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Description of *Varotylus jairajpurii*, New Species (Tylenchida: Hoplolaimidae: Hoplolaiminae) From Paschim Medinipur, West Bengal, India with Key to its World Species

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Abstract.- *Varotylus jairajpurii* found in Paschim Medinipur, West Bengal, India is distinguished from all species of *Varotylus* in general and its closest ally *V. siddiqii* Mulk and Jairajpuri and *V. secondus* Mulk and Jairajpuri in particular on the basis of small spirally curved body, high hemispherical lip with distinct annulations which is continuous with body and flat at apex, long stylet, excretory pore near oesophago-intestinal junction and cylindrical tail with broadly rounded striated terminus. A key to all twelve world species of *Varotylus* is presented here including the new species.

Key words: *Varotylus jairajpurii* new species, India, Tylenchida, Hoplolaiminae.

INTRODUCTION

The genus *Varotylus* was established by Siddiqi (1986) by differentiating it from the genus *Orientylus* Jairajpuri and Siddiqi, 1977. He included eleven species under this genus. He shifted ten species *viz. Varotylus basiri* Khan and Khan, 1982, *V. citri* Rashid and Khan, 1974, *V. elegans* Khan and Khan, 1982, *V. helicus* Husain and Khan, 1967, *V. himprus* Sultan, 1980, *V. peculiaris* Khan and Khan, 1982, *V. secondus* Mulk and Jairajpuri, 1976, *V. siddiqii* Mulk and Jairajpuri, 1976, *V. symmetricus* Sultan, 1980 and *V. varus* Jairajpuri and Siddiqi, 1979 from the genus *Orientylus*. He also shifted *V. ranapoi* Darekar and Khan, 1982 from the genus *Rotylenchus* Filipjev, 1936. Presently the genus has a global strength of 12 species. Except the type species *i.e. V. varus* all other species of the genus are known from India. A new species of this genus is being described and illustrated hereunder. A species key of the genus is also provided.

Here we have described our new species *V. jairajpurii* on the basis of the characters that are diagnostic in the genus *Varotylus* and are helpful in the identification of species such as orifice of dorsal oesophageal gland about half stylet length behind stylet base, subventral glands lying in a subdorsal to lateral position, didelphic gonad with well developed ovaries and female tail dorsally convex-conoid to rounded.

MATERIALS AND METHODS

Nematodes were collected from rhizospheric soil sample of banana plantation (*Musa paradisiaca* L. cv. Kanthali) at Amlichak village under Kharagpur-2 block of Paschim Medinipur district, West Bengal, India. Soil sample (250 gm) was taken by the first author on 26. 8. 2004 from a small area of 10 cm x 10 cm up to the depth of 20 cm, at a distance of 25 cm from the main bole of the orchard. The specimens were extracted from soil by Cobb's sieving technique (Cobb, 1918) and decanting method followed by Modified Baermann's funnel technique (Christie and Perry, 1951), processed by Seinhorst's slow dehydration method (Seinhorst, 1959), mounted on slides in anhydrous glycerin and sealed. Measurements were taken with an ocular micrometer using Olympus research microscope with drawing-tube attachment, model no. BX 41. Dimensions were presented in accordance with De Man's formula (De Man, 1884). Diagrams were drawn with a camera lucida.

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Varotylus jairajpurii, new species
(Table I, Fig. 1)

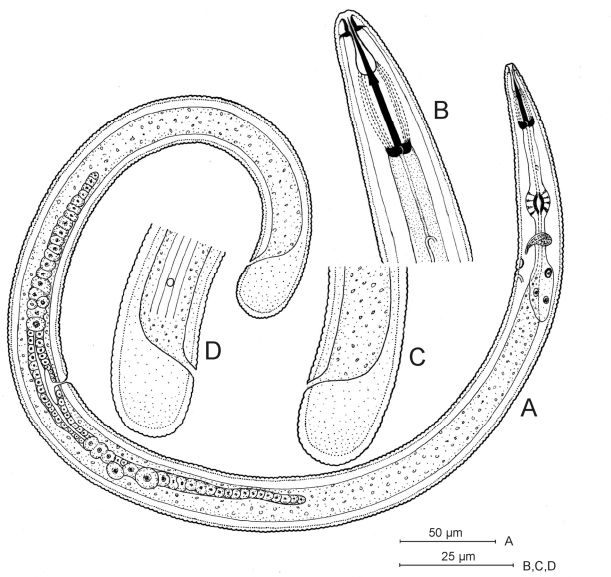

Fig. 1. *Varotylus jairajpurii*, new species: A, entire female; B, female anterior region; C - D, female posterior region.

Measurements are shown in Table I.

Description

Female

Body spirally curved upon fixation, tapering gradually anterior to oesophago-intestinal junction. Cuticle with deep transverse striations, annules 1.0-1.5 µm wide near midbody. Lateral fields marked with 4 incisures, occupying about 1/4th of body-width near middle.

Lip region high hemispherical in shape, continuous with body, flat at apex, marked with a slight depression; with 4-5 distinct annules. Stylet long, conus about 46% of stylet length. Stylet knobs anteriorly pointed or with flattened to slightly concave anterior surfaces, 4-5 µm across. Orifice of dorsal oesophageal gland 18.7 µm (16.1-18.9 µm) posterior to stylet base, more than half of stylet length. Median oesophageal bulb oval in shape, measures 11 µm x 12 µm. Centre of median oesophageal bulb 73.6 µm (68.8-74.1 µm) from anterior extremity of the body. Excretory pore near oesophago-intestinal junction. Hemizonid 2 annules wide, one annule anterior to excretory pore. Nerve ring at about middle of the oesophago-intestinal junction and base of median oesophageal bulb.

Table I.- Measurements of *Varotylus jairajpurii,* new species (all measurements in µm except L in mm).

Morphometric characters	Holotype female	Paratype females (n= 11)	Mean±SD
L	0.77	0.64-0.78	0.69±0.1
a	28.2	26.2-28.4	27.3±0.6
b	6.4	5.7-6.8	6.3±0.3
b'	5.8	5.2-5.8	5.5±0.2
c	34.6	32.6-34.9	33.6±0.7
c'	1.1	1.0-1.2	1.1±0
V	61.5	55.4-61.6	58.6±1.9
V'	63.4	57.1-63.4	60.6±1.9
m	46.4	46.2-46.4	46.3±0.1
O	67.9	63.4-68.2	65.9±1.6
MB	61.2	58.9-62.1	60.3±1.1
Height of lip region	2.9	2.6-2.9	2.8±0.1
Width of lip region	5.6	5.2-5.7	5.4±0.1
Stylet length	27.5	25.3-27.6	25.7±0.6
Conus	12.8	11.7-12.8	11.8±0.3
Shaft	14.7	13.6-14.8	13.8±0.3
Dorsal oesophageal gland opening from stylet base	18.7	16.1-18.9	17.8±0.7
Nerve ring from anterior end	98.4	96.9-98.8	97.7±0.6
Excretory pore from ant. end	104.9	99.5-105.9	102.7±1.6
Vulva from ant. end	474.2	354.6-480.7	428.6±43.6
Anterior genital branch	142.1	138.7-143.2	141.3±1.5
Posterior genital branch	105.3	102.1-106.1	104.3±1.2
Maximum body width	27.2	24.3-27.4	25.9±0.8
Body width at vulva	22.1	21.2-22.4	21.8±0.4
Body width at anus	20.6	19.3-20.8	20.0±0.5
Tail length	22.2	19.6-22.3	20.8±0.9

L, total body length; a, body length/maximum body width; b, body length/oesophageal length; b', body length/distance from head end to posterior end of oesophageal gland; c, body length/tail length; c', tail length/body width at anus; V, distance from head end to vulva/body lengthX 100; V', distance from head end to vulva/distance from head end to anus X 100; m, conus length/stylet length X 100; O, distance between stylet base and orifice of dorsal oesophageal gland/stylet length X 100; MB, distance between anterior end of body and centre of median oesophageal bulb/oesophageal length X 100.

Reproductive system amphidelphic; anterior gonad longer than posterior one. Vulva transverse; vagina occupying about half of the corresponding body width. Ovaries long, outstretched. Spermatheca axial, without sperms. Oocytes arranged in single or double rows.

Tail cylindrical with broadly rounded or hemispherical striated terminus, with 9-11 annules ventrally; 0.8-0.9 anal body width long. Phasmids

11-14 annules anterior to anus, 31-33 µm from tail terminus.

Male

Not found.

Differential diagnosis and relationships

Varotylus jairajpurii n. sp. is characterized by having small spirally curved body; high hemispherical lip with distinct annulations, continuous with body and flat at apex; long stylet; excretory pore near oesophago-intestinal junction; cylindrical tail with broadly rounded striated terminus.

It closely resembles *V. siddiqii* Mulk and Jairajpuri, 1976 in the values of L, a, b and b' but differs in c, V, O and stylet length (L= 0.61-0.78 mm; a= 27-33; b= 6.2-7.3; b'= 5.2-6.0; c= 48-63; V= 60-62; O= 44-50; stylet= 22-24 µm in *V. siddiqii*). Lip region high hemispherical in both the species; it is marked off by a slight depression and without annulation in *V. siddiqii*, but continuous and with 4-5 distinct annules in the present species. Spear knobs with concave anterior surfaces in the present species (*vs.* rounded). Tail cylindrical with broadly rounded striated terminus in both the species, but it is longer in *V. jairajpurii* n. sp. (*vs.* 12.4-12.7 µm). Phasmids 31-33 µm anterior to tail terminus in the present species (*vs.* 22-27 µm).

Proposed new species also shows similarities with *V. secondus* Mulk and Jairajpuri, 1976 in general body shape and in the values of L, b and b'; but differs in the values of a, c, V, O, stylet and tail length (L=0.63-0.77 mm; b=5.6-6.7; b'=5.0-5.5; a=30-39; c=40-58; V=61-65; O=50-60; stylet= 22-24 µm; tail= 13.3-15.6 µm in *V. secondus*). Lip region high hemispherical in both the species; with 4-5 annules in the present species but without annulation in *V. secondus*. Tail cylindrical with broadly rounded terminus in the present species but with a slight depression or a distinct notch on dorsal disc in *V. secondus*. Phasmids 11-14 annules anterior to anus in the present species (*vs.* near anal level).

Type material

Specimens are deposited with the National Zoological Collections of the Zoological Survey of India, Kolkata, West Bengal, India, under the Registration No. 1286 (Holotype) and WN 1287 (Paratypes).

Etymology

This species is named after Professor Mohammad Shamim Jairajpuri, stalwart nematologist of the world and the Ex-Director of the Zoological Survey of India, Kolkata.

KEY TO THE TWELVE WORLD SPECIES OF *VAROTYLUS* SIDDIQI

1.	Tail rounded or hemispherical 2
–	Tail dorsally convex-conoid, with or without a ventral projection 7
2.	Head annuli distinct 3
–	Head annuli absent or indistinct .... *V. siddiqii* (Mulk and Jairajpuri) Siddiqi
3.	Phasmids 2-4 annuli anterior to anus 4
–	Phasmids 8-14 annuli anterior to anus 5
4.	L=0.9-1.0 mm; stylet 25-27 µm .... *V. basiri* (Khan and Khan) Siddiqi
–	L=0.5-0.7 mm; stylet 22-25 µm ....*V. elegans* (Khan and Khan) Siddiqi
5.	Head hemispherical ..*V. citri* (Rashid and Khan) Siddiqi
–	Head truncate 6
6.	Vulva more posterior of the body; V=68-79 ....*V. symmetricus* (Sultan) Siddiqi
–	Vulva slightly posterior to midbody; V=55-61 .... *V. jairajpurii* n. sp.
7.	Tail with a ventral projection 8
–	Tail without ventral projection..... ..... *V. peculiaris* (Khan and Khan) Siddiqi
8.	Head annuli indistinct 9
–	Head with 4-5 annuli..... 10
9.	Phasmids 4-12 annuli anterior to anus..... ..... *V. ranapoi* (Darekar and Khan) Siddiqi
–	Phasmids on tail or near to anus..... ..... *V. secondus* (Mulk and Jairajpuri) Siddiqi
10.	Phasmids 2-14 annuli anterior to anus..... 11
–	Phasmids on tail... *V. helicus* (Husain and Khan) Siddiqi
11.	Tail tip annulated .....*V. himprus* (Sultan) Siddiqi
–	Tail tip without annulation .... *V. varus* (Jairajpuri and Siddiqi) Siddiqi

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REFERENCES

CHRISTIE, J.R. AND PERRY, V.G., 1951. Removing nematodes from soil. *Proc. helminthol. Soc. Washington,* **18**: 106-108.

COBB, N.A., 1918. Estimating the nema population of the soil. *Agricultural Technology Circular I.* Bureau of Plant Industry, Department of Agriculture, United States. pp. 1- 48.

DE MAN, J.G., 1884. *Die frei in der reinen Erde und im sussen Wasser lebenden Nematoden der niederlandischen Fauna*. Leiden. pp. 1-206.

MULK, M. AND JAIRAJPURI, M.S., 1976. Nematodes of leguminous crops in India IV. Two new species of *Rotylenchus* Filipjev, 1936 (Hoplolaimidae). *Indian J. Nematol.*, **5**: 9-14.

SEINHORST, J.W., 1959. A rapid method for the transfer of nematodes from fixative to anhydrous glycerin. *Nematologica*, **4**: 67-69.

SIDDIQI, M.R., 1986. Tylenchida: *Parasites of plants and insects.* Commonwealth Agricultural Bureaux, UK. pp. 1-645.

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