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### DESCRIPTIONS OF THREE NEW SPECIES OF PRATYLENCHUS FILIPJEV, 1936 (NEMATODA: PRATYLENCHIDAE)

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Summary. Two new bisexual and one monosexual species of the genus *Pratylenchus* collected from India, Panama and Australia are described and illustrated. These species with distinguishing features are: *Pratylenchus bhattii* sp.n. from *Saccharum spontaneum* L., India:  $\varphi$ L = 0.42-0.60 (0.48) mm; lip annuli three; stylet 13-14 (13.5 µm; V = 69-76 (73); tail subcylindrical to conoid, with 16-23 annuli and a rounded smooth terminus; males common; Pratylenchus panamaensis sp.n. from Coffea sp. in Panama: Q L = 0.42-0.59 (0.48) mm; lip annuli two, stylet = 15-17 (16)  $\mu$ m; spermatheca filled with sperms; 4-5 sperms occupying its width; subcylindrical to subclavate tail with broadly rounded, crenate terminus; males common; Pratylenchus curvicauda sp.n. from Trifolium sp. from Perth, Australia: Q L = 0.45-0.55 (0.5) mm; lip annuli three; stylet = 15-16.5 (16) µm; spermatheca empty; tail conoid, ventrally curved usually with indented terminus; phasmids located anterior to the middle of the tail being 16-22 annuli or 21-29 µm from tail terminus; males absent.

Three new species of the genus Pratylenchus Filipjev, 1936 are described. Nematodes were killed and fixed in hot 4% formalin and processed to anhydrous glycerine by the slow method; all measurements were taken from glycerine mounted specimens.

### Descriptions

### PRATYLENCHUS BHATTII sp.n. (Fig. 1)

Holotype female: L = 0.49 mm; a = 29; b = 5.3; b' =4.2; c = 19.3; c' = 2.6; V = 72.7; stylet = 14  $\mu$ m. 10 Paratype females: L = 0.42-0.60 (0.48) mm; a =

25-31 (27.8); b = 4.7-7.4 (5.7); b' = 3.4-4.9 (4.4); c = 15-20 (17.2); c' = 2.3-3.2 (2.5); V = 69-76 (73); stylet = 13-14 (13.5) µm.

11 Paratype males: L = 0.35-0.48 (0.42) mm; a = 25-29(27.8); b = 4.7-5.3 (5); b' = 3.4-4.6 (3.9); c = 16-21(18.2); stylet = 12-13.5 (12.8)  $\mu$ m; spicules = 15-17 (16) μm.

Female: Body posture almost straight or slightly arcuate after fixation. Cuticular annuli about 1µm wide at midbody, 1.1µm wide near oesophago-intestinal junction. Lateral fields occupy 1/4 to 1/3 body width, with four incisures, not areolated behind oesophageal region. Cephalic region continuous with body contour or slightly offset, with three distinct annuli. Cephalic framework heavily sclerotized, its margins extending one body annulus. Stylet rather slender, with 6.7-7 µm long conus and round basal knobs measuring about 3 µm across, with flattened to concave anterior surfaces; 16-18 (17) annuli between anterior end of body and level of the base of stylet. Opening of dorsal oesophageal gland 2.5-3 µm behind stylet base. Median oesophageal bulb oval, rarely round, 9-10 µm long, 7.0-7.5 µm wide; with prominent oval valvular apparatus, 3.3-3.7 µm long, 2.3-3 µm wide (Fig. 1 Fa, J). Oesophageal gland lobe overlapping intestine 1.5-2.5 times body width. Nerve ring at middle or posterior region of isthmus. Excretory pore 65-73 (68) µm from anterior extremity. Hemizonid just anterior to excretory pore 2-4 annuli wide. Ovary outstretched; oocytes arranged in two rows in the zone of multiplication, in a single row in growth zone. Spermatheca generally rounded (12.5x11.5 µm), sometimes longitudinally oval (16x11.5 µm) located 37-53 µm anterior to vulva and filled with sperms; 5-6 sperms fill its width. Vulva located on a prominent protuberance of body (Fig. 1 I). Post-vulval uterine sac 11-22 µm long, with rudimentary ovarian cells. Tail subcylindrical to conoid with 16-23 (19) annuli on ventral side. Tail tip rounded and smooth; lateral field incisures not reaching tail terminus. Phasmids at middle of tail.

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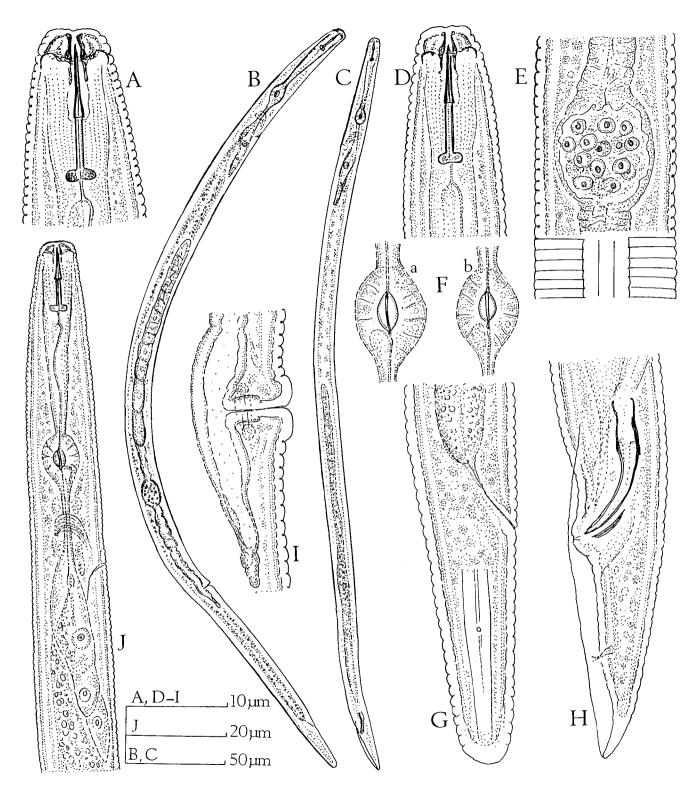


Fig. 1 - Pratylenchus bhattii sp.n.: A, B, E, Fa, G, I, J, females; C, D, Fb, H, males. A, D, head ends; B, C, entire individuals; E, spermatheca and lateral field; F, median oesophageal bulbs; G, H, tail ends; I, vulva region; J, oesophageal region.

*Male*: Stylet and head sclerotization weak in comparison with that of female. Stylet conus 6.2-6.7  $\mu m$  long. Spicules 13-16.5 (15.5)  $\mu m$  long. Gubernaculum troughshaped, 3-5  $\mu m$  long. Phasmids near mid-tail, extending into bursa. Tail enveloped by a bursa that arises about the level of spicule head.

This species is named after Dr D.S. Bhattii, Head of the Department of Nematology, Haryana Agricultural University, Hisar, Haryana State, India.

Type habitat and locality: Soil around roots of wild sugarcane, Saccharum spontaneum L. near Gohana, on Gohana-Jind Road (Sonepat district), Haryana State, India.

Type specimens: Three paratype females and three paratype males at International Institute of Parasitology, St. Albans, England; two paratype females and two paratype males at Division of Nematology, IARI, New Delhi; holotype and five paratype females and six paratype males at Department of Nematology, HAU, Hisar, India.

Differential diagnosis and relationship: Pratylenchus bhattii sp.n. is recognized by three lip annuli, stylet 13-14 μm long, V = 69-76, subcylindrical to conoid tail with smooth terminus and in being bisexual. It is close to P. sudanensis Loof et Yassin, 1971 and can be differentiated from it in having a smaller and less robust stylet having smaller conus, median oesophageal bulb with larger valvular apparatus, a vulva with raised lips, lateral field incisures not reaching female tail terminus which is not crenate, and smaller spicules [female stylet 15-16 µm and conus 8.0-8.3 µm long, female valvular apparatus of median oesophageal bulb 2.5-2.7 µm long and 2.2-2.5 µm wide, vulva lips not raised above body surface, outer incisures of lateral field often crossing over tail terminus giving it a crenate appearance and spicules 17-18 µm long in paratypes of P. sudanensis studied by us. Loof and Yassin (1971) also found some females of P. sudanensis having tail terminus with a few striae]. It also resembles P. penetrans Cobb, 1917 but differs in having a smaller stylet and anteriorly placed vulva [stylet = 15-17 µm; V = 75-84 after Loof (1960) and Corbett (1973)]. From P. zeae Graham, 1951 it differs in being bisexual and having a smaller stylet.

# PRATYLENCHUS PANAMAENSIS sp.n. (Fig. 2)

Holotype female: L = 0.44 mm; a = 29.3; b = 5.3; b' = 3.6; c = 19; c' = 2.2; V =  $^{34}$ -81.3<sup>-4.7</sup>; stylet = 16  $\mu$ m.

25 Paratype females:  $L = 0.42\text{-}0.59 \text{ (0.48) mm; a} = 21\text{-}30 \text{ (25); b} = 4.7\text{-}7.3 \text{ (5.7); b'} = 3.0\text{-}4.6 \text{ (4); c} = 17\text{-}26 \text{ (21); c'} = 1.6\text{-}2.5 \text{ (1.9); V} = 77\text{-}83 \text{ (80); stylet} = 15\text{-}17 \text{ (16) } \mu\text{m}.$ 

25 Paratype males: L = 0.38-0.46 (0.43) mm; a = 22-29 (27); b = 4.7- 6.4 (5.5); b' = 3.2-4.3 (3.9); c = 15-23 (19); c' = 1.4-2.5 (2); T = 36-60 (48); stylet = 14-15.5 (15)  $\mu$ m; spicules = 15-17 (16)  $\mu$ m; gubernaculum = 3- 5 (4)  $\mu$ m.

Female: Body straight to slightly curved ventrally, at times irregularly, after fixation. Lateral fields occupy 1/3 to 3/7 of mid-body width, with four equidistant incisures, not areolated, inner incisures usually fusing on tail (Fig. 2 G-J). Cephalic region low, flat and having two annuli which are larger than adjoining body annuli. Outer margins of cephalic framework extending to 1-1.5 body annuli. Stylet with 7-8.5 µm long conus and strong rounded to anteriorly flattened basal knobs, measuring 2.5-3.9 (3) µm across. Opening of dorsal oesophageal gland 2-3 µm from stylet base. Median oesophageal bulb well developed, 11-13 µm by 9-10.5 µm. Oesophageal gland lobe overlapping intestine usually for 1.5-2 times body widths behind cardia. Nerve ring at middle or posterior region of isthmus. Excretory pore 60-88 (74) µm from anterior extremity, usually opposite oesophago-intestinal junction. Hemizonid just anterior to excretory pore, 1-2 annuli long.

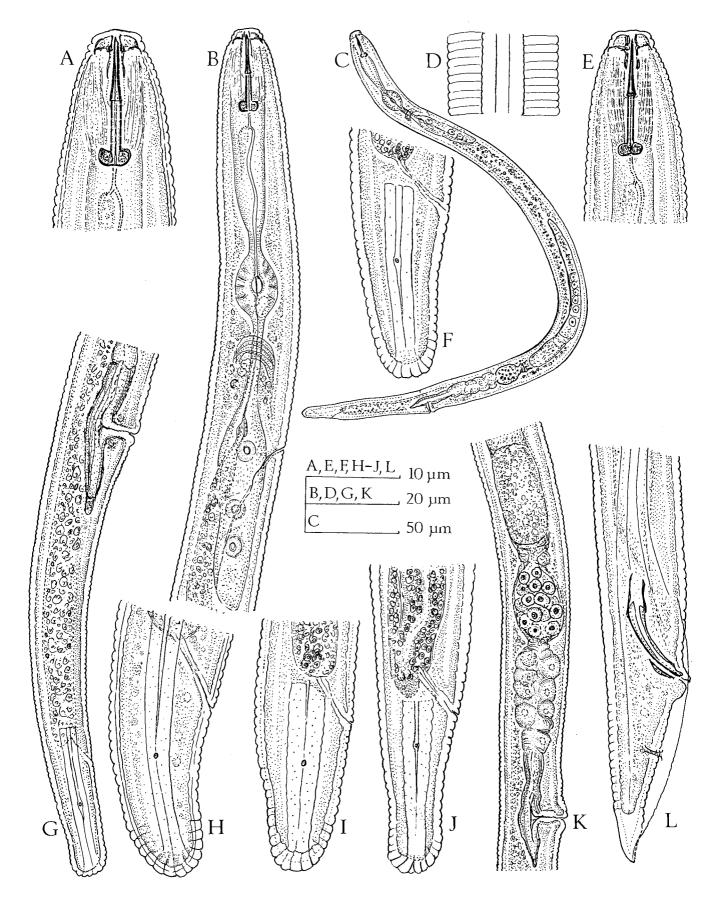
Ovary may extend to oesophageal glands, with oocytes arranged in a single row except for zone of multiplication where they are in double rows. Spermatheca longitudinally oval, at 34-59 (45) µm from vulva, filled with sperms; 4-5 sperms occupying its width. Intra-uterine egg 60 µm by 20 µm. Post-vulval uterine sac 16-23 µm long, its tip with 2-3 vestigial cells. Vulva a transverse slit about 2/5 of body width in length, located on a prominent ventral protuberance of body. Vulva-anus distance 80-106 (97) µm. Tail subcylindrical to subclavate, 20-24 (22) µm long, with 17-23 (20) annuli on ventral side and with a broadly rounded, distinctly crenate terminus. Phasmids located at or just anterior to middle of tail, 11-16 (14) annules from tail tip.

Male: As abundant as female. Stylet and cephalic sclerotization weaker than that of female. Spicules cephalated, gubernaculum trough-shaped. Tail tip narrow and pointed. Bursa arises a little anterior to head of spicule and envelopes tail. Phasmids distinct, extending into bursa, at or just anterior to middle of tail.

Type habitat and locality: Soil around roots of coffee, Coffea sp., Rosa Poás CR, Panama, Central America; collected by J. Pinochet in 1986.

Type specimens: Holotype female and 19 female and 19 male paratypes at International Institute of Parasitology, St. Albans, Herts, England; 6 female and 6 male paratypes at the Department of Nematology, HAU, Hisar, India.

Differential diagnosis and relationships: Pratylenchus panamaensis sp.n. is close to P. coffeae (Zimmermann, 1898) Filipjev et Schuurmans Stekhoven 1941 and P. loosi Loof,



1960 but differs from them in having a subcylindrical to subclavate female tail with a broadly rounded and distinctly crenate terminus. These three species are very similar to each other differing mainly in female tail shape, and hence could be considered as subspecies of  $P.\ coffeae$ . Since the tail character is stable we consider them as separate species.  $P.\ panamaensis$  has also some affinities with  $P.\ similis$  Khan et Singh, 1975 and  $P.\ flakkensis$  Seinhorst, 1968. It differs from  $P.\ similis$  in having a longer stylet, more annuli on female tail and longer spicules (stylet 12-14  $\mu m$ ; 16-18 annuli on female tail and spicules 14  $\mu m$  long in  $P.\ similis$ ). From  $P.\ flakkensis$  it differs in having a more posteriorly situated vulva and a different tail shape (V=73-77, tail conical, terminus sometimes with faint annuli in  $P.\ flakkensis$ ).

## PRATYLENCHUS CURVICAUDA sp.n. (Fig. 3)

Holotype female: L = 0.47 mm; a = 27.6; b = 5.4; b' = 3.5; c = 16.2; c' = 2.9; V =  $^{38.5}$ -71.5 $^{4.6}$ ; stylet = 16 µm.

20 Paratype females: L = 0.45-0.55 (0.5) mm;  $a = 21\text{-}28 (24); b = 5.2\text{-}6.8 (5.9); b' = 3.0\text{-}3.9 (3.4); c = 13\text{-}18 (14.5); c' = 2.1\text{-}2.9 (2.7); V = 69\text{-}76.5 (73); stylet = 15\text{-}16.5 (16) \mum.$ 

Female: Body strongly ventrally arcuate to c-shaped (Fig. 3B) or irregularly curved, never straight in relaxed condition; maximum body width 17-25 (21) µm. Body annuli about 1 µm wide at midbody. Lateral fields occupying about 1/3 body width, with four incisures, central band slightly narrower than lateral ones and occasionally with one or two additional incisures, not areolated behind oesophagus. Cephalic region broadly rounded to truncate, continuous with body or slightly offset having three annuli (occasionally specimen with two cephalic annuli seen). Outer-margins of cephalic framework extending up to one body annulus. Stylet conus 7.2-8.5 µm long; basal knobs rounded, anteriorly flattened, 3.9-4.8 (4.2) µm across and about 2 µm high. Opening of dorsal oesophageal gland at 2.5-3.7 µm from stylet base. Median bulb rounded to oval, large and muscular, 15-18x10-12 μm; vulvular apparatus 3.4-3.6 µm long by 2.5-3.0 µm wide. Excretory pore slightly anterior to oesophago-intestinal junction, 70-89 (82) µm from anterior extremity. Hemizonid 2-4 annuli long, just anterior to excretory pore. Oesophageal glands extending to 47-80 (62) µm over intestine; nuclei of subventral glands close together (Fig. 3C).

Ovary outstretched, may extend to the oesophageal glands; oocytes arranged in a single row except for anteriormost part of multiplication zone. Spermatheca small, empty. Egg in uterus 65x21 µm. Post-vulval uterine sac 19-37 (25) µm long, with rudimentary ovarian cells. Vulva on a ventral protuberance of body. Distance between vulva and tail terminus 111-150 (129) µm; VL/VB usually 6.5 (5.8-8.5). Annuli between vulva and anus 60-88 (77) (N = 7). Tail ventrally arcuate, conoid-rounded 27-38 (32) µm long, with 24-31 (26) annuli ventrally; tail terminus narrowly rounded and usually indented (Fig. 3D,F,G). Phasmids placed anterior to middle of the tail, 16-22 annuli or 21-29 µm from terminus; lateral fields behind phasmids form a plain band which may bear a central incisure.

Male: Not found.

Type habitat and locality: Soil around roots of Trifolium sp. from Perth, Western Australia.

Type specimens: Holotype female and 15 paratype females deposited with International Institute of Parasitology, St. Albans, Herts., England. Seven paratype females at the Department of Nematology, HAU, Hisar, India.

Differential diagnosis and relationships. Pratylenchus curvicauda sp.n. is recognized by a combination of characters viz. strongly ventrally arcuate to c-shaped body posture on death, 3 annuli in the cephalic region, a conoid, ventrally arcuate female tail with phasmids located anterior to its middle being 16-22 annuli or 21-29 µm from tail terminus and the absence of males. On these characters it is close to P. zeae Graham, 1951, from which it can be differentiated in having strongly ventrally arcuate to c-shaped body on death, larger stylet knobs, longer oesophageal glands, ventrally arcuate female tail often with indented tip and phasmids located 16-22 annuli or 21-29 µm anterior to tail tip. It also resembles P. vulnus Allen et Jensen, 1951, from which its females can be differentiated in having a more anteriorly placed vulva, spermatheca without sperm and phasmids located anterior to the middle of the tail (V = 78-82 and phasmids located posterior to the middle of the tail, after Sher and Allen, 1953).

*P. curvicauda* sp.n. is also related to *P. mulchandi* Nandkumar *et* Khera, 1970, but differs from it in having a more tapering and ventrally arcuate female tail; phasmids located 16-22 annuli or 21-29  $\mu$ m from tail terminus and vulva located more anteriorly (V = 75-78 (76.8) in *P. mulchandi*).

Fig. 2 (Front page) - Pratylenchus panamaensis sp.n.: A-D, F-K, females; E, L, males. A, E, head ends; B, oesophageal region; C, entire individual; D, lateral field at mid-body; F-J, L, tail ends; K, vulva and spermatheca region.

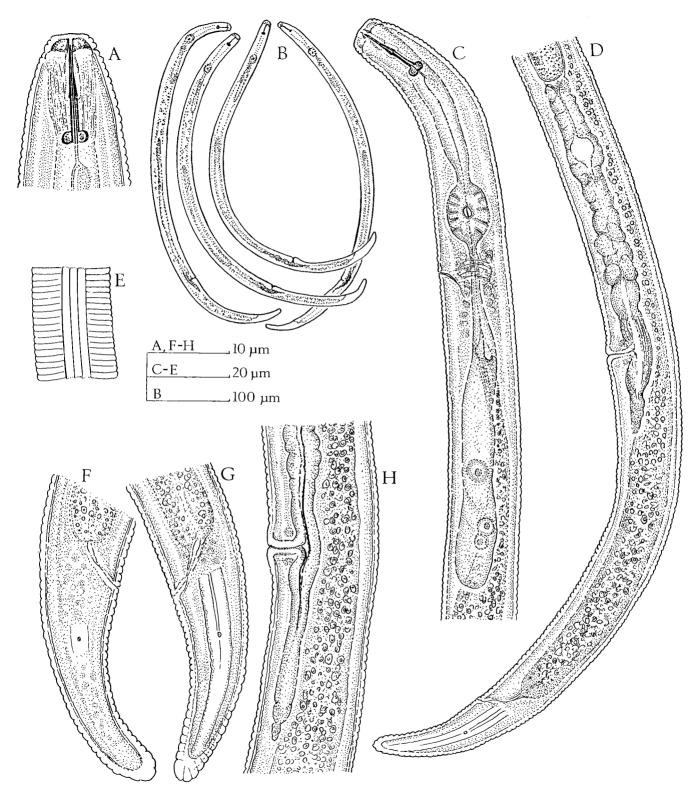


Fig. 3 - Pratylenchus curvicauda sp.n.: females. A, head end; B, entire individuals; C, oesophageal region; D, posterior region; E, lateral field at mid-body; F, G, tail ends; H, vulva region.

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