

## A new species *Bursaphelenchus manipurensis* sp. nov. from Manipur, India

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### Abstract

A new species of *Bursaphelenchus* Fuchs, 1937 (Nematoda: Tylenchina) from Manipur, India has been described. *Bursaphelenchus manipurensis* sp. nov. is characterised by having Length=461.91-591.69  $\mu$ m, a=13.84 15.57, b=6.7 9.25, b'=4.23-5.02, c=9.53-16.82, V=67.83-80.88, T=31.08-56.93, tail=29.41-58.82 $\mu$ m, spicule=10.38  $\mu$ m and bursa=51.9  $\mu$ m.

Key words : Nematode, New species, Manipur, India.

### INTRODUCTION

*Bursaphelenchus* Fuchs, 1937 is a small to long nematode with slender body. Their cuticle are finely annulated with number of lateral fields varying from none to four. Their cephalic region is relatively high, usually offset by a constriction, sometimes weak, sometimes strong. Stylet well developed, usually with 12- 20  $\mu$ m long but it may reach up to 26 $\mu$ m. Conus attenuating to a fine point, the shaft more robust and usually with basal swellings of lesser or greater development. Oesophageal glands forming a dorsally overlapping lobe up to about nine body widths long. Post uterine sac rarely less than a body width long, more usually three to six body widths in extent. Tail variable, usually medium conoid, but may be longer and more attenuate, terminus rounded or pointed. Male tail strongly curved ventrally, conoid; terminus variously pointed. A small bursa-like, cuticular structure situated terminally.

*Bursaphelenchus* Fuchs, 1937 contains about 90 valid species and its generic definition is very wide <sup>[1,2, 3]</sup>. Several species in the genus share characteristic morphological traits with other genera or even with another family <sup>[4]</sup>.

During a survey for aphelenchid nematodes in Manipur, North East India, a peculiar species of *Bursaphelenchus* was revealed from a dried out uprooted pine tree. Thorough study of literatures and based on certain morphological traits, the nematode was found to be a new and undescribed species. The nematode is described herewith.

### MATERIALS AND METHODS

Rotten and drying wood log of *Pinus kesiya* Royle was collected from the pine forest of Nongpok Sekmai, Thoubal District, Manipur, India on 10<sup>th</sup> July 2013. The log was cut into small pieces and soaked in filtered water for 48 hours. The nematodes were collected using Baermann funnel technique and nematodes so collected were killed and fix by TAF (Triethanol amine formalin) for 24 hours. The nematodes were processed by quick method by transferring to glycerine [5]. They were then mounted on permanent slides. All measurements were made using Olympus microscope model and figures drawn through a camera lucida attached to the same microscope.

### RESULTS

*Bursaphelenchus manipurensis* sp. nov.

#### Descriptions:

**Female:** Body slender, cylindrical, slightly curved ventrally at middle body part upon fixation, finely annulated, about 461.91-591.69(517.72 $\pm$ 46.71)  $\mu$ m long and 13.84 15.57(15.08 $\pm$ 0.78) $\mu$ m width. Lateral fields with four incisures above vulval region but gradually diminish into two incisures after vulval region at around anal region. Lip region offset, flatten, 5.19 $\mu$ m width and 2.58 $\mu$ m high, separated into six, lips with two lateral lip sectors narrower than remaining four. Well developed stylet, very short and slender 5.19-6.92(5.68 $\pm$ 0.78)  $\mu$ m long. Conus attenuating to a fine point, shaft more robust and with small rounded basal swellings of 1.7 $\mu$ m diameter. Procorpus cylindrical about 38.06-55.36(46.96 $\pm$ 6.09) $\mu$ m long leading to a strong median bulb which is ovoid, about 6.92 -8.64(7.67 $\pm$ 0.98) $\mu$ m diameter and 12.11-15.52(13.26 $\pm$ 1.27) $\mu$ m high, which is almost of body diameter at corresponding level. Median bulb valve well developed, muscular, plate not central, located posterior to middle of bulb. Pharyngeal gland lobe well developed, about four-body diameter, overlapping intestine dorsally. Nerve ring at 53.63-77.85(65.45 $\pm$ 8.07)  $\mu$ m from anterior end of body, three to five times maximum body diameter long. Excretory pore 64.01-81.31(66.88 $\pm$ 7.91)  $\mu$ m from anterior end of body, usually at base of median bulb. Vulva posterior, usually at (67.83 80.88) % of body length. Vulva not protuberant, vulval flaps absents, vagina muscular, surrounded by vaginal muscle ring, vagina at right angles to body axis or directed anteriorly. Genital tract monoprodelphic, outstretched, 143.59-281.65(213.19 $\pm$ 50.95)  $\mu$ m long, oocytes arranged in single to double rows from anterior, two large ovum, present at middle. Spermatheca rounded, about 43.25 48.4 (45.5 $\pm$ 3.5) $\mu$ m long, filled with sperms. Post uterine sac cylindrical, 27.68-48.44(36.08 $\pm$ 5.80)  $\mu$ m long about 2- 3.5 maximum body diameter long. Rectum 5.19  $\mu$ m long and distinct anus. Tail 29.41-58.82(42.01  $\pm$ 9.46)  $\mu$ m long about 9.53 16.82(12.68  $\pm$ 2.65) anal body diameter long, gradually tapering to conoid tail tip with a small mucro.

**Male:** Anterior body region and cuticle similar to female, body 466.2-510.5(482.4  $\pm$ 0.02)  $\mu$ m long, straight to slightly curved ventrally upon fixation. Testis outstretched, anterior part

with sperm cells, spermatocytes arranged in two rows. Sperm cells spherical, simple and single. Spicule rose-thorn shaped, paired 10.38  $\mu\text{m}$  long, distal tip pointed, rostrum not prominent, calomus smoothly curved, no swelling or cucullus is seen. Flap like smooth bursa, 51.9  $\mu\text{m}$  long, covering anal region upto tail tip. Caudal papillae not seen. Tail curved ventrally, 50.17-58.82(54.49 $\pm$ 4.32)  $\mu\text{m}$  long, gradually tapering conoid structure to a pointed terminus bearing a mucro.

**Type host and locality:** Type species was isolated on July 2013 from a dead dried out log of *Pinus kesiya* Royle from Nongpok Sekmai Pine Forest, Thoubal District, Manipur, India.

**Type specimen:** Holotype female on slide BFYS-♀<sub>1</sub>-1/*Bursaphelenchus manipurensis* sp. nov., paratype females on slides BFYS-♀<sub>1</sub>-2-11/*Bursaphelenchus manipurensis* sp. nov. and paratype males on slides BFYS-♂<sub>1</sub>-1-6/*Bursaphelenchus manipurensis* sp. nov. The slides are deposited in the Nematode collection centre of Parasitology Section, Department of Life Sciences, Manipur University, Canchipur, Manipur, India.

### Diagnosis and relationships:

*Bursaphelenchus manipurensis* sp. nov. is characterised by short well developed stylet with small rounded basal knobs, presence of four lateral lines in anterior body which gradually diminish into two at posterior tail region, absence of vulval flaps, elongated post uterine sac, distinct rectum and anus in females, female tail tapering to a conoid tail with pointed terminus, elongated arcuate spicules with one pair of male caudal papillae. The present species differs from all other species in having a distinct ventral caudal bursa covering anal region.

*Bursaphelenchus manipurensis* sp. nov. comes close to *Bursaphelenchus chitwoodi* Rühm, 1956<sup>[6]</sup>; *Bursaphelenchus gonzalezi* Loof, 1964<sup>[7]</sup>; *Bursaphelenchus poligraphi* Fuchs, 1937<sup>[8]</sup>; *Bursaphelenchus scolyyti* Massey, 1974<sup>[9]</sup>; *Bursaphelenchus sychnus* Rühm, 1956<sup>[6]</sup> and *Bursaphelenchus talonus* [Thorne, 1935<sup>[10]</sup> Massey, 1956<sup>[11]</sup>.

## DISCUSSIONS

*Bursaphelenchus manipurensis* sp. nov. comes close to *Bursaphelenchus chitwoodi* Rühm, 1956<sup>[6]</sup> in having pointed female tail terminus, tip of spicular lamina finely pointed, spicule relatively slender in width, similar male body length, similar c value range in female. But the present species differs from *Bursaphelenchus chitwoodi* Rühm, 1956 in having smaller body length, larger body size, smaller stylet, more posterior body to vulva, absence of vulval flaps in females and smaller body size, greater tail length and lesser spicules in males [L=619, a=21, stylet=12, V%=69, indetermine vulval flaps in females and L=547, a=34, stylet=12, spicule= 16 in males of *Bursaphelenchus chitwoodi* Rühm, 1956<sup>[6]</sup>.

*Bursaphelenchus manipurensis* sp. nov. comes close to *Bursaphelenchus gonzalezi* Loof, 1964<sup>[7]</sup> in having female tails with pointed terminus and tip of spicular lamina finely rounded, smaller tail, absence of vulval flaps in females. But the present species differs from *Bursaphelenchus gonzalezi* Loof, 1964<sup>[7]</sup> in having smaller body length, greater body width, smaller stylet and more posterior body to vulva in females and smaller body length, lesser body width, greater tail length, smaller stylet and spicules in males [L= 690-1100, b=25-36, stylet=13-16, V=71-76% in females and L=580-970, a=30-38, c=21-29, stylet=12-15 and spicules= 13 in males of *Bursaphelenchus gonzalezi* Loof, 1964<sup>[7]</sup>.

*Bursaphelenchus manipurensis* sp. nov. comes close to *Bursaphelenchus poligraphi* Fuchs, 1937<sup>[8]</sup> in being spicule without cucullus, finely rounded tip of spicular lamina, stout spicule, spicule length 11-13  $\mu\text{m}$  less, females without vulval flaps and similar range of female body length. But the present species differs from *Bursaphelenchus poligraphi* Fuchs, 1937<sup>[8]</sup> in having lesser female body length, greater body width and tail length, smaller stylet length, more posterior body to vulva in females and lesser male body length, greater body width and tail length, smaller stylet and lesser spicule length in males [L=605-914, A=41-57, C=45, stylet=9, V%=76 in females and L=589-914, a=35-65, c=34, stylet=10 and spicules= 13-14 in males of *Bursaphelenchus poligraphi* Fuchs, 1937<sup>[8]</sup>.

*Bursaphelenchus manipurensis* sp. nov. comes close to *Bursaphelenchus scolyyti* Massey, 1974<sup>[9]</sup> in having tip of spicular lamina finely rounded, spicular length lesser than 11-13  $\mu\text{m}$ , female without vulval flap. But the present species differs from *Bursaphelenchus scolyyti* Massey, 1974<sup>[9]</sup> in having smaller female body length, greater body width, lesser tail length, more posterior body to vulva and smaller stylet length and greater spicule length in males [L=340, a=40, c=20, stylet=11, V%=72 in females and L=800, a=38, c=25, stylet=11 and spicules= 7 in males of *Bursaphelenchus scolyyti* Massey, 1974<sup>[9]</sup>.

*Bursaphelenchus manipurensis* sp. nov. comes close to *Bursaphelenchus sychnus* Rühm, 1956<sup>[6]</sup> (J.B. Goodey, 1960) in having slender spicule with less than 11-13  $\mu\text{m}$  length, females without vulval flap and similar range of male body length. But the present species differs from *Bursaphelenchus sychnus* Rühm, 1956 in having lesser female body length, greater body width, smaller tail and stylet length, more posterior female body to vulva and smaller male body width, longer tail, smaller stylet and spicules in males [L=634-662, a=23-29, c=11-12, stylet=12-13, V%=73-74 in females and a=24-30, c=22-24, stylet=12-14, spicules= 19-23 in males of *Bursaphelenchus sychnus* Rühm, 1956<sup>[6]</sup>.

*Bursaphelenchus manipurensis* sp. nov. comes close to *Bursaphelenchus talonus* [Thorne, 1935<sup>[10]</sup> Massey, 1956<sup>[11]</sup> in having spicule without cucullus, female tail pointed terminus, tip of spicular lamina finely rounded, similar female body length, spicular lamina finely rounded, similar female body length, spicular length lesser than 11-13  $\mu\text{m}$  and females without vulval flaps. But the present species differs from *Bursaphelenchus talonus* [Thorne, 1935(10) Massey, 1956<sup>[11]</sup> in having smaller female body length, greater body width, greater tail length, smaller stylet in both male and female, more posterior body to vulva in females and smaller body length, greater body width, longer tail and spicules in males {L=800, a=33, c=25, stylet=11, V%=73 in females and L=800, a=47, c=25, stylet=11 and spicules= 15 in males of *Bursaphelenchus talonus* [Thorne, 1935(10) Massey, 1956<sup>[11]</sup>.

## CONCLUSION

There are 47 valid species of *Bursaphelenchus* spp. which are found scattered in different journals published from different regions of the World. Based on study of literatures on the genus, the present species has been identified as new to science. The finding of *Bursaphelenchus manipurensis* spp. nov. is also first record of its kind in the entire North-East India.

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## REFERENCES

1. Hunt DJ. Aphelenchida, Longidoridae and Trichodoridae, Their systematics and Bionomics; CAB International; Wallingford. 1993. p.352.
2. Ryss A, Vieira P, Mota M, Kulinich O. A synopsis of the genus *Bursaphelenchus* Fuchs, 1937 (Aphelenchida: Parasitaphelenchidae) with keys to species. *Nematol.* 2005; 7: 393 458
3. Kanzaki K. Taxonomy and systematics of *Bursaphelenchus* nematodes. *J. of Japanese For. Soc.* 2006; 88: 392 406.
4. Braasch H. A new *Bursaphelenchus* species (Nematoda: Parasitaphelenchidae) sharing characters with Ektaphelenchidae from the People's Republic of China. *Zoo.* 2004; 624: 1 10.
5. De Grisse A. Contribution to the morphology and the systematics of the Criconematidae (Taylor, 1930) Thorne, 1949; Faculty of Agricultural Science; Belgium, 1969. P. 35.
6. Rühm W. Die Nematoden der Ipiden. *Parasitol. Anz.* 1956; 153: 221 242.
7. Loof PAA. Free-living and plant parasitic nematodes from Venezuela. *Nematol.* 1964; 10: 201 300.
8. Fuchs AG. Neue parasitische und halbparasitische Nematoden bei Borkenkäfern und einige andere Nematoden. I. Teil. *Zoologische Jahrbücher, Abteilung für Systematik. Ökologie und Geographie der Tiere.* 1937; 70: 291 380.
9. Massey CL. *Biology and Taxonomy of Nematode Parasites and Associates of Bark Beetles in the United States*; CAB; Washington, 1974. p. 233.
10. Thorne G. Nemic parasites and associates of the mountain pine beetle (*Dendroctonus monticolae*) in Utah. *J. Agric.Res.* 1935; 51: 131 144.
11. Massey CL. Nematode parasites and associates of the Eglemann spruce beetle (*Dendroctonus engelmanni* Hopk). *Proc. Helminthol. Soc. Washington.* 1956; 27: 14 22.