

SOME SPECIES OF DORYLAIMOIDEA (NEMATODA) ASSOCIATED WITH GUAVA AND LITCHI, WITH NEW RECORDS FROM WEST BENGAL, INDIA

DEBABRATA SEN

Zoological Survey of India, M – Block, New Alipore, Kolkata – 700 053, West Bengal, India

E-mail: debabrata.zsi@gmail.com

INTRODUCTION

Few specimens of *Aporcelaimellus amylovorus* (Thorne and Swanger, 1936) Heyns, 1965, *Aporcelaimellus baqrii* Ahmad & Jairajpuri, 1982, *Aporcelaimellus chauhani* Baqri & Khera, 1975, *Aporcelaimellus coomansi* Baqri and Khera, 1975, *Aporcelaimellus indicus* Baqri & Jairajpuri, 1968, *Aporcelaimellus papillatus* (Bastian, 1865) Baqri and Khera, 1975, *Aporcelaimellus tritici* (Bastian, 1865) Andrásy, 1986 and *Tyleptus projectus* Thorne, 1939 were collected from soil around the roots of guava and litchi plantations at different locations of South 24-Parganas, West Bengal, India. Among these *A. papillatus* and *A. tritici* are the new records from India. The other species are with the new distributional records from South 24-Parganas as well as from west Bengal. *Aporcelaimellus amylovorus*, *Aporcelaimellus baqrii*, *Aporcelaimellus indicus* are observed for the first time in West Bengal and *Aporcelaimellus chauhani*, *Aporcelaimellus coomansi*, *Tyleptus projectus* are the first distributional records in South 24-Parganas district of West Bengal. The present specimens of the above genera agree well with their original description except some minor variations which are considered to be intraspecific. The distributions of the species in India as well as in the world have been provided. The nomenclature for the different parts of vagina, i.e., *pars proximalis*, *pars refringens* and *pars distalis* vaginae in dorylaimoid nematodes have

been given after De lay, Loof and Coomans (1993). The measurements of these three parts of vagina have been provided in the present communication.

MATERIALS AND METHODS

The collected soil samples were processed by Cobb's sieving and decantation technique (Cobb, 1918) followed by modified Baermann funnel technique (Christie and Perry, 1951) for extraction of nematodes. The nematode specimens were fixed and preserved in their characteristic body posture in hot FA (formalin-acetic acid 4:1) solution and were mounted in anhydrous glycerin, sealed by paraffin wax (De Maeseneer & d'Herde, 1963) to make permanent slides. Then they were observed under a compound microscope (Olympus BX 41), measured and drawings were made by the help of a drawing tube attached to the same microscope.

SYSTEMATIC POSITION

Order DORYLAIMIDA Pearse, 1942

Sub order DORYLAIMINA Pearse, 1936

Super family DORYLAIMOIDEA
de Man, 1876

Family APORCELAIMIDAE Heyns, 1965

Sub family APORCELAIMINAE Heyns, 1965

Genus *Aporcelaimellus* Heyns, 1965

1. *Aporcelaimellus amylovorus* (Thorne and Swanger, 1936) Heyns, 1965

2. *Aporcelaimellus baqrii* Ahmad and Jairajpuri, 1982
3. *Aporcelaimellus chauhani* Baqri and Khera, 1975
4. *Aporcelaimellus coomansi* Baqri and Khera, 1975
5. *Aporcelaimellus indicus* Baqri and Jairajpuri, 1968
6. *Aporcelaimellus papillatus* (Bastian, 1865) Baqri and Khera, 1975
7. *Aporcelaimellus tritici* (Bastian, 1865) Andrassy, 1986

Super family TYLENCHOLAIMOIDEA
Filipjev, 1934

Family LEPTONCHIDAE Thorne, 1935

Sub family TYLEPTINAE Jairajpuri, 1964

Genus *Tyleptus* Thorne, 1939

8. *Tyleptus projectus* Thorne, 1939

1. *Aporcelaimellus amylovorus* (Thorne and Swanger, 1936) Heyns, 1965

(Figure 1)

Measurements: Females (n = 3): L = 1.97–2.21 μm ; a = 26.73–30.06; b = 3.78–4.19; c = 52.6–57.3; c' = 0.84–0.95; V = 51.22–51.69%; G₁ = 14.87–24.31%; G₂ = 15.98–22.56%; odontostyle = 20.5–24.5 μm ; odontostyle width = 5 μm ; odontostyle aperture = 10.5–13.5 μm ; odontophore = 39–43 μm ; maximum body width = 66–78 μm ; length of pharynx = 519.5–527 μm ; body width at neck base = 62.5–68.5 μm ; body width at vulva = 66–78 μm ; expanded part of pharynx = 257–274.5 μm ; glandularium = 217.5–223.5 μm ; distance of vulva from anterior end = 1022–1139 μm ; length of anterior gonad = 294–507 μm ; length of posterior gonad = 316–355 μm ; prerectum = 196–250 μm ; rectum = 37–51.5 μm ; tail length = 34.5–42 μm ; anal body diameter = 39–44 μm .

Diagnosis: Female: Body ventrally curved on fixation, slightly tapering towards anterior end. Cuticle thick at anterior and posterior ends; its thickness 3.5–5 μm at the level of odontostyle, 2.5–3.5 μm at mid body and 3.5–5 μm on tail. Lip region set off by deep constriction, slightly

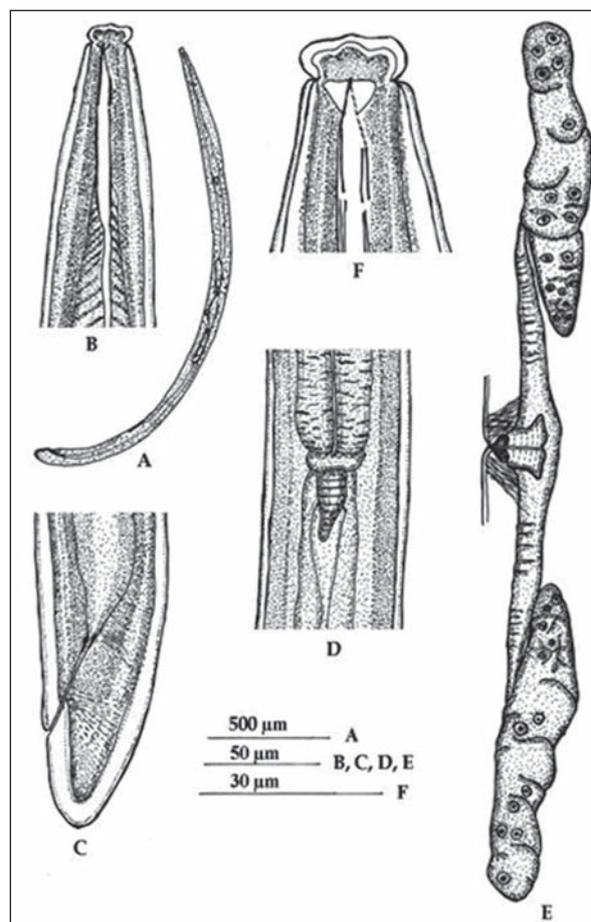


Fig. 1. *Aporcelaimellus amylovorus*. Female: A. Entire body, B & F. Anterior end showing odontostyle & amphid, C. Tail, D. Pharyngo-intestinal junction & cardia, E. Reproductive system.

wider than adjoining body, 7.0 μm high, and 17–20 μm wide or 1/3.5 of the body-width at neck base. Amphids stirrup shaped, their apertures occupying about half of the lip width. Odontostyle 1–1.5 lip region-widths long, aperture distinct and large, about 52–55% of its length. Guiding ring at 10–11 μm from anterior end. Odontophore rod-like, about 1.6–1.7 times the odontostyle length. Nerve ring at 164–169 μm from anterior end. Expanded portion of pharynx 49–52% of the total pharyngeal length. Well developed cardiac disc present, cardia elongated. Vulva almost equatorial or slightly post-equatorial. Vagina distally sclerotized, 21.5–24.5 μm long (*pars proximalis* vagina 12.5–14.5 μm , *pars refringens* 5–6 μm and *pars distalis* 3.5–4 μm long) or about one-third about the corresponding body width. Female reproductive system amphidelphic. Both

ovaries reflexed, anterior ovary 122.5–247 μm and posterior ovary 122.5–205.5 μm long. Prerectum about 4–7 and rectum about one anal body-widths long. Tail short, less than one anal body width, convex both dorsally and ventrally, ending in a rounded terminus.

Male: Not found.

Habitat and Locality: Collected from soil around the roots of guava from Sitakundu, Baruipur, South 24-Parganas.

Registration Number: On slide, WN 1440, deposited in National Zoological Collection, Zoological Survey of India, Kolkata

Distribution: In India: Himachal Pradesh and West Bengal.

In world: Hungary, Poland, Spanish mainland.

Remark: Ahmad and Jairajpuri (1982) first reported the male and female of *Aporcelaimellus amylovorus* from Himachal Pradesh, India from the soil around the roots of apricot (*Prunus armeniaca* L.). They reported the females with longer odontostyle measuring 22–23 μm (20 μm in type specimen) which agrees well with the present specimens. Females of the present specimens are also very close to those described by Thorne and Swanger (1936) except the lesser value of 'c' ($c = 67$ in type specimen). This is the first report of the species from West Bengal.

2. *Aporcelaimellus baqrii* Ahmad & Jairajpuri, 1982

(Figure 2, 3)

Measurements: Females (n = 14): L = 1.86–2.43 μm ; a = 25.8–38.3; b = 3.5–4.4; c = 59.3–71.7; c' = 0.5–0.8; V = 48.1–58.8%; G₁ = 9.1–21.3%; G₂ = 11.1–22.7%; odontostyle = 20.5–24.5 μm ; odontostyle aperture = 10.5–12.5 μm ; odontophore = 27.5–37.5 μm ; maximum body width = 50.5–78 μm , length of pharynx = 495–581 μm ; body width at neck base = 49–71 μm ; body width at vulva = 50.5–78 μm ; expanded part of pharynx = 267–313 μm ; glandularium = 235–262.5 μm ; distance of vulva from anterior end = 941–1240 μm ; length of

anterior gonad = 184–409 μm ; length of posterior gonad = 225.5–441 μm ; prerectum = 51.5–107 μm ; rectum = 32–49 μm ; tail length = 27–39 μm ; anal body diameter = 33–59 μm .

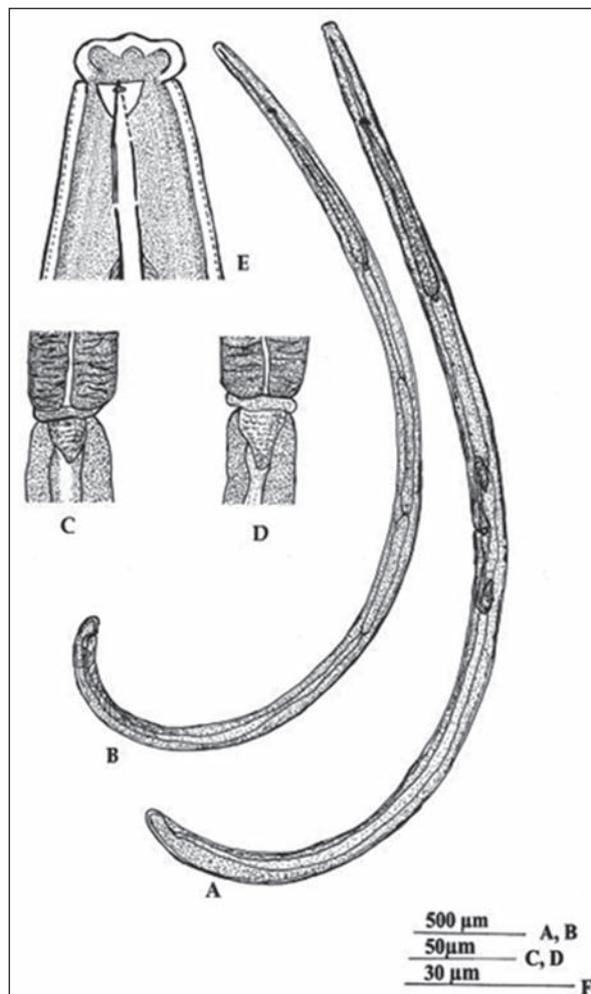


Fig. 2. *Aporcelaimellus baqrii*. Female: A. Entire body, C & D. Pharyngointestinal junction showing differences in shape of cardia, E. Anterior body end. Male: B. Entire body.

Males (n = 02): L = 1.86–1.93 μm ; a = 31.7–38; b = 3.7–3.8; c = 63.4–71.7; c' = 0.8–0.9; T = 52.2–57.8%; odontostyle = 22.5–23.5 μm ; odontostyle aperture = 11.5 μm ; odontophore = 35–36 μm ; maximum body width = 49–61 μm ; length of pharynx = 485–514.5 μm ; body width at neck base = 49–58.5 μm ; expanded part of pharynx = 245–269.5 μm ; prerectum = 98–122.5 μm ; tail length = 27–29.5 μm ; anal body diameter = 31.5 μm .; length of testis = 1012–1078 μm ; spicule length = 54–56.5 μm ; lateral guiding

piece = 12–15 μm ; Number of Ventromedian supplements = 11–12.

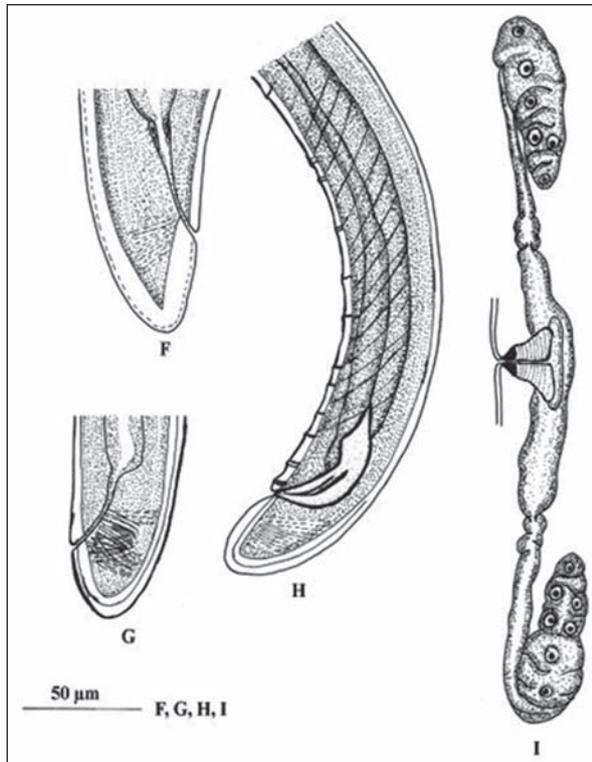


Fig. 3. A. *Aporcelaimellus baqrii*. Female: F & G. difference in tail shape, I. Reproductive system. Male: H. Posterior end showing ventromedian supplements and spicule and tail.

Diagnosis: Female: Body ventrally curved on fixation, the posterior portion in particular, slightly tapering towards anterior end. Cuticle finely striated, 3.5–5 μm thick at the level of odontostyle, 2.5–5 μm at mid body and 5–9 μm on tail. Lip region clearly set off by constriction, slightly wider than adjoining body, 16–21.5 μm wide or about one-third of body width at neck base, 6.5–10 μm high. Amphids stirrup-shaped. Odontostyle 1.1–1.5 lip region-widths long, its aperture 48–53.5% of odontostyle length. Guiding ring 10–12 μm from anterior end. Odontophore rod-like, 1.2–1.6 times the odontostyle length. Nerve ring at 139.5–174 μm from anterior end. Expanded part of pharynx 51–56% of the pharyngeal length. Cardiac disc present, cardia rounded to conoid, 10–19.5 μm long. Vulva transverse, slightly pre-equatorial to post-equatorial. Vagina 15–27 μm or about half to one-fourth of the corresponding body width

(length of *pars proximalis* vagina 13.5–17.5 μm , *pars refringens* 5–7 μm and *pars distalis* 2–4 μm), distally sclerotized. Female reproductive system amphidelphic, both ovaries reflexed. Prerectum 1–3.1 and rectum more or less one anal body-width long. Tail short, 0.6–0.88 anal body-width long, dorsally and ventrally convex ending in a bluntly conoid to hemispheroid terminus.

Male: Similar to females in general morphology except the following. Testes outstretched. Supplements consist of an adanal pair and 10–11 irregularly spaced ventromedians. Spicules 1.6–1.7 anal body diameter long. Lateral guiding piece 1/3.7–1/4.5 of spicule length. Prerectum 3.1–3.8 anal body widths long. Tail short with rounded terminus, 0.8–0.9 anal body widths long.

Habitat and Locality: Collected from soil around the roots of guava at Sonarpur and Baruipur block and from that of litchi at Joynagar, South 24-Parganas district.

Registration Number: On slides, WN1441, WN1442, WN1443 and WN1444, WN1045, WN1446, and WN 1454, deposited in National Zoological Collection, Zoological Survey of India, Kolkata.

Distribution: In India: Uttar Pradesh and West Bengal.

Remark: Ahmad and Jairajpuri (1982) described this species from soil around the roots of mosses and ferns from Uttar Pradesh, India. Females of the present population agree well with those except in having slightly shorter odontostyle and longer prerectum (odontostyle = 24–26 μm and prerectum = 45–67 μm in the female paratypes). They described *A. baqrii* based on a single male paratype. Some measurements in males, although come closer, differ from the present male specimens because no minimum-maximum range of body dimensions of male paratype was provided by Ahmad and Jairajpuri (1982) due to single male ($a = 29$; $c = 58$; prerectum = 65 μm ; spicules = 63 μm ; ventromedian supplements = 12 in the male paratype). This is the first report of the species from West Bengal.

3. *Aporcelaimellus chauhani* Baqri &
Khera, 1975
(Figure 4)

Measurements: Females (n = 11): L = 1.28–1.92 μ m; a = 23.8–33.7; b = 3.5–4.2; c = 28–34; c' = 1.4–2.1; V = 49.6–53.9%; G₁ = 15.4–22.7%; G₂ = 15.4–25.7%; odontostyle = 19.5–22.5 μ m; odontostyle width = 2.5–4 μ m; odontostyle aperture = 8–10 μ m; odontophore = 31.5–34 μ m; maximum body width = 46.5–63.5 μ m, length of pharynx = 343–453 μ m; body width at neck base = 42.5–56.5 μ m; body width at vulva = 46.5–62.5 μ m; expanded part of pharynx = 154–196 μ m; glandularium = 125.5–144.5 μ m; distance of vulva from anterior end = 674–1036 μ m; length of anterior gonad = 240–372.5 μ m; length of posterior gonad = 240–404 μ m; prerectum = 37–83 μ m; rectum = 29.5–41.5 μ m; tail length = 42–61 μ m; anal body diameter = 27–29.5 μ m.

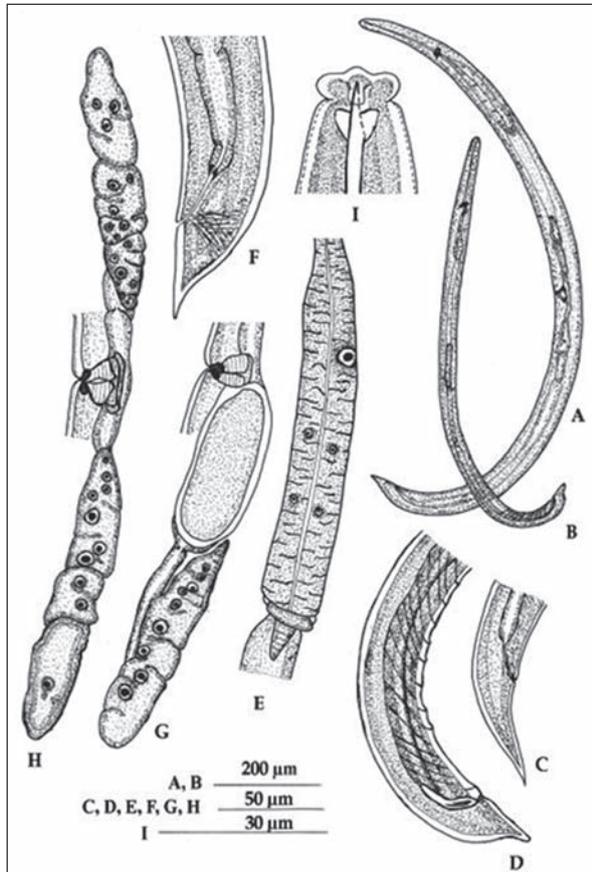


Fig. 4. *Aporcelaimellus chauhani*. Female: A. Entire body, E. Expanded part of pharynx showing gland nuclei and cardia, F. Tail end, G & H. Reproductive system & intra-uterine egg, I. Anterior end. Male: B. Entire body, D. Posterior end showing ventromedian supplements, spicule & tail. Juvenile: C. Tail end.

Male (n = 01): L = 0.80 μ m; a = 27.7; b = 3.4; c = 27.7; c' = 1.1; T = 54.4%; odontostyle = 16.5 μ m; odontostyle aperture = 7.5 μ m; odontophore = 18.5 μ m; maximum body width = 29 μ m; length of pharynx = 235 μ m; body width at neck base = 29 μ m; expanded part of pharynx = 110 μ m; prerectum = 44 μ m; tail length = 29 μ m; anal body diameter = 24.5 μ m.; length of testis = 438.5 μ m; spicule length = 27.5 μ m; Number of Ventromedian supplements = 9.

Juvenile (n = 01): L = 0.85 μ m; a = 26.8; b = 3.4; c = 17.5; c' = 2.5; odontostyle = 14.5 μ m; replacing odontostyle = 14.5 μ m; odontostyle aperture = 7 μ m; odontophore = 19.5 μ m; maximum body width = 32 μ m; length of pharynx = 250 μ m; expanded part of pharynx = 117.5 μ m; body width at neck base = 29 μ m; prerectum = 32 μ m; rectum = 22 μ m; tail length = 49 μ m; anal body diameter = 19.5 μ m.

Diagnosis: Female: Body ventrally curved on fixation, gradually tapering towards anterior end. Cuticle finely striated, 1–2.5 μ m thick at the level of odontostyle, 2.5 μ m at mid body and 3.5–5 μ m on tail. Lip region distinctly set off from body by deep constriction, slightly wider than adjoining body, 15–17 μ m wide and 6–7.5 μ m high. Amphids stirrup shaped, at 8–9 μ m from the anterior end. Odontostyle 1.2–1.4 lip region widths long. Guiding ring indistinct, 9–14.5 μ m from anterior end. Odontophore 1.5–1.7 times the odontostyle length. Nerve ring at 120–127 μ m from anterior end. Expanded portion of pharynx 44.5–47% of the pharyngeal length. Cardiac disc present, Cardia 14.5 μ m long, elongate conoid with finely rounded terminus. Vulva transverse, almost equatorial to slightly post-equatorial. Vagina 18–24.5 μ m long or about half to one-third of the corresponding body width (length of *pars proximalis* vagina 10–14.5 μ m, *pars refringens* 5–6 μ m and *pars distalis* 3–5 μ m), distally sclerotized. Reproductive system amphidelphic. Ovaries reflexed and long, anterior ovary 88–159 μ m and posterior ovary 86–159 μ m long. Prerectum 1.27–1.8 and rectum 1–1.1 anal body-widths long. Tail 1.4–2.1 anal body widths long, ventrally convex-conoid with slight dorsal concavity towards extremity ending in a sub-acute to acute terminus.

Male: Similar in general morphology and most of the body ratios with those of females except much shorter body length and the following features. Lip region 12.5 μm wide and 5 μm high. Amphids at 6 μm from anterior end. Odontophore shorter, 1.1 times the odontostyle length. Nerve ring at 86 μm from anterior end. Testes outstretched. Supplements consist of an adanal pair and eight regularly placed ventromedians. Spicules small, slightly arcuate, 1.1 anal body widths long. Tail 1.2 anal body widths long, with slight dorsal concavity towards extremity, ending in a subacute or finely rounded terminus.

Juvenile: General body shape similar with those of adult females. Lip region 10 μm wide and 6 μm high. Both odontostyle and replacing odontostyle 1.5 lip region-width long, aperture 45.4% of the odontostyle length. Odontophore 1.3 times the odontostyle length. Tail shape and terminus exactly as that of females, 2.5 anal body-widths long.

Habitat and Locality: Collected from soil around the roots of guava at Joynagar block, at Natunpara and Dhaphdapi of Baruipur block, and from soil around the roots of litchi at Sonarpur block, South 24-Parganas district.

Registration Number: On slides, WN 1447, WN 1448, WN 1449 and WN 1450, deposited in National Zoological Collection, Zoological Survey of India, Kolkata.

Distribution: In India: Darjeeling, Hooghly and South 24-Parganas districts of West Bengal.

Remark: The present female specimens are in well conformity with those described by Baqri and Khera (1975) from soil around the roots of banana from Darjeeling district, West Bengal, India except in having sub-acute to acute tail tip, slightly longer odontostyle and tail (odontostyle = 17–20 μm , tail = 34–45 μm with sub-acute terminus). The sub-acute tail of female paratypes agrees well with the tail of single male of the present specimen. Jana and Baqri (1981) reported this species with its first male from the soils of ladies finger (*Hibiscus esculentus*) from Hooghly district, West Bengal. This is the first report of the species from South 24-Parganas district.

4. *Aporcelaimellus coomansi*

Baqri and Khera, 1975

(Figure 5)

Measurements: Females (n = 6): L = 2.04–2.28 mm; a = 40.5–43.5; b = 4.1–4.3; c = 40.5–45.7; c' = 1.4–1.7; V = 52.9–55.2%; G₁ = 11–15.2%; G₂ = 11.7–19.7%; odontostyle = 14.5–17.5 μm ; odontostyle width = 3–4 μm ; odontostyle aperture = 8.5–10 μm ; odontophore = 27.5–29 μm ; maximum body width = 49–54 μm , length of pharynx = 490–534 μm ; body width at neck base = 46.5–51.5 μm ; body width at vulva = 49–54 μm ; expanded part of pharynx = 284–308 μm ; distance of vulva from anterior end = 1132–1240 μm ; vaginal length = 20.5–22.5 μm ; length of anterior gonad = 248–333 μm ; length of posterior gonad = 267–443 μm ; prerectum = 96–216 μm ; rectum = 29–37 μm ; tail length = 49–56 μm ; anal body diameter = 29–34 μm .

Diagnosis: Female: Body slightly ventrally curved on fixation, tapering towards anterior end. Cuticle with striations, 2.5 μm thick at the level of odontostyle and at mid body, 5–6 μm on tail and thickest on tail on tail tip being 13 μm . Lip region set off by constriction, slightly wider than adjoining body; 5 μm high, 15 μm wide or about 1/3.5 of body widths at neck base. Amphids stirrup-shaped, 5 μm from anterior end. Odontostyle 1–1.2 lip region-widths long, its aperture 55.5–56.2% of odontostyle length. Guiding ring at 6–7 μm from anterior end. Odontophore rod-like, 1.5–1.8 times the odontostyle length. Nerve ring at 125–137 μm from anterior end. Expanded portion of pharynx occupying 55–59% of total pharyngeal length. Thin pharyngo-intestinal disc present. Cardia hemispheroid, tongue-shaped. Vulva transverse, slightly post-equatorial. Vagina about 1/2.5 corresponding body-widths long (length of *pars proximalis* vagina 11.5–14.5 μm , *pars refringens* 4–5 μm and *pars distalis* 5–6 μm); very lightly sclerotized distally. Reproductive system amphidelphic. Ovaries reflexed, anterior ovary 68.5–135 μm and posterior ovary 81–174 μm long. Prerectum 3.8–6.3 and rectum 1–1.1 anal body-widths long. Tail short, convex-conoid with rounded terminus, 1.6 anal body-widths long, with two caudal pores on each side.

Male: Not found.

Habitat and Locality: Collected from soil around the roots of litchi from Baruipur and Joynagar block, South 24-Parganas district.

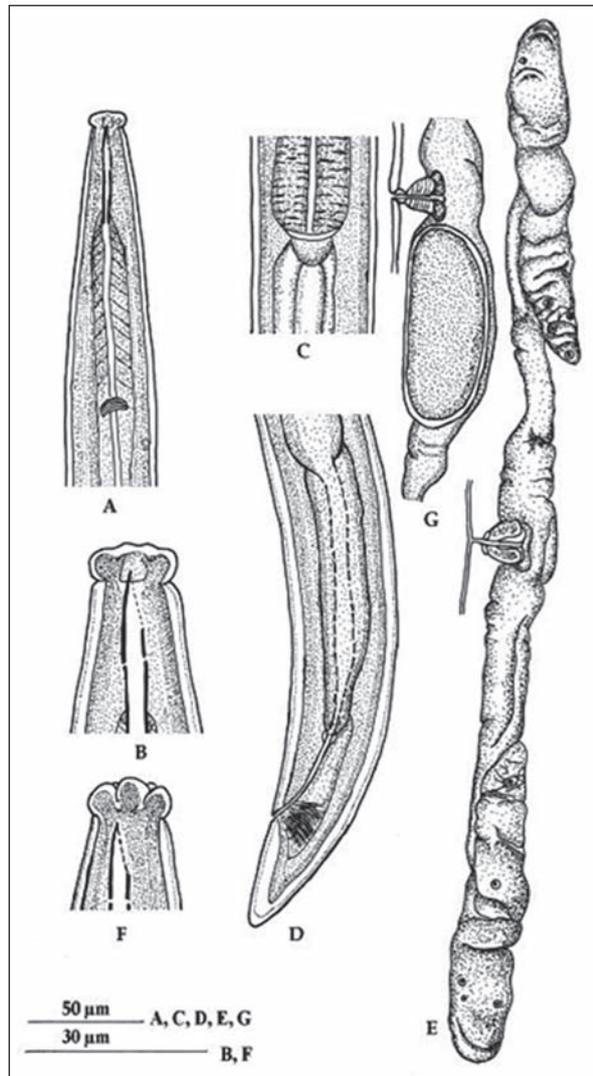


Fig. 5. *Aporcelaimellus coomansi*. Female: A. Anterior end, B & F. Variation in cephalic region, C. Pharyngo-intestinal junction & cardia, D. Posterior end, E. Reproductive system, G. Intra-uterine egg.

Registration Number: On slides, WN1451, WN1452 and WN 1453, deposited in National Zoological Collection, Zoological Survey of India, Kolkata.

Distribution: In India: Darjeeling and South 24-Parganas districts of West Bengal, Silent valley of Kerala.

Remark: Baqri and Khera (1975) described the species from soil around the roots of banana from

Darjeeling district, West Bengal, India. Further, Jana and Baqri (1981) reported the species from same habitat and locality. Then after Ahmad (1995) recorded this species along with its first report of male from soil around the roots of wild tree at Silent Valley, Kerala, India. The present specimens are in conformity with the earlier ones. Andrassy (2001) transferred the species to the genus *Metaporcelaimellus* Lordello, 1965. This is the first report of the species from South 24-Parganas.

5. *Aporcelaimellus indicus*

Baqri & Jairajpuri, 1968

(Figure 6)

Measurements: Females (n = 04): L = 2.31–2.77 mm; a = 37.2–42.8; b = 3.8–4.1; c = 39.2–47; c' = 1.3–1.8; V = 54.8–56.1%; G₁ = 11.2–17.2%; G₂ = 10.5–20.8%; odontostyle = 17.5–24.5 µm; odontostyle aperture = 9.5–12.5 µm; odontophore = 31–35 µm; maximum body width = 54–74.5 µm, length of pharynx = 600–669 µm; body width at neck base = 54–68.5 µm; body width at vulva = 54–71 µm; expanded part of pharynx = 301–392 µm; distance of vulva from anterior end = 1267–1560.5 µm; vaginal length = 27–31 µm; length of anterior gonad = 260–480 µm; length of posterior gonad = 245–580 µm; prerectum = 117.5–159 µm; rectum = 37–56 µm; tail length = 59 µm; anal body diameter = 32–44 µm.

Diagnosis: Female: Body stout, cylindrical, gradually tapering towards anterior end, ventrally curved behind vulva in the posterior portion. Cuticle smooth, 2.5–5 µm thick at the level of odontostyle and at mid body, 6–10 µm on tail and 17 µm on tail tip. Lateral, dorsal and ventral body pores not visible. Lip region set off from body by depression, 7.5 µm high, wider than adjoining body, 17–23 µm wide or about one-third of body width at neck base. Amphids broad, stirrup-shaped, occupying 8–10 µm or about two-fifth of the corresponding body width, located at 8µm from anterior end. Odontostyle slightly more than one lip region-width long, its aperture 52–55.5% of odontostyle length. Odontophore simple, rod-like, 1.4–1.7 times the odontostyle length.

Nerve ring at 139–193 μm from anterior end. Expanded portion of pharynx occupying about 50–58.5% of the pharyngeal length. Pharyngo-intestinal disc present, cardia hemispheroid or tongue-shaped. Vagina about half of the corresponding body-width long, sclerotisation absent. Reproductive system amphidelphic, uterus and oviduct distinctly separated by a sphincter in both anterior and posterior sexual branch. Ovaries reflexed, anterior ovary 90–205 μm and posterior ovary 81–284 μm long, oocytes arranged in a single row. Prerectum 3.6–3.6 and rectum 1.1–1.2 anal body-widths long. Tail 1.3–1.8 anal body widths long, slightly ventrally arcuate, conoid with rounded terminus.

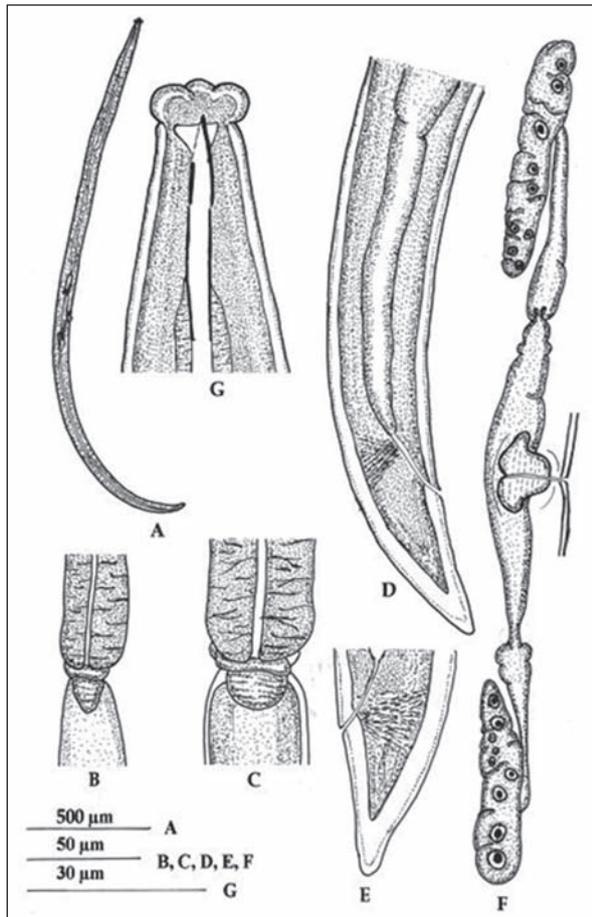


Fig. 6. *Aporcelaimellus indicus*. Female: A. Entire body, B & C. Pharyngo-intestinal junction showing variation in shape of cardia, D & E. Posterior end showing variation in tail shape, F. Reproductive system, G. Anterior body end.

Male: Not found.

Habitat and Locality: Collected from soil around the roots of guava at Dhaphdhabi, Baruipur block, South 24-Parganas district.

Registration Number: On slide, WN1454, WN1455, deposited in National Zoological Collection, Zoological Survey of India, Kolkata

Distribution: In India: Uttar Pradesh and West Bengal.

Remark: The present female specimens conform well with those described by Baqri and Jairajpuri (1968) from soil around the roots of cotton (*Gossypium hirsutum* L.) from Uttar Pradesh, India except in having longer odontostyle, lesser value of a and b (odontostyle = 16 μm ; a = 49–50; b = 4.7 in type specimens). Andrassy (2001) synonymised this species with *Metaporcelaimellus mombucaae* Lordello, 1965. This is the first report of the species from West Bengal.

6. *Aporcelaimellus papillatus* (Bastian, 1865)
Baqri and Khera, 1975

(Figure 7)

Measurements: Females ($n = 1$): $L = 2.23 \mu\text{m}$; $a = 45.5$; $b = 4.3$; $c = 69.6$; $c' = 1.1$; $V = 60.5\%$; $G_1 = 24.4\%$; $G_2 = 25.4\%$; odontostyle = 17.5 μm ; odontostyle width = 4.5 μm ; odontostyle aperture = 10 μm ; odontophore = 39 μm ; maximum body width = 49 μm , length of pharynx = 510 μm ; body width at neck base = 45 μm ; body width at vulva = 49 μm ; expanded part of pharynx = 284 μm ; distance of vulva from anterior end = 1350 μm ; vaginal length = 26.5 μm ; length of anterior gonad = 546 μm ; length of posterior gonad = 568 μm ; prerectum = 179 μm ; rectum = 32 μm ; tail = 32 μm ; anal body diameter = 29 μm .

Males ($n = 1$): $L = 2.24 \mu\text{m}$; $a = 41.5$; $b = 4.1$; $c = 70.1$; $c' = 0.8$; $T = 60\%$; odontostyle = 20.5 μm ; odontostyle width = 4.5 μm ; odontostyle aperture = 11.5 μm ; odontophore = 41 μm ; maximum body width = 54 μm ; length of pharynx = 539 μm ; body width at neck base = 54 μm ; expanded part of pharynx = 274 μm ; prerectum = 184 μm ; rectum = 37 μm ; tail length = 32 μm ; anal body diameter

= 36.75 μm .; length of testis = 1348 μm ; spicule length = 54.5 μm ; Number of Ventromedian supplements = 9.

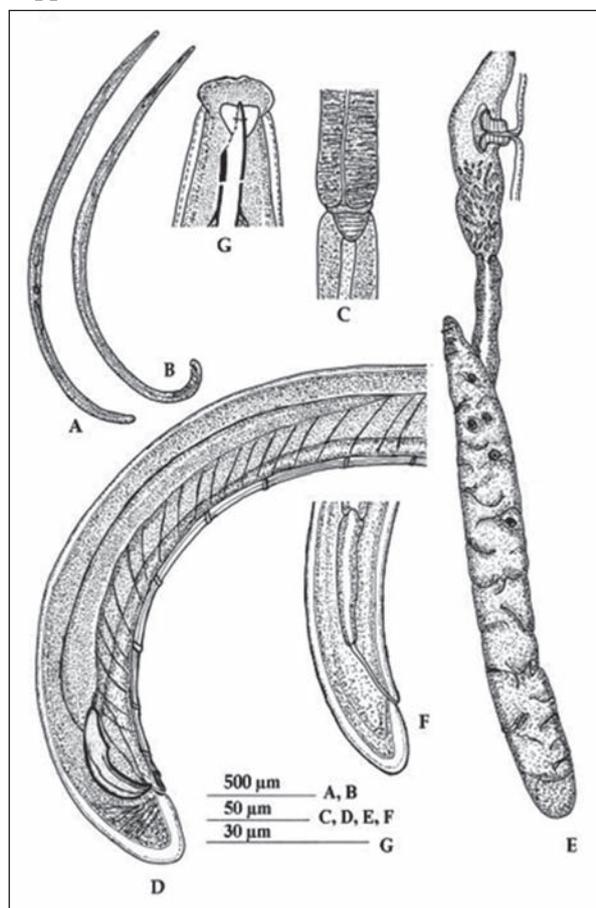


Fig. 7. *Aporcelaimellus papillatus*. Female: A. Entire body, C. Pharyngo-intestinal junction & cardia, E. Posterior branch of gonad, F. Tail end. Male: B. Entire body, D. Posterior body end showing ventromedian supplements & spicule.

Juvenile ($n = 1$): $L = 1.59 \mu\text{m}$; $a = 40.8$; $b = 3.6$; $c = 59$; $c' = 0.9$; odontostyle = 18.5 μm ; Odontostyle width = 4 μm ; replacing odontostyle = 19.5 μm ; odontostyle aperture = 10.5 μm ; odontophore = 36 μm ; maximum body width = 39 μm ; length of pharynx = 441 μm ; expanded part of pharynx = 215.5 μm ; body width at neck base = 39 μm ; prerectum = 71 μm ; rectum = 27 μm ; tail length = 27 μm ; anal body diameter = 29 μm .

Diagnosis: Female, Male and Juvenile: Body ventrally curved upon fixation, particularly the posterior end of male. Cuticle 2.5 μm in female and juvenile and 5 μm in male at the level of

odontostyle, 2.5 μm at mid body, 7.5 μm on tail in male and female and 3.5 μm in juvenile. Body pores indistinct. Lips conspicuous, distinctly set off by constriction; 5 μm high and 15 μm wide in female, 7 μm high and 18 μm wide in male, 6 μm high and 13.5 μm wide in juvenile, slightly wider than adjoining body, exactly one-third of the body width at neck base in male and female. Amphids stirrup-shaped, at 5–7.5 μm from anterior end. Odontostyle and odontophore shorter in female than in male. Odontostyle 1.1 lip region-widths long in female and male, 1.4 lip region-widths long in juvenile; its aperture occupying 55.5–57.3% of odontostyle length. Replacing odontostyle in juvenile 1.5 times the lip region. Guiding ring at 8.5–9.5 μm from anterior end. Odontophore 2–2.2 times the odontostyle length in male and female and 1.9 times in juvenile. Nerve ring at 135 μm in female, 149.5 μm in male and 130 μm in juvenile from anterior end. Expanded portion of pharynx 55.7% in female, 51.1% in male and 48.8% in juvenile of the total pharyngeal length. Thin pharyngo-intestinal disc present, cardia 10 μm and 12 μm in male and female respectively, conoid and tongue-shaped. Female reproductive system amphidelphic. Vulva post-equatorial, vaginal length more than half of the corresponding body width, with sclerotisation. Both ovaries reflexed and long; anterior ovary 208 μm and posterior ovary 245 μm long. In male, testes opposed, anterior outstretched, posterior reflexed. Supplements consist of an adanal pair and eight regularly spaced ventromedians; first pair comes closer to the adanal pair. Spicules slightly arcuate, 1.4 anal body width long. Prerectum 5 – 6 anal body-widths long in male and female and 2.4 in juvenile. Rectum 1 – 1.1 anal body-widths long in all. Tail short, about one anal body-width, convex-conoid with rounded tip in female and in juvenile. Male tail almost hemispheroid, slightly arcuate ventrally.

Habitat and Locality: Collected from soil around the roots of litchi at Khanpara, Baruipur block, South 24-Parganas.

Registration Number: On slide, WN14556,

deposited in National Zoological Collection, Zoological Survey of India, Kolkata.

Distribution: In India: West Bengal.

In World: Italian mainland, Poland, Slovakia.

Remark: This is the first record of the species from India. The present specimens conform well to those described by Bastian (1865) under the genus *Dorylaimus* Dujardin, 1845 except the greater value of 'a' ($a = 30$ in female, 28 in male in the type specimen) Baqri and Khera (1975) transferred the species under *Aporcelaimellus* Heyns, 1965.

7. *Aporcelaimellus tritici* (Bastian, 1865)

Andrássy, 1986

(Figure 8)

Measurements: Females (n=06): L= 1.91–2.11 mm; $a = 25.6$ –43.2; $b = 3.5$ –3.9; $c = 54.6$ –75.2; $c' = 0.7$ –0.9; V = 45.7–53.2%; $G_1 = 10.2$ –13.5%; $G_2 = 10.7$ –13.5%; odontostyle = 18.5–23.5 μm ; odontostyle width = 4–4.5 μm ; odontostyle aperture = 8.5–11.5 μm ; odontophore = 20–36 μm ; maximum body width = 44–86 μm ; length of pharynx = 505–598 μm ; body width at neck base = 44–81 μm ; body width at vulva = 44–83 μm ; expanded part of pharynx = 274–331 μm ; glandularium = 240–257 μm ; distance of vulva from anterior end = 955.5–1134 μm ; vaginal length = 14.5–30.5 μm ; length of anterior gonad = 208–294 μm ; length of posterior gonad = 247–269.5 μm ; prerectum = 49–98 μm ; rectum = 29–49 μm ; tail length = 27–39 μm ; anal body diameter = 34–49 μm .

Diagnosis: Female: Body stout, ventrally curved upon fixation, slightly tapering towards anterior end. Cuticle 3.5–5 μm thick at the level of odontostyle, 3.5 μm at mid body and 10 μm on tail. Lateral, dorsal and ventral body pores not visible. Lip region set off by constriction, 5–7 μm high, slightly wider than adjoining body, 15.5–17 μm wide or 1/2.6–1/4.7 of the body width at neck base. Amphids stirrup-shaped, its aperture about half of the corresponding body width. Odontostyle 1.1–1.3 lip region-widths long, its aperture 47.3–52.6% of the odontostyle length. Nerve ring at 147–166 μm from the anterior end. Expanded

portion of pharynx occupying 51–55% of its total pharyngeal length. Thin pharyngo-intestinal disc present, cardia tongue-shaped, conoid, 19.5–22 μm long. Vulva transverse, slightly pre-equatorial to almost equatorial. Vagina 1/2.6–1/4.8 of the corresponding body-width long (length of *pars proximalis* vagina 7.5–19.5 μm , *pars refringens* 5–6 μm and *pars distalis* 2–5 μm), moderately sclerotized distally. Both ovaries reflexed, anterior ovary 61–115 μm and posterior ovary 71.5–98 μm long. Prerectum 1.2–2.4 and rectum 0.8–1.3 anal body-widths long. Tail 0.7–0.9 anal body-width long, convex-conoid with blunt or rounded terminus.

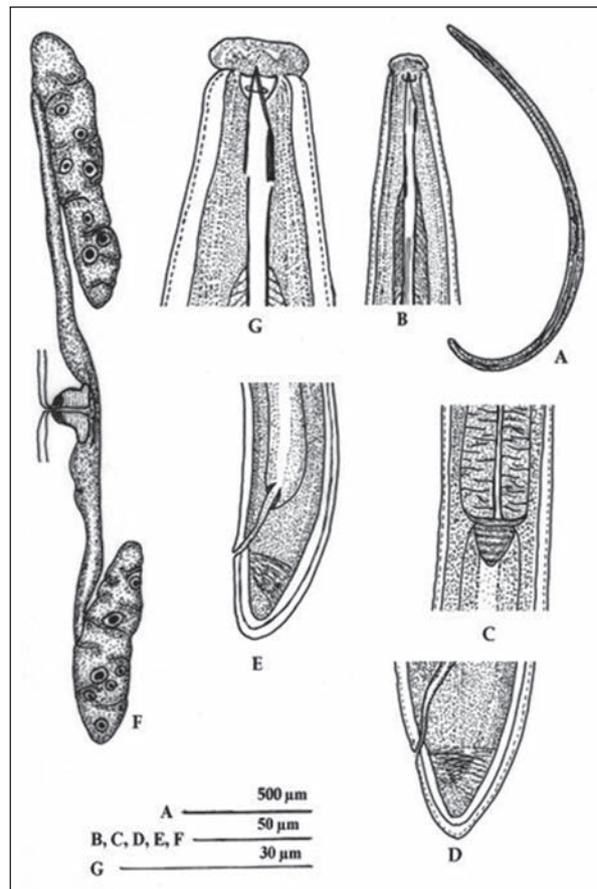


Fig. 8. *Aporcelaimellus tritici*. Female: A. Entire body, B & G. Anterior end, C. Pharyngo-intestinal junction & cardia, D & E. Variation in tail shape, F. Reproductive system.

Male: Not found.

Habitat and Locality: Collected from soil around the roots of guava at Natunpara, Dhaphdahi, Baruipur block, South 24-Parganas district.

Registration Number: On slides, WN1457 and WN 1458, deposited in National Zoological Collection, Zoological Survey of India, Kolkata

Distribution: In India: West Bengal.

In world: Italian Mainland, Poland, Slovakia, Ukraine, The Netherlands, Belgium.

Remark: This is the first report of the species from India. The present specimens conform well to those reported by Thorne and Swanger (1936) except in having greater range of 'a' value ($a = 28$ which is within the range of the present specimens).

8. *Tyleptus projectus* Thorne, 1939

(Figure 9, 10)

Measurements: Females (n = 12): L = 1.06–1.28 mm; $a = 29.9$ –35.1; $b = 4.5$ –5.6; $c = 78.8$ –94.5; $c' = 0.5$ –0.6; V = 30.8–34.2%; $G_1 = 4.8$ –7.1%; $G_2 = 33.7$ –48%; odontostyle = 9–10 μm ; odontophore = 10–11.5 μm ; maximum body width = 33–39 μm , length of pharynx = 208–254 μm ; body width at neck base = 29.5–34 μm ; body width at vulva = 32–37 μm ; basal bulb (expanded part) of pharynx = 27–34 μm ; glandularium = 17.5–26 μm ; distance of vulva from anterior end = 338–397 μm ; vaginal length = 15–17 μm ; length of anterior uterine sac = 52–78 μm ; length of posterior gonad = 360–549 μm ; prerectum = 73.5–91 μm ; rectum = 22–32 μm ; tail length = 12–14.5 μm ; anal body diameter = 21–27 μm .

Male (n = 01): L = 1.03 μm ; $a = 35.7$; $b = 4.9$; $c = 52.8$; $c' = 0.8$; T = 56.2%; odontostyle = 7.5 μm ; odontophore = 7.5 μm ; maximum body width = 29 μm , length of pharynx = 208 μm ; body width at neck base = 27 μm ; basal bulb (expanded part) of pharynx = 32 μm ; prerectum = 54 μm ; tail length = 19.5 μm ; anal body diameter = 22 μm .; length of testis = 583 μm ; spicule length = 31.5 μm ; lateral guiding piece = 12 μm ; Number of Ventromedian supplements = 3.

Diagnosis: Female: Body slightly ventrally curved on fixation. Cuticle smooth and uniform all over the body, 1–2.5 μm thick at the level of

odontostyle and on tail, 2.5 μm at mid body. Sub cuticle smooth or with fine transverse striations, 1.5–3 μm apart. Lip region set off by depression, liplets prominent. Head narrower than adjoining body, 5 μm high, 8.5–10 μm or one-third or slightly more of neck base-width wide. Amphids

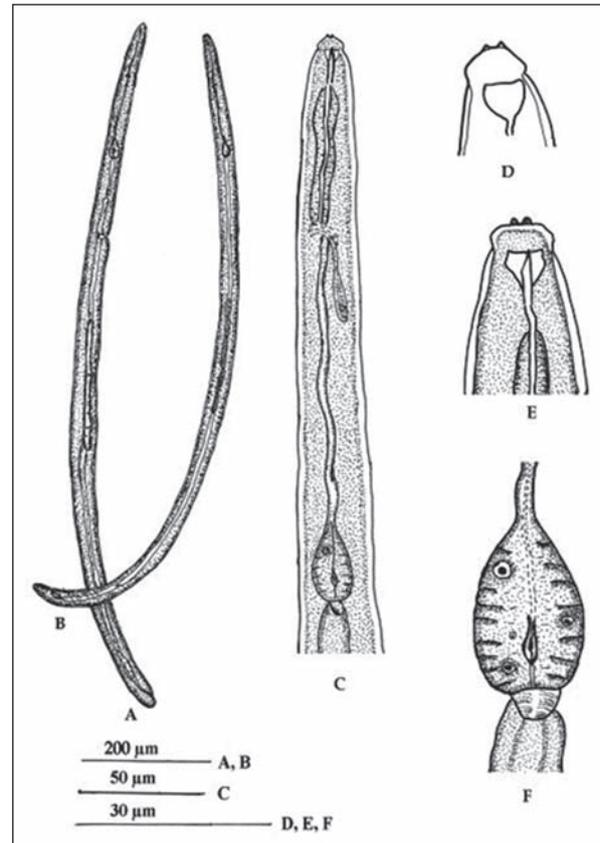


Fig. 9. *Tyleptus projectus*. Female: A. Entire body, C. Anterior portion of body showing pharynx, D & E. Anterior end showing cephalic region, amphid & odontostyle, F. Pharyngeal bulb & cardia, Male: B. Entire body

wide, stirrup-shaped, 5–6 μm from anterior end, apertures occupying about 6 μm or 51% of the corresponding body width. Odontostyle 0.9–1.1 lip region-width long. Guiding ring about 5 μm from anterior end. Odontophore 1–1.2 times the odontostyle length. Expanded part of pharynx a pyriform bulb measuring 27–34 $\mu\text{m} \times 15$ –17 μm , occupying 12.2–14.9% of total pharyngeal length. Cardia small, broadly rounded, 4–5 μm long. Vulva transverse, distinctly pre-equatorial. Vaginal length about half or slightly more of the corresponding body width, unsclerotized. Reproductive system

mono-opisthodelphic. Anterior branch of gonad in the form of a uterine sac, 1.6–2.4 vulval body-widths long, containing spindle-shaped sperms in some specimens. Posterior branch of gonad very long well developed. Posterior ovary reflexed, 166–216 μm long. Distinct sphincter present at uterus-oviduct junction. Prerectum 3.4–4.1 and rectum 1–1.5 anal body width long. Tail short, broadly rounded, 0.5–0.6 anal body width long.

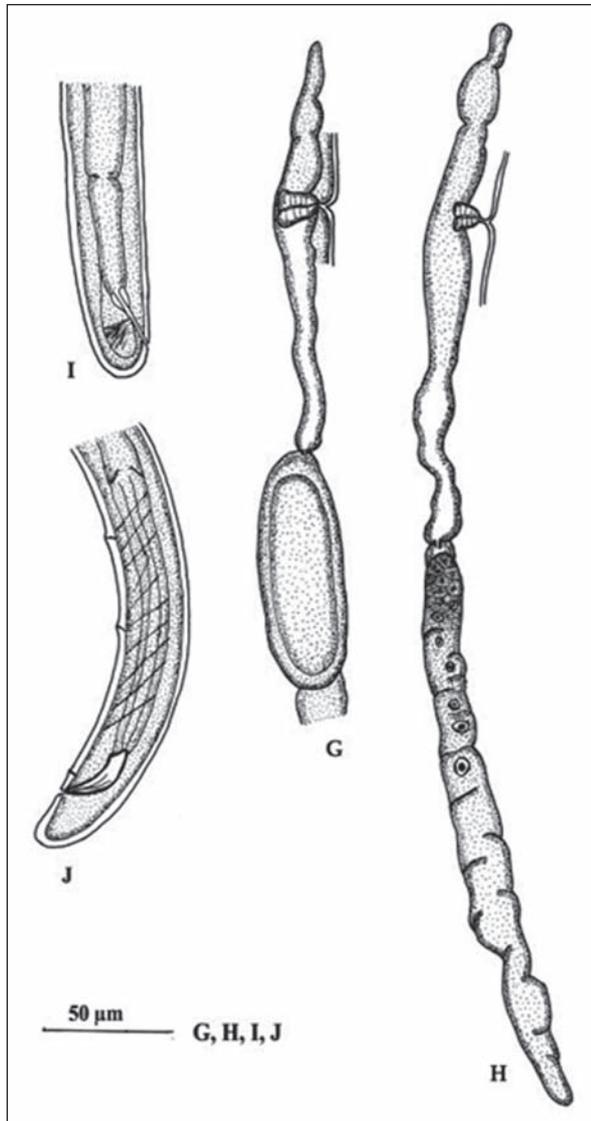


Fig. 10. *Tyleptus projectus*. Female: G & H. Mono-opisthodelphic reproductive system showing intra-uterine egg and anterior uterine sae. I. Tail, Male: J. Posterior end showing ventromedian supplements, spicule & tail.

Male: Similar to female in general morphology except the following. Testes outstretched. Spicules 1.4 anal body width long. Lateral guiding piece

1/2.6 of the spicular length. Supplements consist of two weakly developed ventromedians and an adanal pair. Tail rounded, 0.8 anal body width long.

Habitat and Locality: Collected from soil around the roots of guava at Kolupara and Sikharbali of Baruipur block, South 24-Parganas district.

Registration Number: On slides, WN1459, WN1460 and WN1461, deposited in National Zoological Collection, Zoological Survey of India, Kolkata

Distribution: In India: Jalpaiguri and South 24-Parganas districts of West Bengal.

In world: Virginia, U.S.A. and Martin State Forest, Indiana.

Remark: The present specimens fit well with the type specimens of *Tyleptus projectus* described by Thorne (1939). Goseco *et al.* (1974) reported a single male of *T. projectus* from Martin State Forest, Indiana in which spicule is 43 μm long. Jana and Baqri (1981) reported this species from soil around the roots of banana (*Musa* sp.) from Jalpaiguri district, West Bengal, India in which the spicule length of male population is 30–32 μm being totally consistent with the present specimens. This is the first report of *T. projectus* from South 24-parganas district, West Bengal, India.

SUMMARY

Few specimens of *Aporcelaimellus amylovorus* (Thorne and Swanger, 1936) Heyns, 1965, *Aporcelaimellus baqrii* Ahmad & Jairajpuri, 1982, *Aporcelaimellus chauhani* Baqri & Khera, 1975, *Aporcelaimellus coomansi* Baqri and Khera, 1975, *Aporcelaimellus indicus* Baqri & Jairajpuri, 1968, *Aporcelaimellus papillatus* (Bastian, 1865) Baqri and Khera, 1975, *Aporcelaimellus tritici* (Bastian, 1865) Andrassy, 1986 and *Tyleptus projectus* Thorne, 1939 were collected from soil around the roots of guava and litchi plantations at different locations of South 24-Parganas district. Among these *A. papillatus* and *A. tritici* are the new records from India. The other species are

with the new distributional records from South 24-Parganas as well as from West Bengal. The distributions of the species in India as well as elsewhere in the world have been provided.

ACKNOWLEDGEMENT

The author is grateful to the Director, Zoological Survey of India, Kolkata to carry out the work and to publish the result.

REFERENCES

- Ahmad, W. 1995. Studies on the genus *Aporcelaimellus* Heyns, 1965 (Dorylaimida: Aporcelaimidae) from India. *Fundam. appl. Nematol.*, **18**: 219–225.
- Ahmad, W. and Jairajpuri, M. S. 1982. Some new and known species of Dorylaimoidea. *Nematologica*, **28**: 39–61.
- Andrássy, I. 2001. A taxonomic review of the genera *Aporcelaimus* Thorne and Swanger, 1936 and *Metaporcelaimus*, Lordello, 1965 (Nematoda: Aporcelaimidae). *Opusc. Zool. Budapest*, **XXXIII**: 7–47.
- Baqri, Q. H. and Khera, S. 1975. Two new species of the genus *Aporcelaimellus* Heyns, 1965 with some remarks on the relationship of *Aporcelaimellus* and *Eudorylaimus* Andrassy, 1959 (Dorylaimida: Nematoda). *Dr. B. S. Chauhan Comm. Vol.*, pp 171–180.
- Baqri, Q. H. and Jairajpuri, M. S. 1968. On six new species of Dorylaimida (Nematoda). *Journal of Helminthology*, **42**(3–4): 243–256.
- Bastian, H. C. 1865. Monograph on the Anguillulidae or free nematoids, marine, land and freshwater with description of hundred new species. *Trans Linn. Soc. Lond.*, **25**: 73–184.
- Christie, J. R. and Perry, V.G. 1951. Removing nematodes from soil. *Proceedings of Helminthological Society of Washington*, **18**: 106–108.
- Cobb, N. A. 1918. Estimating the nema population of the soil. *Agricultural Technology Circular I*. Bureau of Plant Industry, United States Department of Agriculture 48pp.
- De Ley, P., Loof, P. A. A. and Coomans, A. 1993. Terrestrial nematodes from the Galapagos Archipelago. II: Redescription of *Aporcelaimellus obtusicaudatus* (Bastian, 1865) Altherr, 1968 with review of similar species and a nomenclature for the vagina in Dorylaimida (Nematoda). *Bull. Inst. R. Sci. Nat. Belgique, Biol.*, **63**: 13–34.
- De Maeseneer, J. & D'Herde, C. J. 1963. Méthodes utilisées pour l'étude des anguillules libres du sol. *Revue Agriculture, Bruxelles*, **16**: 441–447.
- Goseco, C. G., Ferris, V. R. and Ferris, J. M. 1974. Revision in Leptonchoidea (Nematoda: Dorylaimida). *Tyleptus* in Leptonchidae, Tyleptinae; *Basirotyleptus* in Leptonchidae, Belonenchinae and *Loncharionema* n. gen. in Leptonchidae, Xiphinemellinae. *Purdue Univ. Agr. Exp. Sta. Res. Bull.*, **913**: 25pp.
- Jana, A. and Baqri, Q. H. 1981. Nematodes from West Bengal (India) XI. Studies on the species of the super family Leptonchoidea (Dorylaimida). *J. Zool. Soc. India*, **33**(1-2): 1–24.
- Thorne, G. 1939. A monograph of the nematodes of the superfamily Dorylaimoidea. *Capita Zool.*, **8**: 1–261.
- Thorne, G and Swanger, H. 1936. A monograph of the nematode genera *Dorylaimus* Dujardin, *Aporcelaimellus* n. gen., *Dorylaimoides* n. gen. and *Pungentus* n. gen. *Capita Zool.*, **6**: 1–223.