotype female: L = 0.6 mm; a = 24; b = 5.9; b' = 4.6 c = 41; c' = 1.0; V = ¹⁹63¹⁸; m = 50; O = 24.

Body forming a close spiral when relaxed. Cuticle striations 1-2 μ m apart near midbody. Lateral fields nonareolated, 1/5-1/4 of body width marked with four straight incisures in the middle.

Lip region marked with 5-6 annules, prominent hemispherical, continuous with body. Cephalic framework sclerotized. Cephalids not seen. Spear 27-28 μ m long, metenchium equal to telenchium, knobs with indented anterior surfaces. Orifice of dorsal oesophageal gland 5.6-7.0 μ m almost one-fourth spear length from spear base. Oesophagus typical with procorpus measuring 32-37 μ m, isthmus 8-14 μ m and basal gland lobe 45-50 μ m. Oesophageal gland overlap extending ventro-laterally. Intestine latero-dorsal to oesophageal lobes. Ventral overlap of basal oesophageal gland lobe longer. Oesophago-intestinal junction at level of excretory pore which is 84-104 μ m from anterior extremity. Hemizonid 2-4 annules anterior to excretory pore and 84-101 μ m from anterior extremity. Hemizonion 9-11 annules posterior to hemizonid and 98-113 μ m from anterior extremity. Nerve ring encircling middle of isthmus. Vulva a depressed transverse slit. Vagina about half body-width long. Gonads amphidelphic, symmetrical; uterus with a proximal muscular part and a distal part ending in an empty spermatheca; ovary with a single row of oocytes. Tail marked with 8-13 annules, almost equal to one anal body-width, terminus ending into an indented ventral projection with a cuticular fold. Phasmids small, pore-like, 5-10 annules above level of anus.

Male: Not found

Type habitat and locality: Soil around roots of Nobab fruit (vernacular name) from Langthabol, Imphal (Manipur), India.

Type specimens: Holotype on slide H.A. 109/*Helicotylenchus parapteracercus* sp. n./1 and paratypes on slides H.A.109/*Helicotylenchus parapteracercus* sp. n./2 and 3.

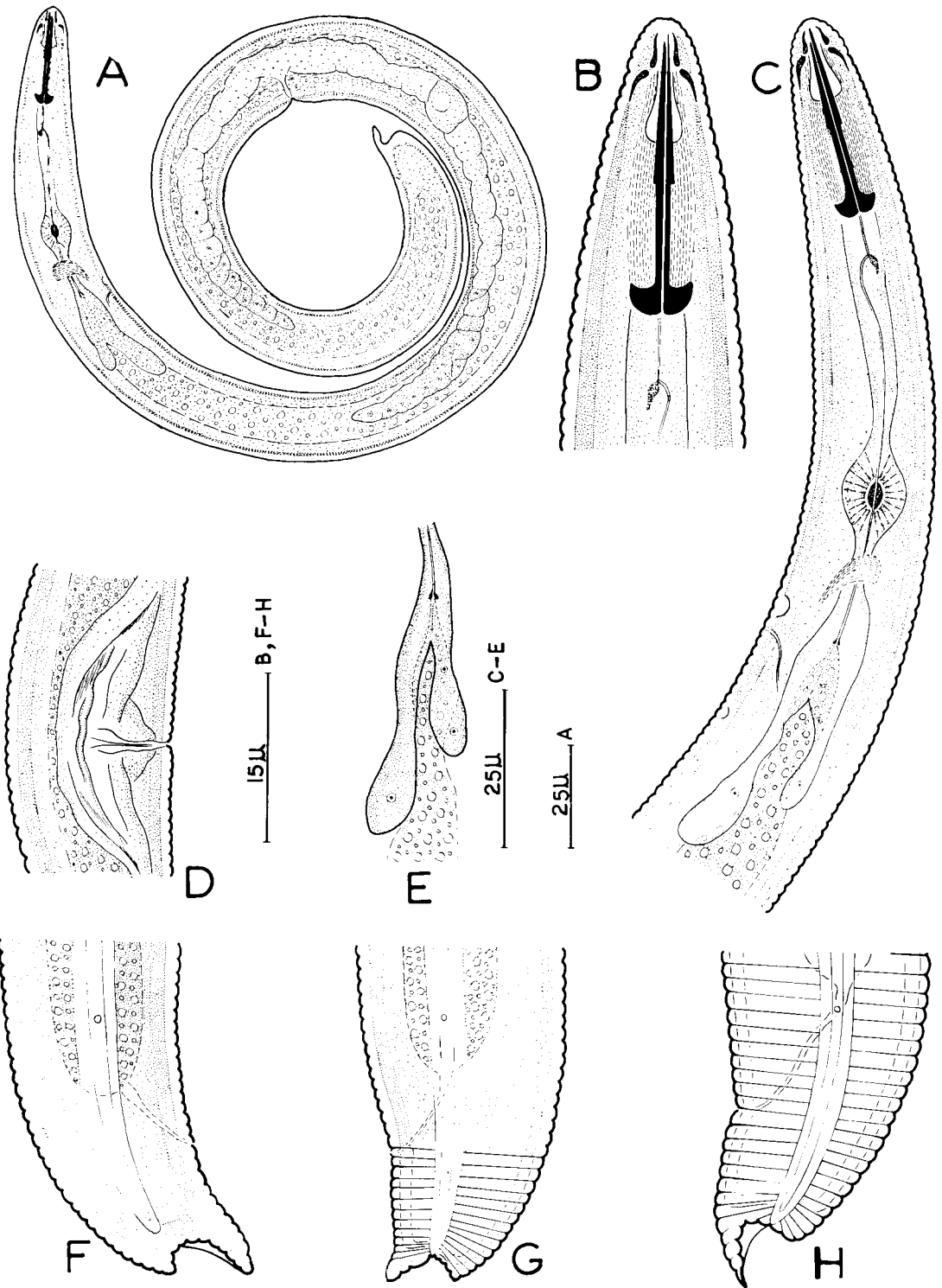


Fig. 2 - *Helicotylenchus parapteracercus* sp. n., A, Entire female; B, Anterior end; C, Oesophageal region; D, Vulva region, lateral view; E, Oesophageal gland lobe; F-H, Tails.

Differential diagnosis: *Helicotylenchus parapteracercus* sp. n. closely resembles to *H. pteracercus* Singh, 1971 and *H. crenacauda* Sher, 1966. From the former it differs in having a longer spear, ventral overlap of basal oesophageal gland lobe much longer than the dorsal one, phasmids anterior to anal level and different manner of termination of lateral lines on tail (spear = 23-25 μm , gland overlapping almost equal on the two sides, phasmids two annules anterior to three annules posterior to level of anus and inner incisures fused near middle of tail in *H. pteracercus*). From *H. crenacauda*, the new species differs in having, more and distinct lip annules, longer spear, differently shaped spear knobs, lesser value of 'O', anterior position of excretory pore and in the manner of termination of lateral lines (lip region with four indistinct annules, spear = 24-25 μm , spear knobs with flattened anterior surfaces, O = 32-42, excretory pore anterior to level of oesophago-intestinal junction, inner lines of lateral fields fusing in posterior third of tail in *H. crenacauda*).

HELICOTYLENCHUS TANGERICUS SP. N. (Fig. 3)

Paratype females (8): L = 0.68 (0.63-0.73) mm; a = 25 (23-27); b = 6.0 (5.7-6.4); b' = 4.8 (4.4-5.1); c = 49 (42-53); c' = 0.8 (0.7-1.0); V = $^{25}61^{24}$ ($^{23-28}56-64^{22-25}$); m = 52 (50-55); O = 22 (19-24).

Holotype female: L = 0.69 mm; a = 24; b = 5.7; b' = 4.8; c = 47; c' = 0.8; V = $^{26}62^{24}$; m = 55; O = 23.

Body forming a close spiral when relaxed. Cuticle striations 1-2 μm wide near midbody. Lateral fields 1/5-1/4 of body width marked with four incisures in the middle. Lip region truncate, marked with 5-6 annules. Cephalic framework typical. Cephalids not seen. Spear 27-31 μm long, metenchium slightly longer than telenchium; basal knobs flat to slightly sloping backwards. Orifice of dorsal oesophageal gland almost one-third spear length from spear base. Oesophagus typical with procorpus measuring 42-47 μm , isthmus 12-15 μm and basal gland lobe 40-48 μm . The ventral overlap of the basal gland lobe almost equal to the dorsal. Oesophago-intestinal junction at level of the base of isthmus. Excretory pore 104-112 μm from anterior extremity, varies in its location from above to below the level of oesophago-intestinal junction. Hemizonid 2-3 μm wide, 0-2 annules

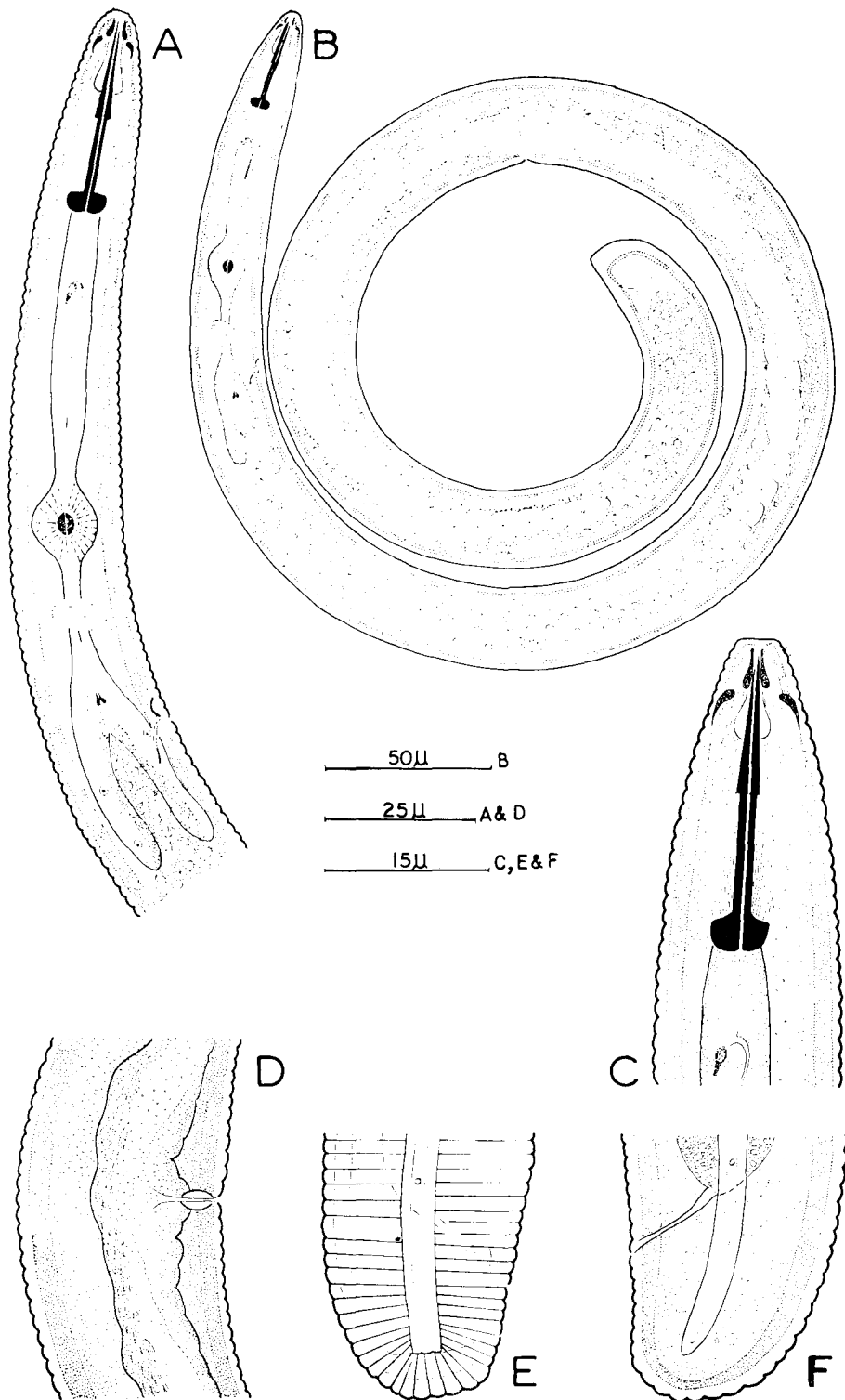


Fig. 3 - *Helicotylenchus tangericus* sp. n., A, Oesophageal region; B, Entire female; C, Anterior end; D, Vulva region, lateral view; E and F, Tails.

anterior to excretory pore and 101-106 μm from anterior extremity. In some specimens hemizonid also found which is 120-126 μm from anterior extremity and 15-17 annules posterior to hemizonid. Nerve ring encircles isthmus in middle. Vulva a depressed, transverse slit. Vagina less than half body width long. Gonads symmetrical, uterus with a proximal muscular part and a distal part ending in an obscure spermatheca; ovary with a single row of oocytes. Phasmid 5-7 annules anterior to level of anus. Tail broadly hemispherical marked with 7-11 annules, slightly shorter than one anal body-width; terminus hemispherical with slightly flat apex.

Male: Not found

Type habitat and locality: Soil around roots of roses (*Rosa* sp.) from Tang Marg, Srinagar (J. and K.), India.

Type specimens: Holotype on slide J.K.29/*Helicotylenchus tangericus* sp. n./1 and paratypes on slides J.K.29/*Helicotylenchus tangericus* sp. n./2-4.

Differential diagnosis: *Helicotylenchus tangericus* n. sp. closely resembles to *H. serenus* Siddiqi, 1963 and *H. retusus* Siddiqi and Brown, 1964. From the former it differs in the shape of lip region and spear knobs, in having the orifice of dorsal oesophageal gland close to base of spear knobs, no spermatheca, and a broadly hemispherical tail (lip region hemispherical, spear knobs anteriorly indented, O = 31-39, spermatheca not offset and tail tapering in *H. serenus*). From *H. retusus* the new species differs in having a shorter and broader body, differently shaped lip region and spear knobs and orifice of dorsal oesophageal gland less than one-third spear length from spear base (L = 0.71-0.94 mm, a = 31-38, lip region hemispherical with indistinct or no annules, spear knobs flat to anteriorly directed, O = 39-52 in *H. retusus*).

HELICOTYLENCHUS WAJIHI SP. N. (Fig. 4)

Paratype females (9): L = 0.56 (0.56-0.58) mm; a = 27 (26-28); b = 6.8 (5.9-7.1); b' = 4.8 (4.7-4.9); c = 46 (45-49); c' = 0.9 (0.8-1.0); V = $^{20}62^{16}$ ($^{20-25}62-63^{16-20}$); m = 53 (50-56); O = 31 (22-35).

Holotype female: L = 0.55 mm; a = 26; b = 6.8; b' = 4.7; c = 46; c' = 0.9; V = ²⁰62¹⁶; m = 56; O = 28.

Body forming a loose spiral when relaxed. Cuticle striations 1-2 μm wide near midbody. Lateral fields 1/5-1/4 of body-width marked with four incisures in the middle. Lip region prominent, hemispherical, marked with 5-6 annules. In some specimens lip annules very faint or even absent. Cephalic framework sclerotized. Cephalids not seen. Spear 23-24 μm long, stout with metenchium slightly longer than telenchium, basal knobs with flat to slightly indented anterior surfaces. Orifice of dorsal oesophageal gland almost one-third spear length from its base. Oesophagus typical with procorpus measuring 32-36 μm , isthmus 20-24 μm and basal glandular lobe 34-38 μm . Oesophago-intestinal junction at level of the base of isthmus. Excretory pore 92-95 μm from anterior extremity, 4-5 annules posterior to the level of oesophago-intestinal junction. Hemizonid 88-91 μm from anterior extremity, 0-2 annules anterior to excretory pore. Hemizonion not seen. Nerve ring encircling isthmus in middle. Vulva a depressed, transverse slit. Vagina less than half body width long. Gonads symmetrical, uterus with a proximal muscular part and a distal part ending in an offset, empty spermatheca; ovary with a single row of oocytes. Phasmids 5-7 annules anterior to one annule posterior to level of anus. Tail marked with 6-10 annules, almost equal to one body width, terminus hemispherical to slightly conical with the tip smooth.

Male: Not found

Type habitat and locality: Soil around roots of mulberry (*Morus indica* L.) from Arsia Bhoji Village, Baheri, Bareilly (U.P.), India.

Type specimens: Holotype on slide PNS-138/*Helicotylenchus wajihi* sp. n./1 and paratypes on slides PNS-138/*Helicotylenchus wajihi* sp. n./1-3.

Differential diagnosis: *Helicotylenchus wajihi* n. sp. closely resembles to *H. digonicus* Perry in Perry, Darling and Thorne, 1959 and *H. cavenessi* Sher, 1966. From the former it differs in having a differently shaped lip region, shorter spear, different position of phasmids and hemispherical to slightly conical tail with smooth terminus (lip region truncate, spear 24-28 μm , phasmids at or

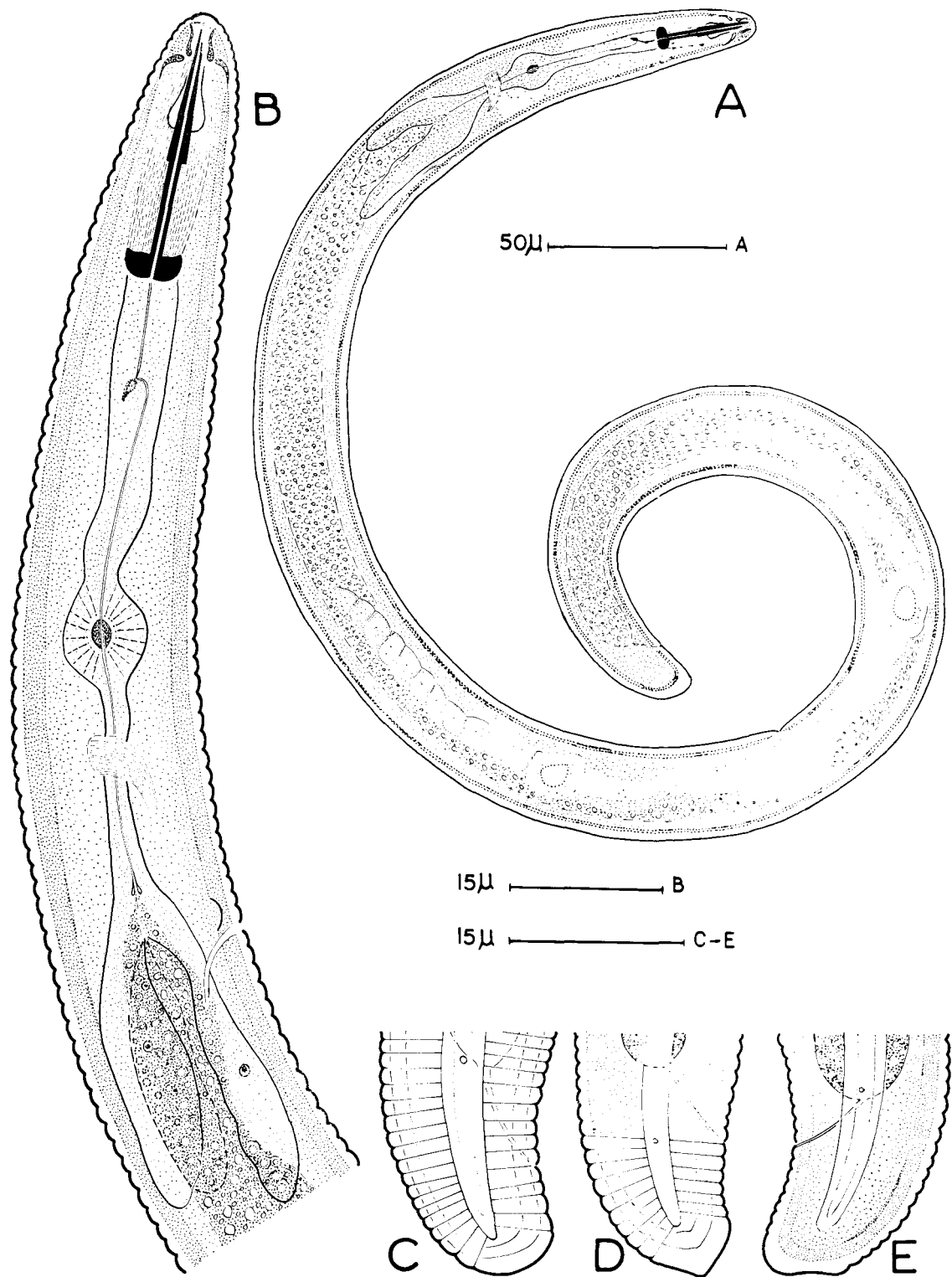


Fig. 4 - *Helicotylenchus wajihi* sp. n., A, Entire female; B, Oesophageal region; C-E, Tails.

1-5 annules anterior to anal level, tail more curved dorsally with slight ventral projection in *H. digonicus*). From *H. cavenessi* the new species differs in having a shorter spear, free middle incisures in tail region and phasmids anterior as well as posterior to the level of anus (spear 24-27 μm , inner incisures of lateral fields fuse at about the posterior third of tail and phasmids inconspicuous, six annules anterior to anal level in *H. cavenessi*). The new species is named after Dr. Wajih U. Khan.

HELICOTYLENCHUS VALECUS SP. N. (Fig. 5)

Paratype females (10): L = 0.69 (0.66-0.74) mm; a = 28 (24-32); b = 5.3 (5.1-5.6); b' = 4.4 (4.0-4.5); c = 33 (32-35); c' = 1.2 (1.0-1.3); V = 61 (60-63); m = 52 (48-57); O = 22 (23-30).

Holotype female: L = 0.70 mm; a = 31; b = 5.1; b' = 4.4; c = 35; c' = 1.3; V = 63; m = 54; O = 29.

Body forming a closed spiral when relaxed. Cuticle striations 1-2 μm near midbody. Lateral fields 1/5-1/4 of body-width marked with four incisures in the middle. Lip region hemispherical, marked with 3-4 annules. Cephalic framework sclerotized. Cephalids 2-3 annules behind lip region. Spear 31-33 μm long, metenchium almost equal to telenchium, basal knobs 5-6 μm wide with anteriorly indented surfaces. Orifice of dorsal oesophageal gland less than one-third spear length from spear base. Oesophagus typical with procorpus measuring 50-55 μm , isthmus 35-40 μm and basal gland lobe 40-50 μm . Oesophago-intestinal junction in the vicinity of the junction of isthmus and basal lobe. Excretory pore 109-126 μm from anterior extremity varying in position from middle to base of isthmus. Hemizonid 2-3 annules wide, 0-1 annule anterior to excretory pore. Hemizonion 12-14 annules posterior to hemizonid. Nerve ring encircling in middle or slightly anterior to isthmus. Vulva a depressed, transverse slit. Vagina about half body-width long. Gonads symmetrical, uterus with a proximal muscular part and a distal part with spermatheca which is not offset, ovary with a single row of oocytes. Phasmids 0-3 annules anterior to anal level. Tail marked with 10-12 annules, almost one anal body-width long, terminus irregularly hemispherical.

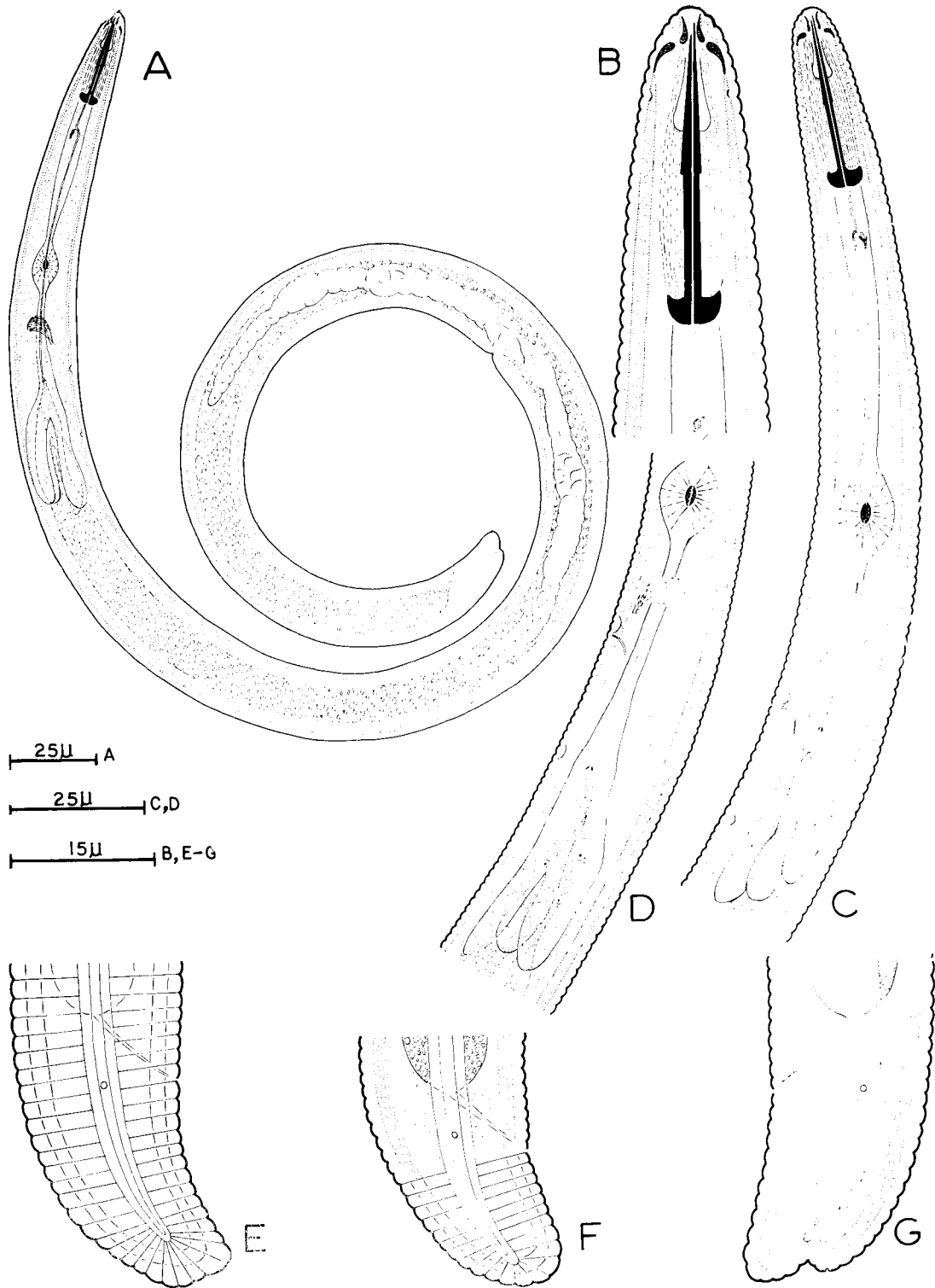


Fig. 5 - *Helicotylenchus valecus* sp. n., A, Entire female; B, Anterior end; C and D, Oesophageal regions; E-G, Tails.

Male: Not found

Type habitat and locality: Soil around roots of grasses (unidentified) from Khajjiar Valley, Chamba (U.P.), India.

Type specimens: Holotype on slide H.A.88/*Helicotylenchus valecus* sp. n./1 and paratypes on slides H.A.88/*Helicotylenchus valecus* sp. n./2 and 3.

Differential diagnosis: *Helicotylenchus valecus* sp. n. closely resembles to *H. serenus* Siddiqi, 1963 and *H. platyurus* Perry in Perry, Darling and Thorne, 1959. From the former it differs in having a longer spear, lesser value of 'O' and irregularly shaped tail terminus (spear 27-30 μ m, O = 31-39 and tail tapering with hemispherical terminus in *H. serenus*). From *H. platyurus* it differs in having a smaller body size, lesser value of 'O', spermatheca not offset and different position of phasmids (L = 0.80-0.92 mm, O = 33-40, spermatheca offset and phasmids six annules anterior to two annules posterior to the level of anus in *H. platyurus*).

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S U M M A R Y

Five new species of *Helicotylenchus* Steiner from India are described. They are: *H. shakili*, *H. parapteracercus*, *H. tangericus*, *H. wajihii* and *H. valecus*.

R I A S S U N T O

Nematodi della sottofamiglia Rotylenchinae Golden, 1971 (Tylenchida: Hoplolaimidae) trovati in India.

Vengono descritte cinque specie nuove di *Helicotylenchus* Steiner trovate in India. Esse sono: *H. shakili*, *H. parapteracercus*, *H. tangericus*, *H. wajihii* e *H. valecus*.

L I T E R A T U R E C I T E D

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