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***Seinura manipurensis* sp. nov. (Nematoda: Tylenchina) from Manipur, North East India**

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ABSTRACT

Survey on the nematode of the superfamily Aphelenchoidea revealed the presence of a new species of *Seinura* associated with rotten pine wood from Bishnupur, Manipur, North East India. The nematodes were extracted from collected samples by Baermann funnel technique. *Seinura manipurensis* sp. nov. is characterized by a body length of 534.57-645.29 μm , spear = 17.3 μm , spear without stylet knobs, a = 26.64-30.9, b = 3.74-4.82, c = 4.66-5.94, c' = 8.66-9.5, V = 68.60-70.50, post uterine sac 2.75-4.37 times vulval body widths long and arrangement of oocytes in a single row.

Key words: Nematodes, Aphelenchoidea, *Seinura*, Manipur, North, East India

INTRODUCTION

The superfamily Aphelenchoidea (Fuchs, 1937; Thorne, 1949) is represented by four families. The family Aphelenchidae is represented by *Aphelenchus* (Bastian, 1865); Amomyctidae with *Anomyctus* (Allen, 1940); Paraphelenchidae with *Paraphelenchus* (Micoletzky, 1922, 1925) and *Metaphelenchus* (Steiner, 1943) and the family Aphelenchoididae is represented by sixteen genera. Aphelenchoididae includes extremely varied groups of nema which are obligate plant parasites, mycophagous, predators and insect parasites. The genus *Seinura* (Fuchs, 1931) under the superfamily is quite distinctive by virtue of having long, attenuated to filiform tails without a terminal mucron.

Seinura spp. play an important role in the natural balance among nematode species because they are predatory on other nematodes. They also provided some guides for speculative interpretation of the phylogenetic development in nematode (Huang and Ye, 2008). The predaceous habit of members of the genus *Seinura* (Fuchs, 1931), has been known since 1937 when their feeding habits were described by Linford (1937) and Linford and Oliveira (1937). Taxonomic studies of *Seinura* spp. are scattered in some few journals. Hunt (1993) reported 38 species of *Seinura* and since then Huang and Ye (2008) gave main morphological characteristics of 43 valid species of the genus. Afterward, Gagarin (2000) described *Seinura informis* and Huang and Ye (2006) described *Seinura lii* and *Seinura wuae*.

The present study deals with the description of a new species, *Seinura manipurensis* sp. nov. from Manipur, North-East India.

MATERIALS AND METHODS

The nematodes are extracted from collected root samples by Baermann funnel technique. Collected nematodes are fixed in TAF (triethanolamine, formaldehyde and water) and processed

by glycerol-ethanol method of Seinhorst (1959). Specimens are mounted in dehydrated glycerine. After slide preparation, measurements are taken using an ocular micrometer and diagrams were drawn under a camera lucida.

RESULTS

Seinura manipuresnis sp. nov. (Table 1 and 2, Fig. 1).

Table 1: Morphometric data of female species of *Seinura manipuresnis* sp. nov

Characters	Holotype	Paratypes
N	1.000	7
Length	534.570	534.7-645.29 (602.91±48.78)
a	30.900	26.64-30.9 (28.77±2.12)
b	4.828	3.74-4.82 (4.28±0.54)
c	5.940	4.66-5.94 (5.30±0.64)
c'	8.660	8.66-9.5 (0.08±0.42)
V	68.600	68.60-70.50 (69.55±0.950)
G ₁	33.330	33.33-33.51 (33.42±0.090)
Maximum body width	17.300	17.3-24.22 (20.18±2.94)
Oesophagus	110.720	110.72-172.02 (139.22±25.20)
PUS	38.060	38.06-60.55 (49.30±11.24)
Lip width	5.190	5.19
Lip height	3.200	3.2
Median bulb length	19.030	19.03-22.49 (20.76±1.41)
Median bulb diam.	8.650	8.65-12.11 (9.80±1.63)
Nerve ring	69.200	69.2 -81.39 (77.3±5.72)
Excretory pore	66.710	66.71-77.09 (72.57±4.29)
Spermatheca	51.700	51.7
Rectum	8.650	8.65
Tail	89.960	89.96-164.35 (130.90±30.82)
ABD	10.380	10.38-15.57 (12.97±2.59)

Table 2: Differences of *Seinura manipuresnis* sp. nov. from closely related species

<i>Seinura</i> species	Characters that differentiate from <i>Seinura manipuresnis</i> sp.nov.	References
<i>S. oliveirae</i>	Absence of uterine sac. 3-5 rows of oocytes, presence of stylet knobs, longer body i.e., 520-760 µm and shorter stylet i.e., 15 - 16 µm	(Christie, 1939; Goodey, 1960)
<i>S. oostenbrinki</i>	Presence of 2 rows of oocytes, longer stylet i.e. 19-22 µm and shorter tail i.e., 50 µm	(Siddiqi <i>et al.</i> , 1967)
<i>S. paratenuicaudata</i>	Presence of multiple rows of oocytes, short post vulvar sac, about one body widths and shorter stylet i.e., 15.5-16.8 µm	(Geraert, 1962)
<i>S. prospera</i>	Presence of multiple rows of oocytes, shorter body and stylet length i.e., 0.40-0.43 and 14.3 µm, respectively	(Kazachenko, 1980)
<i>S. sterineri</i>	Presence of 1-2 rows of oocytes, longer body and stylet length i.e., 680-960 µm and 20-25 µm, respectively	(Hechler and Taylor, 1965)
<i>S. sutura</i>	Presence of multiple rows of oocytes, presence of vulval flap and shorter stylet i.e., 14 µm	(Massey, 1971)
<i>S. tenuicaudata</i>	Presence of multiple rows of oocytes and longer stylet i.e., 24-27 µm	(De Man, 1895; Goodey, 1960) in Hechler (1963)

Table 2: Countinue

<i>Seinura</i> species	Characters that differentiate from <i>Seinura manipurensis</i> sp. nov.	References
<i>S. tritici</i>	Presence of 2-5 rows of oocytes, longer body i.e. 0.57-0.70 mm and shorter median bulb and tail i.e., 17-20 μ m and 4-5 times anal body diameter, respectively	(Bajaj and Bhatti, 1982)
<i>S. variobulbosa</i>	Presence of stylet knobs, shorter spear i.e., 14.4-16.8 μ m and lateral fields marked by four incisures	(Haque, 1966)

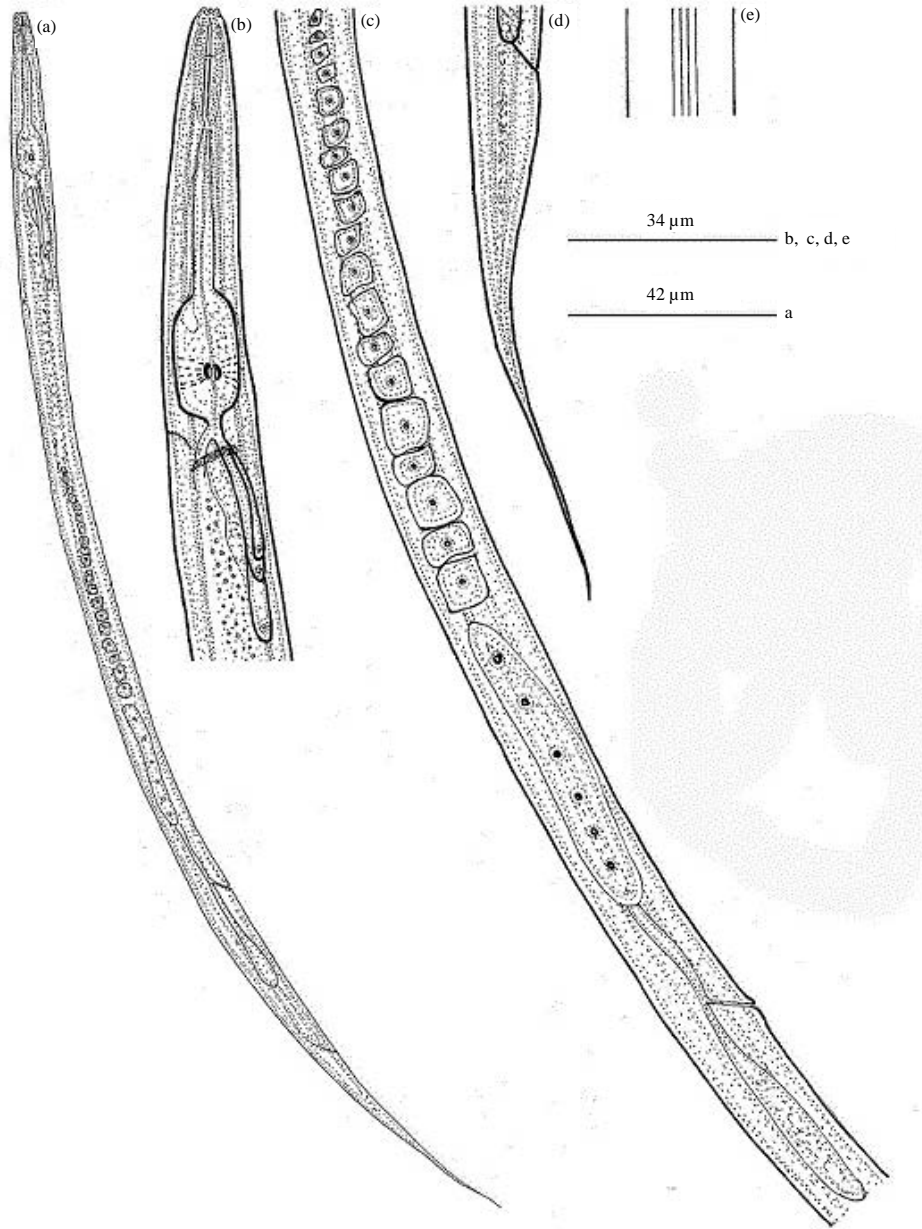


Fig. 1(a-e): *Seinura manipurensis* sp. nov. (Camera lucida drawings), (a) Entire female body, (b) Anterior female body, (c) Female reproductive system, (d) Female tail region and (e) Lateral lines

Female: Body slightly curved ventrally upon fixation, 534.57-645.29 μm long. Cuticle with fine transverse striae. Lateral fields with four incisures. Cephalic region with six lips slightly set off from ventrally and posterior tip attenuated. Procorpus attenuated, 44.98-51.9 (48.44 \pm 2.82) μm long, well developed guitar-shaped metacarpus, 19.03-22.49 (20.76 \pm 1.41) μm long and 8.65-12.11 (9.8 \pm 1.63) μm across with inner cuticular plates at posterior region. Excretory pore at level of cuticular thickenings of oesophageal bulb. From anterior end. Nerve ring at 69.2-81.31 (77.3 \pm 5.72) μm from anterior end.

Vulva inclined, vagina 6.92 μm diameter, spermatheca elongated, 51.7 μm long filled with sperms, ovary arranged in single row, posterior uterine sac elongated spherical 38.06-60.55 (49.30 \pm 11.24) μm long, about 2.73-4.37 times vulval body widths. Vulva anus distance 67.85 μm . Tail elongated, distally filiform ending into dorsally pointed terminus, 89.96-164.35 (130.90 \pm 30.82) μm long, 4.66-5.94 times anal body width long.

Male: Not found.

Type habitat and locality: Collected from rooten pine from Chingning khul, Bishnupur, Manipur, North- East India in August, 2013.

Type material: Holotype on the slide FSB-S₁-1/*Seinura manipurensis* sp. nov., paratypes on the slides FSB-S₁-2-10/*Seinura manipurensis* sp. nov. and deposited in the nematode collection center of Parasitology Section, Department of Life Sciences, Manipur University, Canchipur 795003, Manipur, India.

Diagnosis: The females of *Seinura manipuresnsis* sp. nov. are characterized by having six lips, barely set off from the body, tail gradually tapers to a amucronate filiform with dorsally pointed terminus, large and elongated guitar-shaped median bulb, elongated spermatheca and uterine sac.

Relationships: *Seinura manipurensis* sp. nov. is similar to *Seinura onondagensis* (Kaisa, 2000) and *Seinura propora* (Siddiqi *et al.*, 1967).

Seinura manipurensis sp. nov. is close to *Seinura onondagensis* (Kaisa, 2000) in having similar body length that tapers posteriorly to a filiform, amucronate terminus, finely annulated cuticles, four lateral lines, spears without stylet knobs, oocytes arranged in single rows, presence of elongated spermatheca and uterine sac.

But *Seinura manipurensis* sp. nov. differ from *Seinura onondagensis* (Kaisa, 2000) in having smaller values of b, c, spear; larger value of c, segmented cephalic region, spermatheca elongated spherical-shaped and longer filiform tail ending into a pointed dorsal terminus (b = 6-8/7-8, c = 7-10/6-7, c' = 6 -9/6-7, spear = 17-22/18-20, round or ovoid spermatheca, rounded head and tail = 55-90 μm in *Seinura onondagensis* (Kaisa, 2000).

Seinura manipurensis sp. nov. is similar to *Seinura propora* (Siddiqi *et al.*, 1967) in having marked off lip region which are segmented, similar range of spear length, absence of stylet knobs, attenuated procorpus, well developed metacarpus and elongate distally filiform tail.

But *Seinura manipurensis* sp. nov. differs from *Seinura propora* (Siddiqi *et al.*, 1967) in having four lateral lines, presence of uterine sac and arrangement of oocytes in single rows (three lateral lines, absence of post uterine sac and arrangement of oocytes in 2-3 rows in *Seinura propora* (Siddiqi *et al.*, 1967).

Bionomics: Nematode predators, bark beetle associate and the species was observed feeding on two different species of *Aphelenchoides* and other *Rhabditis* spp.

The occurrence of the species is the first record of its kind in the entire North East India.

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