A New Subfamily, A New Subgenus and Eight New Species of Nematodes from India Belonging to Superfamily Tylenchoidea

S. Ishar Husain and ABRAR M. Khan

The genera belonging to the family Tylenchidae differ greatly with respect to sclerotization of the cephalic framework. In *Tylenchus*, *Psilenchus*, and *Macrotrophurus* cephalic sclerotization is absent; in *Trophurus*, *Pseudhalenchus*, and *Ditylenchus*, weak sclerotization is present; and in *Tylenchorhynchus* and *Telotylenchus* it is quite conspicuous. It therefore appears that there is a gradual evolution of the cephalic sclerotization in the family Tylenchidae leading to the genera of the families Hoplolaimidae and Pratylenchidae with well-developed sclerotization. Moreover, the presence of two ovaries, large enveloping bursa, large size of phasmids, and conspicuous head sclerotization of the genera *Tylenchorhynchus* and *Telotylenchus* show affinities with the members of Hoplolaimidae.

Siddiqi (1960) described the genus *Telotylenchus*, which he placed along with *Pseudhalenchus* Tarjan, 1958 in a new subfamily Telotylenchinae. Loof (1963), rightly questioned the creation of this subfamily as the two genera in question exhibit resemblance with respect to basal esophageal region only, a character not enough to warrant the creation of a separate subfamily. *Telotylenchus* resembles *Tylenchorhynchus* more than it resembles *Pseudhalenchus* with regard to the shape of head and spear, relative dimensions of the various body parts, number and form of ovaries, tail shape in both sexes, details of male reproductive organs and the large size of phasmids. Therefore, *Telotylenchus* is better placed with *Tylenchorhynchus* and *Pseudhalenchus* with *Ditylenchus* which it closely resembles.

Recently Eliava (1964) created a new subfamily Tylenchorhynchinae under Hoplolaimidae to accommodate *Tylenchorhynchus* because of its conspicuous head sclerotization, well-developed stylet with parallel protractor muscles, raylike phasmids, and large enveloping bursa. From the recent account on the morphology of 68 species of the genus *Tylenchorhynchus* given by Tarjan (1964), 45 species possess inconspicuous head sclerotization, 8 species moderately conspicuous head sclerotization and 11 species very conspicuous head sclerotization. Furthermore the genera having two ovaries like *Psilenchus* and *Macrotrophurus*, well-developed stylet like *Macrotrophurus* and *Tetylenchus*, and large enveloping bursa like *Trophurus*, *Macrotrophurus*, *Neoditylenchus*, and *Sychnotylenchus* are found in Tylenchidae also as in Hoplolaimidae. Although the majority of the species of the genus *Tylenchorhynchus* possess relatively conspicuous phasmids *T. microphasmis* Loof, 1959 possesses a relatively small phasmid, a characteristic feature of Tylenchidae.

Moreover, Eliava (1964) failed to include *Telotylenchus*, a closely related genus to *Tylenchorhynchus* under Tylenchorhynchinae. In view of these facts the subfamily Tylenchorhynchinae should better be placed under Tylenchidae as a link between the families Tylenchidae, Hoplolaimidae, and Pratylenchidae. An amended diagnosis of Tylenchorhynchinae is therefore presented.

Linford and Oliveira (1940) proposed the genus *Rotylenchulus* which along with *Nacobbus* Thorne and Allen, 1944 was placed in the newly created subfamily Nacobbinae under the family Pratylenchidae. Allen (1960) on the other hand suggested that *Rotylenchulus* should be placed near *Helicotylenchus* Steinier, 1945 in the family Hoplolaimidae and that *Nacobbus* in the subfamily Nacobbinae of the family Pratylenchidae. Similar views were expressed by Siddiqi (1963) with respect to the genus *Nacobbus*. The authors while generally agreeing with Allen (1960) and Siddiqi (1963) feel that in view of the saccate body of the mature female of the genus *Rotylenchulus* and the nature of its parasitism, this genus does not fit in the existing subfamilies of the family Hoplolaimidae and therefore a new subfamily Rotylenchulinae is proposed under Hoplolaimidae.
idiae to include the genus *Rotylenchulus*. A key to the subfamilies of Hoplolaimidae is presented.

**Subfamily Tylenchorhynchinae**

**Eliava, 1964.**

**Diagnosis:** Tylenchidae: Lip region continuous or set off by a constriction. Head skeleton fairly well developed. Lateral field with four to six incisures. Cuticle distinctly annulated. Phasmids large; deirids indistinct; amphids porelike near the lateral lips. Spear well developed and knobbed. Terminal portion of esophagus glandular, overlapping the intestine or set-off bulb. Gonads paired, opposed, outstretched. Female tail short and rounded. Bursa enveloping male tail.

**Type genus:** *Tylenchorhynchus* Cobb, 1913.

**Other genus:** *Telotylenchus* Siddiqi, 1960.

**Subfamily Tylenchinae**

**De Man, 1876**

**Diagnosis:** Tylenchidae: Lip region smooth or striated. Head skeleton slight or absent. Lateral field marked with incisures. Cuticle finely or coarsely annulated. Amphids usually porelike, located near the lateral lips or sometimes elliptical slits placed below the level of lateral lips. Terminal portion of esophagus a definite bulb, sometimes lobed behind and extending slightly over the intestine (glandular, overlapping the intestine in *Pseudhalenchus*). Gonad single or paired; if single, short postuterine sac present. Tail long filiform, convex-conoid to broadly rounded or sometimes with clavate terminus. Bursa adanal, subcaudal or caudal.

**Type genus:** *Tylenchus* Bastian, 1865.

**Other genera:** *Ditylenchus*, *Neoditylenchus*, *Sychnotylenchus*, *Psilenchus*, *Macrotrichus*, *Anguina*, *Paranguina*, *Trophurus*, *Chitinotylenchus*, *Tetelylenchus*, *Tyldorusrus*.

The authors have proposed a new subgenus *Ottolenchus* under the genus *Tylenchus* Bastian, 1865.

**Tylenchus** subgenus

**Ottolenchus** n. subgen.

**Diagnosis:** Tylenchus: Small sized nematodes. Body cuticle strongly annulated. Lateral field with only two crenate incisures, running parallel to the body till anus or cloaca.

Head rounded with a slight depression at the base of lip region, without clear annulations. Median bulb oval. Males with moderately developed distinctly crenate bursa. Spicules and gubernaculum tylenchoid. Tail long and filiform with acute terminus which is often recurved.

**Type species:** *Tylenchus (Ottolenchus) equisetus* n. subgen., n. sp.

**Tylenchus (Ottolenchus) equisetus**

**n. subgen., n. sp.**

(Fig. 1, A-D)

**Females** (12): L = 0.38–0.47 mm; a = 27–28; b = 5.4–6.5; c = 4.4–4.6; V = 58–62%; spear = 12–14 μ.

**Males** (8): L = 0.40–0.48 mm; a = 30–35; b = 5.3–6.3; c = 3.5–4.7; spear = 12–14 μ; spicules = 15–17 μ; gubernaculum = 5–6 μ.

**Description:** Body cylindrical, open C-shaped when relaxed by gentle heat, tapering on both extremities. Cuticle and subcuticle strongly annulated. Head flat and rounded with a slight depression at the base of the lip region. Spear with rounded basal knobs, 12–14 μ in length. Orifice of the dorsal esophageal gland close to spear base. Procorpus a slender tube ending in an oval valvulated median bulb. Isthmus long and slender, encircled by a nerve ring. Excretory pore situated at 68–72 μ from the anterior end of the body. Basal esophageal bulb pyriform with three gland nuclei, set off from the intestine. Cardia rounded. The distance from the anterior end of the body to the center of the medium bulb is slightly less than the distance from the latter to the base of esophagus.

Vulva postequatorial with reduced lateral cuticular flap. Ovary single, prodelphic, outstretched with oocytes arranged in a single file. Oval spermatheca present. Postuterine sac short, half the vulvar-body width long. Tail long and filiform with acute terminus, 12–14 times the anal-body widths long, tip often recurved. Lateral field marked by two strongly crenate incisures, running parallel to the body upto the anus or cloaca.

Males similar to females in shape and appearance. Body more slender than females. Testis single, outstretched. Spicules paired, tylenchoid 15–17 μ in length when measured along the curved median line, ventrally curved.
**Figure 1, A-D. Tylenchus (Ottolenchus) equisetus** n. subgen., n. sp. A. Esophageal region of female; B. Lateral field; C. Female tail; D. Male tail.

and cephalated, Gubernaculum simple, 5–6 μ long. Bursa moderately developed, distinctly crenate, originating at the level of the head of the spicules and terminating at more than two cloacal-body diameters behind the cloaca, nearly four times the cloacal-body width long. Tail 14–16 times the cloacal-body widths long with acutely pointed terminus. Phasmids post-anal, nearly one cloacal-body width behind the cloaca.

**Holotype:** Female, Slide No. 101, deposited with the Plant Pathology Section, Department of Botany, Aligarh Muslim University, Aligarh, U.P., India.

**Allotype:** Male, Slide No. 101-B, collected with the females; other data same as for holotype.

**Paratypes:** Twenty-five females and 15 males in the collection of the authors.

**Type Habitat:** Soil around the roots of *Casuarina equisetifolia* Forst.

**Type Locality:** University Campus, Aligarh Muslim University, Aligarh, U.P., India.

**Diagnosis and Relationship:** *Tylenchus* subgen., *Ottolenchus* n. subgen. resembles *T. subgen. Miculenchus* Andrassy, 1959 and *T. subgen. Aglenchus* Andrassy, 1954. It differs from the former in possessing moderately developed bursa in males (bursa absent in *Miculenchus*) and lip region not clearly annulated while from the latter in possessing oval median bulb (median bulb round in *Aglenchus*) and only two strongly crenate incisures in the lateral field.

*Tylenchus (Lelenchus) mirus* n. sp.

(Fig. 2, A–D)

**Females (4):** L = 0.36–0.42 mm; a = 32–35; b = 5.4–6.9; c = 3.7–4.8; V = 63–64%; spear = 10–11 μ.

**Males (3):** L = 0.35–0.38 mm; a = 32–39; b = 4.6–5.0; c = 3.5–4.1; spear = 10–12 μ; spicules = 11–13 μ; gubernaculum = 3–4 μ.

**Description:** Body cylindrical, ventrally arcuate when relaxed by gentle heat, tapering on both extremities. Cuticle finely annulated. Lateral field marked by four incisures. Lip region rounded, continuous with the body contour, annulated, annulations faint. Spear short with rounded basal knobs, 10–11 μ long. Orifice of the dorsal esophageal gland close to spear base. Corpus a slender tube ending in...
PROCEEDINGS OF THE 
[Vol. 34, No. 2

Figure 2, A–D. *Tylenchus (Lelenchus) minis* n. sp. A. Esophageal region of female; B. Portion of female reproductive organs; C. Female tail; D. Male tail. Figure 2, E–G. *Tylenchus (Lelenchus) cynodontus* n. sp. E. Esophageal region of female; F. Lateral field; G. Female tail.

Vulva postequatorial. Ovary single, prodelphic, outstretched with oocytes arranged in a single file. Elongate pouchlike spermatheca present. Postuterine sac short, nearly half the vulvar-body width long.

Males similar to females in shape and appearance. Testis single, outstretched. Spicules paired, arcuate, 11–13 μ long when measured along the curved median line. Gubernaculum short and simple, 3–4 μ in length. Bursa rudimentary, 2½ times the cloacal-body widths long.

**Holotype:** Female, Slide No. 103, deposited with the Plant Pathology Section, Department of Botany, Aligarh Muslim University, Aligarh, U.P., India.

**Allotype:** Male, Slide No. 103 B, collected with the females; other data same as for holotype.

**Paratypes:** Three females and two males in the collection of the authors.

**Type Habitat:** Soil around the roots of *Hibiscus rosa-sinensis* L.

**Type Locality:** University Campus, Aligarh Muslim University, Aligarh, U.P., India.

**Diagnosis and Relationship:** *Tylenchus (Lelenchus) minis* n. sp. comes closer to *T. (L.) discrepans* Andrassy, 1954, and *T. (L.) infirmus* Andrassy, 1954. It differs from the former in the position of vulva, size of the spear and the tail length (tail ten times the anal-body widths long in *T. (L.) discrepans*), and from the latter in the larger size of the body and position of vulva (V = 57.9% in *T. (L.) infirmus*).

*Tylenchus (Lelenchus) cynodontus* n. sp.

**Figure 2, E–G**

**Females (6):** L = 0.39–0.48 mm; a = 26–32; b = 4.7–5.2; c = 4.3–5.2; V = 60–65%; spear = 9–11 μ.

**Description:** Body cylindrical, ventrally arcuate when relaxed by gentle heat, tapering on both extremities. Cuticle finely annulated. Lateral field marked by four incisures, occupying nearly ¼ the corresponding body width. Lip region continuous with the body contour, flat and rounded, narrower than front end of body. Spear short with small rounded basal knobs, 9–11 μ long. Orifice of the dorsal esophageal gland close to spear base. Procorpus a slender tube ending in a fusiform median bulb.
Isthmus long encircled by a nerve ring. Hemizonid distinct, situated 2–3 body annules anterior to the excretory pore. Basal esophageal bulb spindle-shaped. Cardia rounded. The distance from the anterior end of the body to the center of the median bulb is slightly less than the distance from the latter to the base of esophagus. Rectum short, nearly \( \frac{1}{3} \) of the anal-body width long. Tail long and filiform with acute terminus, measuring nearly 8–9 times the anal-body widths. Nearly last quarter of the tail dorsally bent.

Vulva postequatorial. Ovary single, prolongate, outstretched with oocytes arranged in a single file. Elongate pouchlike spermatheca present, measuring 20 by 7 \( \mu \). Postuterine sac short, nearly half the vulvar-body width long.

**Holotype:** Female, Slide No. 102, deposited with the Plant Pathology Section, Department of Botany, Aligarh Muslim University, Aligarh, U.P., India.

**Paratypes:** Five females in the collection of the authors.

**Type habitat:** Soil around the roots of *Cynodon dactylon* (L.) pers.

**Type locality:** Aligarh, U.P., India.

**Diagnosis and relationship:** *Tylenchus (Lelenckus) cynodontis* n. sp. resembles *T. (L.) discrepans* Andrassy, 1954 but differs from it in the absence of males, size of the spear (spear = 7.0–7.7 \( \mu \) in *T. (L.) discrepans*), length of the tail (c = 4.0–4.4 in *T. (L.) discrepans*), continuous head and comparatively more posteriorly located vulva.

**Ditylenchus minutus** n. sp. (Fig. 3, A–C)

**Females** (15): \( L = 0.35–0.48 \) mm; \( a = 20–27; b = 4.5–4.7; c = 10–13; V = 72–80\%; 

**Males** (5): \( L = 0.32–0.38 \) mm; \( a = 23–25; b = 4.2–4.7; c = 9–10; spear = 8–9 \( \mu \); spicules = 10–12 \( \mu \); gubernaculum = 4–5 \( \mu \).

**Description:** Body cylindrical, regularly tapering towards both extremities. Cuticle finely annulated. Lateral field marked by four incisures. Lip region slightly set off, striated. Buccal spear weak, with basal knobs. Orifice of the dorsal esophageal gland close to the spear base. Procorpus a slender tube ending in an oval valvulated median bulb. Isthmus long, encircled by a nerve ring posterior to its middle. Basal esophageal bulb distinctly set off from the intestine. Excretory pore 71 \( \mu \) apart from the anterior end of the body.

Vulva a transverse slit. Ovary single, prolongate, outstretched with oocytes arranged in a single file. Postuterine sac twice or slightly more than twice the vulvar-body widths long, extending half way from vulva to anus. Rectum half or slightly less than half the anal-body width long. Tail elongate-conoid with sub-acute terminus.

**Males** similar in appearance to females. Testis single, outstretched spermatocytes serially arranged. Spicules paired, ventrally arcuate, cephaled, 10–12 \( \mu \) long. Gubernaculum simple, trough-shaped, 4–5 \( \mu \) in length. Bursa crenate, enveloping less than \( \frac{1}{3} \) of the tail length. Tail ventrally arcuate, regularly tapering and ending in a subacute terminus.

**Holotype:** Female, collected in October 1964, Slide No. 115, deposited with the Plant Pathology Section, Department of Botany, Aligarh Muslim University, Aligarh, U.P., India.

**Paratypes:** Twenty females and six males in the collection of the authors.

**Type habitat:** Soil around the roots of *Punica granatum* L.

**Type locality:** Ghazipur, U.P., India.

**Diagnosis and relationship:** *Ditylenchus minimus* n. sp. resembles *D. misellus* Andrassy, 1958 as regards body size but can at once be differentiated by the almost straight body shape on being relaxed (spiral in *D. misellus*); more posteriorly located vulva (V = 68.2\% in *D. misellus*); more robust body and short tail.

**Ditylenchus cyperi** n. sp. (Fig. 3, D–G)

**Females** (10): \( L = 0.50–0.66 \) mm; \( a = 18–29; b = 5.2–6.3; c = 17–18; V = 75–83\%; 

**Males** (2): \( L = 0.46–0.50 \) mm; \( a = 22–33; b = 4.5–4.9; c = 15–17; spear = 10–11 \( \mu \); spicules = 15–18 \( \mu \); gubernaculum = 7–9 \( \mu \).

**Description:** Body cylindrical, tapering on both extremities, slightly arcuate on death.
Cuticle finely annulated. Lateral field marked by five incisures. Lip region continuous with the body contour, flat and rounded. Spear weakly developed with knobs, 10–11 μ long. Orifice of the dorsal esophageal gland close to spear base. Corpus a slender tube with oval valveulated median bulb. Basal esophageal bulb slightly overlapping the intestine ventrally. Isthmus encircled by a nerve ring. Excretory pore situated near the beginning of the basal esophageal bulb. Hemizonid 2–3 body annules long, situated just anterior to the excretory pore.


Males similar to females in general appearance. Testis single, outstretched. Spermatoocytes serially arranged. Spicules paired, ventrally arcuate, cephalated, 15–18 μ long. Gubernaculum simple, 7–9 μ in length. Bursa subcaudal, originating at the level slightly anterior to the head of the spicules.

**Holotype:** Female, collected in December, 1964, Slide No. 116, deposited with the Plant Pathology Section, Department of Botany, Aligarh Muslim University, Aligarh, U.P., India.

**Allotype:** Male, Slide No. 116-B, collected with the female; other data same as for holotype.

**Paratypes:** Nine females and one male in the collection of the authors.

**Type Habitat:** Soil around the roots of *Cyperus rotundus* L.

**Type Locality:** University Campus, Aligarh Muslim University, Aligarh.

**Diagnosis and Relationship:** *Ditylenchus cyperi* n. sp. resembles *D. nannus* Siddiqi, 1963, *D. mirus* Siddiqi, 1963, *D. procerus* (Bally and Raydon, 1931) Filjpev, 1936, and *D. dipsecoideus* (Andrássy, 1952) Andrássy, 1956, but differs from (i) *D. nannus* in the position of vulva, size of the spear, and spicules and in the tail shape; (ii) *D. mirus* in the position of vulva, size of the spear and gubernaculum and in tail shape; (iii) *D. procerus* in the body width and tail length (c = 14 in *D. procerus*) and (iv) *D. dipsecoideus* in the longer postuterine sac, lateral field with five incisures and more terminal bursa in males.

*P. 180* PROCEEDINGS OF THE

**Figure 3, A–G. Ditylenchus minutus** n. sp. A. Esophageal region of female; B. Male tail (ventral view); C. Female tail. Figure 3, D–G. *Ditylenchus cyperi* n. sp. D. Esophageal region of female; E. Male tail; F. Lateral field; G. Female tail.

*P. 182* PROCEEDINGS OF THE

**Figure 4, A–E.**

**Females (8):** L = 0.51–0.61 mm; a = 24–29; b = 5.7–6.6; c = 9–10; V = 72–75%; spear = 10–11 μ.

**Males (2):** L = 0.45–0.47 mm; a = 32–34; b = 4.9–5.2; c = 9–10; spear = 10–11 μ; spicules = 12–15 μ; gubernaculum = 6–7 μ.
Figure 4, A–E. *Ditylenchus ausafi* n. sp. A. Esophageal region of female; B. Male tail; C. Entire male; D. Female tail; E. Entire female.

Ovary single, prodelphic, outstretched with oocytes arranged in a single file, sometimes reaching near the basal esophageal bulb. Postuterine sac slightly more than vulvar-body width long. Tail long elongate-conoid with subacute terminus.


HOLOTYPE: Female, collected in December, 1964, Slide No. 117, deposited with the Plant Pathology Section, Department of Botany, Aligarh Muslim University, Aligarh, U.P., India.

ALLOTYPE: Male, Slide No. 117-B, collected with the females; other data same as for holotype.

PARATYPES: Seven females and one male in the collection of the authors.

TYPE HABITAT: Soil around the roots of *Rosa* sp.

THE LOCALITY: University Campus, Aligarh Muslim University, Aligarh.

DIAGNOSIS AND RELATIONSHIP: *D. ausafi* n. sp. comes closer to *D. cypéri* n. sp., *D. nannus* Siddiqi, 1963, *D. mirus* Siddiqi, 1963, and *D. dipsecoideus* (Andrássy, 1952) Andrássy, 1956, but differs from (i) *D. cypéri* in the number of incisions in the lateral field, long tail, short bursa and anteriorly located vulva; (ii) *D. nannus* and *D. mirus* in possessing long tail, short bursa, shape of the tail terminus and more anteriorly located vulva; and (iii) *D. dipsecoideus* in short bursa and longer body.

Pseudhalenchus minutus Tarjan, 1958

**MALE (1):** L = 0.44 mm; a = 36.6; b = 4.2; c = 9.3; spear = 8 μ; spicules = 14 μ; gubernaculum = 5 μ.

Although the specimens of *Pseudhalenchus minutus* Tarjan, 1958, isolated from around the roots of *Brassica oleracea* L. differ from the original measurements as given by its author, but in view of the fact that only one specimen was isolated, it has, therefore, been considered as geographical variant of *P. minutus*. This is the first report of this species from India.

Subfamily Rotylenchulinae n. subfam.

DIAGNOSIS: Hoplolaimidae: Sexual dimorphism a prominent feature, female being swollen to kidney shape, male vermiform. Orifice of the dorsal esophageal gland about half way between spear base and median esophageal bulb. Females with two ovaries and post median vulva. Esophageal glands forming long lobe overlapping the intestine. Male with rather weak head sclerotization, weak spear, and reduced esophagus and with or without bursa.

TYPE AND ONLY GENUS: *Rotylenchulus* Lindford and Oliveira, 1940.

A KEY TO THE SUBFAMILIES OF *HOPLOLAIMIDAE*

1. Mature females vermiform .................. 2
   Mature females swollen, kidney shaped .................. Rotylenchulinae n. subfam.

2. Basal part of esophagus bulbular ............ 3
   Basal part of esophagus glandular ......... 3
   Basal part of esophagus glabular ........ 3

3. Ovaries paired .......................... 4
   Ovary single .......................... 4

4. Phasmids absent .......................... 5
   Phasmids present .......................... 5

5. Heads show sexual dimorphism, cephalic framework usually with strong sclerotization, spear 2–4½ times head-width long .......................... 4
   Heads four lobed; spear considerably long ... Belonolaiminae Whitehead, 1958
Figure 5, A–D. *Rotylenchus helicus* n. sp. A. Esophageal region; B. Female tail; C. Lateral field; D. Entire female.
Rotylenchus helicus n. sp.
(Fig. 5, A–D)

FEMALES (20): L = 0.66–0.86 mm; a = 26–30; b = 4.9–6.7; c = 56–93; V = 20–2855–70% 85%; spear = 28–32 μ.

DESCRIPTION: Body spirally curved when relaxed by gentle heat. Cuticle distinctly annulated, annules 2 μ apart at midbody. Lateral field marked by four cretate incisures, measuring % of the corresponding body width, outer incisures more distinct than the inner ones. Lip region hemispherical, with five labial annules, slightly set off, if at all. Labial sclerotization moderate. Spear well developed with anteriorly concave and posteriorly convex knobs, anterior part of the spear slightly shorter than the posterior part. Orifice of the dorsal esophageal gland more than half the spear length behind the spear base, measuring 15–18 μ from the spear base. Procorpus cylindrical ending in an oval median bulbus with well-developed valvular apparatus. Nerve ring just behind the median bulbus. Excretory pore near the end of the glandular esophagus. Esophageal glands overlapping the intestine more than four body annules dorsally, laterally and ventrally, typically the greatest overlap dorsally. Intestinal portion granular. Rectum distinct, slightly less than the anal-body width long. Phasmids 3–5 annules posterior to anus. Tail convex-conoid with broadly rounded terminus, ½–¾ anal-body width long. Tail annules numbering 8–10 ventrally.


Males not found.

HOLOTYPE: Female, Slide No. 361, deposited with the Plant Pathology Section, Department of Botany, Aligarh Muslim University, Aligarh, U.P., India.

PARATYPES: Fifty females in the collection of the authors.

TYPE HABITAT: Soil around the roots of Psidium guajava L.

TYPE LOCALITY: Rampur, U.P., India.

DIAGNOSIS AND RELATIONSHIP: Rotylenchus helicus n. sp. resembles R. quartus (Andrássy, 1958) Sher, 1961, R. buxophilus Golden, 1956, R. unisexus Sher, 1965, and R. orientalis Siddiqi and Husain, 1964, but differs from all except the last named species in possessing the orifice of the dorsal esophageal gland at more than half the spear length behind the spear base and shorter tail. It further differs from (i) R. quartus in head shape, position of vulva (V = 54–59% in R. quartus) and the number of tail annules; (ii) R. buxophilus in possessing smaller body, size of the spear and the position of vulva (V = 52–58% in R. buxophilus); (iii) R. unisexus in the number of lip region annules, positions of excretory pore, phasmid and vulva; (iv) R. incultus in the positions of excretory pore, phasmid and vulva, absence of males and in the presence of distinct epitygma in females; (v) R. orientalis in the size of the spear, position of phasmid, presence of distinct epitygma and normally developed ovaries (posterior ovary reduced in R. orientalis).

Hemicycliophora dhirendri n. sp.
(Fig. 6, A–E)

FEMALES (6): L = 0.64–0.77 mm; a = 15–24; b = 5.2–6.3; c = 11–12, V = 80–85%; spear = 67–70 μ; Body annules = 100–240.

MALES (2): L = 0.56–0.64 mm; a = 20–27; b = ?; c = 7.0–7.2; spicules = 40–41 μ; gubernaculum = 10 μ.

DESCRIPTION: Body remains almost straight on death or assumes a slightly ventrally arcuate shape; cylindrical, almost of the same diameter up to vulva from where it narrows uniformly into an elongate conical tail. Fifth cuticle of the body not very loose. Cephalic framework moderately sclerotized. Lip region continuous with the body contour, flat and rounded with one or two annules. Lateral field a single line, crossed by transverse annulations and forming rectangular blocks. Spear well developed extending up to 18–20 annules of the body; slightly arcuate with posteriorly backward flattened knobs, spear tip 45–48 μ long. Orifice of the dorsal esophageal gland 7 μ from the spear base. The whole spear is enclosed by the procorpus of the esophagus which is fused with the metacorpus. Isthmus short, expanding to form a pyriform basal bulbus. Nerve ring encircles the isthmsus. Hemizonid not seen. Excretory pore 4–6 annules posterior to the base of the esophagus, i.e., on 38th to 42nd body annule.
Figure 6, A–E. *Hemicycliophobia dhirendri* n. sp.  
A. Esophageal region of male; B. Male tail; C. Female tail region; D. Female esophageal region; E. Ovary monodelphic, prodelphic and outstretched with prominent spherical spermatheca filled with sperms; spermatheca set off. Oocytes arranged in a single row except for a short region of multiplication. Vulva opens under a folded skirt of second cuticle. Tail conical with rounded terminus.

Male cuticle marked by fine transverse striae. Lateral field marked by two crenate incisures becoming invisible after cloaca. Lip region slightly expanded. Spear absent. Pharynx with slight sclerotization forming a chamber. Testis single, outstretched. Spicules sickle-shaped. Bursa crenate, less than two times as long as body-width. Tail conoid with a rounded terminus.

**Holotype:** Female, collected in October, 1964, Slide No. 661, deposited with the Plant Pathology Section, Department of Botany, Aligarh Muslim University, Aligarh, U.P., India.

**Allotype:** Male, Slide No. 661-B, collected with the females, other data same as for holotype.

**Paratypes:** Five females and one male in the collection of the authors.

**Type Habitat:** Soil around the roots of *Cyperus rotundus* L.

**Type Locality:** University Campus, Aligarh Muslim University, Aligarh.

**Diagnosis and Relationship:** *Hemicycliophobia dhirendri* n. sp. comes closer to *H. oostenbrinki* Luc, 1958; *H. typica* De Man, 1921 and *H. uniformis* Thorne, 1955. It differs from *H. oostenbrinki* in the absence of longitudinal lines, hemizonid and the tubular sheath covering the spicules. It also differs in the tail shape and size of the spicules. It differs from *H. typica* in the size of the spear, lateral field, male body-width and in having the vulva under a folded skirt. From *H. uniformis*, it differs in lesser number of body annules and smaller size of the females.

**Summary**

Interrelationship of the genera of the family Tylenchidae with special reference to *Tylenchorhynchus* and *Telotylenchus* is discussed. The subfamily Tylenchorhynchinae Eliava, 1964 is shifted to the family Tylenchidae for the last two named genera, which can serve as a bridge between the families Tylenchidae, Hoplolaimidae and Pratylenchidae. The systematic position of the genus *Rotylenchulus* is also discussed with the erection of a new subfamily Rotylenchulinae (Hoplolaimidae) for it. A new subgenus *Ottolenchus* is proposed under the genus *Tylenchus* Bastian, 1865. Two new species under the subgenus *Lelenchus* of the genus *Tylenchus*, three new species of the genus *Ditylenchus* and a new species each of *Rotylenchulus* and *Hemicycliophobia* are described from Indian soils. *Pseudohalcnchus minutiis* Tarjan, 1958, is reported for the first time from this country.

**Literature Cited**


Andrassy, I. 1954. Revision der Gattung *Tylen-


