

# SPECIES OF *FILENCHUS* ANDRASSY, 1954 FROM MANIPUR WITH DESCRIPTION OF *FILENCHUS NEOLONGICAUDATUS* SP. NOV.

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## ABSTRACT

During a survey carried out in the valley districts of Manipur in order to find out the plant parasitic nematodes associated with mulberry plants, *Morus* spp. and pine trees, three species of *Filenchus* Andrassy, 1954 were discovered. Among them, one is recorded as a species new to science. *Filenchus neolongicaudatus* sp. nov. is characterized by having a long body of 0.49-0.71mm, a long tail of 144.5-248.2 $\mu$ m length and spear of 17-18.7 $\mu$ m length. The genus *Filenchus* is reported for the first time from Manipur.

## INTRODUCTION

The genus *Filenchus* Andrassy, 1954 as revised by Raski and Geraert, 1987 is characterised by the presence of lateral fields each with four incisures, moderately developed stylet, conus solid appearing anteriorly, sharply pointed, about 1/3 of total stylet length, knobs distinct, rounded and basal bulb offset from intestine which is generally pyriform. A number of workers (Dhanachand, 1983; Gambhir and Dhanachand, 1996; Anandi and Dhanachand 1993; Dhanachand and Romabati, 1994; Mohilal *et al.*, 2001 and 2009) had carried out survey on plant parasitic nematodes associated with different host plants from the state of Manipur show no record of the species of *Filenchus*. So a survey for this group of nematode was taken up. During the present survey for soil and plant parasitic nematodes associated with mulberry plants and pine trees, the presence of three species of *Filenchus* Andrassy, 1954 was encountered among which *Filenchus neolongicaudatus* associated with mulberry plants from Imphal east District was reported as a new species. Other species encountered were *Filenchus brevis* Lal and Khan, 1987 and *F. nakasonoi* Mizukubo, 1991. Illustrations supported with morphometric details are provided.

## MATERIALS AND METHODS

The collected soil samples were processed through Cobb (1918) sieving and decanting method followed by modified Baermann's funnel technique. The extracted nematodes were killed in warm F.A (4:1) and dehydrated under the rapid glycerin method of Seinhorst (1959). After slide preparation,

measurements were taken using an ocular micrometer and diagrams were drawn using a camera lucida.

## RESULTS AND DISCUSSION

### *Filenchus brevis* Lal and Khan, 1987

Dimensions: Table 1

### Descriptions

**Female:** Body almost straight to slightly arcuate upon fixation, narrowing towards both extremities, maximum body width 17 $\mu$ m in mid-body. Cuticle with fine striation. Lateral field with four incisures. Labial region slightly set off from body contour, 5.9 $\pm$ 0.8 (5.1-6.8)  $\mu$ m wide, 3.4  $\mu$ m high, with indistinct 4 annuli. Stylet 13.6  $\mu$ m long, with small knobs. Orifice of dorsal oesophageal gland at 2.5 $\pm$ 0.8(1.7-3.4)  $\mu$ m from the stylet knobs. Median bulb oval with lightly developed cuticular thickenings. Isthmus narrow and longer than procorpus. Nerve ring situated at 56.1 $\pm$ 1.7 (54.4-57.8)  $\mu$ m from anterior end. Excretory pore at 61.2  $\mu$ m from anterior end. Basal bulb pyriform, containing 3g land nuclei. Cardia present. Vulva a transverse slit, without lateral vulval membranes. Vagina at right angle to body axis. Gonad monoprodelpic and outstretched. Spermatheca rounded without sperms. Post-vulval uterine sac well-developed. Tail long filiform, 137.7 $\pm$ 18.7 (119-156.4)  $\mu$ m in length, ending in an unhooked pointed terminus.

**Male:** Not found.

**Habitat and Locality**

**Table 1: Morphometric data of female species of *Filenchus brevis* and *F. nakasonoi***

Characters	<i>F. brevis</i>	<i>F. nakasonoi</i> from Manipur	<i>F. nakasonoi</i> Mizukubo, 1991
Length	4	0.47–0.58(0.52 ± 56.6)	252–284(268 ± 10.7)
a	0.40–0.49(0.44 ± 0.04)	34.7–36(35.3 ± 0.53)	23.5–30.4(26.9 ± 2.02)
b	24–299(26.5 ± 2.5)	5.8 – 8.1(6.6 ± 1.0)	4.0–4.6(4.2 ± 0.12)
c	5.1–6.3(5.7 ± 0.60)	4.8–7.3(5.7 ± 1.1)	5.1–6.2(5.4 ± 0.38)
c'	14.0–15.(14.6 ± 0.65)	7.6–11.3(9.6 ± 0.8)	6.5–9.3(8.3 ± 0.78)
V	55–57.8(56.4 ± 1.4)	58.8–66.5(62.0 ± 3.2)	64.6–68.8(66.9 ± 1.08)
G <sub>1</sub>	24.1–36.2(30.1 ± 6.05)	35.6–48.5(41.3 ± 5.3)	24.4–43.2 (31.8 ± 4.8)
Tail / V-a	-	0.69–1.1(0.9 ± 0.13)	1.1–1.4(1.3 ± 0.13)
Max. body width	-	13.6–17(14.7 ± 1.6)	9.2–10.(10.0 ± 0.52)
Lateral field	4 Nos.	4 Nos.	4 Nos.
Vulval body diameter	-	11.9–15.3(13.6 ± 1.3)	8.6–10.2(9.5 ± 0.6)
ABD	8.5–10.2(9.3 ± 0.85)	8.5–10.2(9.6 ± 0.8)	5.6–6.6(6.1 ± 0.39)
Centre of median bulb from anterior body end	-	37.4–49.3(43.3 ± 5.9)	24–36(30 ± 3.0)
Excretory pore	61.2	64.6–78.(70.2 ± 5.7)	42–48(46 ± 1.7)
Mesocorpus W/H	-	5.1(5.1 ± 0)/10.2(10.2 ± 0)	3.6–5.0(3.9 ± 0.4)/8.6–11.2( 9.4 ± 0.8)
Isthmus	-	23.8–25.5(24.6 ± 0.8)	22 – 46(17 ± 5.7)
Basal bulb	-	15.3–17(16.1 ± 0.8)	11 – 13 (12 ± 0.8)
Oesophagus	76.5–79.9(78.2 ± 1.7)	57.8–100.3(80.4 ± 17.4)	34 – 42(39 ± 2.4)
VL	-	158.1–246.8(193.2 ± 29.1)	172–191(179 ± 7.1)
Vulva – anus	-	90.1–130.9(104 .8 ± 18.4)	34 – 42 (39 ± 2.4)
Tail	119–156.4(137.7 ± 18.7)	64.6–115.9(94.1 ± 21.6)	41 – 54(50 ± 4.2)
Post – uterine sac	-	6.8 – 8.5(7.9 ± 0.8)	4.0 – 8.6(5.5 ± 1.26)
Spermatheca	-	20.4–25.5(22.9 ± 2.5)	4.6 – 8.3(6.4 ± 1.3)

(All measurements in  $\mu\text{m}$  except L in mm)

Collected on June, 2008 from soil around the rhizosphere of *Pinus roxburghii* Sarg. from Nongpok Sekmai, Thoubal District, Manipur.

#### Remarks

The present specimen is the first report of the species from the state of Manipur. On comparison with the morphological characters and measurements of other workers, the present specimens conform well with those described by Lal and Khan (1987). However, slightly shorter body length, longer oesophageal length and stylet length, which can be considered as intraspecific variation are found in the present specimens.

#### *Filenchus nakasonoi* Mizukubo, 1991

**Dimensions:** Table 1

#### Descriptions

**Female:** Body slightly ventrally curved, open “C” shaped when killed and stout with a total length of 0.47–0.58mm. Body annules fine and distinct, 1.7  $\mu\text{m}$  apart at mid–body. Lateral fields with 4 incisures, outer incisures dimmed, occupying 1/4<sup>th</sup> – 1/3<sup>rd</sup> of the corresponding body. Deirids distinct at the level of excretory pore. Phasmid not seen.

Lip region convex conoid, continuous with body contour, 1.7  $\mu\text{m}$  high and 3.4  $\mu\text{m}$  wide. Labial sclerotisation absent, without transverse lamellae for attachment of spear muscle. Spear 2.5 times as long as lip width, conus shorter than shaft, knobs smoothly rounded, 0.8  $\mu\text{m}$  across. Dorsal oesophageal gland opening at 6.8  $\mu\text{m}$  behind spear base.

Total oesophageal length 57.8–100.3  $\mu\text{m}$  from the base of cephalic frame-work. Median oesophageal bulb oval, 10.2  $\mu\text{m}$  high and 5.1  $\mu\text{m}$  across. Basal oesophageal bulb pyriform, 15.3 – 17  $\mu\text{m}$  long or less than half of the isthmus in length. Isthmus enveloped by nerve ring at the level of neck of basal bulb. Excretory pore located at 64.6–78.2  $\mu\text{m}$  from the anterior

base. Cardia small.

Vulva a depressed transverse slit with a pair of vulval lips. Vagina perpendicular to body axis, extending half way into body. Ovary single, anteriorly outstretched having oocytes arranged in a single file. Spermatheca distinct, offset, ovoid containing many sperms. Post uterine sac 6.8 – 8.5  $\mu\text{m}$  long or about one quarter to two times the vulval body width long. Distance between vulva and anus 90.1 – 130.9  $\mu\text{m}$  long. Rectum ventrally arcuate and a simple tube 8.5  $\mu\text{m}$  long. Tail 64.6 – 115.9  $\mu\text{m}$  or 7.6 – 11.3 times anal body widths long, ventrally arcuate, gradually tapering to a rounded terminus towards the dorsal side.

**Male:** Not found.

#### Habitat and locality

Collected in March, 2009 from soil around the rhizospheric regions of mulberry plants, *Morus* spp. from Mayang Imphal Konchak Makha Leikai, Thoubal District, Manipur, India.

#### Remarks

The morphological details of the present specimens agree well with the original descriptions of *Filenchus nakasonoi* Mizukubo, 1991. A vast variations in body length, tail length, oesophageal lengths etc. were encountered. But their morphological details could not be distinguished from those of original descriptions. These variations might be due to intraspecific variations brought about by geographical gradients and environmental differences.

The species is also reported for the first time from Manipur.

#### *Filenchus neolongicaudatus* sp. nov. (Fig. 1)

**Dimensions:** Table 2

#### Descriptions

**Female:** Body 0.49 – 0.71mm long with straight to ventrally

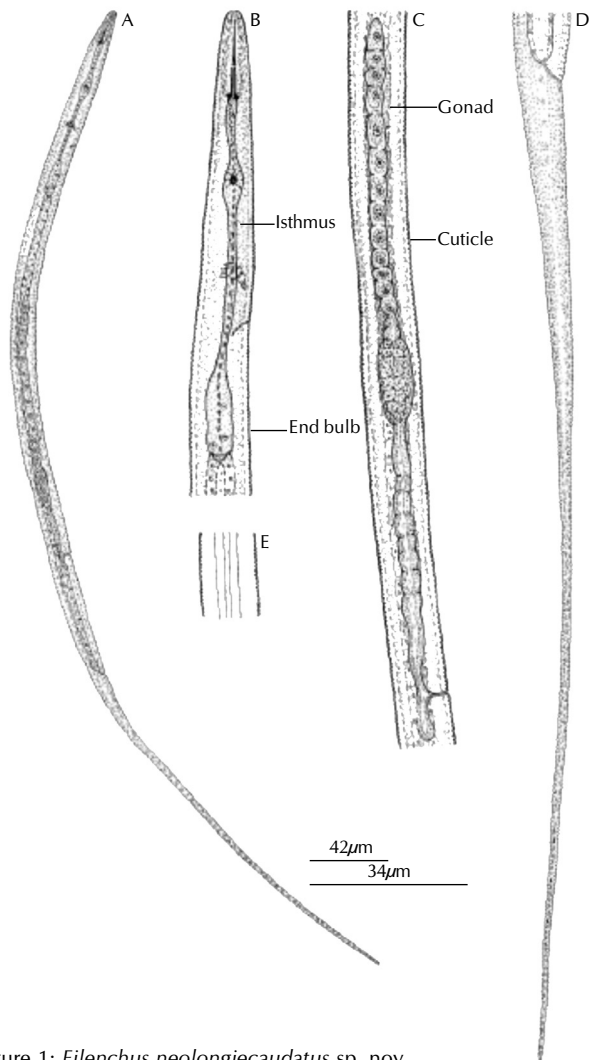


Figure 1: *Filenchus neolongicaudatus* sp. nov. A. Entire length of the body; B. Anterior part of body; C. Reproductive system; D. Tail length and E. Lateral lines

curve upon fixation with the greatest body diameter of 11.9 – 15.3  $\mu\text{m}$ . Posterior body length is similar to anterior body length or slightly longer. Body tapers towards both extremities. Cuticle finely striated 1.7  $\mu\text{m}$  wide at mid body. Lateral fields marked by 4 incisures, outer lines non – crenate, measuring 1/4<sup>th</sup> of body width at mid-body. Hemizonid 57.8 – 68  $\mu\text{m}$  from anterior end of the body, just about 2 annuli behind the excretory pore. Lip region finely annulated, offset and flattened, 3.4  $\mu\text{m}$  across and 2.5  $\mu\text{m}$  high. Stylet 17–18.7  $\mu\text{m}$  long with strongly developed basal knobs. Anterior spear longer than the posterior spear. Basal knobs well developed, rounded, 2.5–3.4  $\mu\text{m}$  wide and 1.4–1.7  $\mu\text{m}$  long. Dorsal oesophageal gland opening at 2.5–5.1  $\mu\text{m}$  from the base of cephalic framework. Median bulb oval with weakly developed cuticular thickenings, 8–11.9  $\mu\text{m}$  high and 5.1 – 6.8  $\mu\text{m}$  wide. Isthmus slender, 17 – 39.1  $\mu\text{m}$  long, with elongated pyriform basal bulb, 5.1 – 8.5  $\mu\text{m}$  across and 15.3 – 25.5  $\mu\text{m}$  long. Intestine with relatively narrow lumen joining oesophagus over indistinct cardiac cells. Nerve ring located at 47.6 – 57.8  $\mu\text{m}$  from anterior base and excretory pore at 59.5 – 86.7  $\mu\text{m}$  encircling the isthmus at the anterior part.

Table 2: Morphometric data of female species of *Filenchus neolongicaudatus* sp.n

Characters	Holotype	Paratypes
n	1	12
L	0.72	0.49 – 0.72 (0.59 $\pm$ 0.06)
a	60.5	32.3 – 60.5 (43.2 $\pm$ 7.3)
b	7.0	5.2 – 8.3 (6.7 $\pm$ 0.9)
c	3.2	2.6 – 3.6 (3.02 $\pm$ 0.3)
c'	25.8	17 – 40.4 (27.0 $\pm$ 6.3)
V	46.7	46.7 – 63.7 (55.0 $\pm$ 4.1)
G <sub>1</sub>	21.2	17.4 – 42.2 (25.7 $\pm$ 8.2)
Uterine sac	8.5	8.5 – 17.0 (10.8 $\pm$ 2.9)
VL	383.9	185.0 – 383.9 (273.1 $\pm$ 52.5)
VB	11.0	10.2 – 11.9 (11.6 $\pm$ 0.8)
Stylet	18.7	17 – 18.7 (18 $\pm$ 0.8)
DGO	5.1	2.5 – 5.1 (3.3 $\pm$ 0.6)
Knob width	2.5	2.5 – 3.4 (2.8 $\pm$ 0.4)
Knob height	1.7	1.4 – 1.7 (1.6 $\pm$ 0.09)
MB	40.6	35.9 – 51.0 (43.0 $\pm$ 4.7)
Oesophagus	102.3	61.2 – 108.8 (89.5 $\pm$ 13.3)
Lip width	3.4	3.4 (3.4 $\pm$ 0.0)
Lip height	2.5	2.5 (2.5 $\pm$ 0.0)
Nerve ring	56.1	47.6–57.8 (52.7 $\pm$ 3.6)
Excretory pore	59.5	59.5 – 86.7 (62.3 $\pm$ 6.1)
Vulva to anus	64.6	56.1 – 76.5 (64.3 $\pm$ 6.1)
Maximum body width	11.9	11.9 – 15.3 (14.1 $\pm$ 1.3)
Tail	219.3	144.5 – 248.2 (198.4 $\pm$ 31.1)
ABD	8.5	5.1 – 10.2 (7.6 $\pm$ 1.7)
Tail / vulva – anus distance	3.3	2.3 – 4.0 (3.06 $\pm$ 0.5)

(All measurements in  $\mu\text{m}$  except L in mm).

Vulva closed type, vagina a transverse slit, right angled to the body and slightly rounded at the middle. Ovary single, prodelphic and outstretched, spermatheca elongated and packed with sperms. Post-uterine sac well developed, 8.5 - 17  $\mu\text{m}$  or slightly longer than the maximum body length.

Tail elongated, filiform ending into a sharply pointed terminus, 144.5 – 248.2  $\mu\text{m}$  long or 21.8 – 40.4 times anal body widths long.

**Male:** Not found.

#### Type Specimen

Holotype female mounted on the slide PBF<sub>1</sub>/5 and paratypes on the slides

PBF<sub>1</sub>/1–12, deposited at the Nematode collection of Parasitology Section, Life Sciences Department, Manipur University, Canchipur, Manipur, India.

#### Type habitat and locality

Soil around the rhizospheric region of mulberry plants, *Morus* spp. from Chingkhru, Pangei, Imphal East District, Manipur, India.

#### Differential Diagnosis and Relationship

*Filenchus neolongicaudatus* sp. nov. differed from all other related species in having longer stylet, oesophagus and tail. The present specimen, in the presence of the continuous finely annulated lip region, is close to *F. magnus* (Hussain and Khan, 1976) Raski and Geraert, 1987 but a wide difference occurs in the stylet length and body length. The present specimen has also differences in the value of a, oesophagus and c (L=0.32-0.40, a=31-37, c=5-6, stylet=5-6 and oesophagus=50 in *F.*

*magnus*). When compared with *F. equisetus* (Husain and Khan, 1967) Raski and Geraert, 1987, the present specimen has greater body length, a, c', stylet, oesophagus and smaller value of c, V and different lip shape (L=0.38-0.47, a=27-28, c=4.4-4.6, c'=12-14, V=58-62, stylet=12-14, oesophagus=50 and slightly offset flat rounded lip region in *F. equisetus*).

The specimen also comes close to *Filenchus conicephalus* Siddiqui and Khan, 1983 and *F. longicaudatus* Sultan *et al.*, 1991. From the former species, it differs in having larger value of a, longer stylet, smaller value of c, V and markedly longer tail (a=24-34.5, c=4.5-5.7, V=62.8-64.8, spear=12-17 and tail=140 µm in *F. conicephalus*). From the later specimen, it differs in having greater body length, larger value of a, b, c', variation in V value, longer stylet, and finely annulated, offset and flattened lip region (L=0.35-0.39, a=31-34, b=5.8-6.9, c=3.1-3.8, c'=13-15, V=50-55, stylet=10-11, and continuous rounded smooth lip region in *F. longicaudatus*).

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