MAP DEPICTING DIFFERENT AREAS OF COLLECTION IN PANJAB
MAP OF PUNJAB
Genus *Filenchus* was considered to be a junior synonym of *Tylenchus* by many workers (Thecne and Nalek, 1968; Bello, 1971; Golden, 1971) while held as valid by many others (Goodey, 1963; Siddiqi, 1971; Andrássy, 1976, 1979).
Andrássy (1979a) in a revision of the genus *Tylenchus* restricted the latter to 15 species and excluded others, some of which were included in the genus *Filenchus*. Andrássy (1976) also synonymised *Lelenchus* Andrássy, 1954 with *Filenchus*, which has been followed by Siddiqi (1986). Siddiqi (1986) has also considered genera *Dactylotylenchus* Wu, 1968 and *Lambertia* Brzeski, 1977 as junior synonyms of *Filenchus*. Following the transfer of genus *Lelenchus* to *Filenchus* species reported from India are:

  - syn. *Tylenchus (Lelenchus) mirus* Husain and Khan, 1967

  - syn. *Tylenchus (Lelenchus) cynodontus* Hussain and Khan, 1967

- *F. microdorus* (Chawla, Prasad, Khan and Nand, 1969) Siddiqi, 1986
  - syn. *Tylenchus (Lelenchus) microdorus* Chawla, Prasad, Khan and Nand 1969


- *F. annulatus* (Siddiqui and Khan, 1983) Siddiqi, 1986
  - syn. *Lelenchus annulatus* Siddiqui and Khan, 1983

- *F. crassus* (Siddiqui and Khan, 1983) Siddiqi, 1986

Following species have been transferred from genus *Tylenchus* to *Filenchus* by Siddiqi (1986)

- *F. goodeyi* (Das, 1960) Siddici, 1986
  - syn. *Tylenchus (Filenchus) goodeyi* Das, 1960

- *F. afghanicus* (Khan and Khan, 1978) Siddiqi, 1986

- *F. sheri* (Khan and Khan, 1978) Siddiqi, 1986
Filenchus pavidus sp. nov.

Plate I; Figs. A - G

MEASUREMENTS:

Female (n=10) : L=0.45 - 0.57 mm; a=36.4 - 54.9; b=5.5 - 6.8; c=3.4 - 4.6; V=50.5 - 53; Stylet=10.3 - 12.3 μm; G₁=95.79 - 108.15 μm.

Male (n=4) : L=0.44 - 0.45 mm; a=28.7 - 36.5; b=5.4 - 6.2; c=2.4 - 3.9; Stylet=10.3 - 11.3 μm; Spicules=12.3 - 13.3 μm; Bursa=20.6 - 30.9 μm; Gubernaculum=5.0 - 5.5 μm; T=149.3.

DESCRIPTION

Female: Eelworm slender, ventrally arcuate when killed by gentle heat, tapering towards both the extremities. Cuticle striated; measuring about 1.8 - 2.1 μm at mid body. Lateral field marked by four incisures measuring 1/3rd of corresponding body width. Cephalic framework weakly sclerotized. Lip region continuous, 2.5 μm high and 5 μm wide. Stylet moderately developed; measuring 10.3 - 12.3 μm in length with slightly backwardly directed knobs measuring 1.2 μm across. Opening of dorsal oesophageal gland located 2 - 2.5 μm behind the stylet base. Oesophagus 77.2 - 87.5 μm long; median bulb ovate with weakly developed cuticular thickenings; 36 - 46.3 μm from anterior end and 8.2 x 6.1 μm in dimensions. Cardia present. Nerve ring encircling the isthmus; located at 46.3 - 56.6 μm from anterior end. Hemizonid adjacent to excretory pore; 1 - 3 annules anterior to the latter.

Vulva a transverse slit; without lateral membranes. Ovary single, prodelphic and outstretched. Post-uterine sac 1/3rd of the corresponding body width. Tail filiform 150 - 185 μm long, ending in a pointed terminus.

**Diagnosis and relationship**

The present species and specimens are assigned to genus *Filenchus* because of annulated cuticle, lateral fields with four incisures cephalic sclerotization weak, an outstretched ovary, and tail elongate, straight and filiform.

**DIFFERENTIAL DIAGNOSIS**

The new species comes close to *F. conicephalus* Siddiqi and Khan, 1983 in the shape of the lip region, distance of DOG opening from the stylet base, length of excretory pore from anterior end and 'c' and 'c' values. It, however, differs from it in having shorter stylet, greater value of a, more anteriorly situated vulva and in the presence of males (Stylet=12 - 17 μm; a=24.0 - 34.5; V=62.8 - 64.8 and males are absent in *F. conicephalus* Siddiqi and Khan, 1983).

In view of the above differences the present species has been considered as new to science and is named as *Filenchus pavidus*.

**Holotype** - One female; collected on 25th July, 1986.

**Paratypes** - Nine females and four males, other particulars as for the holotype.

**Type habitat** - From the rhizosphere of rice.

**Type locality** - Harike.
The genus *Coslenchus* was proposed by Siddiqi (1978). He transferred from *Aglenchus* to *Coslenchus* those species which had longitudinal ridges around body, viz., *C. costatus* (de Man, 1921) Siddiqi, 1978 (type species) and *C. indicus* (Khan, Chawla and Prasad, 1969) Siddiqi, 1978; *C. areolatus* (Egunjobi, 1967) Siddiqi, 1978 and *C. lycopersicus* (Husain and Khan, 1976) Siddiqi, 1978. Andrásy (1982) shifted *Aglenchus assamensis* Phukan and Sanwal, 1980 to the genus *Coslenchus*. Siddiqui and Khan (1982) described five new species of this genus: *C. brevis* and *C. tausifi* were reported from the rhizosphere of *Mannihot utilissima* at Ooti, Tamil Nadu; *C. emelcius* was described from soil around roots of banana from Tamil Nadu; from soil around roots of pine, *C. temperatus* was collected at Pahalgam in Jammu and Kashmir while *C. lycus* was reported from Tamil Nadu from the rhizosphere of geranium. Bajaj and Bhatti (1983) described *C. polygyrus* from soil around roots of citrus at Sirsa in Haryana. Siddiqi (1986), in his new classification, has synonymised genus *Cosaglenchus* Siddiqui and Khan, 1983 with *Coslenchus* and hence transferred *Coslenchus rafiqus* Siddiqui and Khan, 1983 and *Cosaglenchus modicus* Siddiqui and Khan, 1983 to the genus *Coslenchus*. Lal and Khan (1987) described *C. diversus* and *C. erectus* collected from the rhizospheres of sorai and *Acacia auriculiformis* respectively from Uttar Pradesh.
**Coslenchus costatus** (de Man, 1921) Siddiqi, 1978

syn. **Tylenchus costatus** de Man, 1921

**T. (Aglenchus) costatus** de Man (Andrásy, 1954)

**Aglenchus costatus** (de Man) Meyl, 1961

**Anguillulina costata** (de Man) Goodey, 1932

**T. buffalorae** Altherr, 1950

**Anguillulina buffalorae** (Altherr) Altherr, 1952

**Coslenchus buffalorae** (Altherr) Siddiqi, 1986

**T. (Aglenchus) neozelandicus** Egunjobi, 1967

**Coslenchus neozelandicus** (Egunjobi) Siddiqi, 1986

**Platell;** Figs. A - F

**MEASUREMENTS:**

Female (n=7): L=0.45 - 0.48 mm; a=23 - 29.6; b=4.5 - 4.8; c=5.7 - 6.2; V=62.5 - 66.8; Stylet=12.6 - 14.5 μm.

Male: not observed.

**DESCRIPTION**

Female: Body slender, assumes a ventrally arcuate shape towards the posterior end when killed by heat. Body tapering towards both extremities. Body cuticle annulated, annules about 1.4 - 3.3 μm apart at midbody. Longitudinal ridges 13 - 18 in number. Lip region continuous to semi-offset, measuring 3.5 to 3.8 μm high and 4.5 - 5 μm wide bearing four faint annules. Stylet 12.6 - 14.5 μm long, conus 4.8 - 5.6 μm long, shaft bears well developed basal knobs. Orifice of dorsal oesophageal gland located 1.2 - 1.4 μm behind stylet base. Oesophagus 85 - 95 μm from anterior end; median oesophageal bulb pyriform; 37 - 42 μm from anterior end. Cardia
present. Nerve ring encircling the isthmus and is located at 60 - 65 μm from the anterior end. Excretory pore 72 - 78 μm from the anterior end. Hemizonid adjacent to excretory pore.

Vulva a transverse slit. Vagina at right angle to body axis, occupying about 1/4th of corresponding body width. Post-vulval uterine sac present. Tail long and filiform measuring 82 - 95 μm; ending in a pointed terminus.

REMARKS

The original description of Coslenchus costatus (de Man, 1921) Siddiqi, 1978 has been supplemented by various authors (Andrássy, 1954; Egunjobi, 1967; Bello and Geraert, 1972; Kheiri, 1972 and Wood, 1973) who studied and re-described it as such or under other names which have now been held synonymous of C. costatus. The species, viz. Tylenchus (Aglenchus) neozelandicus described by Egunjobi (1967) were synonymised with Aglenchus costatus (de Man, 1921) Meyl, 1961 by Bello and Geraert (1972) after a study of their paratypes. Kheiri (1972), studied Aglenchus costatus populations and stated that cuticle consisted of 14 longitudinal ridges separated by 12 longitudinal striae, excluding the four incisures of lateral fields. He also pointed out that the usual number of longitudinal ridges, given as 18 - 24 by Andrássy (1954) was inclusive of the lateral fields and that de Man's drawing also showed the vulval region with lateral field and 7 ridges. Wood (1973), after studying the transverse striations of New Zealand isolate of A. costatus, gave the number of longitudinal striae to be 16. Wood further stated that the inner incisures of lateral fields may appear as two fine lines with central flat area between two longitudinal ridges in transverse sections.
The present author's observation on *Coslenchus costatus* (de Man, 1971) Siddiqi, 1978 made on seven females from the rhizosphere of rice, conform to those of the other authors. The longitudinal striae observed in the present studies are 12 - 16 and lateral field has 3 - 4 incisures.

Habitat - Rhizosphere of rice

Locality - Ludhiana
**Coslenchus robustus** sp. nov.

Plate III; Figs. A - E

**MEASUREMENTS:**

Female (n=7): L=0.40 - 0.42 mm; a=36.3 - 38.9; b=4.2 - 4.9; c=4.2 - 4.7; c'=12 - 13.7; V=64 - 66.8; Stylet=10.5 - 11 μm;

Male: not observed.

**DESCRIPTION**

Female: Body slender, assuming a ventrally arcuate shape when killed by gentle heat. Body tapering towards both extremities. Cuticle annulated, annules 1 - 1.5 μm wide at midbody. Lateral field with three incisures occupying about 1/3rd of the corresponding body width. Lip region semi-offset, 3.5 - 4.8 μm wide x 2.2 - 3 μm high, bearing 2 - 4 annules, annules sometimes not clear. Cephalic framework lightly sclerotized. Stylet 10.5 - 11 μm long; conus 5 μm long; shaft bears slightly posteriorly directed knobs. Dorsal oesophageal gland orifice 1.3 μm behind stylet base. Oesophagus 83 - 97 μm long; distance from anterior end to base of median bulb 37 - 46 μm; basal oesophageal bulb pyriform, set off from intestine. Cardia distinct. Nerve ring at middle of isthmus; 50 μm from the anterior end. Excretory pore 67 - 75 μm from anterior end. Hemizonid immediately anterior to excretory pore.

Vulva transverse, lateral membranes distinct. Vagina at right angles to body axis occupying about 1/2 the corresponding body width. Ovary monodelphic, prodelphic and outstretched. Post-uterine sac less than 1/2 of vulval-body width long. Tail filiform, measuring 84 - 96 μm long i.e., more than 12 anal body widths long ending in a pointed terminus.
Diagnosis and relationship

The characters, viz. body cuticle coarsely annulated, presence of longitudinal striae; lateral field with 3 incisures; basal oesophageal bulb set off from intestine; vagina at right angles to body axis; tail filiform; assign the present species and specimens to Coslenchus.

DIFFERENTIAL DIAGNOSIS

The new species comes close to C. tausifi Siddiqui and Khan, 1982 in its head shape, total length of oesophagus from the anterior end, tail length and 'b' and 'c' values. It, however, differs from the latter in having longer stylet, comparatively anteriorly situated vulva, DOG opening more posterior to stylet base and greater 'a' value. (Stylet=9 - 10 μm; V=71 - 72%; DOG= 1.5 μm and a=23 - 28.8 in C. tausifi Siddiqui and Khan, 1982).

In view of the above differences, the present species has been found new to the science and is named as Coslenchus robustus.

Paratypes - Six females, other details as per holotype.
Type habitat - From the rhizosphere of rice.
Type locality - Hoshiarpur.
Subfamily - Boleodorinae Khan, 1964
syn. Basiriinae Decker, 1972

Genus - Basiria Siddiqi, 1959

Tylenchus (Clavilenchus Jairajpuri, 1966)

Clavilenchus Jairajpuri, 1966 (Thorne and Malek, 1968)

Genus Basiria was erected by Siddiqi (1959) and synonymised with Tylenchus (Fileichus) by Goodey (1963). It was rediagnosed and reinstated by Siddiqi (1963a). Siddiqi (1959) described B. graminiphila from soil around roots of grasses and citrus collected at Aligarh, U.P. He (1963a) transferred Psilenchus abercans Thorne, 1949 and Psilenchus gracilis Thorne, 1949 to Basiria. B. ritteri was described in 1969 by Baqri and Jairajpuri as Tylenchus ritteri and later on shifted to Basiria by Bernard (1980). Jairajpuri (1965) described B. kashmiriensis from the roots of apple, Pyrus malus collected at Srinagar, Kashmir. Khan and Nanjappa (1971) transferred Trophurus indicus Chawla, Bhamturkar, Khan and Prasad, 1968; collected from the rhizosphere of custard apple, Annona squamosa from New Delhi to Basiria as B. indica. Fotedar and Mahajan (1973) added two more species, viz. B. haki and B. tritici collected from the soil around roots of Brassica oleracea and Triticum aestivum respectively from Kashmir. Darekar and Khan (1979) reported B. nasikensis from wheat roots from Maharashtra. Bajaj and Bhatti (1979) described two new species from Haryana; B. hissariensis was collected from soil around roots of Pyrus malus and B. indica from Mangifera indica. Siddiqi (1986) proposed B. babhi as nom. nov. for B. indica pre-occupied...

The names of the species B. simlai and B. raskiensis have been emended as B. simlaensis and B. raskiensis (Nomenclature corrections - Article 31-A)

**Basiria tenuis** sp. nov.

Plate IV; Figs. A – G

**MEASUREMENTS:**

Female (n=8) : L=0.57 - 0.66 mm; a=39.6 - 47; b=5.4 - 6.4; c=5.4 - 6.4; c'=10.5 - 14.2; Stylet=10.3 - 11.3 μm V=63 - 66; G₁=164.8 - 226.6 μm.

Male (n=4) : L=0.59 - 0.65 mm; a=42.6 - 48.1; b=5.5 - 5.9; c=5 - 5.6; c'=10.2 - 11.4; Stylet=10.3 μm; Spicules=18.5 - 19.5 μm; Bursa=20 - 30 μm; Gubernaculum=5.15 - 5.25 μm.

**DESCRIPTION**

Female : Body slightly arcuate in posture when killed. Cuticle annulated, annule width less than 1 μm at midbody. Head offset; 3 μm high and 5μm wide, finely striated. Lateral fields four, plain occupying about 1/6th of the corresponding body width. Stylet 10.3 - 11.3 μm long with
small posteriorly directed knobs. Length of metenchium and telenchium almost same; 5 - 5.2 \( \mu \text{m} \). Orifice of dorsal oesophageal gland located 2 \( \mu \text{m} \) behind stylet base. Oesophageal length 97 - 113 \( \mu \text{m} \) long consisting of a procorpus; valvate median bulb; pyriform basal bulb; well set-off from intestine. Nerve ring situated 68-72 \( \mu \text{m} \) from anterior end. Excretory pore located posterior to nerve ring in the region of basal bulb; 82.4 - 92.7 \( \mu \text{m} \) from anterior end.

Vulva post-equatorial, vagina about 1/5th of vulval body diameter in length. Ovary monodelphic, prodelphic and outstretched. Oocytes arranged in a single row. Post-uterine sac about \( 1/2 \) of the vulval-body width in length. Distance between vulva and anus equal to tail. Phasmid post-anal; 65 -75 \( \mu \text{m} \) from tail end. Tail elongate, filiform; 97.8 - 121.3 \( \mu \text{m} \) long; about 12 - 15 anal-body width long, tapering to a rounded terminus.

Male: Essential morphology same as female. Spicules 18.5 - 19.5 \( \mu \text{m} \) long. Gubernaculum rod like with a slight curve; 5.1 - 5.2 \( \mu \text{m} \) long. Bursa adanal; 20 - 30 \( \mu \text{m} \) long.

**Diagnosis and relationship**

The present species has been assigned to the genus *Basiria* as cuticle is finely annulated, lateral field with four incisures, amphidial aperture prominent; located at base of lateral lip areas, stylet slender, basal bulb offset from intestine. Cardia present and ovary is single and outstretched.

**DIFFERENTIAL DIAGNOSIS**

The new species comes close to *B. graminophila* Siddiqi, 1959. Its character, viz. shape of lip region, distance of excretory pore from anterior end, total oesophageal length, 'b' and 'c' values bring it closer to
B. graminophila Siddiqi, 1959. It, however, differs from it in having smaller stylet; value of MB; dorsal oesophageal gland opening closer to stylet base and greater spicule length (Stylet=11 - 13 μm; MB=51 - 57%; DOG opening=5 - 9 μm and spicule length=14 - 17 μm in B. graminophila Siddiqi, 1959).

In view of the above differences, the present species is considered new to science and is named as B. tenuis.

Holotype - One female, collected on 7th October, 1985
Paratypes - Seven females and four males; other details as per holotype.
Type habitat - Rhizosphere of rice.
Type locality - Gurdaspur.
Basiria lautus sp. nov.

Plate V; Figs. A - F

MEASUREMENTS:

Female (n=5) : L=0.60 - 0.61 mm; a=38.3 - 40; b=5.8 - 6.0; c=5.8 - 6.3; c'=5.8 - 6.6; Stylet=11 - 12 μm; V=61.2 - 62.7; G1=135 - 175 μm.

Male : not observed.

DESCRIPTION

Female : Body generally straight when relaxed. Body cuticle finely annulated, annules less than 1 μm apart at midbody. Lateral fields with four plain incisures, occupying about 1/4 of the corresponding body width. Lip region continuous; 2 μm high and 4 μm wide. Lip striations absent. Stylet slender; 11 - 12 μm long with rounded knobs. Metenchium and telenchium equal in length; 5 - 5.5 μm. Orifice of dorsal oesophageal gland 3.4 - 3.6 μm behind stylet base. Oesophagus length 100 - 106 μm from anterior end. Median bulb ovate, slightly posterior to the middle of oesophagus (MB=51 - 53%). Basal bulb pyriform; set-off from intestine. Excretory pore located in the region of isthmus posterior to nerve ring; 80 - 86 μm from anterior end. Nerve ring enveloping isthmus near its middle.

Vulva post-median. Vagina about 1/3rd of vulval-body width long. Oocytes arranged in a single row. Post-uterine sac more than 1 the vulval body width. Vulva-anus distance slightly greater than tail length. Tail 10 - 11 anal body width long, filiform with a clavate terminus.

Diagnosis and relationship

This species is assigned to genus Basiria as cuticle is finely annulated, lateral field with four incisures, amphidial aperture very prominent

DIFFERENTIAL DIAGNOSIS

The new species comes close to *B. ritteri* (Baqri and Jairajpuri, 1969) Bernard, 1980 in the shape of the head, tail length and similar 'b' and 'c' values. It, however, differs from it in having longer stylet, posteriorly situated median bulb, position of excretory pore and anteriorly situated vulva (stylet=9–10 μm; MB=36–39%; excretory pore originates at the middle of basal bulb and V=71–77% in *B. ritteri* (Baqri and Jairajpuri, 1969) Bernard, 1980).

In view of the above differences, the present species has been considered new to science and is named as *E. lautus*.

Holotype - One female, collected on 13th November, 1985.
Paratypes - Four females; other particulars as per holotype.
Type habitat - Rhizosphere of rice.
Type locality - Gurdaspur.
Basiria pakhi Hashim, 1985 (=nom. nov.)
syn. Basiria elegans Patil and Khan, 1983
nec. Basiria elegans (Khan and Khan, 1975) Bajaj and Bhatti, 1979

Plate VI; Figs. A - F

MEASUREMENTS:

Female (n=6) : L=0.46 - 0.68 mm; a=41 - 53; b=5.4 - 7.6; c=5.8 - 6.2; V=61 - 65; Stylet=10.5 - 13 μm.

Male: not observed.

DESCRIPTION

Female : Body slender, tapering towards both extremities. Cuticle annulated, annules 1.1 - 1.3 μm apart at midbody. Lateral fields four; occupying 1/3rd of the corresponding body width; with outer fields annulated. Lip region 3 - 3.2 μm high and 5 μm wide, continuous with very weak sclerotization. Stylet 10.5 - 13 μm long with rounded stylet knobs. Orifice of dorsal oesophageal gland 3 - 4 μm behind stylet base. Oesophagus 95 - 104.2 μm long, median bulb 48 - 52.5 μm long from anterior end. Cardia present. Excretory pore 72 - 84 μm from anterior end. Nerve ring 68 - 70 μm from anterior end.

Vulva transverse slit, vagina about half the vulval body width. Ovary monodelphic, prodelphic, outstretched. Oocytes arranged in a single row. Spermatheca present. Tail measuring 72 - 78 μm long and filiform; ending in a pointed terminus.
REMARKS

The present species closely fit in the description of *B. pakhi* Hashim, 1986 (nom. nov.) syn. *B. elegans* Patil and Khan, 1983. In the present studies 'a' value and stylet length has been observed to be slightly longer.

Habitat - Rhizosphere of rice.
Locality - Fardkot.
Subfamily - Duosulciinae Siddiqi, 1979

Genus Malenchus Andrássy, 1968

Malenchus eslami Siddiqui and Khan, 1983

Plate VII; Figs. A - E

MEASUREMENTS:

Female (n=4) : L=0.27-0.32 mm; p=20 - 24; b=4.2 - 4.5; c=4 - 5.2; 
V=60.9 - 62.8; Stylet=7.5 - 8.2 μm.

Male : not observed.

DESCRIPTION

Female : Eelworm small, ventrally arcuate. Body cuticle distinctly annulated, annules 1.5 - 1.6 μm apart at midbody and 1 μm apart in anterior region. Lateral field with two incisures slightly crenate measuring 1/4 - 1/5 of body width at midbody, originating in the region of procorpus and ending at anus. Head continuous with body contour, measuring 2.6 x 4.3 μm in dimensions, smooth slightly narrower than body. Stylet small measuring 7.5 - 8.2 μm in length with conus 3 μm long. Stylet bears small rounded knobs at its base about 1.5 μm across. Opening of dorsal oesophageal gland located 1.5 μm behind stylet base. Oesophagus tylenchoid; median bulb ovate with cuticular thickening. Basal bulb pyriform. Cardia present. Excretory pore at the level of middle oesophageal bulb. Nerve ring encircles the isthmus at 51 - 54 μm from anterior end.

Vulva, wide sunk in body. Lateral vulval membranes absent. Ovary single, prodelphic and outstretched. Post-uterine sac 1/2 the anal—body width long. Tail long, filiform with acute terminus.
The author's observations generally conform to those of the
original description. Slightly higher value of 'a' and lower value of 'b'
have been observed in the present studies.

Habitat  - Rhizosphere of rice.
Locality - Jalandhar and Ferozepur.
Genus *Duotylenchus* Saha and Khan, 1982

*Duotylenchus infidelis* sp. nov.

Plate VIII; Figs. A - D

**MEASUREMENTS:**

Female (n=5) : L=0.41 - 0.47 mm; a=33.2 - 37.1; b=5.2 - 5.8; c=3.6 - 4; c'=11 - 16; V=65 - 67.2; Stylet=6.8 - 8 μm; G₁=120 - 180.5 μm.

Male : not observed.

**DESCRIPTION**

Female : Eelworm assumes ventrally arcuate shape when killed. Cuticle finely annulated. Lateral field marked by two incisures, having a maximum of 1/6th of corresponding body width; originating at the level of metacorpus and extending upto the middle of the tail. Lip region semi-set off; with dimensions 4.12 x 3.09 μm. Stylet weak, 6.8 - 8 μm long with moderately developed, slightly asymmetrical knobs. Oesophagus 75.5 - 92.7μm long; metacorpus valveless 8 - 9 μm long and 5 - 5.5 μm wide, fairly long isthmus endites into a pyriform shaped basal oesophageal bulb. Opening of dorsal oesophageal gland 2 - 2.3 μm behind stylet base. Nerve ring 45-52 μm from anterior end. Excretory pore situated 57.9 - 74 μm from anterior end. Oesophageo-intestinal junction marked by cardia.

Diagnosis and relationship

The present species has been assigned to genus *Duotylenchus* because of the presence of two incisures; postcorpus, non-muscular, spindle shaped swelling lacking valve plate. Vagina at right angle to body axis and tail is elongate filiform and conoid.

**DIFFERENTIAL DIAGNOSIS**

The new species comes closer to *D. bilineatus* Saha and Khan, 1982, only species of this genus, in similar value of 'a' and 'b', length of tail and length of vulva from anterior end. It differs from *D. bilineatus* Saha and Khan, 1982 in having lip region semi-offset (continuous in *D. bilineatus*); stylet small (9 - 11 µm in the latter); DOG closer to stylet base (3 µm from stylet base); differentially shaped oesophageal bulb; spermatheca empty and non-functional as against filled with sperms in *D. bilineatus* and shorter post-uterine sac as compared to latter.

In view of the above differences, the present species has been considered new to the science and hence named as *Duotylenchus infidelis*.

**Holotype**
- One female, collected on 9th November, 1986.

**Paratypes**
- Four females; other details as per holotype.

**Type habitat**
- Rhizosphere of rice.

**Type locality**
- Abohar.
Family - Tylodoridae Paramonov, 1968 (Siddiqi, 1976)

Subfamily - Tylodorinae Paramonov, 1967

syn. Campbellenchinae Wouts, 1978

Pleurotylenchinae Andrassy, 1976

Genus - Cephalenchus Goodey, 1962 (Golden, 1971)
syn. Tylenchus (Cephalenchus Goodey, 1962)


Cephalenchus insignis sp. nov.

Plate IX; Figs. A - F

MEASUREMENTS:

Female (n=5) : L=0.503 - 0.573 mm; a=38 - 50; b=5.3 - 5.7; c=2.6 - 2.9; V=53 - 54; Stylet=16 - 17 μm.

Male : not observed.

DESCRIPTION

Female : Eelworm assumes ventrally arcuate shape when killed by
gentle heat. Body tapering towards both the ends. Cuticle coarsely annulated, 1.5 - 1.8 μm apart in midbody region. Lateral field marked by 6 incisures measuring about 1/2 - 1/3rd of the corresponding body width. Head set off from body contour, anteriorly flattened; measuring 4 μm x 3 μm in dimensions. Stylet 16 - 17 μm long; conus slightly longer than shaft; shaft with laterally directed basal knobs. Orifice of dorsal oesophageal gland 1 μm from base of stylet. Oesophagus 89 - 96 μm long, short and broad; median oesophageal bulb well developed with crescentic thickening located at centre; oval in shape and 34 - 44 μm from anterior end. Isthmus slender, elongate, enveloped by the nerve ring slightly anterior to its middle at 46 - 47 μm from anterior end of body. Basal oesophageal bulb sac like with 3 gland nuclei. Cardia distinct; conoid-round in shape. Excretory pore 51.5 - 61.8 μm from anterior end.

Vulva a depressed transverse slit; vagina leading inwards at right angle to body axis; post-uterine sac short measuring 7 μm in length i.e., slightly more than half of corresponding body width long. Spermatheca present. Ovary monodelphic, prodelphic and outstretched. Lateral vulval membranes absent. Anus distinct. Tail long, filiform, 190 - 210 μm, and about 18 - 20 times equal body width ending in a pointed terminus.

**Diagnosis and relationship**

Because of the presence of six lateral fields at midbody, stylet with knobs; vulva transverse, post-uterine sac present, gonad mono-prodelphic, and tail elongate and filiform, the specimens (and species) are assigned to the genus *Cephalenchus*.

**DIFFERENTIAL DIAGNOSIS**

The new species shows affinity with *C. rotundus* Siddiqui and
Khan, 1983 in having similar values of 'b' and 'c' similarly shaped lip region, and in oesophageal length. It, however, differs from the latter in having smaller stylet; excretory pore almost at the middle of isthmus and comparatively anterior vulva and longer tail. (Stylet=16 - 17 μm; excretory pore almost at the level of beginning of oesophageal bulb; V=58 - 62.5 and c=3.0 - 4.6 in C. rotundus Siddiqui and Khan, 1983).

In view of the above differences, the present species is considered new to science and is named as Cephalenchus insignis.

Holotype - One female, collected on 7th December, 1986
Paratypes - Four females,
Type habitat - Rhizosphere of rice.
Type locality - Jalandhar.
Superfamily - Dolichoroidea Chitwood in Chitwood and Chitwood, 1950
(Siddiqi, 1980)

Family - Dolichodoroidae Chitwood in Chitwood and Chitwood, 1950
(Skarbilovich, 1959)
Tylenchorhynchidae Eliava, 1964 (Golden, 1971)

Subfamily - Tylenchorhynchinae Eliava, 1964
syn. Dolichorhynchinae Fotedar and Handoo, 1978

Genus- Tylenchorhynchus Cobb, 1913
syn. Divittus Jairajpuri, 1984
Morasinema Javed, 1984
Tessellus Jairajpuri and Hunt, 1984

The genus Tylenchorhynchus was established by Cobb in 1913, with the description of Tylenchorhynchus cylindricus collected from soil from coastal swamp lands in South California. Filipjev (1934) erected the subgenus Bitylenchus under this genus with Tylenchus dubius Bastian, 1865 as its type species and later in 1936 he synonymised Bitylenchus with Tylenchorhynchus. He also considered T. cylindricus as junior synonym T. dubius, thus making T. dubius as the type species of the genus Tylenchorhynchus. Allen (1955) considered T. cylindricus Cobb, 1913 and T. dubius Bastian, 1865 as two different species and re-established T. cylindricus Cobb, 1913 as the type species of Tylenchorhynchus. The generic characters of Tylenchorhynchus have been emended by Siddiqi (1970, 1976, 1986), Tarjan (1973) and others. In India, the first record of the genus was made by Siddiqi and Basir (1959) when they described two new species

_Tylenchorhynchus infestus_ sp. nov.  
Plate X; Figs. A - F

**MEASUREMENTS:**

Female (n=10) : L=0.43 - 0.47 mm; a=30.2 - 35.6; b=3.6 - 4; 
c=12.8 - 13.2; c'=4.5 - 4.5; V=60.2 - 64.9; Stylet=12.4 - 15.4μm; G₁=92.7 - 113.3 μm; G₂=85.4 - 110.5 μm.

Male : not observed.
DESCRIPTION

Female: Eelworm assumes slightly ventrally arcuate position on killing. Body tapering towards both extremities. Body cuticle annulated, each annule about 1 μm apart at midbody. Lateral field with four plain incisures occupying about 1/3rd of corresponding body width. Head semi-hemispherical, semi-offset; measuring 2 μm in height and 6 μm in width. Lip region bears annules. Stylet well developed, 12.4 - 15.4 μm in length. Conus and shaft of the same size. Stylet knobs backwardly directed with 3 μm x 2 μm dimensions. Orifice of dorsal oesophageal gland 2 μm behind stylet base. Oesophagus 92.7 - 117.4 μm long. Procorpus cylindrical; median bulb oval, measures 10.3 x 7.2 μm in dimensions with a well developed crescentic value, which is located slightly anterior to the centre of median bulb. Isthmus long, expanding into a pyriform basal bulb. Cardia well developed with maximum width of 3 μm. Nerve ring encircles the isthmus slightly anterior to middle of isthmus at about 67 - 72 μm from anterior end. Hemizonid lies immediately anterior to excretory pore. Excretory pore located at 85 - 89 μm from anterior end.

Vulva transverse. Vagina extending to about ¼ the vulval body width. Ovaries paired, symmetrical, outstretched with oocytes arranged in a single row. Rectum about onehalf of the anal body diameter. Tail with 25 - 35 annules; 32.9 - 34 μm long narrows gradually ending in a bluntly rounded unstriated terminus.

Diagnosis and relationship

The present species has been assigned to genus *Tylenchorhynchus* in having four lateral fields, cephalic framework moderately sclerotized,
stylet well developed, gonads amphidelphic, didelphic and outstretched.

**DIFFERENTIAL DIAGNOSIS**

Tylenchorhynchus *infestus* sp. nov. comes closer to *T. mashhoodi* Siddiqi and Basir, 1959 in having similar length of oesophagus, tail length and similar 'a' and 'c' values. It, however, differs from the latter in having differently shaped lip region, shorter stylet length, vulva located more posteriorly and in the absence of males. (Lip region rounded, slightly set off; stylet 16 - 19 μm; V=44.59% in *T. mashhoodi* Siddiqi and Basir, 1959).

In view of the above differences, the present species has been considered new to science and named as *Tylenchorhynchus infestus*.

**Holotype** - One female, collected on 8th September, 1987

**Paratypes** - Nine females, other particulars as for the holotype.

**Type habitat** - Rhizosphere of rice.

**Type locality** - Faridkot.
Tylenchorhynchus mundus sp. nov.

Plate XI; Figs. A - G

MEASUREMENTS:

Female (n=8) : L=0.5 - 0.6 mm; a=29.5 - 29.9; b=4.2 - 4.5; c=13.6 - 15.4; c'=2.8 - 3.7; V=49.3 - 54.1; Stylet=12 - 15 μm.

Male : not observed.

DESCRIPTION

Female : Body open, C-shaped when relaxed. Cuticle annulated, annules about 2 μm wide in region of oesophagus. Lateral field four, outer ones areolated, occupying about 1/3rd of the body width near midbody region. Lip region bearing 3 - 6 very fine annules, semi-offset to offset. Cephalic framework moderately sclerotized. Stylet 12 - 15μm long with rounded to laterally directed basal knobs. Dorsal oesophageal gland opening 2 - 4 μm behind stylet base. Excretory pore anterior to basal bulb; 77 - 88 μm from anterior end. Nerve ring 75 - 78 μm from anterior end. Intestine extending to the tail end as post-rectal blind sac.

Vulva transverse. Gonads, didelphic, amphidelphic and outstretched. Tail about 3 times the anal body width long with a smooth terminus. Tail annules 23 - 29; unequal in width. Phasmids anterior to middle of tail.

Diagnosis and relationship

The present species has been assigned to the genus Tylenchorhynchus in having four lateral fields, cephalic framework moderately sclerotized, stylet well developed, gonads amphidelphic, didelphic and outstretched.
DIFFERENTIAL DIAGNOSIS

The present specimens come closer to Tylenchorhynchus neoclavicaudatus Mathur, Sanwal and Lal, 1978 in similar values of a, c and V, lateral fields four, outer ones crenate. It, however, differs from it in lip region being semi-offset to offset; more number of lip annules; smaller stylet length and b value; lesser number of tail annules and in the absence of males (Lip region continuous with 2 - 3 annules; stylet=20 - 23 μm; b=4 - 5.8; tail annules=32 - 50 and males are present in T. neoclavicaudatus Mathur, Sanwal and Lal, 1978).

In view of the above differences, this species has been considered new to science and is named as Tylenchorhynchus mundus.

Holotype - One female, collected on 28th October, 1987.
Paratypes - Seven females, other details as per holotype.
Type habitat - Rhizosphere of rice.
Type locality - Gurdaspur.
Tylenchorhynchus nudus Allen, 1955

Plate XII; Figs. A - G

MEASUREMENTS:

Female (n=8) : L=608 - 883 mm; a=26 - 35; b=5.2 - 6.5; c=12.2 - 16.6; Stylet=18 - 21 μm.

Male (n=2) : L=.508 - .718 mm; a=25 - 35; b=4.2 - 5.9; c=10.5 - 17; Stylet= 18 - 21 μm; Spicules=22 - 28 μm; Gubernaculum=9 -14μm.

DESCRIPTION

Female : Body curved in posterior half of its length upon fixation, tapering slightly towards both extremities. Cuticle marked with distinct striae, 1 - 2 μm apart. Lateral fields four; occupying about 1/4 - 1/5 of the corresponding body width. Lip region continuous with body, 6 - 8 μm wide and 3 - 4 μm high, generally bearing two annules. Cephalic framework moderately sclerotized. Stylet 18 - 21 μm long, its metenchium 9 - 11 μm long. Basal knobs rounded, 3 - 4 μm across. Oesophagus 102 - 143 μm from anterior end. Median oesophageal bulb at 45 - 57% of the oesophageal length from the anterior end. Nerve ring 69 - 94μm from anterior end. Excretory pore 83 - 125 μm from anterior extremity. Hemizonid 1 - 2 annules long, situated 1 - 2 annules above the excretory pore.

Vulva, a transverse slit. Vagina 1/3 - 1/2 of corresponding body width. Gonads didelphic, amphidelphic, outstretched. Spermatheca ovate or spherical filled with sperms. Oocytes arranged in a single row. Tail cylindrical ending in a clavate terminus, 40 - 60 μm long, marked with
14 - 23 striae and 2.5 - 4.5 anal body width long. Phasmids 34 - 38 µm from the posterior end.

**Male**: Similar to female in general shape and morphology except the reproductive system and tail shape. The two inner incisures of the lateral fields terminate before cloaca. Spicules 22 - 28 µm long. Gubernaculum stout, 9 - 14 µm long; slightly or distinctly curved. Tail with subacute terminus, 2.3 - 3.4 anal body widths long, enveloped by bursa. Phasmids 26 - 35 µm from tail terminus.

**REMARKS**

The present specimens closely resemble with description of _T. nudus_ Allen, 1955. Baqri and Ahmad (1981) studied the variations in _T. nudus_ from West Bengal (India); from a larger population. In the present studies all the measurements closely fit into those given by Baqri and Ahmad (1981). Slightly smaller value of spicules and gubernaculum has been observed in the present studies.

**Habitat** - Rhizosphere of rice.

**Locality** - Faridkot.
Tylenchorhynchus mashhoodi Siddiqi and Basir, 1959

Plate XIII; A - C

MEASUREMENTS

Female (n=10) : L=0.49 - 0.78 mm; a=25 - 35; b=4.5 - 5.7; c=13 - 19; V=55 - 58; Stylet=17 - 21 μm.

Male (n=6) : L=0.47 - 0.57 mm; a=29 - 32; b=4.7 - 4.9; c=16 - 18; Stylet=15 - 16 μm; Spicules=15 - 22 μm; Bursa=42 - 57 μm; Gubernaculum=6 - 10.5 μm.

DESCRIPTION

Body curved ventrally in posterior half upon fixation. Cuticle annulated. Lateral field marked by four incisures; occupying 1/4 - 1/5 of body width at the middle. Lip region continuous marked with 3 - 4 annules; 3.2 - 5.1 μm high and 5.7 - 7.2 μm in diameter. Cephalic framework moderately sclerotised. Stylet well developed 17 - 21 μm long; with slightly anteriorly directed knobs. Dorsal oesophageal gland opening 3 - 5 μm behind stylet base. Nerve ring 72 - 87 μm from anterior end, encircling the isthmus. Excretory pore 75 - 115 μm from the anterior extremity.


Male : General morphology is same as female except the reproductive organs and tail shape. Tail conoid Spicules 15 - 12 μm long;
gubernaculum 6 - 10.5 μm in length. Bursa crenate, 42 - 57 μm long.

**REMARKS**

This species is reported to be widely distributed in India. After the original description, many authors have redescribed the species for its variations. Baqri and Jairajpuri (1970) described several populations of this species from cotton and sunhemp fields and found the specimens to closely resemble with the original description. In the present studies also, the specimens closely agree with the description given by Baqri and Jairajpuri (1970) with minor variations.

**Habitat**  
- Rhizosphere of rice.

**Locality**  
- Widely distributed Ludhiana, Abohar, Gurdaspur, Amritsar, Ropar, Ferozepur and Chandigarh.
Genus - *Bitylenchus* Filipjev, 1934 (Siddiqi, 1986)

*syn. Tylenchus* (Bitylenchus Filipjev, 1934)

The genus *Bitylenchus* was erected as subgenus of *Tylenchorhynchus* Filipjev, 1934 with *Tylenchus dubius* Bietschli, 1873 as type species. However, later in 1936 he synonymised it with the genus *Tylenchorhynchus* Cobb, 1913. Jairajpuri (1982) again revalidated it as subgenus with emended characters. Siddiqi (1986) raised it to generic rank with *Bitylenchus dubius* Bietschli, 1873 as its type species; emended the generic diagnosis and included those species of *Tylenchorhynchus* which have four incisures with outer bands areolated, post-anal intestinal sac very large, and cuticle at tail terminus thickened under *Bitylenchus*. In India, six species of the genus *Bitylenchus* are known. *Bitylenchus dubius* (Bietschli, 1873) Siddiqi, 1986 was recorded by Prasad, Dasgupta and Mukhopadhyaya (1964). Sethi and Swarup (1968) reported *Bitylenchus brevilineatus* (Williams, 1960) Siddiqi, 1986 from soil around roots of *Cuminum cyminum*. *Bitylenchus vulgaris* (Upadhyay, Swarup and Sethi, 1972) Siddiqi, 1986 was described from the rhizosphere of *zea mays* from Delhi. *B. swarupi* (Singh and Khera, 1978) Siddiqi, 1986 was described from Narendpur and other villages of Hooghly in soil around roots of *cauliflower* var. *botrytis* and other crops. *B. goffarti* (Sturhan, 1966) Siddiqi, 1986 was reported from soil around roots of *Hibiscus cannabinus* by Baqri and Jairajpuri (1970). *B. cuticaudatus* (Roy and Das, 1983) Siddiqi, 1986 was described from the rhizosphere of potato.
**Bitylenchus vulgaris** (Upadhyay, Swarup and Sethi, 1972) Siddiqi, 1986

syn. **Tylenchorhynchus vulgaris** Upadhyay et al. 1972

Plate XIV; Figs. A – E

**MEASUREMENTS**

**Female** (n=8); L=0.48 – 0.66 mm; a=24.6 – 29.8; b=4.2 – 5.8; c=14 – 18; V=51 – 57; Stylet=14 – 16 µm.

**Male** (n=4); L=0.53 – 0.68 mm; a=24 – 35; b=4.2 – 5.7; c=14 – 17.5; T=45 – 57.8; Stylet=14 – 17 µm; Spicules=22 – 26 µm; Gubernaculum=13 – 16 µm.

**DESCRIPTION**

**Females** : Body cylindrical to slightly arcuate at posterior end, tapering towards both extremities. Cuticle coarsely striated; striae about 1.3 µm apart at midbody. Lateral field with four incisures. Outer incisures areolated; occupying about 1/4th of the corresponding body width. Longitudinal striae on body absent. Lip region offset, slightly wider than body’s anterior end. 3 µm high x 6.8 µm wide, bearing 4 to 5 distinct annules. Cephalic framework moderately sclerotized. Stylet knobs laterally directed 4.5 µm across. Dorsal oesophageal gland orifice 2.8 – 3.1 µm behind stylet base. Oesophagus tylenchoid; 130 – 140 µm long; cardia oblong shaped. Nerve ring posterior to middle oesophageal bulb; 72 – 74 µm from anterior end. Excretory pore 95 µm from the anterior end. Hemizonid 4 annules anterior to excretory pore.

bluntly rounded smooth terminus.

Male: Essential details similar to females. Spicules 22 – 26 μm; gubernaculum 13 – 16 μm long. Bursa present.

REMARKS


Habitat - From the rhizosphere of rice.
**Bitylenchus swarupi** (Singh and Khera, 1978) Siddiqi, 1986


Plate XV; Figs. A - G

**MEASUREMENTS:**

- **Female** (n=6) : L=0.45 - 0.51 mm; a=29.2 - 33.3; b=4.6 - 5.2; c=12.9 - 14.2; V=53 - 55.7; Stylet=13.2 - 15.3 µm.

- **Male** (n=2) : L=0.46 - 0.57 mm; a=32 - 34; b=4.8 - 5.6; c=14 - 16; Stylet=13-14.6 µm; Spicules= 17 - 20 µm; Gubernaculum=8 - 10 µm.

**DESCRIPTION**

**Female:** Body curves ventrally upon fixation; tapering slightly at both the extremities. Cuticle very finely annulated. Lateral fields four, occupying about 1/3rd of the corresponding body width. Head clearly set off, consisting of 4 - 6 indistinct annules; 3 - 3.8 µm high and 4 - 6.5 µm wide. Cephalic framework weakly sclerotized. Stylet 13.2 - 15.3 µm long, with knobs directed slightly posteriorly. Dorsal oesophageal gland orifice 2 - 3 µm behind the stylet base. Oesophagus 130 µm long with cylindrical procorpus, a median bulb having dimensions 9.5 - 12.6 x 7 - 10.2 µm with well developed crescentic valve and a pyriform terminal bulb. Cardia present. Nerve ring 58 - 82 µm from anterior end; encircling isthmus. Excretory pore 75 - 88 µm from anterior end.

**Vulva,** a transverse slit. Gonads didelphic, amphidelphic, outstretched. Vagina about 1/2 the vulval-body width. Oocytes arranged in a single row. Post-intestinal sac present extending in more than half of the tail. Tail cylindrical with conoid striated terminus.
Male: General morphology same as that of female. Spicules 17 - 20 μm long, gubernaculum trough shaped 8 - 10 μm long. Bursa 45 - 60 μm long. Tail elongate, conoid with acute terminus, about 3 times the anal-body diameter long.

REMARKS

The present species closely resemble with B. swarupi (Singh and Khera, 1970) Siddiqi, 1986 except in the value of 'a' which is slightly higher than the original described value (28 - 31). In males, spicule length was observed to be slightly smaller. These minor variations are due to intraspecific variations.

Habitat - Rhizosphere of rice.
Locality - Ludhiana Amritsar, Gurdaspur.
The genus *Quinisulcius* was proposed by Siddiqi, 1971 when he split the genus *Tylenchorhynchus* Cobb, 1913. This genus was proposed for forms having five incisures, non-areolated lateral fields. He transferred five species in this group. Siddiqi (1986) removed the restriction of non-areolated lateral field. Following species have been described from India so far. *Q. capitatus* (Allen, 1955) Siddiqi, 1971 was reported by Sethi and Swarup (1968) from soil around roots of *Triticum aestivum* and *Hordeum vulgare* from hilly tracts. From rhizosphere of *Opuntia dilerii*, *Mangifera indica*, *Ricinus communis*; *Q. acutus* (Allen, 1955) Siddiqi, 1971 was reported by Sethi and Swarup (1958). Chawla, Bamburkar, Khan and Prasad (1968) described a new sp. *Q. cacti* from Delhi from soil around roots of cactus which was transferred to the genus by Siddiqi in 1971. In 1971, Singh reported *Q. curvus* (Williams, 1960) Siddiqi, 1971 from soil around roots of *Aster*. *Q. punici* new sp. was described by Gupta and Uma (1980) from rhizosphere of *Punica granatum* from Srinagar. From rhizosphere of *Capsicum annuum* Ray and Das, 1983 described *Q. paracti* from Ganjan district.

*Quinisulcius capitatus* (Allen, 1955) Siddiqi, 1971  
*syn. Tylenchorhynchus capitatus* Allen, 1955

*T. acti* Hopper, 1959

*Q. acti* (Hopper) Siddiqi, 1971

*T. nilgirienses* Seshadri, Muthukrishnan and Shunmugam, 1967

*O. nilgirienses* (Seshadri et. al) Siddiqi, 1971

*O. himalayae* Mahajan, 1974

*O. solani* Maqbool, 1982
MEASUREMENTS:

Female (n=6) : L=.6 - .7 mm; a=26 - 32; b=5 - 5.3; c=14 - 15.5; c'=2.5 - 2.8; V=53 - 56; Stylet=16.5 - 18 µm.

Male : not observed.

DESCRIPTION

Female : Body C-shaped. Cuticle marked with distinct transverse striae measuring about 1.2 µm and 1.6 µm apart near base of oesophagus and invlal region respectively. Lateral field with 5 incisures; occupying 1/3 of the corresponding width; areolation present. Lip region distinct by narrowing 7.4 - 8 µm wide x 4 - 6.0 µm high, appearing squarish with flat anterior surface, sometimes with slight rounded edges, bearing 7 - 8 fine annules. Cephalic framework lightly sclerotized; its basal part extending into the lip region thus giving it an appearance of being lower from inside. Stylet knobs anteriorly to laterally directed; about 4 µm across. Stylet 16.5 - 18 µm long. Dorsal oesophageal gland opening : 2.4 - 2.8 µm behind the stylet base; median oesophageal bulb large, slightly oval; basal oesophageal bulb elongate, sac like. Cardia well developed. Nerve ring at about middle of isthmus. Excretory pore at level opposite anterior half of basal bulb; 110 - 122 µm from anterior end. Hemizonid 2½ annules long, 1 - 3 annules anterior to excretory pore.

Vulva transverse; vulval lips sometimes slightly protruding. Vagina slightly less than ½ the vulval-body width. Tail 32 - 52 µm long; bearing 38 - 45 annules; tail terminus narrow and smooth; marked off from body.
REMARKS

The specimens fit in well with the description of *Q. capitatus* (Allen, 1955) Siddiqi, 1971 with slight intraspecific variations.

Habitat - Rhizosphere of rice.
Locality - Patiala.
Family - Psilenchidae Paramonov, 1967 (Khan, 1969)

Subfamily - Psilenchinae Paramonov, 1967
syn. Leipotylenchinae Sher, 1974

Genus - Psilenchus de Man, 1921

Psilenchus hilarulus de Man, 1921

Plate XVII; Figs. A - E

MEASUREMENTS:

Female (n=5) : L=1.2 - 1.5 mm; a=32.5 - 37; b=5.9 - 7.2; c=7.5 - 8.5; V=46 - 51; Stylet=12.4 - 15 μm.

Male (n=3) : L=1 - 1.25 mm; a=31.8 - 35.7; b=6.2 - 6.9; c=5.7 - 6.7; Stylet=12.4 - 14.5 μm; Spicules=25 - 32 μm; Gubernaculum=7 - 11 μm.

DESCRIPTION

Female : Body slender, slightly arcuate ventrally towards the posterior end. Cuticle finely annulated, annules about 1 μm wide. Lateral field with four incisures. Head region faintly set off by constriction. Stylet slender 12.4 - 15 μm long; delicate without knobs. Oesophagus tylenchoid, median bulb ovate with well marked crescentic valves; basal bulb pyriform. Nerve ring posterior to the median bulb at the middle of isthmus. Excretory pore slightly anterior to the basal oesophageal bulb.

Vulva a transverse slit. Gonads, amphidelphic, didelphic and outstretched. Spermatheca present. Oocytes arranged in a single row except in the zone of multiplication. Tail elongate, ending in a clavate tip.

**REMARKS**

Five females and two males were recovered from the rhizosphere of rice from villages in Ropar district of *Psilenchus hilarulus* de Man, 1921. *P. hilarulus* de Man, 1921 has been recorded and redescribed by various authors from different populations. de Man, 1921 gave the stylet length to be 11 \( \mu m \) and DOG opening to be slightly half of the stylet from its base (cited from Knobloch, 1975). Thorne (1949) gave the stylet length as 17 - 19 \( \mu m \) and DOG opening close to stylet base. Knobloch (1975) observed stylet length to be 12 - 14 \( \mu m \) and DOG opening 6.5 to 7 \( \mu m \) behind stylet base. Bajaj and Bhatti (1979) studied three populations and found the stylet length to be 12 - 13 \( \mu m \) and dorsal oesophageal gland orifice 4 - 8 \( \mu m \) behind stylet base.

In the present population the stylet length does not exceed 12.4 - 15 \( \mu m \) and DOG opening 4.7 - 5.7 \( \mu m \) behind the stylet base. The variability observed in the present specimens being not so large, the specimens are, therefore, identified as *P. hilarulus* de Man, 1921.

**Habitat**
- Rhizosphere of rice.

**Locality**
- Ropar.
Superfamily - Hoplolaimoidea Filipjev, 1934 (Paramonov, 1967)
syn. Hoplolaimoidi (=sub-superfamily proposed by
Paramonov, 1967 as Hoplolaimini)

Heteroderoidea Filipjev and Schuurmans Stekhoven, 1941 (Golden, 1971)

Family - - Hoplolaimidae Filipjev, 1934 (Wieser, 1953)
syn. Nemonchidae Skarbilovich, 1959
Aphasmatylenchidae Sher, 1965 (Fotedar and Handoo, 1978)

Subfamily - Hoplolaiminae Filipjev, 1934

Genus - Basirolaimus Shamsi, 1979

Basirolaimus indicus (Sher, 1963) Shamsi, 1979

Plate XVIII; Figs. A - E

MEASUREMENTS:

Female (n=15); L=0.98 - 1.6 mm; a=25.2 - 35.3; b=9.2 - 12.2;
b'=5.8 - 9; c=47 - 72; V=51 - 58; Stylet=29 - 39 μm.

Male (n=10) : L=0.9 - 1.4 mm; a=24.5 - 32.7; b=9.3 - 12.6;
b'=6.3 - 9.2; Spicules= 30- 42 μm; Gubernaculum=15 - 22 μm.

DESCRIPTION

Female : Body stout, generally straight, curves ventrally upon
fixation. Cuticle annulated, annules prominent 2 - 3 μm apart at midbody.
Lateral field with 2 - 3 poorly developed incisures. Head distinctly set off
from body, semispherical to slightly cone shaped in some; marked with 4 -6
annules. Basal plate curved backwardly. Cephalic framework well sclerotized. Stylet well developed with anteriorly directed knobs. Stylet knobs have 2 – 3 denticles. Dorsal oesophageal gland orifice 5.8 – 7.5 μm from the base of the stylet knobs. Oesophagus consisting of a cylindrical procorpus, subspherical median bulb with well developed crescentic plates. Oesophageal gland with six nuclei, overlapping intestine dorsally. Nerve ring enveloping the isthmus. Excretory pore placed at the level of the oesophageo-intestinal junction. Intestine granular, not overlapping rectum.


REMARKS

The present species closely fit in the description given by Sher, 1963. Variation in stylet knobs from rounded to tulip shaped have been observed in the present studies.

Habitat - From the roots and rhizosphere of rice.
Locality - Widely distributed; Chandigarh, Ropar, Ludhiana, Faridkot, Gurdaspur, Patiala, Ferozepur and Fazilka.
Subfamily - Rotylenchoidinae Whitehead, 1958

Helicotylenchus Steiner, 1945
syn. Zimmermannia Shamsi, 1973

The genus Helicotylenchus was proposed by Steiner (1945). It was placed under Tylenchinae (Tylenchidae) for including those nematodes which had an overlapping basal bulb and were erroneously placed in Rotylenchus Filipjev, 1936. Mayne and Subramaniam (1933) recorded the occurrence of this genus from India for the first time. They reported H. multicinctus (Cobb, 1893) Golden, 1956 under the name Anguillulina multicincta (Cobb, 1893) Goodey, 1932 from soil around roots of Erythrina indica. Das (1960) reported a new species H. crenatus from roots of Solanum melongena, Beta vulgaris and Lycopersicon esculentum at Hyderabad. He further reported H. multicinctus around roots of Musa sapientum at Hyderabad. H. crenatus was later synonymised with H. dihystera (Cobb, 1893) Sher, 1961. Rao et al. (1960) reported H. erythrinae (Zimmermann, 1904) Golden, 1956 which was collected from rhizosphere of sugarcane, at Arcot (Tamil Nadu). From Aligarh, Siddiqi (1963d) described H. indicus from soil around roots of grass, Cynodon dactylon. Subsequently in 1964 he described yet another species, viz. H. mucronatus collected from rhizosphere of grasses from Shimla which was later synonymised with H. erythrinae. Prasad and Dasgupta (1964) reported H. nannus from Rosa sp. Delhi, which was synonymised subsequently with H. dihystera (Cobb, 1893) Sher, 1961. Khan and Basir (1964) described two species, viz. H. insignis and H. plumariae collected from lawn grass at Taj Mahal, Agra and Plumaria acutifolia at Shahjahanpur, respectively which was later synonymised with H. indicus Siddiqi, 1963. Two species, namely H. digitatus and H. neoformis collected from Citrus sinensis at Jog falls,
Karnataka were described by Siddiqi and Husain (1964). Prasad, Khan and Chawla (1965) described H. impar and H. microdorus collected from Dhandesugar (South India) and Chandigarh respectively. Nandakumar and Khera, 1970 considered H. impar as synonym of H. retusus Siddiqi and Brown, 1964 and H. microdorus as a probable synonym of H. indicus. H. thornei, collected from fields of tomato, Lycopersicon lycopersicum at Ludhiana was described by Gupta and Chhabra (1967); this being a junior homonym of H. thornei Roman, 1965 was re-named as H. teres by Gaur and Prasad (1973). Swarup and Sethi (1968) reported a number of new and known species of which the following seven species were reported for the first time from this country. These were H. canadensis Waseen, 1961, H. digonicus Perry, in Perry, Darling and Thorne, 1959, H. egyptiensis Tarjan, 1964, H. pseudorobustus (Steiner, 1914) Golden, 1956, H. retusus Siddiqi and Brown, 1964, H. rotundicauda Sher, 1966, and H. serenus Siddiqi, 1963. They also described two new species H. pisi and H. punicae, collected at Baijnath (H.P.) from rhizosphere of Pisum sativum and Punica granatum respectively. Of these two, H. punicae was synonymised with H. dibystera by Siddiqi (1972). Jacob et al. (1969) reported H. caribensis Roman, 1965 for the first time from India from Canna indica, collected at Vellayani, Kerala. Tikyani, Khera and Bhatnagar (1969) described H. goodi from great millet. H. pteracercus was described by Singh (1971) from paddy fields in Hyderabad. Rashid and Khan (1972) described H. imperialis from the rhizosphere of Musa paradisiaca, H. paracncaevus from the rhizosphere of Prunus bukharensis, H. solani from the rhizosphere of Solanum melongena and H. brassicae from Brassica oleracea. H. brassicae has been recorded species inquirenda by Siddiqi (1986). Saxena, Chhabra and Joshi (1972) described H. persici from soil around roots of Prunus persica near Khanna in Punjab. Siddiqi (1972)
described *H. willmottae* from potato fields of Ootachmund, Nilgiris. Three species were described by Khan and Nanjappa (1972) from IARI field, New Delhi. These were *H. astriatus* from banana *H. aquilis* from *bougainvillea* and *H. delhiensis* from *Canna*. In 1973 *H. graminophilus* from forest soil, *H. haki* from *Brassica oleracea*, *H. steineri* from *Zea mays* and *H. jammuensis*. Manjrekar (1972) described *H. hoplocauda* from soil around fruit trees from Maharashtra. This species is also considered species inquirenda by Siddiqi (1986). Jairajpuri and Baqri (1973) described *H. rohtangus* around grass roots at Rohtang Pass. Rashid and Khan (1974) described *H. imperialis* and *H. paraconcaicus* from rhizosphere of banana, *Musa paradisiaca* collected at Pachmari, Madhya Pradesh, respectively. *H. paraconcaicus* has been synonymised with *H. dihysteria* by Siddiqi (1986). Two species, viz. *H. girus* and *H. paragirus* from rhizosphere of apricot, *Prunus armeniaca* at Dalhousie and sugarcane, *Saccharum officinarum* at Saharanpur respectively were described by Saha, Chawla and Khan (1974). Fotedar and Handoo (1974) described *H. kashmiriensis* from *Prunus persica*, Kashmir and *H. hazratbalensis* from soil around roots of *Pyrus malus* from Srinagar. Five new species and two new species records from India, were reported by Mulk and Jairajpuri (1975). The new species were *H. arachisi* from *Arachis hypogaea* collected at Ajmer, Rajasthan, *H. bihari* from *Pisum sativum* at Gaya, Bihar, *H. indenticaudatus* from *Crotolaria juncia* at Udaipur, *H. macronatus* from *Lens culinarius* at Gaya, Bihar and *H. sharafati* from *Cicer arietinum* collected at Raisen, Madhya Pradesh. The new species records were of *H. paraplatyurus*, Siddiqi, 1972 and *H. abunaamai* Siddiqi, 1972. The latter species was, however, considered as junior synonym of *H. exallus* Sher, 1966 by Ali et al. 1969. Mohandas (1975) described *H. trivandranus* rhizosphere of *Piper nigrum*
Helicotylenchus dihystera (Cobb, 1893) Sher, 1961

syn. Tylenchus dihystera Cobb, 1893

T. olaee Cobb, 1906

Tylenchorhynchus olaee (Cobb) Micoletzky, 1922

Helicotylenchus olaee (Cobb) Siddiqi, 1986

Aphelenchus dubius var. peruensis Steiner, 1920

Tylenchus spiralis Cassidy, 1930

Helicotylenchus spiralis (Cassidy) Siddiqi, 1986

Helicotylenchus nannus Steiner, 1945

Helicotylenchus crenatus Das, 1960

Helicotylenchus flatus Roman, 1965

Helicotylenchus punicae Swarup and Sethi, 1968

Helicotylenchus paraconcavus Rashid and Khan, 1974

Plate XIX; Figs. A - C

MEASUREMENTS:

Female (n=7) : L=0.57-0.62 mm a=22 - 24; b=4.6 - 5.3; b'=4 - 4.4;
c=39 - 42; c'=0.85 - 1.07; V=60 - 64; Stylet 24 - 27 μm.

Male : not observed.

DESCRIPTION

Body curved. Cuticle with annulations 1.7 - 2.2 μm. apart.
Lateral fields four, plain. Lip region continuous, hemispherical marked by 4 - 5
annules. Stylet 24 - 27 μm long with knobs indented anteriorly or flattened.
Opening of dorsal oesophageal gland 9 - 12 μm behind stylet base.
Oesophagus typical of the genus. Median bulb 11.7- 12.7 x 8 - 10 μm in
diameter. Excretory pore slightly anterior to the end of oesophageal glands 90 - 112 μm from anterior end. Nerve ring 83 - 87 μm from anterior end.


REMARKS

The present specimens closely resemble with those of *H. dihystera* (Cobb, 1893) Sher, 1961. The body dimensions and measurements fit in well with those given by Anderson, 1974. Slightly lower value of b and b' have been observed in the present studies.

Habitat - Rhizosphere of rice.
Locality - Ludhiana, Faridkot.
Helicotylenchus indicus Siddiqi, 1963

Plate XIX; Figs. D - E

MEASUREMENTS:

Female (n=10): L=0.45 - 0.65mm; a=21.5 - 29; b=4.2 - 6.6; b'=4.5 - 5; c=36 - 37; c'=1.2 - 1.6; V=57 - 66; Stylet=19 - 24 μm.

Male: not observed.

DESCRIPTION

Female: Body spirally coiled, tapering slightly towards both the extremities. Lateral field marked by four incisures occupying about 1/5 - 1/6th of the total body width. Lip region conoid, continuous, with 4 - 5 indistinct annules. Cephalic framework moderately sclerotized with basal plates curved backwardly. Stylet=19 - 24 μm long, with rounded knobs. Oesophagus typical of the genus. Nerve ring 70 - 89 μm from the anterior end. Excretory pore 85 - 120 μm from the anterior extremity.


REMARKS

The present specimens closely resemble with Helicotylenchus indicus Siddiqi, 1963. The measurements have been compared with those given by Azmi and Jairajpuri (1978). These authors made a detailed study of
morphometrics and allometrics of *H. indicus* from Aligarh. Slightly higher value of posterior gonad length and 'b' value have been observed in the present studies.

Habitat - Rhizosphere of rice.

Locality - Widely distributed; Chandigarh, Ludhiana, Zirakpur, Ropar, Ferozepur and Patiala.
Heicotylenchus erythrinae (Zimmermann, 1904) Golden, 1956

syn. Tylenchus erythrinae Zimmermann, 1904

Tylenchorhynchus erythrinae (Zimmermann) Bailey and Reydon, 1931

Anguillulina erythrinae (Zimmermann) Goodey, 1932

Rotylenchus erythrinae (Zimmermann) Goodey, 1951

R melancholicus Lordello, 1955

H. melancholicus (Lordello) Andrassy, 1958

H. spicaudatus Tarjan, 1964

Plate XX; Figs. A - B

MEASUREMENTS:

Female (n=7) : L = 0.62 - 0.75 mm; a=24 - 29; b=4.6 - 5.5; b’=4.2 - 5.4; c=32 - 37; c’=1.2 - 1.4; V=59 - 62.5; Stylet=22.5 - 24.7 μm.

Male : not found.

DESCRIPTION

Female : Body spirally coiled, tapering towards both the extremities. Cuticle annulated. Lateral field marked by four plain incisures occupying about 1/4 - 1/5 of the corresponding body width. Lip region conoid, continuous, with four or five indistinct annules. Cephalic framework, strongly cuticularized. Stylet 20.5 - 24.7 μm long with knobs 4 - 5 μm across. Oesophagus consisting of a cylindrical procorpus, median bulb with well developed valvular apparatus. Oesophageal glands overlap intestine dorsally, laterally and ventrally. Nerve ring 75 - 90 μm from anterior end. Excretory pore 82 - 107 μm from anterior end. Hemizonid 3 annules anterior to excretory pore.

Gonads didelphic, amphidelphic and outstretched. Oocytes
arranged in a single row. Spermatheca set off filled with sperms. Tail 9 - 14 annules long with a pronounced ventral projection usually ending in a mucro. Phasmid located at 5 - 6 annules anterior to anus.

**REMARKS**

The present specimens agree in all details with the description of *H. erythrinae* (Zimmermann, 1904) Golden 1956. Sher (1966) separated the topotypes of *H. erythrinae* from type locality and gave a new description of the species. The present measurements closely fit in to the one given by Sher, 1966 except in the length of stylet, which has been observed to be slightly smaller in the present studies.

**Habitat**  
- Rhizosphere of rice.

**Locality**  
- Amritsar, Zirakpur, Ropar.
Helicotylenchus multicinctus (Cobb, 1893) Golden, 1956

syn. Tylenchus multicinctus Cobb, 1893

Tylenchorhynchus multicinctus (Cobb) Micoletzky, 1922

Anguillulina multicincta (Cobb) Goodey, 1932

Rotylenchus multicinctus (Cobb) Filipjev, 1936

Rotylenchus iperoiguensis Carvalho, 1956

Helicotylenchus iperoiguensis (Carvalho) Andrassy, 1958

Plate XX; Figs. C - F

MEASUREMENTS:

Female (n= ): L=0.49 - 0.59 mm; a=23 -31; b=4.9 - 6; b'=4 - 4.9;
c=38 - 52; c'=1.02; V=64 - 70; Stylet 22 - 25 μm.

Male : not observed.

DESCRIPTION

Female: Body curved ventrally. Cuticle annulated, annules 1.5 - 2.5 μm apart at midbody. Lip region, hemispherical, continuous with body marked by 4 - 5 annules. Stylet 22 - 25 μm long, stylet knobs, flattened or slightly indented anteriorly. Opening of dorsal oesophageal gland 10 μm behind the stylet base. Oesophagus tylenchoid, 120 - 122 μm from anterior end. Middle, oesophageal bulb spherical to ovate 98 - 102 μm from anterior end. Excretory pore anterior to oesophageo-intestinal junction.

REMARKS

The present specimens of *H. multicinctus* (Cobb, 1893) Golden, 1956 agree with the description provided by Sher (1966) in having same body dimensions, stylet length, rounded head with slight depression terminally, spermatheca filled with sperms and tail shape.

Habitat - Rhizosphere of rice.
Locality - Ferozepur, Faridkot.
Family - Pratylenchidae Thorne, 1949 (Siddiqi, 1963)

syn. Radopholidae Allen and Sher, 1967 (Khan and Nanjappa, 1972)

Subfamily - Pratylenchinae Thorne, 1949

Genus - Pratylenchus Filipjev, 1936

(Pratylenchus Filipjev, 1934 = nomen nudum)

The genus Pratylenchus was erected by Filipjev (1936). The occurrence of Pratylenchus, commonly known as root lesion nematode in India was first reported by Mayne and Subramaniam when they observed the association of this nematode with a disease of coffee in Coorg, Mysore. The field symptoms described included yellowing of leaves, loss of primaries and stunting of shoots. The nematode was identified as Anguillulina pratensis which is now known as P. pratensis (de Man, 1880) Filipjev, 1936. Chona and Swarup (1960) reported Pratylenchus sp. from soil around roots of diseased plants at Nellikuppam, Madras. Das (1960) described two new species, P. brevicercus (considered as species inquirenda by Siddiqi, 1986) from roots of potato and P. indicus (species inquirenda by Loof, 1978) from roots of potato and tomato at Hyderabad. P. pratensis was also reported by Das (l.c.) from the roots of potato lettuce and brinjal from the same locality. Choudhri (1961) reported P. thornei Sher and Allen, 1953 from Shimla hills. Prasad (1962) observed infestation of tomato by P. pratensis at Delhi. P. thornei and P. zeae Graham, 1951 were reported to be present in the rhizosphere of tobacco plants at Anand, Gujrat by Singh et al.(1964). Siddiqi (1964) reported the occurrence of P. scribneri Steiner in Sherbakoff and Stanley, 1943 and P. brachyurus (Godfrey, 1929) Filipjev and Schuurmans and Stekhoven, 1941 around the roots of Brassica oleracea and guava.
respectively. Nandakumar and Khera (1970) described *P. mulchandi* from Jodhpur (Rajasthan) from soil around roots of *Pennisetum typhoides*. Khan and Singh (1975) described five new species *P. ranjani* from soil around roots of mustard from Gheora, Delhi, *P. similis* from roots of rose, Lucknow, *P. impar* from guava roots, Burwala, Delhi, *P. neocupitatus* from wheat roots, Shimla and *P. teres* from potato roots, Ludhiana. Das and Sultana (1979) described *P. exilis* from soil around roots of *Mentha arvensis* and *Coriandrum sativum*, *P. singhi* and *P. barkati* from soil around roots of *Brassica oleracea*, *P. capitatus* from the rhizosphere of *Abelmoschus esculentus*, *Coccinia indica*, and *Brassica oleracea* and *P. crassi* from rhizosphere of *Coccinia indica*. Maharaju and Das (1981) described *P. nizamabadensis* from soil around roots of *Arachis hypogaea* at Nizamabad (Andhra Pradesh). Quraishi (1982) described *P. manohari* from soil around roots of *Vitis vinifera* from Hyderabad. Bajaj and Bhatti (1984) described three new species from Haryana, viz. *P. ekrami* from the rhizosphere of apples; *P. cruciferus* from *Brassica campestris* and *P. microstylus* from *Sorghum halepense*. Singh and Gill (1986) have proposed nom. nov. *P. hyderabadensis* for *P. capitatus* Das and Sultana, 1979 (preoccupied).

**Pratylenchus intactus** sp. nov.

Plate XXI; Figs. A - E

**MEASUREMENTS:**

Female (n=8) : L=0.52 - 0.65 mm; a=31.5 - 35; b=6.4 - 7.6; b'=5.7 - 6.6; c=18.5 - 20.9; V=79 - 80; Stylet=15.5 - 17 μm.

Male : not observed.
DESCRIPTION

Female: Body curved ventrally, tapering gradually posterior to vulva. Cuticle finely annulated, annules 2 μm apart at midbody region. Head region flattened, continuous, moderately sclerotized; 3 μm high and 6 μm wide; bearing 3 labial annules. Stylet 15.5 - 17 μm, with conus 8.9 μm long. Stylet knobs cup shaped with slightly anteriorly directed ends. Orifice of dorsal oesophageal gland 4 μm behind stylet base. Oesophagus typical of the genus; median bulb with well developed crescentic plates; 13 μm long and 7 μm wide. Oesophageal lobe extending ventrally over the intestine for about 3 - 3½ times body width. Excretory pore behind nerve ring; 85 - 97 μm from anterior end. Nerve ring 72 - 77 μm from anterior end. Hemizonid 1½ annules anterior to excretory pore.

Vulva transverse. Ovary single, outstretched with oval spermatheca, post-uterine sac about one vulval body width long. Tail 30 - 34 μm long, conoid, deeply striated with notched terminus.

DIAGNOSIS AND RELATIONSHIP

The present species and specimens have been assigned to the genus Pratylenchus because of the presence of lateral fields with four incisures. Cephalic region moderately sclerotized. Oesophageal lobe-like mostly on the ventral side of intestine. Gonads pseudo-mono-prodelphic, with only anterior ovary functional.

DIFFERENTIAL DIAGNOSIS

The new species comes close to P. pseudopratensis Seinhorst, 1968. It comes closer to it in having similar 'b' and 'c' values and distance of excretory pore from the anterior end. However, differs from it in having
longer body and stylet, lesser number of lip annules, more 'a' value, slightly indented tail terminus and absence of males. (L=0.41 -0.50 mm, Stylet=15 μm. Lip annules 3 - 4; a=21 - 25 μm. Tail tip smooth rounded and males present in P. pseudopratensis).

In view of the above studies, the present species has been considered new to science and is named as P. intactus.

Paratypes      - Seven females, other details as per holotype.
Type habitat   - Rhizosphere of rice.
Type locality  - Gurdaspur.
Pratylenchus zeae Graham, 1951

Plate XXII; Figs. A - F

MEASUREMENTS:

Female (n=7); L=0.51 - 3.53 mm; a=24 - 28; b=6 - 8; b'=4.3 - 4.8; c=16.2 - 17.6; V=70 - 83; Stylet length=14 - 16.8 μm; G₁=130 - 155 μm.

Male: not observed.

DESCRIPTION

Female: Body straight with a slight curve in posterior region. Cuticle annulated, annules 1 - 1.2 μm apart at midbody. Lip region flattened, continuous 1.8 μm high x 3.8 - 4.5 μm wide. Cephalic framework strongly sclerotized. Stylet 14 - 16.8 μm long with well developed rounded basal knobs. Dorsal oesophageal gland 2-3 μm behind stylet base. Oesophagus 99 - 109 μm from anterior end. Procercus 30 - 32 μm long and median bulb with well developed crescentic lips. Nerve ring 65 - 72 μm from anterior end. Excretory pore 70 - 78 μm from anterior extremity. Hemizonid at the level of excretory pore 1½ - 2 annules wide.


REMARKS

The specimens fit in well with the description of *P. zeae* Graham, 1951.

Habitat - Rhizosphere of rice.

Locality - Ludhiana and Faridkot.
Subfamily - Hirschmanniellinae Fotedar and Handoo, 1978

Genus - Hirschmanniella Luc and Goodey, 1964

syn. Hirschmannia Luc and Goodey, 1962

nec. Hirschmannia Elofson, 1941 (Crustacea)

Hirschmanniella gracilis (de Man, 1880) Luc and Goodey, 1964

syn. Tylenchus gracilis de Man, 1880

Tylenchorhynchus gracilis (de Man) Micoletzky, 1925

Anguillulina gracilis (de Man) Goodey, 1932

Chitinotylenchus gracilis (de Man) Hirschmann, 1955

Radopholus gracilis (de Man) Allen, 1955,
(also by Hirschmann, 1955)

Hirschmannia gracilis (de Man) Luc and Goodey, 1962

Radopholus gigas Andrassy, 1954

Hirschmanniella gigas (Andrassy) Siddiqi, 1986

Plate XXIII; Figs. A - E

MEASUREMENT:

Female (n=9) : L=1.5 - 1.8 mm; a=47 - 55; b=8.9 - 12.5; b'=4.4
- 6.3; c=15 - 22.5; c'=3.4 - 6.8; V=50 - 56; Stylet=18.5 - 22.5 μm.

Male (n=4) : L=1.5 - 1.7 mm; a=48 - 59; b=9.8 - 11.4; b'=4.6 - 5.2; c=17.2 - 22.5; c'=4.02 - 4.85; Stylet=18-22 μm; Gubernaculum=7.6 - 12 μm; Spicules=29 - 33μm.
DESCRIPTION

Female: Body long, slender. Cuticle transversely striated. Lateral fields with four plain incisures, occupying about 1/3 - 1/4 of the total body width. Head continuous; lip region, slightly flattened with rounded edges with 3 - 4 indistinct annules. Cephalic framework strongly sclerotised. Stylet well developed 18.5 - 22.5 μm long, with rounded basal knobs 4.5 - 6 μm across; sloping slightly towards posterior. Oesophagus typical of the genus, procorpus 40 - 59 μm long, median bulb with valve, 14.8 - 22.5 x 11 - 13.2 μm in diameter. Oesophageal gland lobe very long and overlapping intestine ventrally. Nerve ring 87 - 123 μm from anterior end. Excretory pore anterior to oesophageo-intestinal valve; 115 - 130 μm from anterior extremity. Hemizonid 1 - 3 annules anterior to excretory pore. Intestine not overlapping rectum.


Male: Similar to female in general morphology. Spicules 29 - 33 μm long; gubernaculum 7.6 - 12 μm long. Bursa 60 - 85 μm, crenate not extending up to the end of tail. Testis monodelphic, prodelphic, spermatocytes arranged in one row.

REMARKS

Description of the present specimens closely agrees with that of H. gracilis given by Sanwal (1957) while studying the morphological details and by Sher (1968) while reviewing the genus.

Habitat: Roots and rhizosphere of rice.  
Locality: Ferozepur.
**Hirschmanniella oryzae** (van Breda de Haan, 1902) Luc and Goodey, 1964

syn. **Tylenchus oryzae** van Breda de Haan, 1902

**Anguillulina oryzae** (van Breda de Haan) Goodey, 1932

**Hirschmannia oryzae** (van Breda de Haan) Luc and Goodey, 1962

**Radopholus oryzae** (van Breda de Haan) Thorne, 1949

**Rotylenchus oryzae** (van Breda de Haan) Filipjev and Schuurmans Stekhoven, 1941

**Tylenchus apapillatus** Imamura, 1931

**Anguillulina apapillata** (Imamura) Goodey, 1932

**Rotylenchus apapillatus** (Imamura) Filipjev, 1936

**Hirschmanniella apapillata** (Imamura) Siddiqi, 1986

**Hirschmanniella nana** Siddiqi, 1966

**Hirschmanniella exigua** Khan, 1972

Plate XXIV; Figs. A - G

**Measurements:**

Female (n=12); L=1.4 - 1.8 mm; a=32 - 60; b=7.6 - 13.1; b'=3.2 - 5.5; c= 5 - 26; V=47 - 61; Stylet=16 - 19 μm.

Male (n=6): L=1.2 - 1.9mm; a=40 - 60; b=7 - 12.5; b'=3.5 - 6.3; c=16 - 23; Stylet=16 - 18.5 μm; Spicules=23 - 28 μm; Gubernaculum=7 - 10 μm; T=27 - 40 μm

**Description**

Female: Body long, slender, irregularly coiled, tapering more towards the posterior end. Lateral fields four, incompletely areolated, occupying about 1/3rd of the corresponding body width. Head region is
slightly marked off from body by a faint constriction, slightly hemispheroic in shape 2.8 - 3 μm high and 8 - 9.2 μm wide. Cephalic framework strongly sclerotized. Stylet well developed, 16 - 19 μm long with rounded or oblong shaped knobs. Orifice of dorsal oesophageal gland 2 - 3 μm behind the base of the stylet. Oesophagus 270 - 415 μm long, median bulb 56 - 85 μm from anterior end; dorsal oesophageal gland overlaps intestine at a distance of 210 - 345 μm. Nerve ring just behind the median bulb. Excretory pore 80 - 110 μm from the anterior end. Hemizonid 3 - 7 annules before excretory pore.

Vulva transverse. Gonads didelphic, amphidelphic and outstretched. Spermatheca present. Tail 75 - 115 μm long, tapering towards the posterior end, ending in a mucronate terminus.

Males: Similar to females in essential details. Testis single; tail elongate conoid. Spicules 23 - 28 μm long and gubernaculum 7 - 10 μm long.

REMARKS

The present specimens closely fit in the description of *H. oryzae* (van Breda de Haan, 1902) Luc and Goodey, 1964; observations have been compared with those given by Ahmad and Jairajpuri (1976) who have worked in detail upon the morphology of *H. oryzae*.

Habitat - Roots and rhizosphere of rice.

Locality - Gurdaspur, Ludhiana, Faridkot.
Suborder - Criconematina Siddiqi, 1980

Superfamily - Criconematoida Taylor, 1936 (1914) Geraert, 1966
   syn. Criconematoidi Paramonov, 1967
   (sub-superfamily name amended from
   Criconematini Paramonov, 1967)

Family - Criconematidae Taylor, 1936 (1914) Thorne, 1949
   syn. Ogmidae Southern, 1914
   Macroposthoniiidae Skarbilovich, 1959
   Madinematidae Khan, Chawis and Saha, 1976

Subfamily - Hemicriconemoidinae Andrassy, 1979

Genus - Hemicriconemoides Chitwood and Birchfield, 1957
   syn. Iota Cobb, 1913, nec Iota Saussure, 1855
   (Hymenoptera)

The genus *Hemicriconemoides* was proposed by Chitwood and Birchfield (1957), as an intermediate genus between *Criconemoides* and *Hemicycliophora* with *H. wessoni* as type species. Goodey, J.B. (1963) synonymised *Hemicriconemoides* with *Hemicycliophora* but Siddiqi and Goodey, J.B. (1964) reinstated the former as a valid genus, mainly on the basis of anchor-shaped stylet base and scaled juveniles. The first published report of this genus from India appears to be that of Siddiqi (1961) when he reported *H. cocophilus* (Loos, 1949) Chitwood and Birchfield, 1957 from soil around roots of *Carissa* sp. from district Banda in U.P. and from sugarcane at Coimbatore, Madras. He also described a new species *H. mangiferae* from soil around roots of mango at Aligarh, U.P. Siddiqi (1964) reported the


**Hemicriconemoides cocophilus** (Loos, 1949) Chitwood and Birchfield, 1957

syn. **Criconemoides cocophilus** Loos, 1949

**Hemicyclophora cocophilus** (Loos) Goodey, 1963

**Criconema mangiferum** Edward and Misra, 1963

**Hemicriconemoides mangiferus** (Edward and Misra) Siddiqi, 1986

**Hemicriconemoides communis** Edward and Misra, 1964

Plate XXV; Figs. A - B
MEASUREMENTS:

Female (n=5) : L=0.43 - 0.52; a=12.8 -15.9; b=5.3- 5.4; V=93.2 - 96.5; V'=28- 37; R=107 -121; R =9 - 11; Stylet=50 - 56 μm.

Male: not observed.

DESCRIPTION

Female : Body enclosed in a double cuticle, outer one sheath like, attached to body at head but not at caudal end; annules of sheath and body round and flat. Lip region slightly set off, bearing two annules. Labial disc present. Stylet 50 - 56 μm long, elongate, with anteriorly cut-shaped knobs 5- 6 μm across. Oesophageal gland orifice 6 - 8 μm from the base of stylet knobs. Nerve ring 65 - 78 μm from anterior end.

Gonad single, prodelphic, outstretched. Spermatheca rounded, filled with sperms. Tail convex-conoid to attenuated, ending in pointed terminus.

REMARKS

This species was originally described by Loos (1949) from rhizosphere of coconut from Kurunengale, Ceylon. Siddiqi (1961b) reported this species from soil around the roots of Curissa sp. from the hilly region of Karwi, district Banda (U.P.) and from sugarcane fields on Coimbatore, Madras. Dasgupta et al. (1969) reported tail to be convex-conoid to attenuated. The specimens in the present studies closely resemble the description of H. cocophillus given by Dasgupta et al (1969).

Habitat - Rhizosphere of rice.
Locality - Patiala.
**Hemicriconemoides mangiferae** Siddiqi, 1961  
*syn. H. litchi* Edward, Misra and Singh, 1965  
*H. aberrans* Phukan and Sanwal, 1983  
*H. birchfieldi* Edward, Misra and Singh, 1965  
Plate XXV; Figs. C - D

**MEASUREMENTS:**

Female (n=8) : L=0.45 - 0.57 mm; a=18 -27.6; b=3.5 - 4.5; c=14.2 - 21.4; V=91 -93; R=130 - 143; R_n=11 -13; Ran=9 - 12; Stylet=70 - 80 μm.

Male : not observed.

**DESCRIPTION**

Body elongate cylindrical, curves upon fixation, enclosed in a double cuticle, outer one sheath like, attached to body at head end; annules of sheath and body round and flat. Cephalic region with two annules, continuous. Stylet elongate, with anteriorly cupped knobs, 70 - 80 μm long.

Gonad single, prodelphic, outstreched; spermatheca rounded, filled with sperms. Tail convex-conoid to attenuated.

**REMARKS**

The present specimens closely fit into the description of *H. mangiferae* Siddiqi, 1961.

Habitat - Rhizosphere of rice.  
Locality - Chandigarh, Zirakpur, Ropar.
Suborder - Hexatylina Siddiqi, 1980
syn. Sphaerulariina Maggenti, 1982
Allantonematina Inglis, 1983
Heterotylenchina Inglis, 1983

Superfamily - Neotylenchoidea Thorne, 1941 (Jairajpuri and Siddiqi, 1969)

Family - Neotylenchidae Thorne, 1941
Fergusobilidae Goodey, 1963 (Siddiqi and Goodey, 1964)
Gymnotylenchidae Siddiqi, 1980

Subfamily - Neotylenchinae Thorne, 1941
syn. Hexatylina Skarbilovich, 1952

Genus - Hexatylus Goodey, 1926
syn. Anguillulina (Hexatylus Goodey, 1926) (Schneider, 1939)
Neotylenchus Steiner, 1931
Anguillulina (Neotylenchus Steiner, 1931) (Schneider, 1939)
Scytaleum Andrassy, 1961

Hexatylus venustus sp. nov.
Plate XVI; Figs. A - D

MEASUREMENTS:

Female (n=7); L=0.55 - 0.75 mm; a=35.4 - 45.2; b=4.9 - 7.0;
c=10.6 - 12; c'=6 - 6.3; V=81 - 84; Stylet=7.2 - 8.2 μm; G_1=455 μm.

Male: not observed.
DESCRIPTION

Female : Body cylindrical, slightly arcuate when fixed. Cuticle with very fine transverse striations. Lateral field marked by six incisures, outer being annulated at places. Cephalic sclerotization weak. Head continuous with body contour, narrower than body; 3.09µm high and 6.18µm wide. Lip region rounded; Stylet 7.2 - 8.2µm long with basal knobs. Oesophagus 96.8 - 133µm long, cylindrical, dilates in the middle, with 2 nuclei. Nerve ring 64 - 92.7µm from anterior end. Excretory pore at the level of basal oesophageal bulb; 80 - 118µm from anterior extremity.

Vulva a transverse slit; without prominent lips. Vagina directed anteriorly. Gonads monodelphic, prodelphic outstretched; oviduct with two consecutive rings of 4 cells each; Vulva- anus distance 65 - 66.5µm. Tail conoid; 51.5 - 77.2µm long. Phasmids pre-anal, opposite junction of intestine and rectum.

Diagnosis and relationship

The present species has been assigned to genus Hexatylus because of the presence of six incisures, cylindrical oesophagus; nerve ring circum-intestinal and gonads monodelphic, prodelphic and outstretched.

DIFFERENTIAL DIAGNOSIS

Presence of six lateral fields; similar length of oesophagus; tail; b and c value bring the new species closer to H. mulveyi Das, 1964. However, the new species differs from H. mulveyi Das, 1964 in having the smaller body size, more value of a, lesser values of c, differently shaped lip region and smaller stylet length (L=0.91 - 1.09mm; a=31.8 - 34.6; c=13.3 - 16.8; lip region low; stylet 8 - 12µm in H. mulveyi).
In view of above differences, the present species has been considered new to science and hence named as *Hexatylus venustus*.

**Holotype** - One female, collected on 8th September, 1987

**Paratypes** - Six females, other details as per holotype.

**Type habitat** - Rhizosphere of rice.

**Type locality** - Amritsar.
Superfamily - Anguinoidea Nicoll 1935 (1926)

syn. Anguillulinoidea Baylis and Daubney, 1926 (Nicoll, 1935)

Nothotylenchoidea Thorne, 1941 (Jairajpuri and Siddiqi, 1969)

Family - Anguinae Nicoll, 1935 (1926)

syn. Anguillulinidae Baylis and Daubney, 1926

Anguinae Paramonov, 1962 (Siddiqi, 1971)

Ditylenchidae Golden, 1971; (Fotedar and Handoo, 1978)

Nothotylenchidae Thorne, 1941 (Jairajpuri and Siddiqi, 1969)

Subfamily - Nothotylenchinae Thorne, 1941

Genus - Nothotylenchus Thorne, 1941

yn. Boleodoroides Mathur, Khan and Prasad, 1966

Boleodorus (Boleodoroides Mathur et al., 1966) (Khera, 1970)

Nothotylenchus jucundus sp. nov.

Plate XXVII; Figs. A - D

MEASUREMENTS:

Female (n=5) L=0.43 - 0.511 mm; a=30.1 - 34.8; b=5.2 - 5.4; c=10.4 - 11.9; V=76.1 - 76.3; Stylet=7.0 - 7.2 μm; G₁=250 μm.

Male: not observed.

DESCRIPTION

Body C-shaped or strongly curved ventrally. Cuticle with fine transverse striae; about 1 μm apart at midbody. Lateral field with 6 incisures; occupying about 1/2 the corresponding body width. Lip region low; offset; 5 μm wide and 2 μm high bearing 2 -3 indistinct annules. Cephalic
framework lightly sclerotized. Stylet 7 - 7.21 μm long with small rounded knobs. Orifice of dorsal oesophageal gland about 1.5 μm behind the stylet base. Oesophagus 81.37 - 97.85μm long; median bulb fusiform; basal oesophageal bulb pyriform 28 - 29 μm long and 9 μm wide. Nerve ring slightly posterior to median bulb; 51 - 61.5 μm from anterior end. Excretory pore 60 - 72.1 μm from anterior end of body.

Vulva a transverse slit. Spermatheca present. Ovary monodelphic, prodelphic and outstretched. Post-vulval uterine sac 1½ times the anal-body width. Vulva-anus distance 60.8 - 81.4 μm; 1.5 - 1.8 times the tail length. Tail elongate cooid, 44.2 - 51.5 μm long, with a pointed terminus.

**Diagnosis and relationship**

The presence of finely striated cuticle, lateral field with 4 - 6 incisures (6 incisures in present species). Corpus valveless, median bulb fusiform, oesophageal glands enclosed in a basal bulb, gonads monodelphic, prodelphic and outstretched and tail elongate-conoid assigns the present species to genus *Nothotylenchus*.

**DIFFERENTIAL DIAGNOSIS**

The present species comes closer to *Nothotylenchus srinagarensis*. Fotedar and Mahajan, 1972 in having similar shaped lip region; length of excretory pore from anterior end; similar values of 'a' and 'c' and same shape of tail. It, however, differs from the latter in having smaller body & stylet length, differently shaped basal bulb, distinct spermatheca and comparatively anteriorly situated vulva (L=0.60 - 0.65 mm; Stylet 8= μm; basal bulb cylindrical indistinct; spermatheca absent and V=79-81 in *N. srinagarensis*. Fotedar and Mahajan, 1972.
In view of the above differences, the present species has been considered new to science and is named as *Nothotylenchus jucundus*.

**Holotype**  - One female, collected on 18th September, 1986  
**Paratypes**  - Four females, other particulars as per holotype.  
**Type habitat**  - Rhizosphere of rice.  
**Type locality**  - Jalandhar.
Superfamily - Sphaerularioidea Lubbock, 1861 (Poinar, 1975)

Family - Paurodontidae Thorne, 1941 (Massey, 1967) = (familia dubia)

Subfamily - Paurodontinae Thorne, 1941

syn. Misticiinae Massey, 1967

Genus - Paurodontus Thorne, 1941

Genus Paurodontus was described by Thorne, 1949 with P. gracilis as the type species. The first record of this genus in India is by Siddiqi (1961), when he described a new species P. similis from rhizosphere of Brassica oleracea at Aligarh, (U.P.). Khan and Basir (1964), described P. neosimilis. Husain and Khan (1965), added two new species, P. chaudhuri from soil around root zone of Allium cepa and P. saxeni from rhizosphere of Saraca indica. P. bajrai was described from Pennisetum typhoides at Dadesagar from Mysore by Khan, Mathur, Nand and Prasad, 1968. Khan and Nanjappa (1972) described P. indicus from soil around roots of grapevine from Delhi. Das and Shivaswamy (1980) described P. brassicace from the rhizosphere of Jasminum.

Paurodontus basilifer sp. nov.

Plate XXVIII; Figs. A - F

MEASUREMENTS:

Female (n=7) : L=0.765 - .795 mm; a=51.1 - 51.4; b=5.6 - 6.3; c=12.7 - 12.9; c' = 6 ; V=80.6 - 82.2; Stylet=7 - 8.2 μm; G=152 - 180 μm.
Male: not observed.

DESCRIPTION

Female: Body elongate and cylindrical. Cuticle annulated Lip region continuous, indistinctly annulated measuring 2 \( \mu \text{m} \) in height and 5.5 \( \mu \text{m} \) in width. Lateral field 7 \( \mu \text{m} \) wide; occupying about 1/2 the corresponding body width. Stylet weakly developed 6.5 – 8.24 \( \mu \text{m} \) in length. Stylet knobs very small and rounded. Orifice of dorsal oesophageal gland very close to the stylet; 0.7 – 0.8 \( \mu \text{m} \) from stylet base. Oesophagus 123 – 139 \( \mu \text{m} \) long. Procorpus cylindrical; median bulb ovate, valveless, followed by a narrow isthmus leading into a cylindrical basal bulb, the latter having an extension into the intestine. Nerve ring encircles isthmus 65 – 78 \( \mu \text{m} \) from anterior end. Excretory pore cuticularised 100 – 111 \( \mu \text{m} \) from anterior end; Hemizonid adjacent to excretory pore.

Vulva transverse. Gonads monodelphic, prodelphic and outstretched Oocytes arranged in a single row except at the tip. Post-uterine sac nearly two times the vulval body width. Vulva–anus distance 79.2 – 91.2 \( \mu \text{m} \). Tail 4 – 6 anal body width long tapering to rounded terminus; 60.7 – 63.8 \( \mu \text{m} \) in length.

Diagnosis and relationship

Because of the presence of the lateral field with 4 – 6 incisures (6 in the present species) Lip region continuous; stylet under 15 \( \mu \text{m} \); corpus with a posterior fusiform swelling, post-vulval uterine sac prominent and gonads monodelphic and outstretched, the present species is assigned to genus Paurodontus.
DIFFERENTIAL DIAGNOSIS

The present species comes closer to *Paurodontus saxeni* Husain and Khan, 1965; in having a chamber surrounding basal oesophageal bulb, six incisures in the lateral field, 'c' and V values. It, however, differs from it in having longer body length; smaller stylet length and greater value of 'a' and 'b'. (L=0.59 - 0.63 mm, a=37.9; b=5.3 - 5.9; and stylet= 10 μm in *P. saxeni* Husain and Khan, 1965)

In view of the above difference, the present species has been considered new to science and is named as *Paurodontus basilifer*.

Holotype - One female, collected on 15th November,
Paratypes - Six females, other details as per holotype.
Type habitat - From the rhizosphere of rice.
Type locality - Hoshiarpur.
Order - Aphelenchida Siddiqi, 1980


Superfamily - Aphelenchoidea Fuchs, 1937 (Thorne, 1949)

Family - Aphelenchidae Fuchs, 1937 (Steiner, 1949)

Subfamily - Aphelenchinae Fuchs, 1937

Genus - *Aphelenchus* Bastian, 1865

*Aphelenchus avenae* Bastian, 1865

Plate XXIX; Figs. A - D

**MEASUREMENTS:**

Female (n=20): L=0.68 - 0.78 mm; a=34 - 41; b=8.5 - 9.6; c=38 - 41.2; c'=15.6; V=76 - 77.6; Stylet=16.5 - 17.5 μm.

Male: not observed.

**DESCRIPTION**

Female: Body usually straight. Cuticle with fine transverse striae not observed in lip region. Lateral field occupying about 1/3 - 1/4 of the body width; marked by 8 - 10 incisures. Head low rounded slightly set off. Cephalic framework weakly developed. Stylet delicate, knobs absent. Oesophagus comprises of a procorpus with prominent median bulb occupying about 3/4th of body width 17 - 20 x 12.5 - 16.2 μm in diameter.

Note: Classification followed is of Siddiqi, 1980 and Fortuner, 1984.
Crescentic valve plates of median bulb conspicuous. Dorsal oesophageal gland orifice in the lumen of median bulb anterior to valve. Nerve ring at a distance 80 - 92 μm from anterior end and excretory pore 80 - 122 μm. Tail cylindrical 21 - 23 μm long, ending in a rounded terminus.

Gonads monodelphic, prodelphic and outstretched. Oocytes arranged in a single row. Post-vulval sac about 2 - 3 times body width.

REMARKS

The forms described fit in well with the description of *Aphelenchus avenae* Bastian, 1865. Many authors have redescribed it. The present observations have been compared with those given by Singh and Khera (1976).

Habitat - Rhizosphere of rice.

Locality - Widely distributed, reported from Chandigarh, Patiala, Ropar, Ludhiana, Gurdaspur, Amritsar and Ferozepur.
Superfamily - Aphelenchoidoidea Skarbilovich, 1947 (Siddiqi, 1980)

Family - Aphelenchoididae Skarbilovich, 1947 (Paramonov, 1953)

Subfamily - Aphelenchoidinae Skarbilovich, 1947

Genus - Aphelenchoides Fischer, 1894

*Aphelenchoides parietinus* (Bastian, 1865) Steiner, 1932

Plate XXX; Figs. A - C

**MEASUREMENTS:**

Male (n=11) : L=0.42 - 0.47 mm; a=25 - 26.7; b=7.6 - 8.2; c=12.5 - 13.9; V=67 - 68.5.

Male : not found.

**DESCRIPTION**

Female : Body slender curves ventrally upon fixation. Lateral fields marked by four incisures which are reduced in numbers towards the extremities. Lip region set off, by distinct expansion. Cephalic framework weakly sclerotized. Stylet with small basal thickenings. Procorpus cylindrical, narrowing at base, median bulb almost as wide as body cavity; oesophageal glands overlapping intestine about four times the body width. Nerve ring close to median bulb, encircling anterior end of intestine and ducts of oesophageal gland. Excretory pore opposite nerve ring.

Gonads monodelphic, prodelphic and outstretched. Oocytes arranged in a single row. Eggs about two times as large as body width. Posterior uterine branch present, extending about half way to anus. Tail long, arcuate, conoid, ending in a mucronate terminus.
Diagnosis and relationship

The present species has been assigned to the genus *Aphelenchoides* as the cuticle is marked by fine transverse. Cephalic framework weakly sclerotized. Oesophageal gland as a long lobe extending over intestine, ovary, monodelphic and outstretched.

REMARKS

Bastian (1865) gave the original description of *A. parietinus*. Later on Franklin (1950) redescribed this species and present specimens closely fit in the description given by Franklin (1950).

Habitat - Rhizosphere of rice.

Locality - Abohar.
Aphelenchoides lucidus sp. nov.

Plate XXXI; Figs. A - E

MEASUREMENTS:

Female (n=10) : L=0.40 - 0.47mm; a=26.6 - 44.3; b=6.1 - 7;
b'=2.5 - 2.9; c=10 - 11.8; V=62.8 - 64.9; Stylet=11 - 13.5 µm.

Male : not observed.

DESCRIPTION

Female : Body slender, slightly arcuate, tapering at both the ends. Lateral fields prominently marked by eight incisures. Head semi-offset, without annules, 2.2 µm high and 5 µm wide; truncate shaped with rounded edges. Stylet 11 - 13.5µm long with small basal thickenings. Oesophagus 147 - 166 µm long; Procorpus with narrow lumen followed by a prominent muscular, squarish bulb with crescentic valve with dimensions 12.6 - 14 µm and 8 - 10 µm. Oesophageal glands lying dorsally along intestine and about four body width long. Nerve ring just behind median bulb 67 - 68 µm from anterior end. Excretory pore 67 - 71 µm from anterior end.

Gonads monodelphic, prodelphic, outstretched. Oocytes arranged in a single row. Vulva slit like with small and slightly prominent lips. Post-uterine sac very long, reaching more than half the distance between vulva and anus. Tail 40 - 42 µm long; elongate conoid with ventral mucro.

Diagnosis and relationship

The present species has been assigned to the genus Aphelenchoides as the cuticle is marked by fine transverse. Cephalic framework weakly
sclerotized. Oesophageal gland as along lobe extending over intestine, dorsal oesophageal gland opening in metacorpus, ovary monodelphic and outstretched.

DIFFERENTIAL DIAGNOSIS

*Aphelenchoides lucidus* comes closer to *Aphelenchoides minor* Seth and Sharma, 1986 in having same number of lateral fields, length of excretory pore; and V value. However, it differs from the latter in having head region semi-offset, longer stylet, oesophagus variation in 'b' and 'c' values (Stylet=10 μm; b=8.1 - 9 and c=14.6 - 14.9 in *A. minor*).

In view of the above differences, the new species has been considered *new to the science and hence named as *Aphelenchoides lucidus*.*

**Holotype**
- One female; collected on 27th October, 1987.

**Paratypes**
- Nine females; other details as per holotype.

**Type habitat**
- From the rhizosphere of rice.

**Type locality**
- Faridkot.
Family - Seinuridae Husain and Khan, 1967 (Baranovskaya, 1981)
Subfamily - Seinurinae Husain and Khan, 1967
Genus - Seinura Fuchs, 1931

Seinura mandatum sp. nov.
Plate XXXII; Figs. A - E

MEASUREMENTS:
Female (n=10) : L=0.570 - 0.633 mm; a=31.7 - 33.5; b=2.7 - 3.2;
\( b' = 7.1 - 7 \); c=17.8 - 18; c'=1.7 - 1.8; V=78 - 79; Stylet=11 - 12.5 \( \mu \text{m} \);
G=280 - 350 \( \mu \text{m} \).

Male : not observed.

DESCRIPTION

Body slightly curved upon fixation. Cuticle finely annulated. Lateral fields obscure. Lip region set off, truncated anteriorly, twice as broad as high, without visible sclerotization. Stylet without knobs 11 - 12.5 \( \mu \text{m} \) long; with conus 6.5 \( \mu \text{m} \) long. Procorpus a cylindrical tube; median bulb twice as long as wide; with dimensions 8 - 11 \( \mu \text{m} \) x 19 - 22 \( \mu \text{m} \) with well developed valvular apparatus located in the middle of the bulb; oesophageal gland 107 - 125 \( \mu \text{m} \) long with gland nuclei arranged in tandem. Nerve ring encircling isthmus just behind the median bulb 75 - 84 \( \mu \text{m} \) from anterior end. Excretory pore 105 \( \mu \text{m} \) from anterior end.

Vulva a transverse slit; vagina about one third of the corresponding body width long. Gonads monodelphic, prodelphic outstretched.
Spermatheca indistinct. Post-uterine sac about 1/2 to 1/3rd of the corresponding body width long. Tail elongated conoid with pointed terminus. 32 - 45 μm long but 4 - 5 times anal body width.

REMARKS

The new species comes close to *S. tritici* Bajaj and Bhatti, 1982 in having similar value of 'a', 'b' and V. It, however, differs from it in having shorter stylet, posteriorly situated excretory pore, smaller post-uterine sac and greater value of 'c'. Stylet 16 - 18 μm; excretory pore 75 - 85 μm from anterior end; post-uterine sac 3/4th of the corresponding body width and c= 12 - 14 in *S. tritici* Bajaj and Bhatti, 1982.

Holotype - One female collected on 7th September, 1987
Paratypes - Nine females, other details as per holotype.
Type habitat - Rhizosphere of rice
Type locality - Jalandhar.
Order - Dorylaimida (de Man, 1876) Pearse, 1942

Suborder - Dorylaimina (de Man, 1876) Pearse, 1936

Superfamily - Longidoroida Thorne, 1935 (Khan and Ahmad, 1975)

Family - Xiphinematidae Dalmasso, 1969 (Khan and Ahmad, 1975)

Subfamily - Xiphinematinae Dalmasso, 1969

Genus - Xiphinema Cobb, 1913

Cobb (1913) proposed the genus Xiphinema; this was placed in the subfamily Longidorinae along with Longidorus by Thorne (1939). Siddiqi, 1959 was the first to describe three new and two known species of Xiphinema from India. *X. americanum* Cobb, 1913 was collected from soil around roots of citrus spp., Grewia asiatica and Mangifera indica from ten districts of U.P. and *X. brevicaudatum* S. Stekhoven, 1951 which was later shifted to Longidorus by Thorne (1961). The three newly described species were *X. basiri*, *X. indicum* and *X. citri* collected from rhizosphere of Citrus sinensis; Grewia asiatica and Citrus limon respectively from Aligarh (U.P.). *X. indicum* was synonymised with *X. insigne* Loos, 1949 by Tarjan and Luc (1963). *X. citri* was transferred to Longidorus by Thorne (1961), then to
Paralongidorus by Siddiqi et al., 1963 and finally to **Siddiqia** by Khan et al., (1978). Thus, *X. basiri* is the first and the earliest described species from India. Siddiqi (1961a) described *X. opisthohysterum* from soil around roots of *Eugenia jambolena* and *Aegle marmelosa* from North India. During the same year he also reported *X. pratense* Loos, 1949 which was later synonymised with *X. elongatum* by Tarjan and Luc (1963). Jairajpuri and Siddiqi (1963) reported *X. brevicolle* Lordello and da Costa, 1961, from Berberis field, Dalhousie (H.P.). Prasad and Dasgupta (1961) reported *X. diversicaudatum* collected from *Rosa* sp. at Delhi. Siddiqi (1964d) described two new species, viz. *X. orbum* and *X. conurum* from soil around roots of *Prunus amygdalus* and *Oryza sativa* respectively, near Patna city. Loof and Maas (1972) doubtfully synonymised *X. conurum* with *X. italicae*. Khan (1964a) described *X. arcum* from rhizosphere of *Cedrus libani var. deodara* at Ranikhet (U.P.). Khan and Ahmad (1975) described a new species named as *X. americanum* but renamed it as *X. inaequale* in 1977 because of homonymy. Lamberti and Loof (1977), however, suggested that *X. inaequale* was a probable synonym of *X. brevicolle*. Bajaj and Jairajpuri (1976) described two species, viz. *X. neoolongatum* and *X. lambertii*, the former from the *Psidium guajava* at Ambala (Haryana), while the latter from *Cajanhus cajan* and *Mangifera indica* at Rajkot (Gujarat). *X. elitum* collected from *Oryza sativa* fields at Andaman island, was described by Khan, Chawla and Saha (1976). Bajaj and Jairajpuri (1979) reported *X. ensiculiferum* Cobb, 1893; *X. radicola* Goodey, 1936 and *X. brasillense* Lordello, 1951 and a new species *X. luci* from India. Jairajpuri and Lamberti (1980) proposed *X. bajaji* nom. nov. for *X. luci*. Sharma and Saxena (1981) described *X. cobbi* from soil around roots of *Solanum melongena* and *X. indicum* from rhizosphere of rose from Bareilly.

*Xiphinema americanum* Cobb, 1913

Plate XXXIII; Figs. A - D

**MEASUREMENT:**

Female (n=8); L=1.5 - 1.87 mm; a=41.6 - 46.5; b=5.9 - 6.5; c=47 - 53.2; c'=1.3 - 1.7; V=51.5 - 53; Odontostyle=70 - 80.5 μm; Odontophore=39 - 43.5 μm.

Male: not observed.

**DESCRIPTION**

Female: Body assumes the shape of an open spiral when relaxed by gentle heat. Cuticle smooth. Lateral field occupy about 1/4th of the corresponding body width. Lip region slightly narrow than body. Amphid apertures slit like. Stylet long and straight with flanges 8 - 9 μm across. Enlarged basal portion of oesophagus two to three times as long as neck width. Cardia bluntly conoid. Rectum one half of the total body width.
Vulva a transverse slit. Ovaries didelphic, amphidelphic and reflexed about half way back to vulva. Eggs four to five times as long as body width. Oocytes arranged in a single row. Tail short conoid caudal pores invisible.

REMARKS

The present specimens fit in well with the description of the species given by Siddiqi (1959) and Thorne (1961).

Habitat - Rhizosphere of rice.

Locality - Widely distributed, Ludhiana, Chandigarh, Ropar, Zirakpur, Faridkot and Ferozepur.
Xiphinema elitum Khan, Chawla and Saha, 1976

Plate XXXIV; Figs. A - D

MEASUREMENTS:

Female (n=5) : L=1.7 - 2.2 mm; a=45 - 60; b=6.5 - 7.5; c=41 - 50; c'= 1.5 - 2.5; V=49.2 - 50; Stylet=115 - 122 μm; Odontophore=57 - 60 μm.

Male: not observed.

DESCRIPTION

Female : Body ventrally arcuate, more so in the posterior one-third of body. Body tapering anteriorly to a smooth rounded head and posteriorly to dorsally convex-conoid tail. Cuticle marked by uninterrupted faint transverse striations. Lip region 8 μm wide and 4.5 μm high, smoothly rounded, continuous with body contour. Lateral field measuring about 1/3rd of the corresponding body width. Amphids stirrup-shaped with slit like aperture. Stylet with basal flanges. Basal oesophageal bulb 72 - 85 μm long.

Gonads didelphic amphidelphic, almost equally developed, reflexed at the posterior end. Rectum about 3/4th of the anal body width. Tail dorsally convex-conoid ending in a subacute terminus 45 - 60 μm long.

REMARKS

The present specimens closely fit in the description of X. elitum Khan, Chawla and Saha, 1976. Slightly lower value of 'a' and 'b' has been observed in the present studies which is a minor intraspecific variation.

Habitat - Rhizosphere of rice.

Locality - Gurdaspur.