

TWO NEW SPECIES OF THE GENUS *MESODORYLAIMUS* ANDRÁSSY, 1959 (NEMATODA: DORYLAIMIDA) FROM WEST BENGAL, INDIA

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INTRODUCTION

The genus *Mesodorylaimus* was erected by Andrassy (1959) belonging to the family Dorylaimidae De Man, 1876 under the order Dorylaimida. It is a wide spread genus and 146 species had been described from the world till date under the genus. From India, 42 species have been described. During a taxonomic survey to the district North 24-Paganas, West Bengal, India, during March 2005 to February 2007, two new nematode species belonging to the genus *Mesodorylaimus* have been collected and identified. These are described and illustrated here under.

MATERIALS AND METHODS

Specimens were collected from rhizospheres of cucurbitaceous plants from different localities of the district North 24-Paganas, West Bengal, India. Nematodes 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. Specimens were identified following the taxonomic key, made by Jairajpuri and Ahmad (1992). Measurements were taken with the help of 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). Positions of the oesophageal gland nuclei were presented according to Andrassy's formula (Andrassy, 1998). Diagrams were drawn with the help of a camera lucida.

De Man's Formula

L = 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 glands

c = body length / tail length

c' = tail length / body width at anus

V = distance from head end to vulva x 100 / body length

V' = distance from head end to vulva x 100 / distance from head end to anus

G₁ = anterior genital branch x 100 / body length

G₂ = posterior genital branch x 100 / body length

Andrassy's formula

Glandularium = distance between dorsal oesophageal gland and oesophago-intestinal junction which contains two pairs of oesophageal gland nuclei

D = distance between head end and dorsal oesophageal gland x 100 / oesophageal length

AS₁ = distance between dorsal oesophageal gland and first anterior sub-ventral oesophageal gland x 100 / glandularium

AS₂ = distance between dorsal oesophageal gland and second anterior sub-ventral oesophageal gland x 100 / glandularium

PS₁ = distance between dorsal oesophageal gland and first posterior sub ventral oesophageal gland x 100 / glandularium

PS₂ = distance between dorsal oesophageal gland and second posterior sub ventral oesophageal gland x 100 / glandularium

SYSTEMATIC ACCOUNTS

SYSTEMATIC POSITION

Order DORYLAIMIDA Pearse, 1942

Suborder DORYLAIMINA Pearse, 1936

Superfamily DORYLAIMOIDEA De Man, 1876

Family DORYLAIMIDAE De Man, 1876

Subfamily LAIMYDORINAE Andr ssy, 1969

Genus *Mesodorylaimus* Andr ssy, 1959

Mesodorylaimus chatterjeei n. sp.

(Table-1; Figs. 1 & 2)

Material examined: 15 females, 8 males.

Measurements: Shown in Table-1.

Description: Female: Body curved ventrally upon fixation, tapering slightly towards both the extremities. Cuticle finely striated 2.5-3.0 μm thick at mid body and 3-4 μm on tail. Lateral chords about one-third of body width at mid body. Lip region offset by slight depression. Lips rounded, amphids stirrup-shaped, aperture about half of the corresponding body width. Odontostyle dorylaimoid, slightly longer than lip width, its aperture about one-fourth of its length. Guiding ring double, located at 0.7-0.8 lip region width from anterior end. Odontophore rod-like, 1.5-1.6 times the odontostyle length. Nerve ring encircling the anterior slender part of oesophagus at 30-36%

of the oesophageal length from anterior end. Oesophageal expansion gradual, expanded part occupying about 38-39% of the total oesophageal length. Cardia conoid about one-fourth as long as corresponding body width. Genital system amphidelphic, both sexual branches almost equally developed. Ovary reflexed with oocytes arranged in a single row near the tip. Oviduct joining ovary subterminally. Presence of distinct *pars dilatata* and sphincter at oviduct-uterus junction. Vulva transverse. Vagina extending about 47% of the corresponding body width deep. *Pars refringens vaginae* consists of two triangular sclerotisation. Prerectum 3.1-3.4 anal body width long. Rectum 0.8-1 times anal body width long. Tail digitate, 1.4-1.6 anal body width long and a pair of caudal pores on each side.

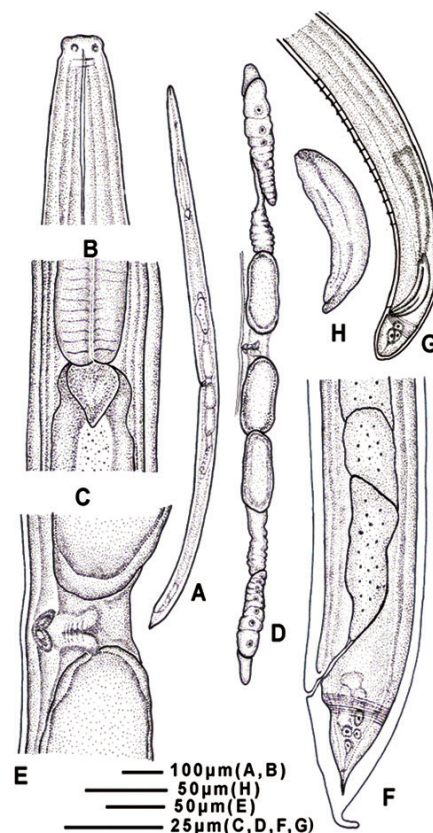


Fig. 1. Camera lucida drawings of *Mesodorylaimus chatterjeei* n. sp. A: Entire female; B: Lip region and Odontostyle of female; C: Cardia of female; D: Female gonads; E: Vulval region; F: Posterior portion of female; G: Posterior portion of male; H: Spicules.

Male: Similar to female in general morphology, except for posterior region being slightly more

curved because of presence of copulatory muscles. Testis opposed. Spicules dorylaimoid, slightly ventrally curved, 1.2-1.3 anal body widths long. Lateral guiding pieces about one-fourth of spicule length. Supplements consist of an ad-anal pair and 8-16 regularly spaced ventromedians. Prerectum 3.1-3.4 anal body widths long, terminating just in front of the first ventromedian supplement. Rectum 1-1.2 anal body widths long; tail short conoid with bluntly rounded tip and with three distinct caudal pores on each side.

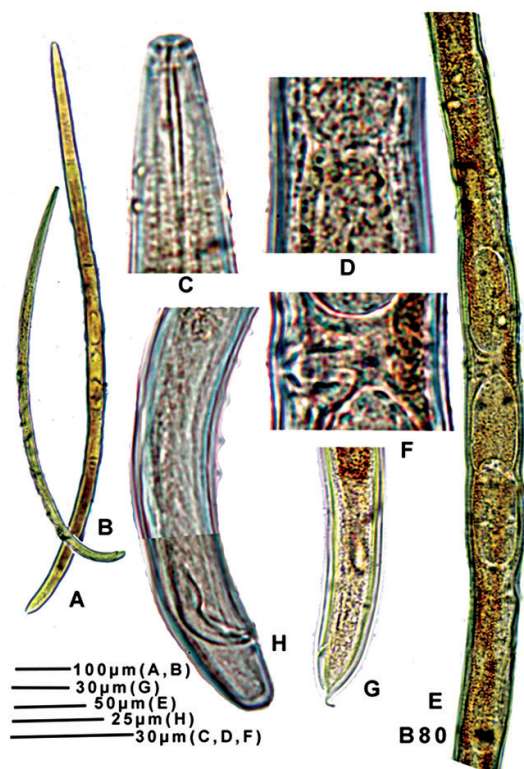


Fig. 2. Photomicrographs of *Mesodorylaimus chatterjeei* n. sp. A: Entire female; B: Entire male; C: Lip region and Odontostyle of female; D: Cardia of female; E: Female gonads; F: Vulval region; G: Posterior portion of female; H: Posterior portion of male.

Type habitat and locality: Specimens were collected by the first author on 07-01-2008 from the rhizospheric soil of ribbed gourd (*Luffa acutangula*) from the village Garulia of district North 24-Paganas, West Bengal, India.

Type materials: Specimens were deposited in the National Zoological Collections of the Zoological Survey of India, Kolkata, West

Bengal, India under the Registration No. WN1330 (Holotype) and WN1331, WN1332, WN1333, WN1340 (Paratypes) on glass slides.

Differential diagnosis and relationships: The present species is characterized by having a medium sized body (L=1.24-1.36 mm in female and 0.89-1.22 mm in male); lip region offset by slight depression; double guiding ring, 11.75-12.5 μm long odontostyle; presence of *pars dialatata* and sphincter in uterus-oviduct junction; transverse vulva; digitate tail in female and males having 8-16 regularly spaced ventromedian supplements. Of all the valid species, the present species closely resembles the following two species.

The species under discussion closely resembles *Mesodorylaimus cognatus* Andrassy, 1986 regarding body length, body width, vulval type and tail length but differs from it in having a narrow lip region (*vs* 13-13.5 μm), double guiding ring (*vs* single), comparatively smaller oesophagus (*vs* 272-333 μm), anteriorly located vulva (*vs* 58-60%), different tail shape, smaller (*vs* 46-47 μm) and more ventrally curved spicule and lesser number of ventromedian supplements (*vs* 17-18).

The proposed species in its general morphology also closely resembles *M. nipponi* Ahmad and Araki, 2003 regarding body length, lip width, body width, oesophageal length, presence of *pars dialatata* and sphincter in uterus oviduct junction and tail length. However, it differs from it in having anteriorly located nerve ring (*vs* 97-102), cardia shape (*vs* elongated conoid) and length (*vs* 18-21), smaller vaginal length (*vs* 19-22) and tail shape (*vs* elongate conoid).

From the discussion, it is obvious that the species does not fit well with the present valid species of the genus and it is new to science.

Etymology: The authors suggest its name as *Mesodorylaimus chatterjeei* after the name of the eminent nematologist Dr. Amalendu Chatterjee, Nematelminthes Section, Zoological Survey of India, Kolkata.

Table-1. Measurements of *Mesodorylaimus chatterjeei* n. sp. (all measurements in μm except L in mm)

Morphometric characters	Holotype female	Paratype females (n=14)	Mean \pm SD	Paratype males (n=8)	Mean \pm SD
L	1.25	1.242 – 1.357	1.29 \pm 0.056	0.885 – 1.22	1.086 \pm 0.17
a	31.25	31.82 – 41.76	37.27 \pm 5.04	35.4 – 39.04	37.01 \pm 1.85
b	4.9	4.97 – 5.27	5.08 \pm 0.17	4.06 – 4.73	4.39 \pm 0.47
c	41.67	33.93 – 42.52	39.28 \pm 4.67	50.57 – 54.22	51.97 \pm 1.96
c'	1.2	1.2 – 2.0	1.5 \pm 0.44	0.86 – 0.9	0.88 \pm 0.02
V/T	52.8	51.86 – 55.79	54.13 \pm 2.03	60.17 – 64.77	62.47 \pm 3.25
G1	23.6	19.5 – 23.18	21.6 \pm 2.15	-	-
G2	27.6	24.32 – 28.37	26.6 \pm 2.07	-	-
Height of lip	3.75	3.75 – 5.0	4.17 \pm 0.72	3.75 – 5.0	4.17 \pm 0.72
Lip width	10	-	10	-	10
Amphid position	6.25	6.25 – 7.5	6.67 \pm 0.72	6.25 – 7.5	6.67 \pm 0.72
Guiding ring	7.5	7.5 – 8.75	7.92 \pm 0.72	7.5 – 8.75	7.92 \pm 0.72
Nerve ring	90	75 – 92.5	85.83 \pm 9.46	80 – 92.5	86.25 \pm 8.84
Stylet length	12.5	11.75 – 12.5	12.25 \pm 0.43	11.75 – 12.5	12.25 \pm 0.43
Stylet aperture	2.75	2.5 – 2.75	2.58 \pm 0.14	2.5 – 2.75	2.58 \pm 0.14
Odontophore	20	17.5 - 20	18.33 \pm 1.44	17.5 - 20	18.33 \pm 1.44
Oesophageal length	255	250 – 257.5	254.17 \pm 3.82	217.5 – 257.5	239.17 \pm 20.21
Expanded part of oesophagus	95	95 – 97.5	95.83 \pm 1.44	80 – 110	93.33 \pm 15.27
Position of DO	170	162.5 – 170	167.5 \pm 4.33	130 – 162.5	146.25 \pm 22.98
Position of AS1 from DO	42.5	30 – 45	39.17 \pm 8.04	25 – 32.5	29.16 \pm 3.82
Position of AS2 from DO	55	37.5 – 55	47.5 \pm 9.01	37.5 – 50	43.75 \pm 8.83
Position of PS1 from DO	67	62.5 – 67	64.83 \pm 2.25	55 – 62.5	58.75 \pm 5.31
Position of PS2 from DO	75	67.5 – 75	71.67 \pm 3.82	62.5 – 67.5	65 \pm 3.54
Cardia	8.75	8.5 – 8.75	8.63 \pm 0.17	8.75	8.75
Maximum width	40	32.5 – 40	35 \pm 4.33	25 – 31.25	28.75 \pm 3.13
Anterior end to vulva	660	660 – 757.5	699.07 \pm 51.33	-	-
Vaginal length	18.75	15 – 18.75	16.25 \pm 2.16	-	-
Vaginal width	12.5	-	12.5	-	-
Pars distalis	2.5	-	2.5	-	-
Pras refringes	5	3.75 – 5	4.17 \pm 0.72	-	-
Pars proximalis	11.25	8.75 – 10	9.17 \pm 0.72	-	-
Anterior Gonad	295	237.5 – 305	279.17 \pm 36.43	-	-
Uterus	82.5	37.5 – 82.5	52.5 \pm 25.98	-	-
Oviduct	127.5	125 – 200	150.83 \pm 42.59	-	-
Ovary	85	67.5 - 85	75.83 \pm 8.78	-	-
Posterior Gonad	345	330 – 352.5	342.5 \pm 11.45	-	-
Uterus	135	37.5 - 135	85.83 \pm 48.75	-	-
Oviduct	125	125 - 205	160 \pm 40.93	-	-
Ovary	85	85 – 117.5	96.67 \pm 18.08	-	-
Testis length	-	-	-	532.5 – 787.5	655 \pm 127.29

Table 1. *contd.*

Morphometric characters	Holotype female	Paratype females (n=14)	Mean \pm SD	Paratype males (n=8)	Mean \pm SD
Spicule length	-	-	-	26.5 – 32.5	29.5 \pm 4.24
Ventromedian supplements	-	-	-	8 - 16	10 \pm 2.82
Rectum	20.5	17.5 – 22.5	20.17 \pm 2.52	20 – 25	22.5 \pm 3.53
Prerectum	67.5	67.5 – 85	77.5 \pm 9.01	67.5 – 85	76.25 \pm 12.37
Tail length	30	30 – 40	33.33 \pm 5.77	17.5 – 22.5	20 \pm 2.5

***Mesodorylaimus sukuli* n. sp.**

(Table-2; Figs. 3 & 4)

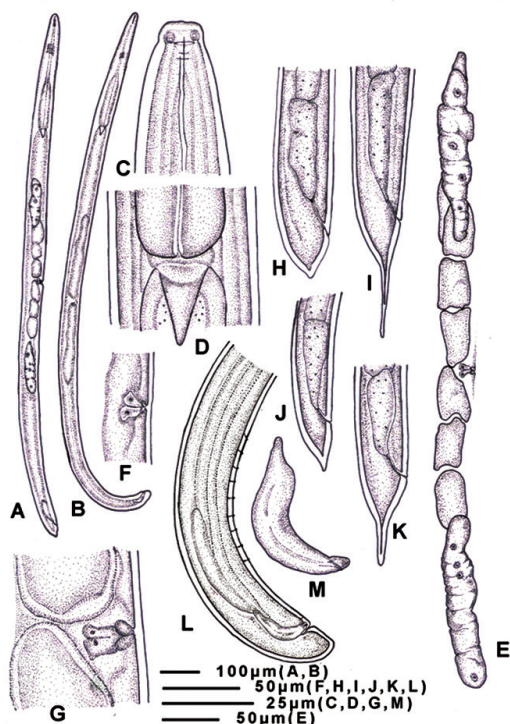
Material examined: 23 females, 16 males.*Measurements:* Shown in Table 2.

Fig. 3. Camera lucida drawings of *Mesodorylaimus sukuli* n. sp. A: Entire female; B: Entire male; C: Lip region and Odontostyle of female; D: Cardia of female; E: Female gonads; F & G: Vulval region; H, I, J & K: Female tail; L: Male tail; M: Spicules.

Description: Female: Body slightly ventrally curved upon fixation, tapering slightly towards both the extremities. Cuticle smooth 2.0-3.0 μ m thick at mid body and 4-5 μ m on tail. Lateral chords about one-third of body width at mid body. Lip region offset by slight depression. Lips rounded, amphids cup-shaped, with aperture about 5-6 μ m wide. Odontostyle dorylaimoid, 1.3-1.5

lip region width long, its aperture about one-third of its length. Guiding ring double located at 0.7 lip region width from anterior end. Odontophore rod-like, 1.6-1.7 times the odontostyle length. Nerve ring encircling the anterior slender part of oesophagus at 34-35% of the oesophageal length from anterior end. Oesophageal expansion gradual, expanded part occupying about 38-42% of the total oesophageal length. Cardia elongate, conoid about more than half as long as corresponding body width. Genital system amphidelphic, both gonadal branches almost equally developed. Ovary reflexed with oocytes arranged in a single row near the tip. Oviduct joining ovary subterminally. Vulva transverse. Vagina extending about one-third of the corresponding body width. *Pars refringens vaginae* consists of two triangular sclerotisation. Prerectum 2.3-2.7 anal body widths long. Rectum 0.9-1.3 times anal body width long. Tail conoid with the tip abruptly tapering both dorsally and ventrally to a very finely pointed tip in few specimens, 1.4-1.6 anal body widths long and a pair of caudal pores on each side.

Male: Similar to female in general morphology, except for posterior region being slightly more curved because of presence of copulatory muscles. Testis opposed. Spicules dorylaimoid, slightly ventrally curved, 1.3-1.7 anal body width long. Lateral guiding pieces about one-fourth of spicule length. Supplements consist of an ad-anal pair and 10 regularly spaced ventromedians. Prerectum 2.3-2.5 anal body width long, terminating just in front of the first ventromedian supplement. Rectum 1.2-1.3 anal body width long, tail short conoid with bluntly rounded tip and with three distinct caudal pores on each side.

Type habitat and locality: Specimens were collected by the first author on 13.03.2007 from the rhizospheric soil of pumpkin (*Cucurbita pepo* L.) and bitter gourd (*Momordica muricata*) from the village Hridaypur of district North 24-Paganas, West Bengal, India.

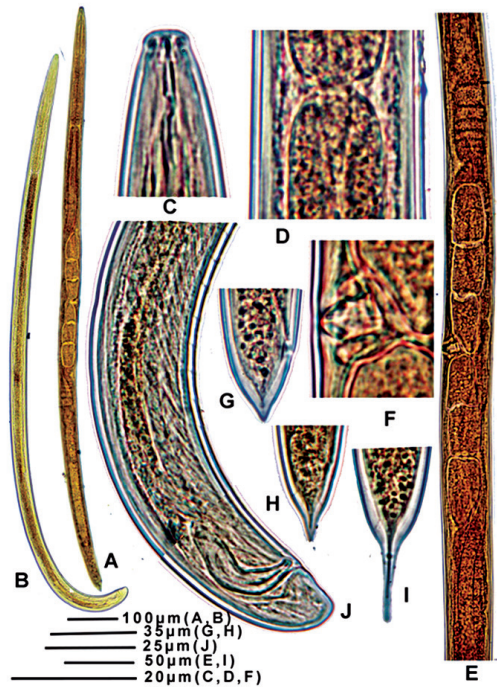


Fig. 4. Photomicrographs of *Mesodorylaimus sukuli* n. sp. A: Entire female; B: Entire male; C: Lip region and Odontostyle of female; D: Cardia of female; E: Female gonads; F: Vulval region; G, H & I: Female tail; J: Male tail.

Type materials: Specimens were deposited in the National Zoological Collections of the Zoological Survey of India, Kolkata, West Bengal, India under the Registration No. WN1325 (Holotype) and WN1326, WN1327, WN1328, WN1329, WN1334, WN1335, WN1336, WN1337 (Paratypes) on glass slides.

Differential diagnosis and relationships: The present species is characterized by having a medium sized body (L= 0.96-1.41 mm in female and 0.95-1.31 mm in male); lip region offset by

slight depression; double guiding ring, 11-12.5μm long odontostyle; elongated and pointed cardia; transverse vulva; conoid tail with the tip abruptly tapering both dorsally and ventrally to a very finely pointed tip in few female specimens and males having 10 regularly spaced ventromedian supplements. Out of all the known valid species, the present species closely resembles with the following species.

The present species also closely resembles *Mesodorylaimus cognatus* Andr ssy, 1986 regarding its body length, body width, vulval type and tail length but differs from it in having a narrow lip region (vs 13-13.5 μm), double guiding ring (vs single), comparatively smaller oesophagus (vs 272-333 μm), anteriorly located vulva (vs 58-60%), different tail shape (vs elongate conoid), smaller (vs 46-47 μm) and more ventrally curved spicule and less number of ventromedian supplements (vs 17-18).

The proposed new species also closely resembles with *M. andrassyi* Ahmad and Ahmad, 1999 regarding body length, lip width, body width, oesophageal length, vulval length and spicule length. However, it differs from it in having double guiding ring (vs single), longer odontostyle (vs 11-12 μm), larger cardia (vs 15-20 μm), transverse vulva (vs longitudinal) and shorter tail length (vs 80-105 μm) and tail shape (vs filiform) in case of female and less number of ventromedian supplements (vs 10-12) in case of male.

Therefore, the species holds significant and substantial differences from all other valid species of this genus and can be considered as a separate new species.

Etymology: The authors suggest its name as *Mesodorylaimus sukuli* after the name of the eminent Nematologist Prof. Nirmal Chandra Sukul (Retd.) of Visva Bharati University, Santiniketan, Birbhum, West Bengal, India.

Table-2. Measurement of *Mesodorylaimus sukuli* n. sp. (all measurements in μm except L in mm).

Morphometric characters	Holotype female	Paratype females (n=22)	Mean ± SD	Paratype males (n=16)	Mean ± SD
L	1.34	0.96 – 1.41	1.13 ± 0.16	0.955 – 1.375	1.21 ± 0.15
a	27.34	28.51 – 35.58	32.15 ± 2.19	29.3 – 34.43	32.71 ± 2.04
b	4.95	4.3 – 5.03	4.63 ± 0.28	4.46 – 4.96	4.78 ± 0.20

Table 2. *contd.*

Morphometric characters	Holotype female	Paratype females (n=22)	Mean \pm SD	Paratype males (n=16)	Mean \pm SD
c	49.62	22.27 – 31.23	26.54 \pm 3.13	52.44 – 70.27	59.16 \pm 7.15
c'	1	1.53 – 2.5	1.84 \pm 0.37	0.75 – 0.82	0.78 \pm 0.03
V/T	50.4	49.3 – 55.74	52.93 \pm 2.09	72 – 83.42	77.68 \pm 5.57
G1	33.4	17.35 – 34.88	27.08 \pm 5.18	-	-
G2	35.07	17.6 – 36.63	27.75 \pm 5.56	-	-
Height of lip	3.75	-	3.75 \pm 0	-	3.75 \pm 0
Lip width	10	-	10 \pm 0	-	10 \pm 0
Amphid position	5	5 – 5.25	5.125 \pm 0.14	5 – 6.25	5.63 \pm 0.88
Guiding ring	6.75	6.5 – 7	6.75 \pm 0.19	6.5 – 7	6.685 \pm 0.13
Nerve ring	92.5	75 - 100	89.38 \pm 8.84	82.5 - 100	91.78 \pm 5.72
Stylet length	12.5	12.5 - 15	13.41 \pm 1.06	13.75 - 15	14.3 \pm 0.65
Stylet aperture	5	3.75 - 5	4.68 \pm 0.63	3.75 - 5	4.68 \pm 0.63
Odontophore	21.25	20- 25	22.8 \pm 2.57	20- 25	22.8 \pm 2.57
Oesophageal length	270.7	215 – 292.5	244.28 \pm 26.72	210 – 292.5	255.83 \pm 29.52
Expanded oesophagus	110.25	82.5 – 122.5	97.34 \pm 12.18	75 - 110	100.42 \pm 12.78
Position of DO	172.5	145 – 192.5	165.94 \pm 15.05	147.5 – 192.5	170 \pm 31.82
Position of AS1 from DO	32.5	25- 45	34.06 \pm 8.33	17.5- 45	30 \pm 17.67
Position of AS2 from DO	37.5	27.5 - 50	39.38 \pm 7.65	20 - 50	35 \pm 21.21
Position of PS1 from DO	62.5	42.5 – 87.5	61.32 \pm 18.17	42.5 – 87.5	65 \pm 31.82
Position of PS2 from DO	70	55 -97.5	93.90 \pm 21.68	47.5 -97.5	72.5 \pm 35.35
Cardia	24.5	22.5 – 24.5	20.68 \pm 3.24	12.5 – 20	17.5 \pm 2.74
Maximum width	49	28.75 - 45	35.63 \pm 6.23	30 – 41.25	37.29 \pm 4.14
Anterior end to vulva	675	495 - 745	599.22 \pm 76.9	-	-
Vaginal length	15	13.75 – 17.5	15.16 \pm 1.56	-	-
Vaginal width	10.5	10 – 12.5	10.91 \pm 1.12	-	-
Pars distalis	2.5	2.25 – 2.75	2.5 \pm 0.20	-	-
Pras refringes	5	3.75 - 5	4.34 \pm 0.64	-	-
Pars proximalis	7.5	7.5 -11	9.13 \pm 1.5	-	-
Anterior gonad	325	170 – 447.5	310.56 \pm 86.39	-	-
Uterus	80	30 -80	62.18 \pm 20.93	-	-
Oviduct	192.5	72.5 -212.5	144.06 \pm 48.80	-	-
Ovary	175	37.5 -175	104.32 \pm 44.97	-	-
Posterior gonad	470	172.5 - 470	319.75 \pm 98.06	-	-
Uterus	125	35 - 125	64.38 \pm 28.46	-	-
Oviduct	165	80 - 235	148.85 \pm 48.06	-	-
Ovary	180	37.5- 180	106.5 \pm 51.96	-	-
Testis length	-	-	-	695 -1097.5	935.42 \pm 132.92
Spicule length	-	-	-	27.5 – 45.5	38.42 \pm 6.37
Ventromedian supplements	-	-	-	-	9
Rectum	25	18.75 - 30	25.16 \pm 3.43	25 - 30	27.5 \pm 2.04
Prerectum	57.5	50 – 62.5	54.84 \pm 4.65	50 – 67.5	58.75 \pm 12.45
Tail length	30.5	32.5 – 57.5	43.75 \pm 10.60	16.5 – 22.5	21.17 \pm 2.42

SUMMARY

Two new species of dorylaimid nematodes viz. *Mesodorylaimus chatterjeei* n. sp. and *M. sukuli* n. sp. collected from rhizospheric soil of cucurbitaceous plants from two different localities of the district North 24-Paganas, West Bengal, India have been described and illustrated.

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