

Three new species of the genus *Belondira* Thorne, 1939 from Manipur, India

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SUMMARY

Three new species belonging to the genus *Belondira* Thorne, 1939 have been described and figured from Manipur, India. *Belondira microdora* n. sp. collected from around the roots of wild plants from Imphal comes close to *B. caudata* Thorne, 1939 and *B. tenuidens* Thorne, 1964 but differs from both of them in having a narrower body, longer anterior uterine sac, smaller tail and in the presence of males. *Belondira tenuidora* n. sp. collected from around the roots of grasses from Imphal is also very similar to *B. caudata* and *B. tenuidens*. From the former it differs in having posteriorly located vulva, smaller prerectum and longer tail and from the latter in having a smaller body, longer oesophagus and tail. *Belondira affinis* n. sp. collected from around the roots of *Musa paradisiaca* L. from Waithou hills comes close to *B. syedi* Suryawanshi, 1972 and *B. goldeni* Suryawanshi, 1972 but differs from both of them in having heavily sclerotized cephalic framework and in the length and shape of odontostyle and odontophore. A key to the species of the genus *Belondira* has also been provided.

RÉSUMÉ

Trois nouvelles espèces du genre *Belondira* Thorne, 1939 provenant du Manipur (Inde)

Trois nouvelles espèces appartenant au genre *Belondira* Thorne, 1939 provenant du Manipur (Inde) sont décrites et illustrées. *B. microdora* n. sp., récolté dans la rhizosphères de plantes sauvages à Imphal est proche de *B. caudata* Thorne, 1939 et *B. tenuidens* Thorne, 1964, mais diffère de l'une et l'autre espèce par un corps plus étroit, un sac utérin antérieur plus long, une queue plus courte et la présence de mâles. *B. tenuidora* n. sp., provenant de la rhizosphère de graminées, à Imphal, est également très voisin de *B. caudata* et *B. tenuidens*; il diffère de la première espèce par une vulve située plus en arrière, un prérectum plus court et une queue plus longue; il se sépare de la deuxième espèce par un corps plus court et un oesophage et une queue plus longs. *B. affinis* n. sp., provenant de la rhizosphère de *Musa paradisiaca* L., dans les collines de Waithou, ressemble à *B. syedi* Suryawanshi, 1972 et *B. goldeni* Suryawanshi, 1972, mais en diffère par une sclérotisation céphalique très développée et par la longueur et la forme de l'odontostyle et de l'odontophore. Une clé des espèces de *Belondira* est proposée.

A survey of plant-parasitic and soil-inhabiting nematodes from Manipur during February, 1977 yielded three new species of the genus *Belondira* Thorne, 1939. These species are named as *B. microdora* n. sp., *B. tenuidora* n. sp. and *B. affinis* n. sp. which are described and illustrated. A key to the species of the genus *Belondira* Thorne, 1939 is also provided.

Measurements were taken and observations made on specimens mounted in glycerine after being killed in hot 4% formalin and dehydrated by the slow method.

Belondira microdora n. sp.

(Fig. 1)

DIMENSIONS

Paratype females (4): L = 0.96-1.11 (1.08) mm; a = 42-48 (45); b = 4.9-5.5 (5.1); c = 64-69 (65); c' = 1.00-1.17 (1.07); V = 34-36 (36); G₁ = 7-9 (7); G₂ = 17-25 (20); odontostyle = 6-7 (6) µm; odontophore = 10-11 (10) µm; expanded part of oesophagus = 78-83 (80) µm; tail = 15-17 (16) µm.

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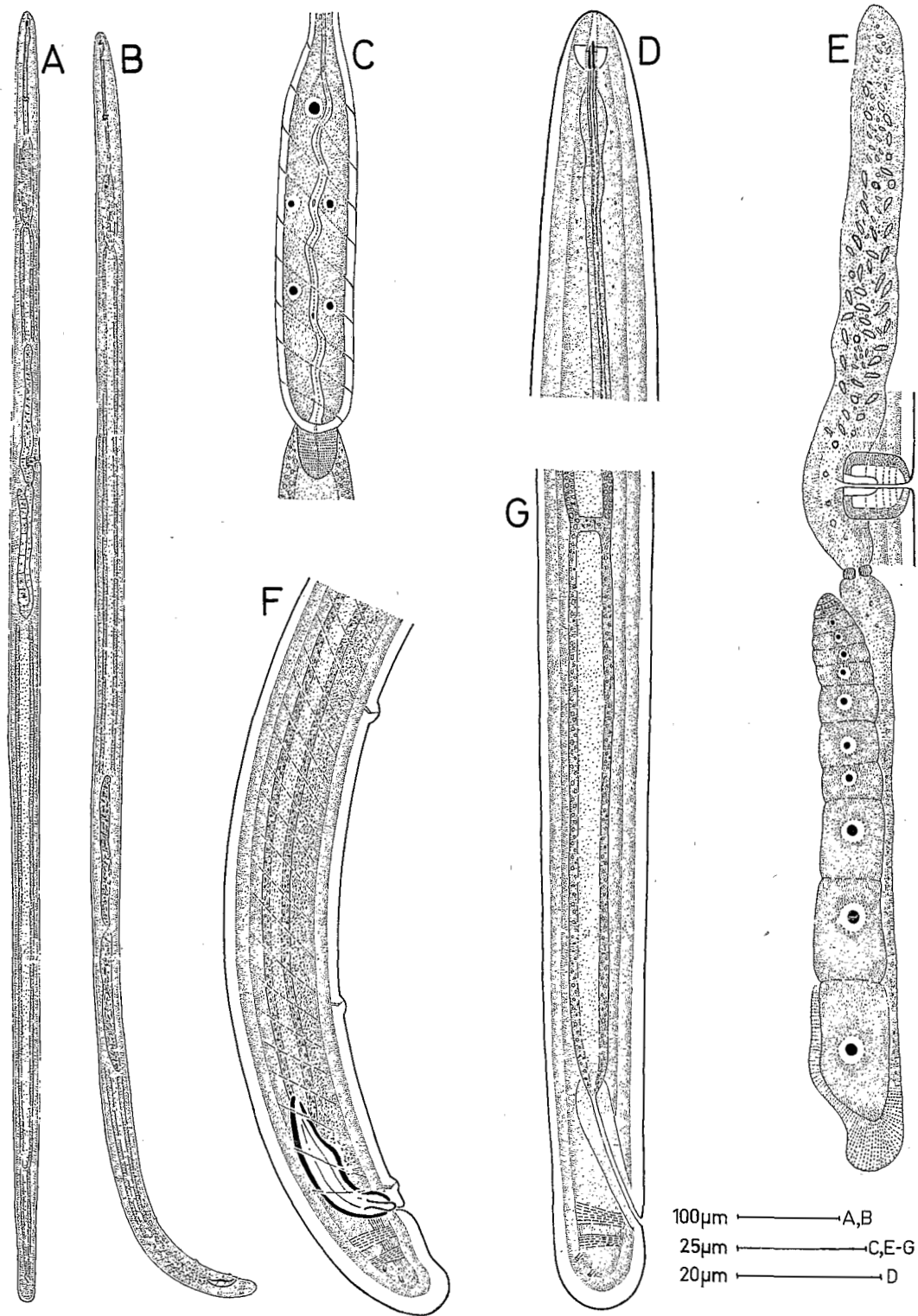


Fig. 1. *Belondira microdora* n. sp. ; A : Entire female ; B : Entire male ; C : Expanded part of oesophagus ; D : Anterior end ; E : Female gonad ; F : Male posterior region ; G : Female posterior region.

Holotype female : L = 1.30 mm ; a = 54 ; b = 6.2 ; c = 76 ; c' = 1 ; V = 36 ; G₁ = 9 ; G₂ = 13 ; odontostyle = 7 µm ; odontophore = 10 µm ; expanded part of oesophagus = 83 µm ; tail = 17 µm.

Paratype males (4) : L = 1.03-1.24 (1.10) mm ; a = 43-52 (48) ; b = 4.8-5.7 (5.2) ; c = 60-67 (63) ; c' = 1.00-1.11 (1.00) ; T = 40-45 (42) ; odontostyle = 6-8 (7) µm ; odontophore = 9-10 (9) µm ; expanded part of oesophagus = 85-90 (87) µm ; spicules = 27-30 (28) µm ; ventromedian supplements = 2 ; tail = 17-20 (18) µm.

DESCRIPTION

Female : Body almost straight upon fixation, tapering gradually anterior to base of oesophagus. Cuticle 2 µm thick at midbody and 3-4 µm on tail. Lateral chords narrow, about one-third of body diameter at midbody.

Lip region rounded and continuous with body contour ; lips amalgamated. Amphids stirrup-shaped, apertures occupying about two-thirds of corresponding body diameter. Odontostyle small, narrow, 6-8 µm or about one lip-width long. Odontophore rod-like, about twice the odontostyle length. Guiding ring obscure, about one lip-width from anterior end. Nerve ring at 72-80 µm from anterior end. Basal expanded part of oesophagus occupying about 35-40% of oesophageal length, surrounded by thick sheath of spiral muscles. Cardia hemispherical, 8-10 µm long.

Vulva transverse, vagina about half vulval body diameter long. Female reproductive tracts mono-opisthodelphic. Anterior uterine sac 80-115 µm or about 3.5-5.0 corresponding body diameters. Posterior gonad well developed with a small uterus. A distinct sphincter present at oviduct-uterus junction. Ovary long with 10-15 oocytes arranged in a single row. Prerectum 100-120 µm or about 6-7 anal body diameters long. Rectum 29-32 µm or about two anal body diameters long. Tail short, hemispherical slightly clavate, 15-17 µm with two caudal pores on each side.

Male : Body slightly ventrally curved in posterior half. Supplements consist of an adanal pair and two widely spaced ventromedians ; the

first one at 40-42 µm from the anus and second at 55-60 µm from the first. Spicules arcuate, 27-30 µm or slightly less than two anal body diameters along median axis. Lateral guiding pieces small, tongue-like, 7 µm long. Tail ventrally curved, bluntly rounded.

TYPE HABITAT AND LOCALITY

Soil around roots of wild plants from Lamphel, Imphal, Manipur state, India ; collected in February, 1977.

TYPE SPECIMENS

Holotype female on slide *Belondira microdora* n. sp./1 ; paratype females and males on slides *Belondira microdora* n. sp./2-4 ; deposited in the nematode collection of Zoology Department, Aligarh Muslim University, Aligarh. A female paratype and a male paratype deposited at Muséum national d'Histoire naturelle, Laboratoire des Vers, Paris, France.

DIFFERENTIAL DIAGNOSIS

Belondira microdora n. sp. comes close to *B. caudata* Thorne, 1939 and *B. tenuidens* Thorne, 1964 because of the absence of swollen cuticle on tail and the oesophagus which is enlarged posterior to its middle. It, however, differs from both these species in having a narrower body, longer anterior uterine sac, shorter tail and in the presence of males. It further differs from *B. caudata* in having a longer odontophore and prerectum (a = 41 ; c = 42 ; anterior uterine sac one body diameter long and prerectum 4-5 anal body diameter long in *B. caudata*). It can be further differentiated from *B. tenuidens* in having a shorter body, odontostyle with a distinct aperture and a shorter oesophagus (L = 1.4 mm ; a = 36 ; b = 6.5 ; c = 59 ; anterior uterine sac one body diameter long in *B. tenuidens*).

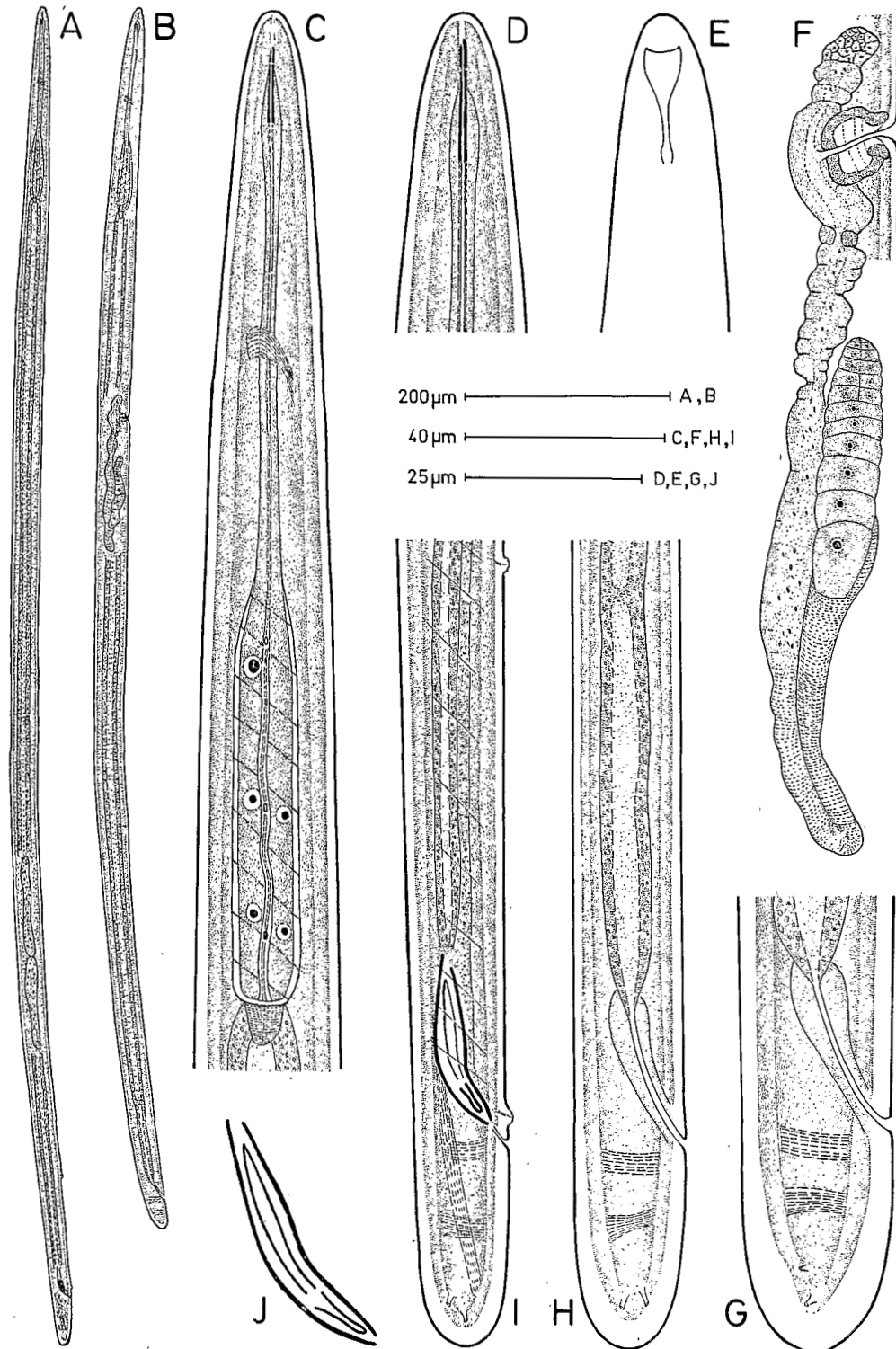


Fig. 2. *Belondira tenuidora* n. sp. ; A : Entire male ; B : Entire female ; C : Oesophageal region ; D : Anterior end ; E : Anterior end showing amphid ; F : Female gonad ; G : Female posterior end ; H : Female posterior region ; I : Male posterior region ; J : Spicule and lateral guiding piece.

***Belondira tenuidora* n. sp.**
(Fig. 2)

DIMENSIONS

Paratype females (5) : L = 1.06-1.24 (1.19) mm; a = 39-50 (43) ; b = 5.4-5.9 (5.6) ; c = 32-35 (34) ; c' = 1.5-1.7 (1.6) ; V = 37-40 (39) ; G₁ = 2-4 (3) ; G₂ = 10-23 (20) ; odontostyle = 8-9 (8) μm ; odontophore = 9-10 (9) μm ; expanded part of oesophagus = 72-98 (87) μm ; tail = 33-38 (35) μm.

Holotype female : L = 1.23 mm ; a = 41 ; b = 5.6 ; c = 35 ; c' = 1.5 ; V = 39 ; G₁ = 3 ; G₂ = 23 ; odontostyle = 8 μm ; odontophore = 9 μm ; expanded part of oesophagus = 98 μm ; tail = 35 μm.

Paratype males (5) : L = 1.16-1.28 (1.21) mm ; a = 41-53 (47) ; b = 5.6-6.3 (5.9) ; c = 27-32 (30) ; c' = 1.8-1.9 (1.8) ; T = 25-36 (31) ; odontostyle = 8-9 (8) μm ; odontophore = 9-10 (9) μm ; expanded part of oesophagus = 79-90 (83) μm ; spicules = 33-36 (34) μm ; ventromedian supplement = 1 ; tail = 38-40 (39) μm.

DESCRIPTION

Female : Body almost straight upon fixation, tapering gradually anterior to base of oesophagus. Cuticle finely transversely striated, 3 μm thick at midbody and 4-6 μm on tail. Lateral chords narrow, about one-third of body diameter at midbody.

Lip region continuous with body contour ; cephalic framework weakly sclerotized. Labial papillae obscure. Amphidial apertures slit-like, almost as wide as lip-width. Odontostyle small, about one lip-width long. Odontophore rod-like, about as long as odontostyle. Guiding ring obscure, about one lip-width from anterior end. Nerve ring at 83-90 μm from anterior end. Basal expanded part of oesophagus occupying about 36-45% of oesophageal length. Cardia hemispherical, 9-11 μm long.

Vulva transverse, vagina about half vulval body diameter long. Female reproductive tracts mono-opisthodelphic. Anterior uterine sac 25-45 μm or slightly more than one body diameter long. Posterior gonad normally developed, 120-

285 μm long. A distinct sphincter present at oviduct-uterus junction. Ovary with 10-13 oocytes. Prerectum 43-75 μm or 2-4 anal body diameters long. Rectum 29-30 μm or about one and a half anal body diameters long. Tail slightly tapering posteriorly, with rounded terminus, about as long as rectum with two caudal pores on each side.

Male : Body slightly ventrally curved in posterior half. Supplements an adanal pair and one ventromedian, the latter at 105-110 μm from the anus. Spicules only slightly arcuate, 33-36 μm or about one and a half anal body diameters along median axis. Lateral guiding pieces small, tongue-like, 8-10 μm long. Tail 38-40 μm with two caudal pores on each side.

TYPE HABITAT AND LOCALITY

Soil around roots of grasses from Sangolban lane, Imphal ; Manipur state, India ; collected in February, 1977.

TYPE SPECIMENS

Holotype on slide *Belondira tenuidora* n. sp./1 ; paratype females and males on slides *Belondira tenuidora* n. sp./2-5 ; deposited in the nematode collection of the Zoology Department, Aligarh Muslim University, Aligarh. One paratype female and a paratype male deposited at Muséum national d'Histoire naturelle, Laboratoire des Vers, Paris, France.

DIFFERENTIAL DIAGNOSIS

Belondira tenuidora n. sp. comes close to *B. caudata* Thorne, 1939 ; *B. tenuidens* Thorne, 1964 and *B. microdora* n. sp. From the former it differs in having a posterior vulva, shorter prerectum, longer tail and in the presence of males (c = 42 ; V = 36 ; prerectum three body diameters long in *B. caudata*). It differs from *B. tenuidens* in having shorter body, longer oesophagus, shorter prerectum, longer tail and in the presence of males (L = 1.4 mm ; b = 6.5 ; c = 59 ; prerectum = 5-6 anal body diameters long in *B. tenuidens*). From *B. micro-*

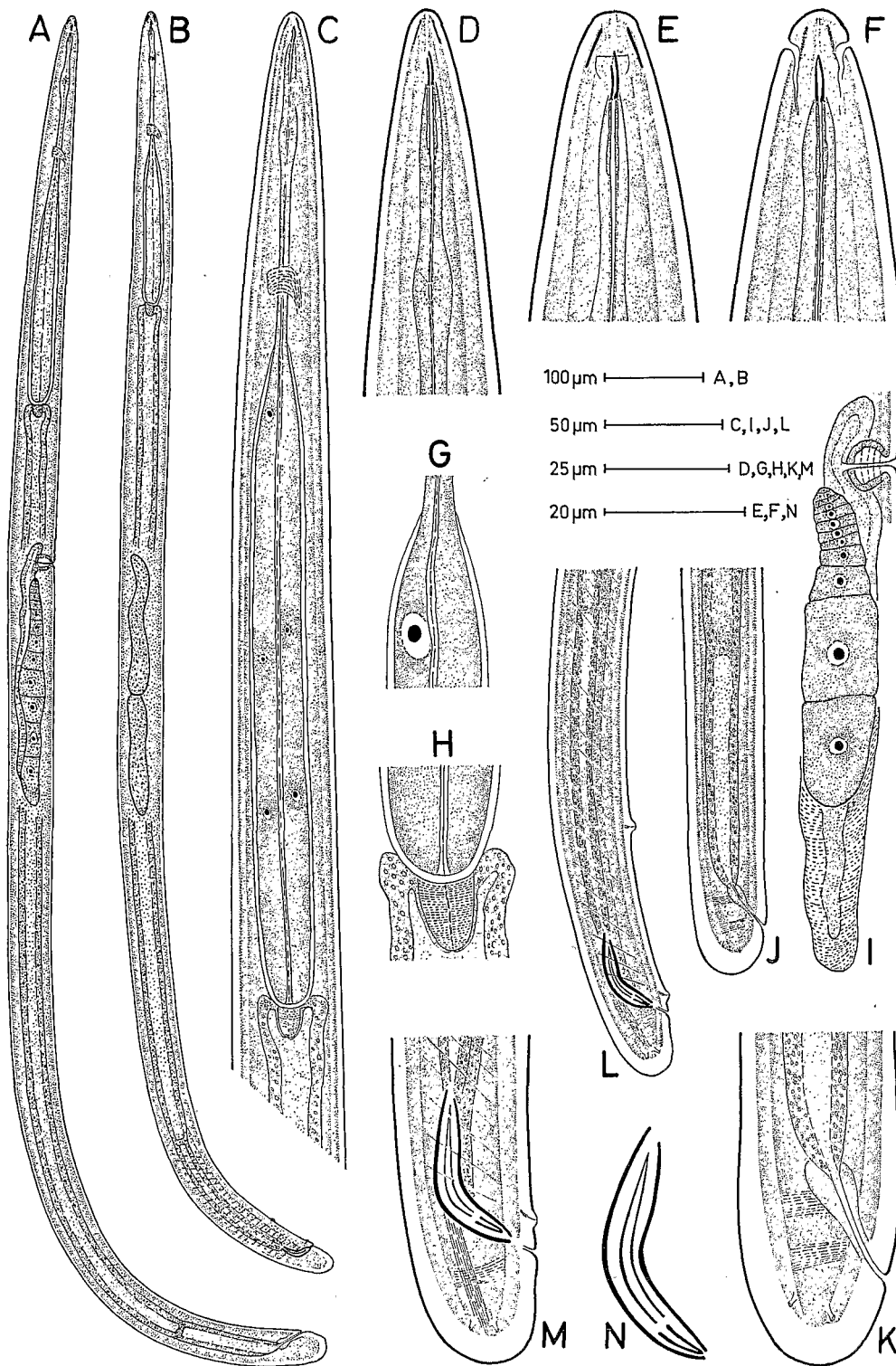


Fig. 3. *Belondira affinis* n. sp. ; A : Entire female ; B : Entire male ; C : Oesophageal region ; D : Anterior region ; E : Anterior end (lateral) ; F : Anterior end (dorsoventral) ; G : Oesophageal constriction ; H : Oesophago-intestinal junction ; I : Female gonad ; J : Female posterior region ; K : Female posterior end ; L : Male posterior region ; M : Male posterior end ; N : Spicule and lateral guiding piece.

dora n. sp. it can be differentiated in having a shorter anterior uterine sac and prerectum, longer tail and longer and differently shaped spicules (anterior uterine sac = 3.5-5.0 body diameters; prerectum 6-7 anal body diameters; $c = 64-69$; spicules = 27-30 μm in *B. microdora*).

***Belondira affinis* n. sp.**

(Fig. 3)

DIMENSIONS

Paratype females (4) : $L = 1.43-1.55$ (1.51) mm; $a = 31-35$ (33); $b = 3.9-4.1$ (4.0); $c = 70-79$ (75); $c' = 0.82-0.92$ (0.87); $V = 35-39$ (37); $G_1 = 2-3$ (2); $G_2 = 12-15$ (14); odontostyle = 8-9 (8) μm ; odontophore = 11-12 (11) μm ; expanded part of oesophagus = 218-233 (226) μm ; tail = 18-22 (19) μm .

Holotype female : $L = 1.44$ mm; $a = 32$; $b = 3.9$; $c = 80$; $c' = 0.86$; $V = 39$; $G_1 = 2$; $G_2 = 13$; odontostyle = 9 μm ; odontophore = 11 μm ; expanded part of oesophagus = 220 μm ; tail = 18 μm .

Paratype males (5) : $L = 1.22-1.51$ (1.36) mm; $a = 37-39$ (38); $b = 4.0-4.9$ (4.2); $c = 61-75$ (69); $c' = 0.81-0.90$ (0.83); $T = 53-54$ (53); odontostyle = 8-9 (8) μm ; odontophore = 13-15 (13) μm ; expanded part of oesophagus = 160-173 (165) μm ; spicules = 33-35 (34) μm ; ventromedian supplement = 1; tail = 18-20 (18) μm .

DESCRIPTION

Female : Body almost straight upon fixation, tapering gradually anterior to base of oesophagus. Cuticle finely transversely striated, 2 μm thick at midbody and 4-6 μm on tail. Lateral chords narrow, about one-third of body diameter at midbody.

Lip region continuous with body contour, one-fourth of body diameter at base of oesophagus; lips rounded and labial papillae obscure. Cephalic framework strongly sclerotized. Amphidial apertures slit-like, almost as wide as lip-width. Odontostyle fusiform, about one lip-width long. Odontophore rod-like, about two

times of odontostyle length. Guiding ring obscure, about one lip-width from anterior end. Anterior slender part of oesophagus has a fusiform swelling just anterior to the odontophore. Basal expanded part of oesophagus occupying about 54-65% of oesophageal length, surrounded by a sheath of spiral muscles. Nerve ring at 90-95 μm from anterior end. Dorsal oesophageal gland nucleus located at 15-17 μm from the anterior expanded part of oesophagus. Cardia hemispherical, 11-15 μm long.

Vulva transverse, vagina about half vulval body diameter long. Female reproductive tracts mono-opisthodelphic. Anterior uterine sac 23-25 μm or less than one body diameter long. Posterior gonad normally developed, 180-240 μm long. A distinct sphincter present at oviduct-uterus junction. Ovary with 8-11 oocytes. Prerectum 90-113 μm or 3-4 anal body diameters long. Rectum 18-22 μm or about one anal body diameter long. Tail short, hemispherical, slightly swollen, 18-22 μm or about as long as rectum, with two caudal pores on each side.

Male : Body slightly ventrally curved in posterior half. Supplements consist of an adanal pair and one ventromedian, the latter at 60-65 μm from the anus. Spicules arcuate, 33-35 μm or about one and a half anal body diameters along median axis. Lateral guiding pieces small, tongue-like, 10-11 μm long. Tail ventrally curved, bluntly rounded, 18-20 μm .

TYPE HABITAT AND LOCALITY

Soil around roots of banana, *Musa paradisiaca* L., from Ushoipokpi, Waithou hills, Manipur state, India; collected in February, 1977.

TYPE SPECIMENS

Holotype female on slide *Belondira affinis* n. sp./1; paratype females and males on slides *Belondira affinis* n. sp./2,5; deposited in the nematode collection of Zoology Department, Aligarh Muslim University, Aligarh. One paratype female and a paratype male deposited at Muséum national d'Histoire naturelle, Laboratoire des Vers, Paris, France.

DIFFERENTIAL DIAGNOSIS

Belondira affinis n. sp. comes close to *B. syedi* Suryawanshi, 1972 and *B. goldeni* Suryawanshi, 1972 but differs from both these species in having prominently sclerotized cephalic framework, and in the length and shape of odontostyle and odontophore. It further differs from *B. syedi* in having a shorter oesophagus, anteriorly located vulva, shorter anterior uterine sac and a longer tail ($b = 3.5-3.9$; $c = 87-94$; $V = 40-42$; anterior uterine sac more than one body diameter in *B. syedi*). From *B. goldeni* it also differs in having a longer oesophagus, shorter spicules and in the number of ventromedian supplements ($b = 4.3-4.6$; spicules = 36-48 μm ; ventromedian supplements = 2 in *B. goldeni*).

Key to species of *Belondira* Thorne, 1939
(Modified after Suryawanshi, 1972)

1. Cuticle at tail terminus not conspicuously swollen, tail usually not clavate 2
Cuticle at tail terminus conspicuously swollen, tail usually clavate 13
2. Body length about 2 mm 3
Body length less than 1.8 mm 4
3. Oesophageal bulb 60% of total oesophagus length
apitica Thorne, 1939
Oesophageal bulb 50% of total oesophagus length
porta Thorne, 1964
4. Oesophageal bulb less than 50% of total oesophagus length 5
Oesophageal bulb equal or superior to 50% of total oesophagus length 8
5. Odontostyle slender 6
Odontostyle fusiform *caudata* Thorne, 1939
6. Body length 1.4 mm ; males not known
tenuidens Thorne, 1964
Body length less than 1.3 mm ; males present . . . 7
7. Anterior uterine sac 3.5-5.0 body diameters long ; spicules 27-30 μm long *microdora* n. sp.
Anterior uterine sac about one body diameter long ; spicules 33-36 μm long *tenuidora* n. sp.
8. Oesophageal bulb 50% of total oesophagus length ; $V = 33$ *cylindrica* Thorne, 1964
Oesophageal bulb superior to 50% of total oesophagus length ; $V > 35$ 9
9. Vulva at 40-42% ; $c = 87-94$
syedi Suryawanshi, 1972
Vulva at 35-39% ; $c = 48-80$ 10
10. Anterior uterine sac twice the body diameter long .
..... *ortha* Thorne, 1939
Anterior uterine sac less than one body diameter long 11
11. Body length 1.17 mm ; $b = 3.4$
..... *neortha* Siddiqi, 1964
Body length 1.22-1.67 mm ; $b = 3.8-4.6$ 12
12. Cephalic framework strongly sclerotized ; tail 18-22 μm *affinis* n. sp.
Cephalic framework not sclerotized ; tail 25-31 μm
goldeni Suryawanshi, 1972
13. Post-rectal sac present *sacca* Thorne, 1964
Post-rectal sac absent 14
14. Body length 3.0-3.6 mm *moldavica* Nesterov, 1976
Body length less than 3 mm 15
15. Oesophageal bulb less than 50% of total oesophagus length 16
Oesophageal bulb 50% of total oesophagus length 21
16. Anterior uterine sac smaller than body diameter
..... *clava* Thorne, 1939
Anterior uterine sac longer than body diameter 17
17. Vulva at 32-35% *nepalensis* Siddiqi, 1964
Vulva at more than 36% 18
18. Odontostyle slender, aperture obscure
..... *thornei* Suryawanshi, 1972
Odontostyle fusiform, aperture distinct 19
19. Anterior uterine sac 2.3-3.0 body diameters long ..
..... *murtazai* Siddiqi, 1968
Anterior uterine sac slightly more than one body diameter long 20
20. Body length 1.0-1.3 mm ; males present
..... *paraclava* Jairajpuri, 1964
Body length 0.9-1.0 mm ; males not known
..... *tumicauda* Coomans & Baqri, 1972
21. Body length less than 1.0 mm (0.7-0.9 mm) .. 22
Body length more than 1.1 mm (1.18-1.30 mm) 25
22. Anterior uterine sac not more than one body diameter long 23
Anterior uterine sac 1.5 or more body diameters long 24
23. Odontostyle slender ; odontophore in two parts *clavicaudata* (Williams, 1958) Andr assy, 1963
Odontostyle fusiform ; odontophore not in two parts
..... *parva* Thorne, 1964
24. Vulva at 37-40% ; tail 15-19 μm
..... *rafiqi* Suryawanshi, 1972
Vulva at 43% ; tail 32-38 μm *bulbosa* Siddiqi, 1966
25. Anterior uterine sac slightly more than one body diameter long *sacchari* Suryawanshi, 1972
Anterior uterine sac about two body diameters long 26
26. Oesophagus 200 μm long ; tail 2.2-2.6 anal body diameters long *mernyi* Andr assy, 1970
Oesophagus 231 μm long ; tail 1.8 anal body diameters
..... *ujjanica* Siddiqi, 1966

Not included in the key :

Belondira gracilis Razzhivin & Mil'an, 1978 because of lack of information on this species. However, it differs from *B. bulbosa* in the shape of tail and in the presence of caudal papillae in females. It also differs from *B. caudata* and *B. porta* in the shape of tail and in the number of genital papillae of the males and of the caudal papillae in the females.

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