

Two new and a known species of the genus *Miconchus* Andrassy, 1958 (Nematoda: Anatonchidae) from West Bengal, India

T. JANA^{1*}, A. CHATTERJEE¹ and B. MANNA²

Abstract. Two new and a known species of the genus *Miconchus* Andrassy, 1958 from the district South 24-Parganas, West Bengal, India are described and illustrated. Fifteen female and ten male representatives of *Miconchus aquaticus* Khan, Ahmad and Jairajpuri, 1978 were collected. *Miconchus rectangularis* n. sp. is characterized by medium sized body (female: 1.77–1.82 mm); buccal cavity very narrow, rectangular in shape, wall of buccal cavity straight; dorsal tooth and two sub-ventral teeth medium in size, situated at 31% from the base of buccal cavity and at same level; gonads amphidelphic; tail conoid, arcuate, gradually tapering at the end, tail-tip rounded, spinneret terminal. *M. bulbicaudatus* n. sp. is characterized by medium sized body (female: 2.1–2.2 mm); broad buccal cavity; dorsal tooth and two sub-ventral teeth small, situated at 31% from the base of buccal cavity and at same level; gonads amphidelphic; tail conoid, arcuate, gradually tapering at the end; tail-tip rounded with a bulbous structure encircled by caudal papillae at its base, spinneret terminal.

One known and two new species belonging to the genus *Miconchus* Andrassy, 1958 (subfamily Miconchinae Andrassy, 1976, family Anatonchidae Jairajpuri, 1969) are described. The specimens were collected during a survey to the district South 24-Parganas, West Bengal, India, from different blocks, in the years 2006–2007. Both male and female representatives were found in *Miconchus aquaticus*, but for the two new species, only females were collected. The new species are named as *Miconchus rectangularis* and *Miconchus bulbicaudatus*.

MATERIALS AND METHODS

The nematode specimens were extracted by a modified Baermann's funnel technique (Christie and Perry, 1951), fixed in hot diluted 4% FA (formalin-acetic acid mixture; Seinhorst, 1966), mounted on slides in anhydrous glycerin and sealed. Preserved specimens were observed under different magnifications with an Olympus BX-51 trinocular light microscope. Figures were drawn with the aid of a camera lucida attached to the microscope. Images were captured with a CCD

digital camera (CoolSnapPro) integrated with the microscope. Body dimensions were tabulated using de Man's formula (de Man, 1880).

DESCRIPTIONS OF SPECIES

Miconchus aquaticus Khan, Ahmad & Jairajpuri, 1978

(Tables I–II, Figs. 1–2)

Measurements in Tables I–II.

Female. Body long, habitus curved. Cuticle moderately thick all over the body, but of variable thickness at lip region, mid-body and caudal region. Width of lip region more or less same as the adjacent body width. Dorsal tooth situated at mid to upper third area of buccal cavity, two sub-ventral teeth present, geusids prominent at the base of buccal cavity. Excretory pore situated behind the nerve ring. Oesophageal glands prominent; oesophagus cylindrical and muscular. Cardia simple, length and width of cardia more or less same. Gonads amphidelphic, ovary reflexed, oviduct

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Table I. Morphometric data of female *Miconchus aquaticus* (all measurements are in μm , except L, in mm)

	Mean	Range
L	2.1	2.1-2.2
a	31.7	29.7-33.8
b	4.5	4.4-4.7
c	16.3	15.8-16.9
c'	3.1	3-3.1
V%	65.2	54-68.7
G1	19	18.3-19.7
G2	18.9	12.3-21.4
Cuticle thickness at head region	4.9	4.7-5
Cuticle thickness at mid-body	3.4	3.3-3.6
Cuticle thickness at tail region	4.9	4.7-5.1
Lip height	10.5	9.8-11
Lip diameter	37.7	36.8-41.7
Mid-body diameter	66.2	63.7-71.1
Anal diameter	41.9	41.7-42.9
Length of buccal cavity	46.8	44.1-50.2
Diameter of buccal cavity	26	24.5-29.4
Position of dorsal tooth from the base of buccal cavity	16.7	15.9-17.2
% of dorsal tooth of total buccal cavity length	56.5	34.2-88.5
Position of first sub-ventral tooth from the base of buccal cavity	15.2	14.7-15.9
Position of second sub-ventral tooth from the base of buccal cavity	15.7	14.7-17.2
Position of amphid from the anterior end	11.8	11.2-12.3
Diameter of amphidial aperture	4.7	4.5-4.9
Position of excretory pore from anterior end	169.7	159.4-183.8
Length of oesophagus	463.5	448.4-480.2
Length of cardia	13.2	12.1-14.2
Diameter of cardia	24.5	23.7-25.7
Position of nerve ring from anterior end	145.5	139.7-154.4
D	39.8	36.3-42.4
AS1	57.1	52.4-60.2
AS2	62	55.6-67.7
PS1	75.1	72.4-80.2
PS2	79.1	75-85
Glandularium	345.6	320.3-368.6
Anterior gonad	398.4	385.7-415
Uterus	202.2	188.7-215.8
Oviduct	148.4	136.6-155.4
Ovary	47.8	42.4-59.6
Posterior gonad	425	399.4-460.5
Uterus	192.4	187.2-198.3
Oviduct	168.2	145.7-189.5
Ovary	64.1	55.7-73.7
Vulval Length	1365.1	1161.3-1450.4
Total length of vagina	23.3	22.6-23.8
<i>Pars proximalis vagina</i>	17.9	17.5-18.4
<i>Pars refringes vagina</i>	4.7	4.3-5.4
<i>Pars distalis vagina</i>	0.6	0.4-0.9
cw	11.1	10.5-12
Rectum length	32.2	30.3-35
Tail length	128.4	125-132.3
% of tail of total body length	6.1	5.9-6.3

Table II. Morphometric data of male *Miconchus aquaticus* (all measurements are in μm , except L, in mm)

	Mean	Range
L	2.1	1.8-2.5
a	35.7	32-38.2
b	4.5	4.2-4.9
c	16.9	16-18.1
c'	2.3	2.1-2.5
T%	39.3	35.7-42.5
Cuticle thickness at head region	3.6	3.4-3.9
Cuticle thickness at mid-body	6.1	5.4-6.9
Cuticle thickness at tail region	7.4	6.6-8.1
Lip height	12.7	11.7-14.3
Lip diameter	38.7	36.5-43
Mid-body diameter	61.3	56.4-66.2
Anal diameter	50.1	46.6-52
Length of buccal cavity	46.3	44.1-48.6
Diameter of buccal cavity	19.8	15.6-29.4
Position of dorsal tooth from the base of buccal cavity	17.6	17.2-18.5
% of dorsal tooth of total buccal cavity length	38.5	36.3-44.4
Position of first sub-ventral tooth from the base of buccal cavity	14.8	14.58-14.90
Position of second sub-ventral tooth from the base of buccal cavity	16.3	14.7-17.6
Position of amphid from the anterior end	11.9	11.2-12.3
Diameter of amphidial aperture	4.7	4.5-4.9
Position of excretory pore from anterior end	169.8	159.4-183.8
Length of oesophagus	465.8	428.8-490
Length of cardia	13.2	12.1-14.2
Diameter of cardia	24.6	23.7-25.7
Position of nerve ring from anterior end	139.7	136.4-142.1
D	40.1	36.3-42.4
AS1	59.2	56-63
AS2	62.6	59-66.4
PS1	75.7	72.4-82.3
PS2	80.4	75-85
Glandularium	346	320.3-368.6
Spicules	81.1	73.5-94.3
Gubernaculum	22.9	19.6-25
Ventro-median supplements	15	15-15
Lateral guiding pieces	19.12	17.2-21.3
Pre-rectum	263.7	254.7-271.2
Rectum length	49	45.7-55.7
Tail length	115.3	110.3-122.5
% of tail of total body length	5.6	4.6-6.8

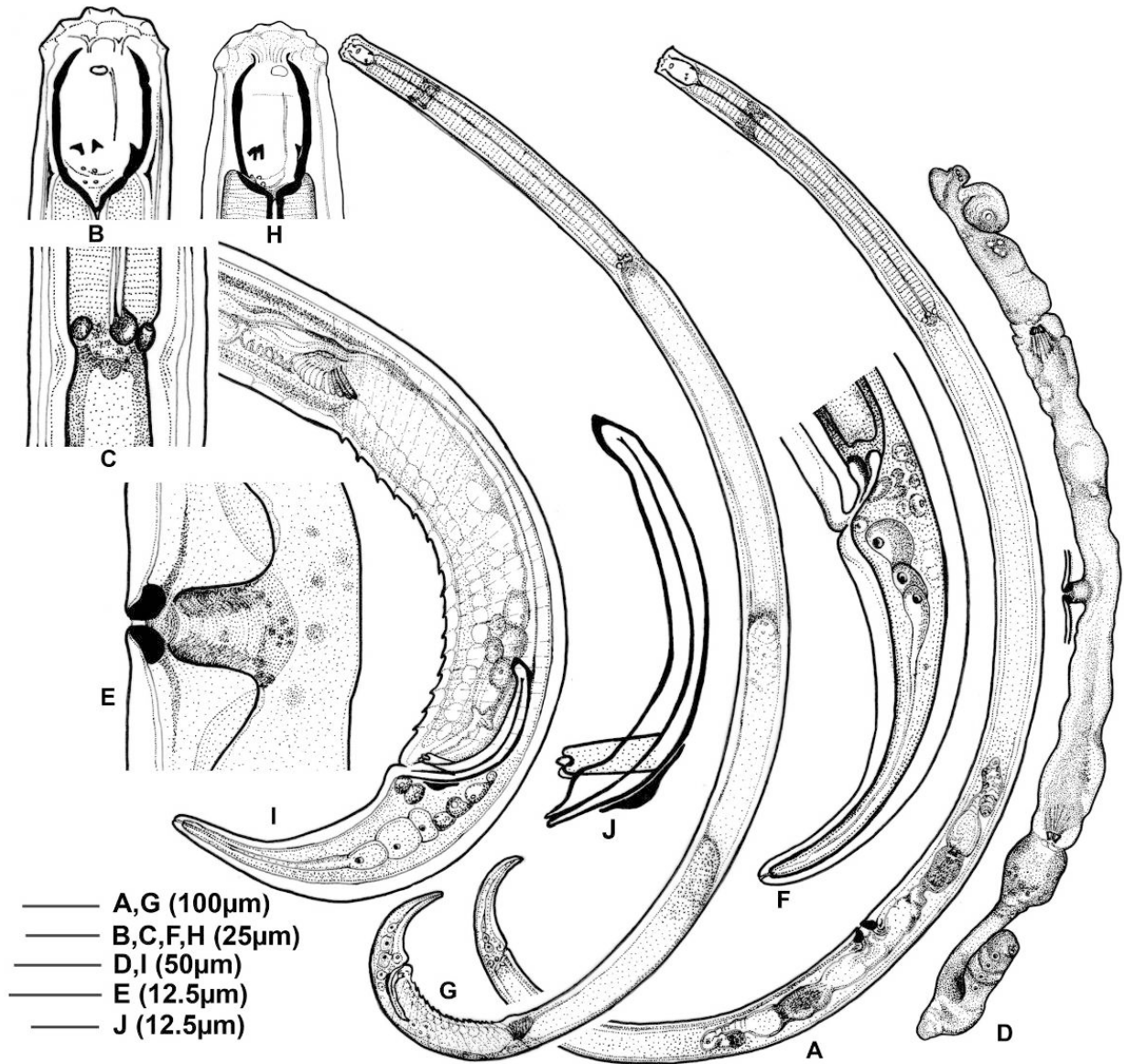


Figure 1. Camera lucida drawings of female and male *Miconchus aquaticus* Khan, Ahmad & Jairajpuri, 1978. Female: A: whole body; B: head; C: oesophago-intestine junction; D: gonad; E: vulval region; F: tail. Male: G: whole body; H: head; I: caudal region; J: spicules, gubernaculum and accessory pieces

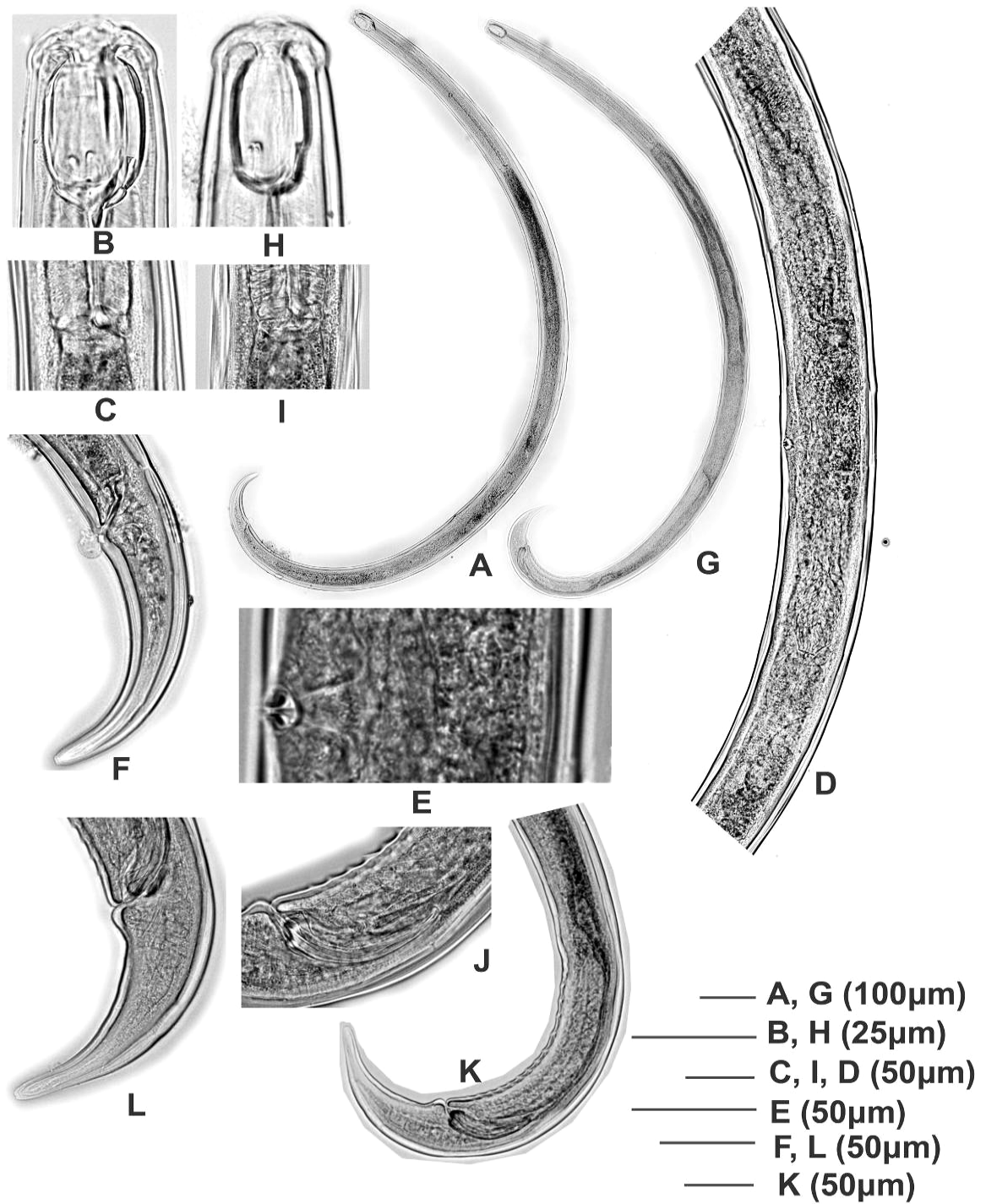


Figure 2. Photomicrographs of female and male *Miconchus aquaticus* Khan, Ahmad & Jairajpuri, 1978. Female: A: whole body; B: head; C: oesophago-intestine junction; D: gonad; E: vulval region; F: tail. Male: G: whole body; H: head; I: oesophago-intestine junction; J: spicules, gubernaculum and accessory pieces; K: caudal region; L: tail

smaller than uterus. Vagina with distinct parts, *pars proximalis vaginae*, *pars refringens vagina*, but *pars distalis vaginae* very small. Rectum just less than one anal diameter long. Caudal pore absent. Tail conoid, arcuate, tip rounded, caudal glands and spinneret present.

Male. General characters of all males are as same as female. All the adult males bear matured double testes, spicules, gubernaculum, accessory pieces. Rectal glands and ejaculatory glands are strongly developed.

Materials examined. Fifteen females and ten males were collected from the district South 24-Parganas, West Bengal, India.

Locality and associated plants. The above species was found in the rhizospheric soil of *Litchi chinensis* Sonn., *Psidium guajava* L., *Oryza sativa* L., *Solanum melongena* L., *Rosa sinensis* L., *Mangifera indica* L. and *Rubus* sp. located at the district South 24-Parganas (22°22.64' N, 88°25.7' E), West Bengal, India during the survey in the years 2006–2007.

Remarks. The genus as well as the species is reported for the first time from West Bengal, India. The specimens match well with the specimens described by Jairajpuri and Khan (1982) from Rajasthan except the value of *c* and *V*, which are lower in female and *T* higher in male in present observation. The male specimens of West Bengal have fewer supplements (15 vs 17–21). The measurements of males and females fit well with the measurements given by Andrassy (1994).

***Miconchus rectangularis* n. sp.**

(Table III, Figs. 3–4)

Measurements in Table III.

Female. Body medium in length, habitus curved. Cuticle moderately thick all over the body but of variable thickness at lip region, mid-body and caudal region. Lip region wider than the adjacent body width, lip region has a prominent constriction. Buccal cavity very narrow, rectan-

gular in shape, wall of buccal cavity straight, width of it is 1/3 of its length. Dorsal tooth and two sub-ventral teeth medium in size, situated at 31% from the base of buccal cavity and at same level, geusids prominent. Excretory pore behind the nerve ring is prominent. Oesophageal glands prominent; oesophagus cylindrical and muscular. Cardia tongue-shaped. Gonads amphidelphic, ovary reflexed, never reach at oviduct-uterus junction, sphincter prominent at oviduct-uterus junction. Vagina with three distinct parts, *pars proximalis vaginae*, *pars refringens vaginae* and *pars distalis vaginae*. Rectum less than one anal diameter long. Caudal pore single. Tail conoid, arcuate, gradually tapering at the end, tail-tip rounded, caudal glands three in number, spinneret opening terminal.

Male. Not found.

Differential diagnosis and relationships. Body medium sized, buccal cavity heavily sclerotized and unusually narrow, more or less flattened at the base, dorsal tooth medium sized and pointed forward, gonads didelphic, tail conoid with terminal spinneret.

The genus *Miconchus* has 29 valid species. Among them, *M. exilis* (Cobb, 1917) Andrassy, 1958 and *M. kansasensis* Mulvey & Dickerson, 1970 are more close to the proposed new species as all of them has the buccal teeth midway of buccal cavity and the tail is shorter than in the other species where it is 2–3 anal diameters long. The new species differs from *M. exilis* as follows: the body is somewhat shorter (1.77–1.82 vs 2 mm), value *a* much lower (26–26.5 vs 43), *c* much lower (24.6–24.7 vs 56), *c'* higher (2–2.1 vs 1.8) and *V* lower (71.3–72.3 vs 78 %). The proposed new species is also close to *M. kansasensis* but differs from that: body longer (vs 1.4–1.6 mm), *c* higher (vs 15–18) and *c'* lower (vs 3). Furthermore, it significantly differs in the shape of buccal cavity which is quite narrow and rectangular (vs barrel-shaped) and in the distinct constriction in lip region (vs slightly expanded); it has caudal glands with prominent terminal spinneret (vs without caudal glands and terminal opening).

Table III. Morphometric data of female *Miconchus rectangularis* n. sp. (all measurements are in μm , except L, in mm)

	Holotype (♀)	Mean	Paratype range
L	1.82	1.8	1.77-1.82
a	26.5	26.3	26-26.5
b	3.9	3.8	3.5-3.9
c	24.7	24.7	24.6-24.7
c'	2.1	2.1	2-2.1
V%	72.3	72	71.3-72.3
G1	17.5	17.5	17.5-17.5
G2	17.6	17.5	17.2-17.6
Cuticle thickness at head region	2.5	2.4	2.3-2.5
Cuticle thickness at mid-body	3.4	3.3	3.3-3.4
Cuticle thickness at tail region	6.6	6.4	6-6.6
Lip height	9.8	9.7	9.5-9.8
Lip diameter	39.2	39.5	39.2-40.1
Mid-body diameter	68.6	67.9	66.6-68.6
Anal diameter	34.3	34.1	33.5-34.3
Length of buccal cavity	51	51.1	51-51.2
Diameter of buccal cavity	17	17	16.9-17
Position of dorsal tooth from the base of buccal cavity	15.9	16	15.9-16.2
% of dorsal tooth of total buccal cavity length	31.2	33.1	32.5-34.2
Position of first sub-ventral tooth from the base of buccal cavity	15.9	16.1	15.9-16.6
Position of second sub-ventral tooth from the base of buccal cavity	15.9	16	15.9-16.2
Position of amphid from the anterior end	10.3	10.5	10.3-11.1
Diameter of amphidial aperture	2.5	2.4	2.3-2.5
Position of excretory pore from anterior end	174	172.5	169.7-174
Length of oesophagus	468	466	462-468
Length of cardia	17.2	17.2	17.2-17.2
Diameter of cardia	27	27	27
Position of nerve ring from anterior end	129.9	130.2	129.9-131
D	24.1	23.9	23.5-24.1
AS1	55	53.4	50.4-55
AS2	58.2	56.6	53.3-58.2
PS1	75.4	75.1	73-76.8
PS2	77.7	78.7	77.7-79.6
Glandularium	110.3	109.8	108.8-110.3
Anterior gonad	317.8	318.1	317.8-318.8
Uterus	143.6	142.8	141.2-143.6
Oviduct	108.1	108.8	108.1-110.2
Ovary	66.1	66.5	66.1-67.3
Posterior gonad	319.4	319.7	319.4-320.2
Uterus	121	121	121
Oviduct	145.2	144.2	142.3-145.2
Ovary	53.2	54.5	53.2-57
Vulval Length	1313.2	1314.2	1313-1316
Total length of vagina	25	24.7	24-25
<i>Pars proximalis vagina</i>	18.4	18.1	17.5-18.4
<i>Pars refringes vagina</i>	5.9	6	5.9-6
<i>Pars distalis vagina</i>	0.7	0.6	0.5-0.7
cw	12.5	12.4	12-12.5
Rectum length	26.3	26.4	26.3-26.4
Tail length	73.5	73.3	72.8-73.5
% of tail of total body length	4	4.1	4-4.1

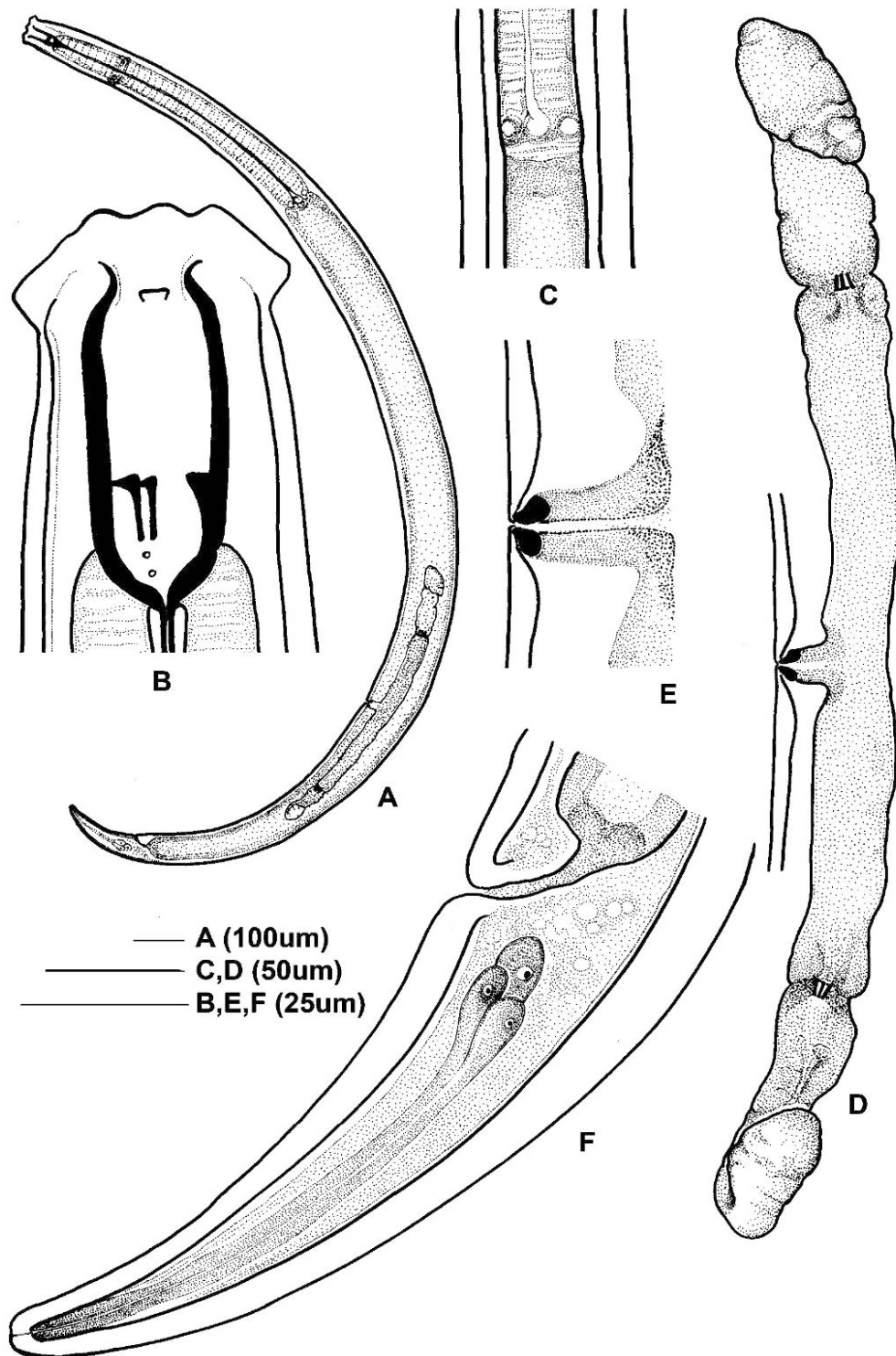


Figure 3. Camera lucida drawings of female *Miconchus rectangularis* n. sp.
A: whole body; B: head; C: oesophago-intestine junction; D: gonad; E: vulval region; F: tail

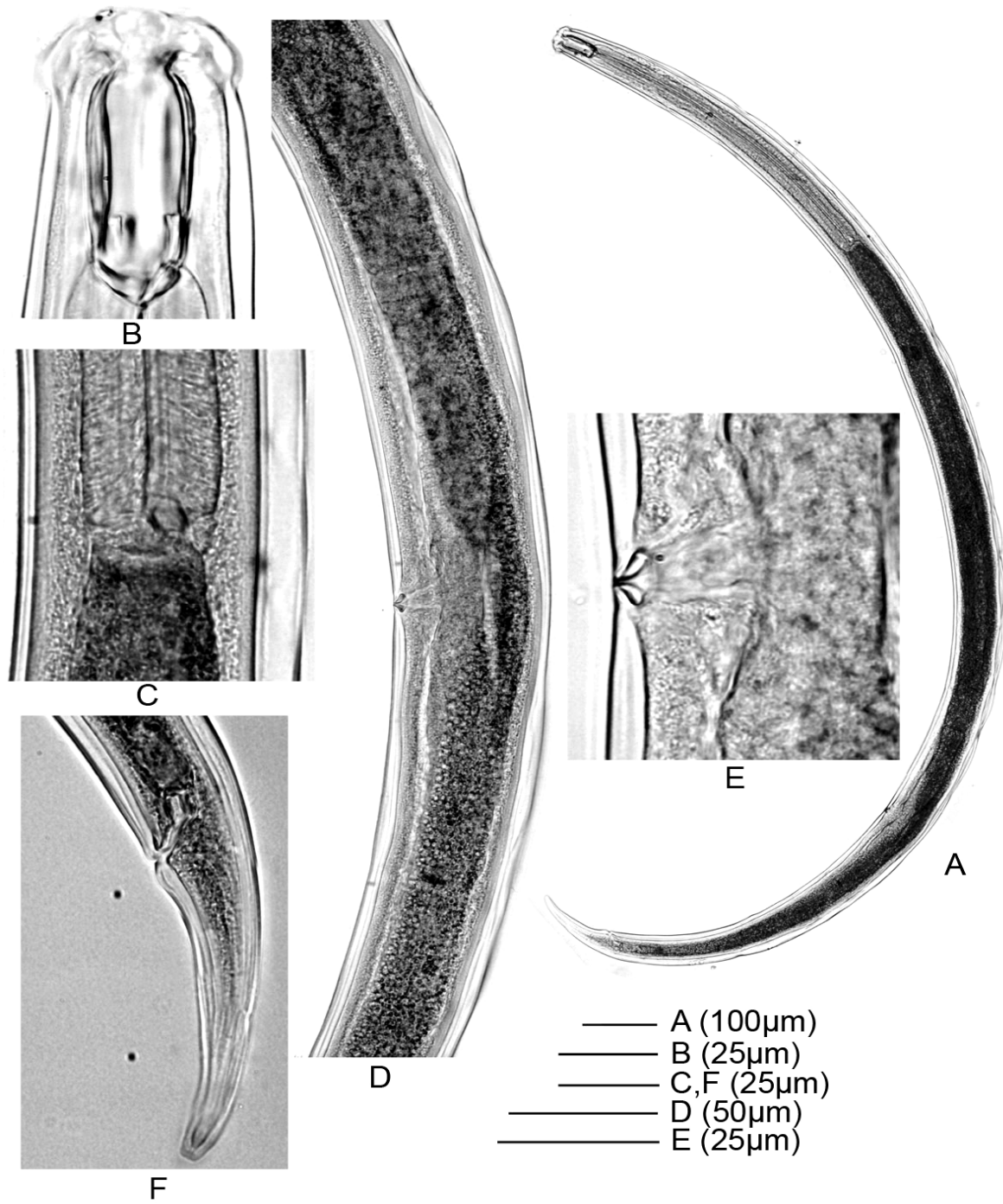


Figure 4. Photomicrographs of female *Miconchus rectangularis* n. sp.
A: whole body; B: head; C: oesophago-intestine junction; D: gonad; E: vulval region; F: tail

Materials examined (type specimens): Slides containing holotype and two paratypes of *M. rectangularis* n. sp. have been deposited at National Zoological Collection of Zoological Survey of India, Kolkata, India with following registration numbers: WN 988 and WN 989.

Type habitat and locality: During survey tour to the district South 24-Parganas (Block-Sonarapur) in February 2006, the present species was collected from the rhizospheric soil of *Litchi chinensis* Sonn.

Etymology: The new species is named after the rectangular shape of its buccal cavity.

***Miconchus bulbicaudatus* n. sp.**

(Table IV, Figs. 5–6)

Measurements in Table IV.

Female. Body medium in length, habitus curved. Cuticle moderately thick all over the body but of variable thickness at lip region, mid-body and caudal region, width of lip region and the adjacent body is same. Buccal cavity much broad, length of the buccal cavity is 1.9 times of its width. Dorsal tooth and two sub-ventral teeth small and situated at 31% from the base of buccal cavity and at same level; geusids prominent. Excretory pore behind the nerve ring is prominent. Oesophageal glands prominent; oesophagus cylindrical and muscular. Cardia tongue-shaped. Gonads amphidelphic, ovary reflexed, never reach at oviduct-uterus junction, sphincter prominent at oviduct-uterus junction. Vagina with three distinct parts, *pars proximalis vaginae*, *pars refringens vaginae* and *pars distalis vaginae*. Rectum less than one anal diameter long. Tail conoid, arcuate, gradually tapering at the end, tail-tip rounded with a bulbous structure at its tip, caudal papillae prominent encircling the base of bulbous structure, caudal glands three in number, spinneret opening terminal.

Male. Not found.

Differential diagnosis and relationships. Body medium sized, buccal cavity heavily sclerotized and roomy, more or less flattened at the base, dorsal tooth medium sized and pointed forward, gonads paired, tail conoid with a small bulbous structure on its tip.

Among the representatives of the genus *M. exilis* (Cobb, 1917) Andrassy, 1958 and *M. kansasensis* Mulvey & Dickerson, 1970 are more close to the proposed new species in having the buccal teeth midway of buccal cavity and the tail shorter than the other species (3.1–3.2 vs 2–3 anal diameters long). The new species differs from *M. exilis* as follows: the body is somewhat longer ($L = 2.1\text{--}2.2$ vs 2 mm), other measurements like *a* higher (38.3–40.2 vs 26.5), *b* higher (4.1–4.3 vs 3.7), *c* much lower (14.2–14.7 vs 56), *c'* higher (3.1–3.3 vs 1.8) and *V* lower (63.5–66.5 vs 78 %). The proposed new species is also differs from *M. kansasensis*: body longer (vs 1.4–1.6 mm), *a* higher (vs 25–31), *c* lower (vs 15–18) and *c'* higher (vs 1.8), *V* lower (vs 70–72%). Moreover, the buccal cavity is much broader in the present species (vs barrel-shaped) and the lip region is constricted (vs slightly expanded); it has caudal glands with prominent terminal spinneret (vs without caudal glands and terminal opening). The present species also has a significant bulbous outgrowth on tip of the tail with prominent caudal papillae encircling the base of bulbous structure.

Materials examined (type specimens). Slides containing holotype and three paratypes of *M. bulbicaudatus* n. sp. have been deposited at National Zoological Collection of Zoological Survey of India with following registration numbers: WN 986 and WN 987.

Type habitat and locality. During survey tour to the district South 24-Parganas (Block-Mograhat II) in February 2006, the present species was collected from the rhizosphere of *Mangifera indica* L.

Etymology. The epithet *bulbicaudatus* refers to the structure of tail tip.

Table IV. Morphometric data of female *Miconchus bulbicaudatus* n. sp. (all measurements are in μm , except L, in mm)

	Holotype (♀)	Mean	Paratype range
L	2.1	2.1	2.1-2.2
a	39.5	39.4	38.3-40.2
b	4.3	4.2	4.1-4.3
c	14.3	14.3	14.2-14.7
c'	3.2	3.2	3.1-3.3
V%	65.7	65.4	63.5-66.5
G1	10.3	10.5	10.2-11
G2	9.8	9.7	9.5-9.8
Cuticle thickness at head region	4.7	4.7	4.7-5
Cuticle thickness at mid-body	7.7	7.7	7.4-8.2
Cuticle thickness at tail region	8.6	8.5	8.2-8.7
Lip height	9.8	9.3	8.6-9.8
Lip diameter	38.8	39.4	38.8-40.2
Mid-body diameter	53.9	53.8	53.2-54.2
Anal diameter	46.6	46.8	46.4-47.7
Length of buccal cavity	49	48.8	48.6-49
Diameter of buccal cavity	26.3	25.8	25.2-26.3
Position of dorsal tooth from the base of buccal cavity	26.1	26.1	25.7-26.5
% of dorsal tooth of total buccal cavity length	53.3	54.3	53.3-55.4
Position of first sub-ventral tooth from the base of buccal cavity	26.6	26	25.5-26.6
Position of second sub-ventral tooth from the base of buccal cavity	26.1	26.3	26.1-26.5
Position of amphid from the anterior end	9.8	9.8	9.5-10.2
Diameter of amphidial aperture	4.2	4.3	4.2-4.4
Position of excretory pore from anterior end	181.3	180	178.7-181.3
Length of oesophagus	494.9	491.2	486.4-494.9
Length of cardia	40.3	40.4	39.7-41.3
Diameter of cardia	35.5	35.1	34.5-35.5
Position of nerve ring from anterior end	147	146.5	145.6-147
D	25.7	25.6	24.8-26.4
AS1	51	51.9	51-53.4
AS2	52.35	54.5	52.4-56
PS1	69.6	72.4	69.6-75.7
PS2	76.4	76.3	75.3-77.7
Glandularium	360.2	357.2	354-360.2
Anterior gonad	262.9	265.9	262.9-274.6
Uterus	67.7	67.9	67.22-68.7
Oviduct	72.6	73.5	72.6-75.4
Ovary	122.6	124.5	121-132
Posterior gonad	287.1	283.3	277.6-287.1
Uterus	73.4	70.4	64.6-73.4
Oviduct	73.4	72	70.1-73.4
Ovary	140.3	140.9	140.3-141.8
Vulval Length	1400	1395.9	1385-1400
Total length of vagina	22.1	21.8	21.5-22.1
<i>Pars proximalis vagina</i>	16.6	15.9	14.7-16.6
<i>Pars refringes vagina</i>	5.1	5.5	5.1-6.5
<i>Pars distalis vagina</i>	0.4	0.4	0.3-0.5
cw	10.2	10.5	10.2-11.1
Rectum length	26.8	26.9	26.8-27.1
Tail length	149.5	150.1	149.5-151.2
% of tail of total body length	7	7	6.8-7.2

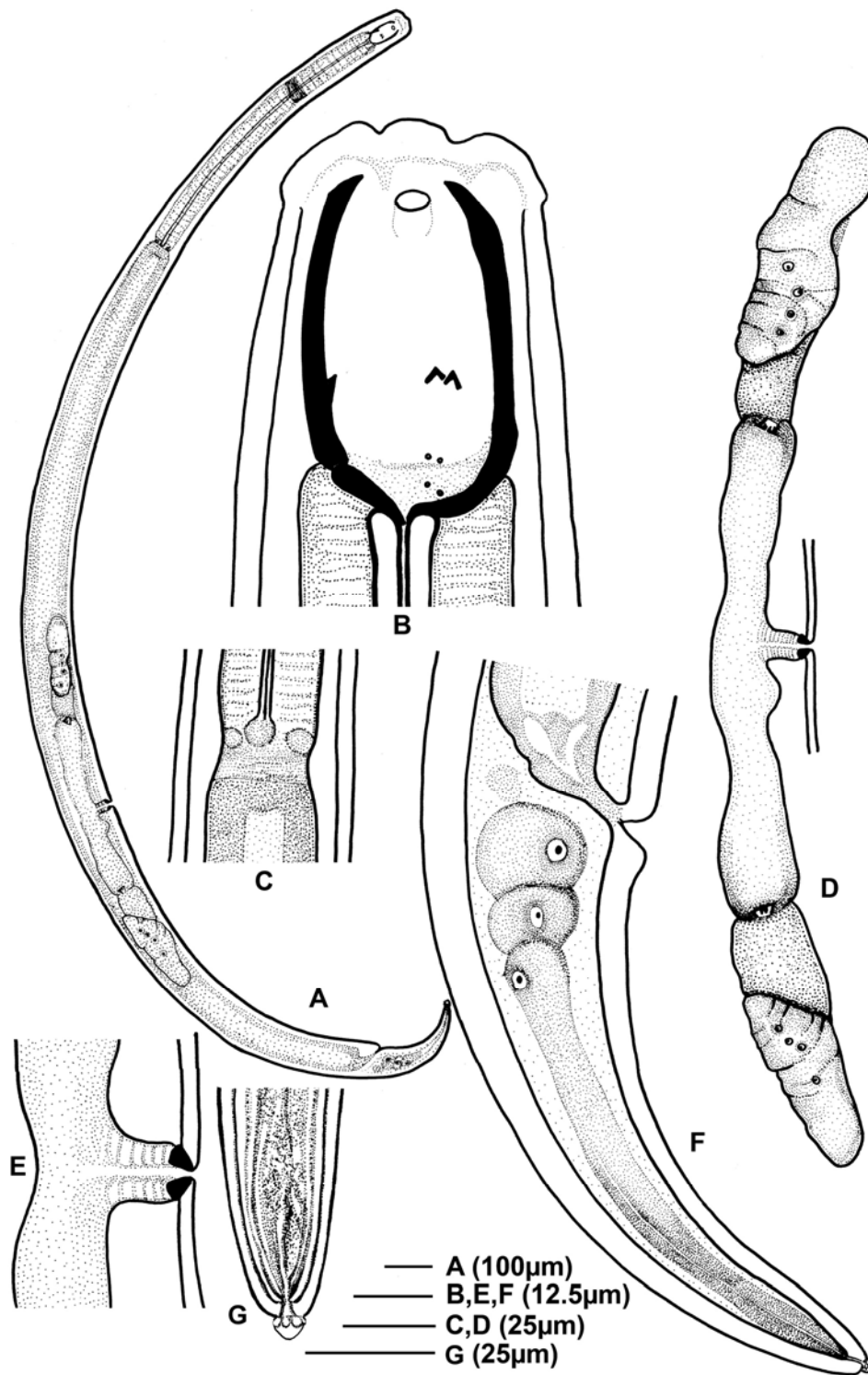


Figure 5. Camera lucida drawings of female *Miconchus bulbicaudatus* n. sp. A: whole body; B: head; C: oesophago-intestine junction; D: gonad; E: vulval region; F: tail; G: tail terminus showing bulbous outgrowth with caudal papillae encircling its base

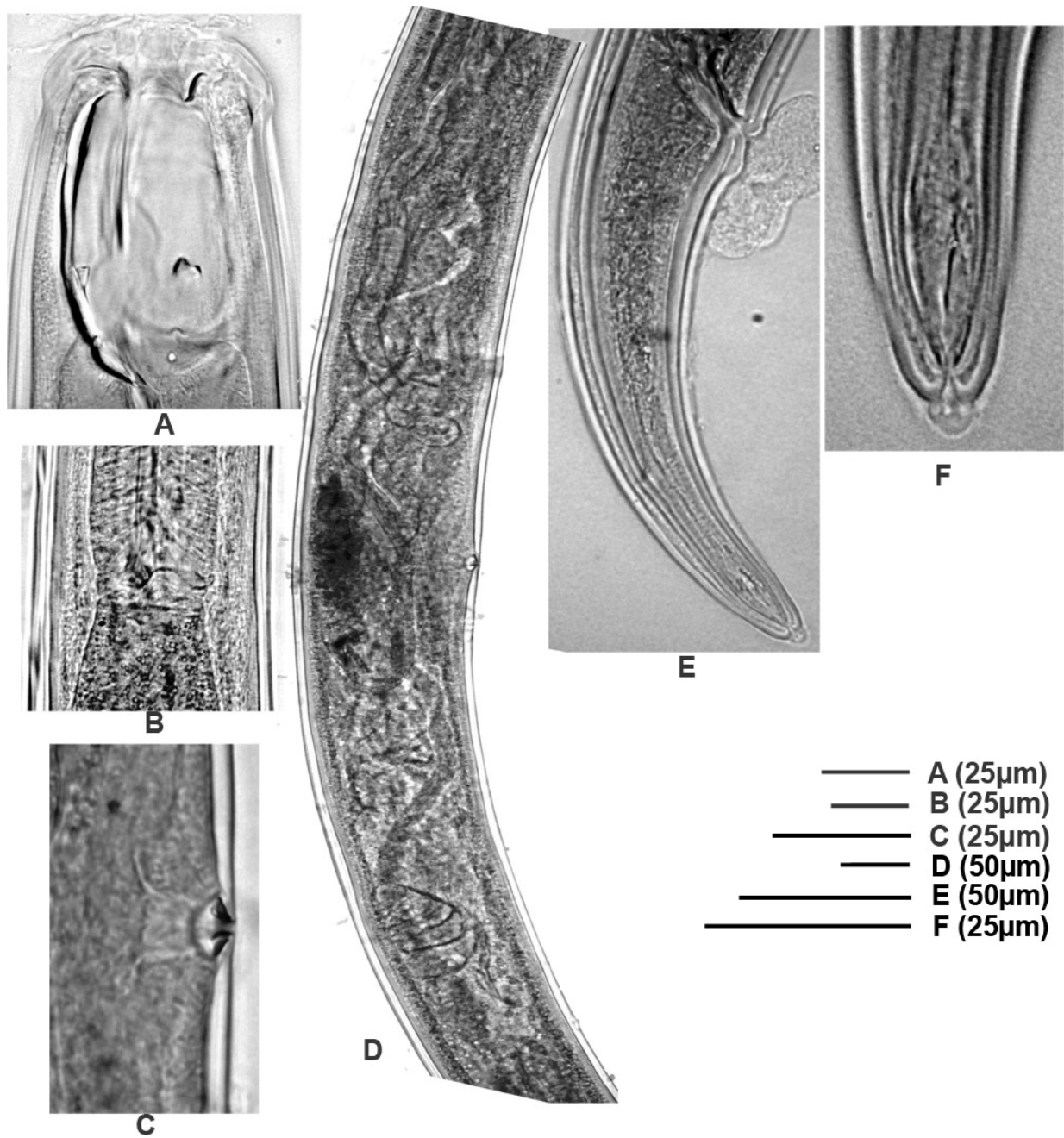


Figure 6. Photomicrographs of female *Miconchus bulbicaudatus* n. sp. A: head; B: oesophago-intestine junction; C: vulval region; D: gonad; E: tail; F: tail terminus showing bulbous outgrowth with caudal papillae encircling its base

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