TYLENCHS
Tylenchs are considered as the most important and widely distributed group of nematode. They are found in the rhizospheric region of plants upon which they feed as ecto- or endo parasites. In any of the soil samples processed, they are found abundantly and a large portion of the total nematode population is found to be their contribution. Roots of plants are infested by these nematodes but such infestation may also extend to the other aerial parts, such as leaves, flowers, fruits, buds etc. In this case, the roots may develop galls, lesions etc. resulting to stunted growth of the plants. They may also cause necrosis of leaves and great distortion of other plant parts. As such they have been extensively studied.
Needham (1743) was the first person who discovered the plant parasitic nematodes as eelworms in seed galls of wheat. The original name given to those nematodes was Vibrio tritici. Scopoli (1777) later renamed it as Anguina tritici. Bastian (1885) then established the genus Tylenchus for those nematode species having a well developed stylet or feeding apparatus and caudal alae in male. Then Dujardin (1845), Khun (1857), Carter (1858), Schmidt (1871), Butschli (1873), De Man (1880), Cobb (1893, 1913), Zimmermann (1898), Steiner (1914, 1945), Taylor (1938), Thorne (1941) reported a large number of species and genera under the family-Tylenchidae Orley, 1880. The original genus Tylenchus and several other genera were synonymised with the genus Anguillulina Gervais and Beneden, 1859 by Baylis and Daubney (1926), because of its priority over Tylenchus. Bastian (1885) and Filipjev (1934) again revised the genus Anguillulina and re-established the genera Tylenchus, Tylenchorhynchus, Anguina and established another two more genera Ditylenchus and Tettylenchus. The amended generic diagnosis of the genus Tylenchus having the full original status was given by Thorne (1949). In recent years a large contribution in the taxonomy of nematode world of this group was made by several other prominent workers like Golden (1971), Andrassy (1976), Southey (1978), Baqri (1978), Bajaj and Bhatti (1978, 1980), Dhanachand and Jairajpuri (1979, 1980), Phukan and Sanwal (1979, 1980), Chawla and Sanathanam (1980), Nickle (1984), Siddiqi, (1986), Maggenti, Luc, Raski, Fortuner and Geraert (1987), Mahajan (1988).
In Manipur, work in the field of Nematology started only during the last 15 years. However, a limited work on plant parasitic and soil nematodes of this state was initiated in 1979 when Sultan and Jairajpuri for the first time published the description of a new species, *Scutellonema imphalus*. Later on workers like Dhanachand and Jairajpuri (1979, 1980, 1981, 1982), Dhananchand and Gambhir (1991), Renubala, Dhanachand and Gambhir (1991, 1992, 1993) worked on Tylenchs and contributed a number of new species.

In the present study 350 soils samples in and around the roots of banana from different localities of this state were collected and analysed. Plenty of nematode species that are known to be plant parasitic in nature were recovered. Detail analysis yielded a large number of Tylenchs belonging to 20 genera under 15 sub families and 10 families. In all 44 species have been identified. Among them 39 are known and reported and 5 are found to be new species belonging to the genera *Neopsilenchus*, *Bolodorus* (*Neobasiria*), *Cephalenchus* and *Helicotylenchus*. Dimensions and necessary illustrations are provided.
Body small, ranging from 0.35-0.55 mm. straight to arcuate. Cuticle coarsely annulated. Lateral lines with 3-4 incisures. Cephalic framework without distinct striation. Amphids indistinct and pore-like. Stylet less than 15 μm long, knobs rounded. Oesophagus tylenchoid. Cardia discoidal. Female reproductive system monoprodelpic. Vulva sunk in body with larger and smaller inner lips and conspicuous lateral membranes, at 53-69% of body length. Vagina directed forward, its wall often swollen. Post vulval uterine sac absent. Spermatheca offset, round to oval, usually with sperms. Phamids dorso-sublateral, postmedian in females usually just behind level of vulva. Tail elongate-filiform, longer than vulva to anus distance. Males with an adanal bursa, spicules 11-16 μm long, cloacal lips elevated.
Type species: *Aglenchus agricola* (De Man, 1884) Meyl, 1961

SPECIES RECORDED FROM OTHER HABITATS OF MANIPUR:

- *A. parvus* Siddiqi, 1963

Soil samples analysed during the present work yielded specimens of *Aglenchus* which belong to one known species, *A. muktii*. Their dimensions and localities are presented.

**AGLENCHUS MUKTII PHUKAN AND SANWAL, 1980**

**DIMENSIONS**

Females (25): L=0.52-0.63mm (0.58mm), a=33 - 42 (37), b=6.2 - 7.6 (6.8), c=2.7 -3.6 (3.0), c' = 18 - 23 (21), v=50 - 54 (51), G₁ = 17 - 28 (22), stylet = 9-11um (10 um), dorsal oesophageal gland orifice at 2 - 3 um from stylet base, oesophagus = 76 - 82 um (79 um) long from anterior end, nerve ring at 53 - 57 um (55 um) from anterior end, excretory pore at 88 - 75 um (70 um) from anterior end, female reproductive system monoprodelphic and outstretched, tail = 162 - 175 um (167 um) long, filiform and tapering to a pointed tip.
Males (5) : L= 0.51 - 0.56 mm (0.54 mm), a= 35 - 36 (35.5),
b = 6.9 - 7.4 (6.9), c = 3.0 - 3.5 (3.2), c' = 16 - 17 (16.5)
T = 40 - 42 (41), stylet = 9 - 10 um (9.5 um), dorsal
oesophageal gland orifice at 2 - 3 um from base of stylet
knob, oesophagus 72 - 75 um (74 um) long from anterior end,
nerve ring at 53 - 54 um (53.5 um) from anterior end,
excretory pore at 65 - 68 um (67 um) from anterior end,
spicules 12 - 14 (13 um) long, ventrally curved,
cephalated, gubernaculum 3 - 4 um (3.5 um) long, trough­
shaped and fixed, bursa adanal, 25 - 26 um (25.5 um)
long, tail 155 - 160 um (158 um) long and filiform.

HABITAT AND LOCALITIES

Detected from soil around roots of banana, Musa sp. from (1) Zinthiang, Churachandpur district, (2)
Potsangbam, Bishnupur district, (3) Weitram, Imphal
district, (4) Ukhongsang, Thoubal district, (5) Wino Bazar,
(6) Thawai, Ukhrul district, (7) Kamkhugong, Tamenglong
district, and (8) Maram, Senapati district, Manipur.

REMARKS

The present specimens conform well in its
dimensions and descriptions with those given by Phukan and
Sanwal (1980) except in its smaller stylet, spicule and
bursa.
GENUS COSENCHUS SIDDIQI, 1978

GENERIC CHARACTERS

Body small, measuring 0.33 - 0.65 mm long, straight to slightly arcuate upon relaxation. Body cuticle coarsely annulated and modified into longitudinal ridges, excluding those of lateral fields at mid body. Lateral field with 2 to 3 ridges, cuticle surface outside lateral fields showing minute squares or rectangles formed by transverse and longitudinal striae or grooves. Cephalic region continuous or slightly set off, usually striated, stylet under 16 um long with conus less than half of its total length. Oesophagus typical tylenchoid type, caruncle rounded or discoidal. Female reproductive system monoprodelpic, vulva with or without lateral membranes. Vagina at right angles to body axis or slightly directed forward. Post vulval uterine sac present. Phasmids dorso-sublateral, postmedian. Tail straight, elongate conoid to filiform. Male usually rare with adanal bursa and cloacal lips forming a short tube.

Type species: Coslenchus costatus (De Man, 1921)

SPECIES RECORDED FROM OTHER HABITATS OF MANIPUR:

C. costatus (De Man, 1921) Siddiqi, 1978.
C. assamesis (Phukan & Sanwal, 1980) Andrassy, 1982
C. diversus Lal and Khan, 1987
In the present study, analysis of soil samples yielded only one known species of the genus *Coslenchus*. Measurements and localities are provided.

**COSLENCCHUS DIVERGUS LAL AND KHAN, 1987**

**DIMENSIONS**
Females (8): $L = 0.51 - 0.59 \text{ mm (0.54 mm)}$, $a = 30 - 37 (34)$, $b = 5.6 - 7.3 (6.3)$, $c = 3.8 - 5.9 (5.2)$, $c' = 9 - 16 (12)$, $V = 83 - 87 (85)$, $G_1 = 19 - 37 (23)$, stylet = $8 - 10 \text{ um (9.5 um)}$, dorsal oesophageal gland orifice at $2 - 3 \text{ um from stylet base}$, oesophagus = $81 - 90 \text{ um (87 um)}$ long from anterior end, nerve ring at $53 - 70 \text{ um (62 um)}$ from anterior end of body, female reproductive system monoprodelphic and outstretched, posterior vulval uterine sac short and almost equal to body width at vulva, tail long, filiform, measuring $86 - 136 \text{ um (108 um)}$ in length.

Male: Not found.

**HABITAT AND LOCALITIES**
Detected from soil around the roots of banana *Musa* sp. from (1) Elangbam Leikai, Imphal district and (2) Wino Bazar, Ukhrul district, Manipur.

**REMARKS**
The present specimens agree well in its dimensions and descriptions with those given by Lal and Khan (1987) except a slight difference in body length.
SUBFAMILY BOLEODORINAE KHAN, 1964
GENUS BOLEODORUS THORNE, 1941

GENERIC CHARACTERS

Body size usually under 1 mm, slightly ventrally arcuate upon fixation. Cuticle finely striated. Lateral field with four incisures, not areolated. Cephalic region elevated, weakly to moderately sclerotized. Amphidial apertures oval or crescentic slits, obliquely placed on the head. Stylet about 8 - 10 um long, conus about one-third of total stylet length, knobs flanged, rarely rounded. Orifice of dorsal oesophageal gland 1-4 um from stylet base. Median bulb cylindroid, with a basal fusiform swelling, devoid of musculature and valve plates. Basal bulb pyriform. Excretory pore behind nerve ring. Reproductive system monoprodelphic. Vulva generally at 59 - 75% of body length. Spicules long, bursa adanal, gubernaculum simple and fixed. Tail ventrally arcuate or straight and usually terminally clavate.

Type subgenus: Boleodorus Thorne, 1941.

SUBGENUS NEOBASTRIA JAVED, 1982

SUBGENERIC CHARACTERS

Body about 1 mm or less long, almost straight upon fixation. Cuticle marked with fine transverse striae
and intercepted by four lateral lines, Cephalic region elevated. Amphids post labial with slit-like apertures. Stylet 10-13 μm long, with flanged knobs. Vulva at 59-60% of body length. Female reproductive system monoprodelpic and outstretched, oocytes arranged in a single row. Tail straight, elongate, may be clavate at tip.

Type species: *Neobasiria citri* Javed, 1982.

In the present work, soil samples analysed revealed two new species of the genus *Boleorinus* viz., *B. (N) cylindricus* and *B. (N)*, *minustylus*. Dimensions and descriptions are provided with suitable illustrations.

**BOLEORINUS* (NEOBASIRIA) CYLINDRICUS*, N. SP.

(FIG. 1)

**DIMENSIONS**

Paratype females (8): L =0.59 - 0.61 mm (0.60), a = 42 - 47 (45), b = 6.2 - 6.5 (6.3), c = 6 - 7 (7), c' = 9 - 13 (11), V = 63 - 64 (63), G₁ = 33 - 36 (34), G₂ = 2, stylet = 8-8 μm (7 μm), tail = 88 - 101 μm (98 μm), ABD = 8 -10 μm (8 μm).

Holotype female: L = 0.48 mm, a = 37, b = 5.9, c = 8, c' = 12, V = 63, G₁ = 38, G₂ = 2, stylet = 8 μm, tail = 88 μm, ABD = 8 μm.
Paratype males (4) : $L = 0.53 - 0.64 \text{ mm} (0.58 \text{ mm})$, $a = 42 - 47 \ (44)$, $b = 5.7 - 6.5 \ (6.0)$, $c = 5 - 6 \ (5)$, $c' = 10 - 13 \ (12)$, $T = 33 - 36 \ (34)$, stylet = 8 um, spicules = 16 um, gubernaculum = 3 - 4 um, bursa = 24 - 27 um (25 um), tail = 88 - 98 um (90 um), ABD = 10 um.

**DESCRIPTION**

Female : Body cylindrical, tapering towards both extremities. Cuticle finely and transversely striated. Lateral fields with four incisures. Lip region elevated with transverse indistinct striations. Amphids posterior to lip region, aperture slit-like. Deirids near the excretory pore, about 76 um from the anterior end. Excretory pore situated in the region of basal oesophageal bulb. Stylet slender 6 - 8 um long with posteriorly directed basal knobs. Orifice of dorsal oesophageal gland located at about 7 um behind stylet base. Median oesophageal bulb located at 53 - 60% of the oesophagus. Nerve ring at 59 - 69 um from the anterior end of the body encircling the isthmus region. Basal bulb of oesophagus cylindrical, 14 - 16 um long. Cardia distinct.

Male: Body structure almost similar with female. Spicules paired 16 μm long. Gubernaculum small 3 – 6 μm in length. Bursa 29 – 32 μm or about three times anal body width. Tail about 10 – 13 times anal body width with a rounded tip.

**TYPE HABITAT AND LOCALITY**

Detected from soil around the roots of Banana, *Musa* sp. from Nambol, Bishnupur District, Manipur.

**TYPE SPECIMENS**

Collected in November, 1992. Holotype female on slide AN41 /Boleodorus (*Neobasiria*) *cylindricus* n. sp./1, Paratype females and males on slides AN41/Boleodorus (*Neobasiria*) *cylindricus* n.sp. /2-11, deposited in the Parasitology Laboratory, Life Sciences Department, Manipur University, Canchipur, Imphal - 795 003.

**DIFFERENTIAL DIAGNOSIS**

*Boleodorus* (*Neobasiria*) *cylindricus* n. sp. comes close to *B. (N) citri* and *B. (N) acutus*. But, differs in having a longer and thinner body, shorter oesophagus, longer tail, shorter basal oesophageal bulb, bigger spicules. (L = 0.51 - 0.54 mm, a = 28 - 37, b = 4.8 - 5.1, c = 8.4 - 9.4, c' = 5.1 - 6.4, stylet = 11 - 12 μm, tail = 58 – 62 μm, basal oesophageal bulb = 25 – 28 μm long and
cylindroid, spicules = 10 - 11 \text{um} in \text{B. (N) citri}). It differs from \text{B. (N) acurvus} in its longer and thinner body, shorter oesophagus and shorter stylet (L =0.47 - 0.54 mm, a = 27 - 37, b = 4.2 - 4.7, stylet = 10 - 11 \text{um} in \text{B. (N) acurvus}).

\textbf{BOLEODORUS (NEOBASIRIA) MINUSTYLUS N. SP.}

\textit{(FIG. 2)}

\textbf{DIMENSIONS}

Paratype females (2) : L = 0.69 - 0.83 mm (0.76 mm ), a = 48 - 52 (50), b = 5.6 - 7.4 (6.5), c = 10-14 (12), c'=5.3 - 7.5 (6.4), v = 79 - 81 (80), G_1 = 11 - 15 (13), G_2 = 3.7, stylet = 4 \text{um}, tail = 59 - 72 \text{um}, (68 \text{um}) ABD = 10-11 \text{um} (10.5 \text{um}).

Holotype female : L = 0.71 mm, a = 45, b = 5.2, c = 12, c' = 5.2, v = 78, G_1 = 42, G_2 = 1.1, stylet = 4.8 \text{um}, tail = 59 \text{um}, ABD = 11 \text{um}.

Paratype males (2) : L = 0.66 - 0.67 mm (0.685 mm), a = 52 - 53 (52.5), b = 5.3 - 5.8 (5.6), c = 11 - 15 (13). c'=5.8-6.0 (5.9), T = 31-48 (39), stylet = 3-4 \text{um} (3.5 \text{um}), spicules =14 - 16 \text{um} (15 \text{um}), gubernaculum = 4.8 \text{um}, bursa = 27 - 35 \text{um} (31 \text{um}), tail = 58 - 61 (60 \text{um}), ABD = 10 \text{um}.
DESCRIPTION


Reproductive system monoprodelphic, outstretched. Vulva transverse. Oocytes arranged in a single row. Posterior uterine sac about half body widths long. Vulva-anus distance 96 - 112 um long or less than one tail length. Tail short tapering uniformly to a rounded terminus, about 5 - 8 times the anal body width in length.

Male: Body posture almost similar with female. Spicule distinctly sclerotized and ventrally arcuate more than one anal body width long. Gubernaculum trough-shaped, 4.8 um long. Tail about 6 times anal body-width long with a rounded terminus.
TYPE HABITAT AND LOCALITY

Detected from soil around the roots of banana, local name Changbi (AB group) from Kanglatombi, Senapati district Manipur.

TYPE SPECIMENS

Collected in December 1992. Holotype female on slide ANae/Boleodorus (Neobasiria) minustylus n.sp./3, paratype females and males on slides ANae/Boleodorus (Neobasiria) minustylus/1,2,2, deposited in the Parasitology Laboratory Life Sciences Department, Manipur University, Canchipur Imphal - 795 003.

DIFFERENTIAL DIAGNOSIS

Boleodorus (Neobasiria) minustylus n.sp. comes close to B. (N) citri Javed, 1982 and B. (N) cylindricus n.sp. From B. (N) citri it differs in its longer body, smaller stylet, shape of stylet knob, shape of oesophagus, shorter oesophageal bulb and longer spicule (L = 0.51 - 0.54 mm, stylet = 11 - 12 um, oesophageal bulb cylindrical, 25-28 um long, spicule = 10 - 11 um in B. (N) citri). It differs from B. (N) cylindricus in its longer body, smaller stylet, shape of stylet knob, slightly posteriorly located vulva, shorter vulva-anus distance and shorter tail. (L = 0.59 - 0.61 mm, stylet = 8 um, V = 83 - 64, Vulva-anus distance = 126 - 138 um, tail 88 - 96 um, in B. (N) cylindricus).
GENUS BASIRIA SIDDIQI, 1959

GENERIC CHARACTERS

Body small to medium size, about 1 mm or less long. Straight to arcuate ventrally upon fixation. Cuticle with fine, distinct annules. Lateral fields each with 4 incisures. Amphidial apertures prominent, arcuate, slit-like or V-shaped, located at base of lateral lip areas, posterior to cephalic sensilla. Cephalic region elevated, rounded, smooth frame work lightly sclerotized lateral lip areas generally smaller than submedians. Stylet slender about 9 - 13 µm long with small rounded knobs. Orifice of dorsal oesophageal gland upto one stylet length behind stylet base. Median bulb generally poorly developed, muscular with refractive valve plates at 36 - 58% of oesophageal length from anterior end. Cardia distinct. Reproductive system monoprodelphic and outstretched, Spermatheca lobed. Post vulval uterine sac shorter than body width. Spicules 14 - 24 µm long, bursa adanal, gubernaculum simple and fixed. Tail elongate, filiform with clavate, rounded, indented or pointed terminus.

Type species: Basiria graminophila, Siddiqi, 1959.

SPECIES RECORDED FROM OTHER HABITATS OF MANIPUR.

B. aberrans (Thorne, 1949) Siddiqi, 1963
B. asaraensis Khan, 1982
B. graminophila Siddiqi, 1959
B. hissariensis Bajaj and Bhatti, 1978.
Soil samples analysed during the present work yielded many specimens of Tylenchs belonging to the genus *Basiria*. A detailed examination revealed that these represent three known species viz., *B. aberrans*, *B. graminophila* and *B. hissariensis*. Measurements and localities are presented.

**BASIRIA ABERRANS** (THORNE, 1949) SIDDIQI, 1963

DIMENSIONS

Females (20) : $L = 0.52 - 0.62$ mm ($0.58$ mm), $a = 38 - 47$ (42), $b = 5.0 - 6.1$ (5.8), $c = 5.2 - 6.3$ (5.8), $c' = 9 - 13$ (11), $V = 58 - 65$ (61), $G_1 = 28 - 37$ (32), $G_2 = 1.2 - 1.3$ (1.2), stylet = 8 um, dorsal oesophageal gland orifice at 5 - 6 um from stylet base, oesophagus = 100 - 104 um (102 um) long from anterior end, nerve ring = 70 - 72 um (70 um) from anterior end, excretory pore = 75 - 80 um (77 um) from anterior end, female reproductive system monoprodelphic and outstretched, tail 100 - 115 um (109 um) long, filiform and tapering to a pointed tip.

Males (2) : $L = 0.55 - 0.58$ mm ($0.57$ mm), $a = 39 - 46$ (43), $b = 5.7 - 6.1$ (5.9), $c = 4.7 - 5.5$ (5.1), $c' = 9 - 12$ (11), $T = 24 - 47$ (36), stylet = 8 um, dorsal oesophageal gland orifice at 5 - 6 um from stylet base, oesophagus = 95 - 98
um (95 um) from anterior end, nerve ring = 72 - 75 um (74 um) from anterior end, excretory pore = 77 - 80 um (79 um) from anterior end of body, spicules = 13 - 16 um (15 um), gubernaculum = 3 - 4 um (3.5 um), bursa = 19 - 29 um (24 um), tail = 102 - 120 um (111 um) long and filiform.

HABITAT AND LOCALITIES

Detected from soil around roots of banana, variety Champakola (AAB group) from (1) Kakching Khunou, Thoubal district, (2) Canchipur, (3) Lamphel, (4) Pheiyeng, Imphal district and (5) Nambol, (6) Kumbi, Bishnupur district, Manipur.

REMARKS

The present specimens agree well with the dimensions and descriptions given by Siddiqi (1963) and Khan, M.L. (1982). But the present specimens have slightly longer oesophagus.
**DIMENSIONS**

Females (18) : \( L = 0.66 - 0.70 \text{ mm (0.67 mm)}, a = 37 - 46 \) (44), \( b = 6.0 - 6.3 \) \( (6.2), c = 5.6 - 6.8 \) \( (6.4), c' = 11 - 12 \) (11), \( V = 63, G_1 = 32, G_2 = 2.4, \) stylet = 10 - 11 um (11 um), dorsal oesophageal gland orifice at 7 - 8 um (7 um) from base of stylet knob, oesophagus = 100 - 111 um (106 um) from anterior end, nerve ring = 78 - 88 um (85 um), excretory pore at 83 um from anterior end of body, female reproductive system monodelphic and outstretched, tail = 96 - 126 um (110 um) long and filiform.

Male : \( L = 0.61 \text{ mm}, a = 38, b = 6.3, c = 5.8, c' = 9.4, \) stylet = 12 um, dorsal oesophageal gland orifice at 7 um from base of stylet knob, oesophagus = 97 um from anterior end, nerve ring = 72 um, excretory pore at 83 um from anterior end of body, spicule = 16 um, gubernaculum = 4 um long, tail = 105 um long and filiform.

**HABITAT AND LOCALITIES**

Detected from soil around roots of banana, *Musa* sp. from (1) Kobowakching, Bishnupur District, (2) Zinthiang, (3) Churachandpur proper, Churachandpur district, (4) Kangkhui Khulen, (5) Viewland, (6) Mahadeva, Ukhrul district, Manipur.
REMARKS

The present specimens adjust well in its dimensions and descriptions with those described by Siddiqi (1957).

**BASIRIA HISSARIENSIS BAJAJ AND BHATTI, 1978.**

**DIMENSIONS**

Females (15) :  
- L = 0.41 - 0.45 mm (0.44 mm),  
- a = 33 - 37 (35),  
- b = 5.0 - 5.4 (5.2),  
- c = 5.5 - 5.6 (5.6),  
- \( c' = 11 - 12 \) (11),  
- V = 58 - 60 (59),  
- \( G_1 = 24 - 30 \) (27),  
- \( G_2 = 1.9 - 2.4 \) (2.0),  
- stylet = 6 - 7 um (6.4 um),  
- dorsal oesophageal gland orifice at 4 - 5 um from base of stylet knob,  
- oesophagus = 80 - 83 um (82 um) from anterior end,  
- nerve ring = 48 - 52 um (50 um),  
- excretory pore at 60 - 64 um (62 um) from anterior end,  
- female reproductive system monoprodelphic and outstretched,  
- tail = 74 - 77 um (76 um) long and filiform.

Males (2) :  
- L = 0.48 - 0.49 mm (0.48 mm),  
- a = 38 - 39 (38),  
- b = 5.7 - 5.9 (5.8),  
- c = 3.9 - 4.5 (4.2),  
- \( c' = 6.4 - 6.0 \) (7.2),  
- T = 45 - 49 (47),  
- stylet = 6 um,  
- dorsal oesophageal gland orifice at 5 um from base of stylet knob,  
- oesophagus = 83 - 84 um (83.5 um) from anterior end,  
- nerve ring = 48 - 49 um (48 um) from anterior end,  
- excretory pore = 60 - 61
um (60.5 um) from anterior end of body, spicules = 14 - 16 um (15 um), gubernaculum = 4 - 5 um (4.5 um), bursa = 27 - 29 um (28 um), tail = 108 - 123 um (115 um) long and filiform.

HABITAT AND LOCALITIES

Detected from soil around the roots of banana Musa sp. from (1) Pallel (Chandel side), Chandel district, (2) Saparmeina, Senapati district, (3) Noneh, (4) Kamkhugong, Tamenglong district, Manipur.

REMARKS

The present specimens fit well with those dimensions and descriptions given by Bajaj and Bhatti (1978) except that these specimens have a slightly longer tail, shorter stylet and anteriorly located vulva.
GENUS NEOPSILENCHUS THORNE AND MALEK, 1968

GENERIC CHARACTERS

Body length ranges below 1 mm and ventrally arcuate upon fixation. Cuticle finely striated. Lateral fields with four incisures. Cephalic region elevated, rounded or conoid rounded. Amphidial apertures slit-like, transverse or oblique. Stylet cylindroid, conus asymmetrical, lumen gland orifice close to stylet base. Median bulb muscular with valve plates, near the middle of oesophagus. Cardia distinct. Female reproductive system mono-prodelphic with outstretched ovary. Post vulbal uterine sac shorter than one body width and with distinct lumen. Sperm rod-shaped or rounded. Spicules short, tylenchoid. Gubernaculum simple. Bursa adanal. Tail elongate-filiform, with pointed or rounded tip.

Type species: Neopsilenchus magnidens (Thorne, 1949)
Thorne and Malek, 1968.

SPECIES RECORDED FROM OTHER HABITATS OF MANIPUR:

N. similis F.A. Khan and A.M. Khan, 1975
N. varians F.A. Khan and A.M. Khan, 1978
Soil samples analysed during the present work yielded two known and one new species of the genus *Neopsilenchus*. The male of *Neopsilenchus affinis* is reported for the first time. Dimensions of the known species are provided. *N. affinis* and the new species named as *N. minutus* is described in detail.

**NEOPSILENCHUS SIMILIS KHAN AND KHAN, 1975**

**DIMENSIONS**

Females (10) : \( L = 0.69 - 0.75 \text{ mm} (0.71 \text{ mm}), a = 33 - 38 \) (35), \( b = 6.7 - 6.8 (8.7), c = 5.5 - 6.0 (5.7), c' = 12 - 13 (12), V = 84 - 66 (65), G_1 = 27 - 32 (29), G_2 = 1 - 2 (1.3), \) stylet = 10 -11 \( \mu \text{m} (10 \mu \text{m}), \) dorsal oesophageal gland orifice at 3 \( \mu \text{m} \) from stylet base, oesophagus = 102 - 110 \( \mu \text{m} (107 \mu \text{m}) \) from anterior end, nerve ring = 70 - 75 \( \mu \text{m} (72 \mu \text{m}) \) from anterior end, excretory pore at 85 - 88 \( \mu \text{m} (86 \mu \text{m}) \) from anterior end of body, female reproductive system monoprodelpic and outstretched, tail = 117 -136 \( \mu \text{m} (126 \mu \text{m}) \) long, tapering uniformly to a finely rounded terminus.

Male : Not found.

**HABITAT AND LOCALITY**

Detected from soil around the roots of wild banana, *Musa* sp. from Viewland, Ukhrul district, Manipur.
The present specimens conform well in its dimensions and descriptions with those described by Khan and Khan (1975). But these specimens have a slightly shorter stylet and tail.

**NEOPSILENCHUS AFFINIS** KHAN AND KHAN, 1975.
(Fig. 3)

**DIMENSIONS**

**Females** (10): $L = 0.55 - 0.59$ mm ($0.57$ mm), $a = 32 - 38$ (35), $b = 4.7 - 6.0$ (5.5), $c = 4.8 - 5.2$ (5.0), $c' = 10 - 12$ (11), $V = 60 - 63$ (62), $G_1 = 21 - 33$ (25), $G_2 = 1.6 - 2.8$ (2.0), stylet = 11 - 13 um (12 um), tail = 112 - 115 um (113 um) long, tapering uniformly to a minutely rounded terminus, $ABD = 10 - 11$ um (10 um).

**Males** (2): $L = 0.59 - 0.63$ mm ($0.61$ mm), $a = 33 - 43$ (38), $b = 5.5 - 5.7$ (5.6), $c = 4.3 - 4.6$ (4.6), $c' = 10 - 11$ (10.5), $T = 27 - 33$ (30), stylet = 11 um, spicules = 16 um long, gubernaculum = 4 um, bursa = 19 um long, tail = 128 - 137 um (132 um), $ABD = 11 - 13$ um.
DESCRIPTION


Reproductive system monoprodelphic and outstretched. Spermatheca containing sperms. Posterior uterine sac 10 - 16 µm long. Vulva-anus distance almost equal to tail length. Tail tapering uniformly to a minutely rounded terminus, about 10 - 12 times the anal body width in length.

Males : Body posture almost similar with female. Spicule paired, distinctly sclerotized and ventrally arcuate, more than one anal body width long. Bursa 19 µm or about two times the anal body-width. Tail about 11 times the anal body width with a rounded tip.
HABITAT AND LOCALITY

Detected from soil around roots of banana, local name Meitei Hei (ABB group) from Viewland, Ukhrul district, Manipur.

Collected in July 1983. Female and Male specimens are mounted on slides AN/Lao/Neopsilenchus affinis/1-10, 1-2 and deposited in the Parasitology Laboratory, Life Sciences Department, Manipur University, Canchipur -3.

REMARKS

The dimensions and morphological characters of female specimens fit well with those described by Khan and Khan (1975). The male of Neopsilenchus affinis is recorded for the first time and described along with the female specimens.

NEOPSILENCHUS MINUTUS N.SP.

(FIG. 4 )

DIMENSIONS

Paratype females (5) : L = 0.36 - 0.41 mm (0.39 mm), a = 33 - 36 (34), b = 5.4 - 5.5 (5.4), c = 5.2 - 5.7 (5.4), c' = 8 - 10 (9), G1 = 24, G2 = 0.8 - 1.2 (1.0), V = 82 - 64 (63), stylet = 7 - 8 um (7.6 um), tail = 66 - 75 um (70 um), ABD = 7 - 8 (7.8 um).
Holotype female: L = 0.40 mm, a = 36, b = 5.4, c = 5.3, c' = 10, G₁ = 24, G₂ = 0.9, B = 82, stylet = 8 µm, tail = 75 µm, ABD = 7 µm.

Paratype male: L = 0.4 mm, a = 35, b = 5.8, c = 3.7, c' = 15, T = 43, stylet = 8 µm, spicule = 14 µm, tail = 118 µm, ABD = 8 µm.

DESCRIPTION

Female: Body slightly curved ventrally upon fixation. Transverse striae on cuticle about 1.6 µm apart near mid body. Lateral fields with four incisures. Labial framework weakly developed. Amphidial aperture slit-like. Excretory pore situated at 54 - 62 µm from anterior end of body. Stylet slender, 7 - 8 µm long with the two portions almost of equal length and without basal knob. Orifice of dorsal oesophageal gland 3 µm behind stylet base. Median oesophageal bulb ovate located at 41-49% of the oesophagus. Nerve ring at 43 - 54 µm from anterior end of body. Basal oesophageal bulb small, pyriform 12 - 15 µm long.

Reproductive system mono-prodelphic and outstretched. Spermatoeca containing sperms. Posterior uterine branch rudimentary, slightly less than the vulval-body width in length. Vulva to anus distance almost equal to tail length. Tail tapering uniformly to a minutely rounded terminus, about 8 - 10 times the anal body - width in length.

**TYPE HABITAT AND LOCALITY**
Detected from soil around roots of banana, *Musa* sp. from Yumnam Leikai, Imphal district, Manipur.

**TYPE SPECIMENS**
Collected in January 1993. Holotype female on slide ANs/*Neopsilenchus minutus* n. sp./1 and paratypic females and male on slides AN3/*N. minutus* n. sp./2-5, deposited in the Parasitology Laboratory, Life Sciences Department, Manipur University, Canchipur - 795 003.

**DIFFERENTIAL DIAGNOSIS**
*Neopsilenchus minutus* n. sp. comes close to *N. similis* and *N. affinis* Khan and Khan (1975). From *N. similis*, it differs in having smaller body length, shorter stylet and shorter vulva-anus distance (*L = 0.72 - 0.79 mm, stylet = 12-14 um, vulva to anus distance greater than tail length in *N. similis*). It also differs from *N. affinis* in its smaller body length, shorter stylet, and slightly shorter oesophagus, longer spicule and shorter bursa. (*L = 0.56 - 0.68 mm, b = 4.8 - 5.3, stylet = 11 - 13 um, spicule = 16 um, bursa = 19 um in *N. affinis*).
FAMILY TYLODORIDAE PARAMONOV, 1968
SUBFAMILY TYLODORINAE PARAMONOV, 1967
GENUS CEPHALENCHUS (GOODEY, 1962) GOLDEN, 1971

GENERIC CHARACTERS

Body size ranging from 0.4 - 1.0 mm, slender, straight to arcuate upon fixation. Lateral fields each with six incisures at mid body. Cephalic region small, rounded, offset or rarely continuous, with distinct annules and framework with light to moderate sclerotization. Amphidial apertures pore-like, labial. Stylet slender, small, about as long as procorpus and with a distinct knob. Orifice of dorsal oesophageal glands 2 – 3 um behind stylet base, Median oesophageal bulb with refractive valve plates, not offset from procorpus. Isthmus very long and slender. Basal bulb pyriform with the base slightly extended over intestine. Vulva transverse, depressed at 52 - 70% of body length. Spermatheca round to oval. Ovary outstretched. Post vulval uterine sac prominent. Males with distinct adanal bursa often with asymmetrical flaps. Spicules cephalated and pointed, with slightly raised cloacal lips. Gubernaculum fixed and rod like.

Type species: Cephalenchus megacephalus (Goodey, 1962)
SPECIES RECORDED FROM OTHER HABITATS OF MANIPUR:

C. leptus Siddiqi, 1963

Analysis of soil samples yielded a new and known species of Cephalenchus. Detail dimensions of the species Cephalenchus leptus and dimensions with descriptions of the new species are provided with suitable illustration.

CEPHALENCHUS LEPTUS SIDDIQI, 1963

DIMENSIONS

Females (5) : L = 0.67 - 0.72 mm (0.69 mm), a = 40 - 55 (47), b = 6.1 - 6.5 (6.4), c = 2.9 - 3.5 (3.1 ), c' = 18 - 26 (23), V = 54 - 60 (57), stylet = 13 - 18 um (14 um), dorsal oesophageal gland orifice at 2-3 um from stylet base, oesophagus 109 - 111 um (110 um) from anterior end of body, nerve ring at 59 um from anterior end, excretory pore = 78 - 88 um (82 um) from anterior end, female reproductive system monoprodelphic and outstretched, tail = 232 - 242 um (238 um), long, filiform and straight.

Males (3) : L = 0.88 - 0.70 mm (0.89 mm), a = 42 - 50 (45), b = 8.0 - 6.3 (8.2), c = 2.8 - 3.0 (2.9), c' = 17 - 25 (22), T = 32-40 (35), stylet = 13 - 14 (13 um ), dorsal oesophageal gland orifice at 3 um from stylet base,
oesophagus = 111 - 113 um (112 um) from anterior end of body, nerve ring at 58 - 60 um (59 um) from anterior end, excretory pore at 78 - 84 um (80 um) from anterior end, spicules = 15 - 16 um (15 um) long, gubernaculum = 4 - 5 um (5 um), tail = 233 - 242 (237 um) long and thin with acute terminus.

HABITAT AND LOCALITY

Detected from soil around the roots of banana, variety Champakola (AAB group), from Leimram, Bishnupur district, Manipur.

CEPHALENCHUS IMPHALUS N. SP.
(FIG. 5)

DIMENSIONS

Paratype females (6) : L = 0.44 - 0.65 mm (0.56 mm), a = 25 - 35 (29), v = 5.2 - 8.8 (5.9), c = 3.9 - 4.4 (4.1), c' = 9 - 12 (11), V = 62 - 67 (65), G₁ = 21 - 36 (30), stylet = 17 - 18 um (17 um), tail = 112 - 155 um (135 um), ABD = 11 - 13 (12 um).

Holotype female : L = 0.60 mm, a = 43, b = 6.4, c = 3.9, c' = 11.8, V = 82, G₁ = 21, stylet = 17 um, tail = 152 um, ABD = 13 um.
DESCRIPTION

Female: Body slender, tapering slightly anterior to base of oesophagus, ending in filiform tail. Body cuticle marked with coarse transverse striations, 2-3 μm apart at mid-body. Lateral fields marked with four incisures occupying about one-fourth of body width. Lip region weakly sclerotized, clavated, 5 μm wide and 2-3 μm high, continuous with body contour, with indistinct annules. Stylet attenuated, slightly less than one body width long, anterior conical part needle-like, basal knobs rounded. Orifice of dorsal oesophageal gland 3 μm behind stylet base. Oesophagus 90-105 μm long. Procorpus cylindrical, slightly less than one stylet length and gradually enlarging into an oval to rounded median bulb situated 40-48 μm from anterior end with distinct crescentic valve plates in the middle. Isthmus very long and narrow expanding gradually to a pyriform basal oesophageal bulb, slightly dorsally inclined, with three oesophageal glands. Cardia distinct, rounded. Nerve ring behind middle of isthmus, 50-55 μm from anterior end, excretory pore at level of nerve ring. Hemizonid adjacent to excretory pore. Deirids prominent, below level of excretory pore.

Reproductive system monoprodelphic and outstretched. Vulva a transverse slit, vulval flaps large, 10 μm, inner edges of flaps partly over vulva and are about 3-4 μm apart. Vagina thick-walled, at right

**TYPE HABITAT AND LOCALITY**

Detected from soil around the roots of banana *Musa* sp. from khoubung Chingkhong, Langthabal, Imphal district, Manipur.

**TYPE SPECIMENS**

Collected in September, 1993. Holotype female on slide AN1s/ *Cephalenchus imphalus* n.sp/1 and paratype females on slide AN1s/ *Cephalenchus imphalus* n.sp/2–5, deposited in the Parasitology Laboratory, Life Sciences Department, Manipur University, Canchipur.

**DIFFERENTIAL DIAGNOSIS**

*Cephalenchus imphalus* n. sp. is similar to *C. intermedius* (Kanwar et. al., 1978) in having four lateral lines. But it differs distinctly in its shorter basal oesophageal bulb, larger vulval flap, shorter tail, besides the position of vulva and the value of c' (long pyriform basal bulb, vulval flap small 3–5 um, tail = 214–280 um, V = 55–58, c' = 22–30 in *C. intermedius*).
GENUS IMPHALENCHUS DHANACHAND AND JAIRAJPURI, 1980.

GENERIC CHARACTERS

Body small to moderately large, slender, straight to arcuate upon relaxation. Lateral fields each with four incisures at mid body. Cephalic region elevated, laterally compressed, offset or rarely continuous, with distinct annules and framework with light to moderate sclerotization. Amphidial apertures pore-like, labial stylet slender, small, as long as procorpus and with a distinct knob. Orifice of dorsal oesophageal glands 2-3 μm behind stylet base, median oesophageal bulb with refractive valve plates, not offset from procorpus. Isthmus very long and slender. Basal bulb pyriform with the base slightly extended over intestine. Vulva transverse, vulval flaps large, a thick vaginal wall and vulva always in the ventral line. Post vulval uterine sac prominent, spermatheca round to oval. Ovary outstretched. Tails elongate, filiform. Males with distinct adanal bursa. Spicules cephalated and pointed with slightly raised cloacal lip. Gubernaculum fixed and trough-shaped. Phasmids on tail.

Type species: *Imphalenchus indicus* Dhanachand and Jairajpuri, 1980.
REMARKS

Dhanachand and Jairajpuri (1980) established the genus *Imphalenchus* differing from its closest relative the genus *Cephalenchus* in the number of lateral line and vulval flaps. They transferred *Tvlenohus (Aglenchus) macrodorus* Chawla, Prasad, Khan and Manl, 1969 to *Imphalenchus*. Siddiqi (1986) recognized *Imphalenchus* as a valid genus. But Geraert and Raski, 1987 synonymised *Imphalenchus* with *Cephalenchus* arguing that *Cephalenchus* has 4 or usually 6 lateral lines. The present author feels that the characters of *Cephalenchus* clearly mentioned that the number of lateral line as 6. Similarly the closest genus of *Imphalenchus* namely *Allotvlenchus* and *Aglenchus* has 2 and 3 lateral lines respectively. Taking into account the lateral field as an important character for distinguishing the concerned specimens, the present author feels that *Imphalenchus* should be retained as a separate genus.

SPECIES RECORDED FROM OTHER HABITATS OF MANIPUR:

*L. indicus* Dhanachand & Jairajpuri, 1980

Soil samples collected and analysed from around banana plants grown in different localities of Manipur state yielded only one known species of the genus *Imphalenchus*. Dimensions and locality are provided.
IMPHALENCHUS INDICUS DHANACHAND & JAIRAJPURI, 1980

DIMENSIONS

Females (4) : $L = 0.67 - 0.70 \text{ mm} (0.68 \text{ mm})$, $a = 38 - 42 (40)$, $b = 6.4 - 7.0 (6.7)$, $c = 3 - 4 (3.5)$, $c' = 15 - 16 (15.5)$, $V = 60 - 65 (62)$, $G_1 = 30 - 38 (34)$, stylet $= 18 - 20 \text{ um} (19 \text{ um})$, nerve ring $= 65 - 70 \text{ um} (67 \text{ um})$ from anterior end, excretory pore $= 66 - 68 \text{ um} (67 \text{ um})$ from anterior end, female reproductive system monoprodelphic and outstretched, tail $= 180 - 195 \text{ um} (189 \text{ um})$ long and filiform.

Males (3) : $L = 0.65 - 0.68 \text{ mm} (0.68 \text{ mm})$, $a = 36 - 38 (37)$, $b = 6.9 - 7.0 (6.95)$, $c = 3-4 (3.5)$, $c' = 15 - 16 (15.5)$, $T = 37 - 40 (38)$, stylet $= 68 - 70 \text{ um} (69 \text{ um})$, gubernaculum $= 8 - 10 \text{ um} (9 \text{ um})$ long trough shaped, bursa $= 30 - 32 \text{ um} (31 \text{ um})$ long and adanal, tail $= 180 - 182 \text{ um} (181 \text{ um})$ long and filiform with pointed terminus.

HABITAT AND LOCALITY

Detected from soil around the roots of banana, Musa sp. from Pallel(Chandel side), Chandel district, Manipur.

REMARKS

The present specimens adjusted well with the dimensions and descriptions given by Dhanachand and Jairajpuri(1980).
SUPER FAMILY DOLICHODOROIDEA CHITWOOD IN CHITWOOD AND CHITWOOD, 1950
FAMILY DOLICHODORIDAE CHITWOOD IN CHITWOOD AND CHITWOOD, 1950
SUBFAMILY DOLICHODORINAE ELIAVA, 1964
GENUS TYLENCHEORHYNCHUS COBB, 1913

GENERIC CHARACTERS

Body small to medium sized, about 1 mm or less long. Body cuticle prominently annulated, may be marked by longitudinal striae. Lateral field with 3 or 4 incisures generally without aerolation behind oesophageal region. Lip region offset from body or continuous, annulated or rarely smooth without longitudinal indentations or annules, labial disc indistinct with light to moderately sclerotized cephalic framework. Stylet well developed with a prominent rounded knobs. Round or oval median bulb, marked off from procorpus and isthmus and with distinct valve plates. Basal bulb of oesophagus offset from intestine or with base slightly extending over intestine, Cardia prominent. Female reproductive system amphidelphic and outstretched. Vulva near middle of body. Spermatheca round, axial. Female tail conoid with blunt tip, sub cylindroid, cylindroid or sub clavate, terminus smooth, rarely striated but not narrowing
to a point. Males generally present. Spicules distally flanged, terminus narrow, indented or pointed. Bursa enveloping tail. Gubernaculum well developed, about half as long as spicules, generally rod-like and protrusible.

Type species: *Tylenchorhynchus cylindricus* Cobb, 1913.

SPECIES RECORDED FROM OTHER HABITATS OF MANIPUR:

- *T. delhiensis* Chawla, Bhamburkar, Khan and Prasad, 1968
- *T. mashhoodi* Siddqi and Basir, 1959
- *T. musae* Kumar, 1981.

In this present study, a large number of species of the genus *Tylenchorhynchus* were found from different localities of Manipur. Dimensions and localities are provided.

**TYLENCHORRHYNCHUS DELHIENSIS CHAWLA, BHAMBURKAR, KHAN AND PRASAD, 1968**

**DIMENSIONS**

Females (20) : $L = 0.70 - 0.79 \text{ mm (0.75 mm)}, a = 30 - 34 (32), b = 5.0 - 5.3 (5.1), c = 12 - 14, (13), c' = 3.2 - 3.5 (3.3), G_1 = 20 - 24(22), G_2 = 18 - 20 (19), V = 54 - 56
49

(55), stylet = 20 - 21 um (20.5 um), dorsal oesophageal gland orifice at 2 - 3 um (2.5 um) from stylet base, oesophagus = 120 - 130 um (126 um) from anterior end, nerve ring at 78 - 82 um (76 um) from anterior end, female reproductive system amphidelphic and outstretched, tail = 43 - 45 um (44 um) and subhemispherical, lateral lines = 4.

Male: Not found.

HABITAT AND LOCALITY

Detected from soil around roots of banana, *Musa* sp. from (1) Tentha, Thoubal district, (2) Kabowakching, (3) Wangoo, Bishnupur District, (4) Elangbam Leikai, Imphal district, and (7) Zinthiang, (8) Leimatak, Churachandpur district, Manipur.

REMARKS

The present specimens conform well with those dimensions and descriptions given by Chawla et al. (1968), except that the present specimens have slightly posteriorly located vulva.
TYLENCHORHYNCHUS MASHHOODI SIDDIQI AND BASIR, 1959.

DIMENSIONS

Females (30) : L = 0.59 - 0.70 mm (0.65 mm), a = 29 - 37 (32), b = 4.5 - 5.6 (5.1), c = 14 - 19 (16), c' = 2.8 - 3.6 (3.2), G1 = 20 - 24 (20), G2 = 18 - 22 (20), V = 54 - 57 (55), stylet = 12 - 15 um (13 um), dorsal oesophageal gland orifice = 8 - 11 um (10 um), oesophagus = 120 - 134 um (128 um) from anterior end, nerve ring = 77 - 82 um (79 um) from anterior end, excretory pore = 95 - 100 um (98 um) from anterior end, female reproductive system amphidelphic and outstretched, tail = 37 - 45 um (42 um).

Male (20) : L = 0.59 - 0.70 mm (0.64 mm), a = 28 - 34 (31), b = 4.7 - 5.3 (5.1), c = 14 - 16 (15), c' = 3.0 - 3.3 (3.2), T = 40 - 45 (42), stylet = 12 - 14 um (13 um), dorsal oesophageal gland orifice at 8 - 11 um (9 um) from stylet base, oesophagus = 120 - 132 um (129 um) from anterior end, nerve ring = 72 - 80 um (77 um) from anterior end, excretory pore at 96 - 105 um (99 um) from anterior end, spicules = 20 - 25 um (22 um), gubernaculum = 10 - 12 um (11 um), bursa = 59 - 64 um (61 um), tail = 38 - 42 um (40 um).
HABITAT AND LOCALITIES


REMARKS

The present specimens conform well with those dimensions and descriptions given by Siddiqi and Basir, (1959). *Tylenchorhynchus mashhoodi* is one of the most widely and abundantly distributed species of the genus in Manipur.

**TYLENCHORHYNCHUS HUSAR** KUMAR, 1981.

DIMENSIONS

Females (15) : $L = 0.62 - 0.71$ mm (0.67 mm), $a = 28 - 32$ (30), $b = 4.3 - 6.6$ (5.3), $c = 17 - 19$ (18), $c' = 2.2 - 3.5$ (2.9), $V = 52 - 56$ (54), stylet = 18 um, dorsal oesophageal gland orifice at 3.2 um from stylet base, female reproductive system amphidelphic and outstretched, tail = 32 - 42 um (37 um), lateral lines = 4.
Hale: Not found.

HABITAT AND LOCALITIES

Detected from soil around the roots of banana, variety Jahaji (AAA group) from (1) Potsangbam, (2) Nambol, Bishnupur District, and (3) Lairenjam, (4) Lamphel, (5) Pangei, Imphal district, Manipur.

REMARKS

The present specimens agree well with those dimensions and descriptions given by Kumar (1981). *T. musae* is reported for the first time from Manipur. According to some authors males of this species are common, but in the present study analysis of a number of soil samples collected at different seasons from the same locality failed to produce any males.

TYLENCHORHYNCHUS TENNI HASHIM, 1984

DIMENSIONS

Females (6) : L = 0.65 - 0.67 mm (0.66 mm), a = 29 - 35 (32), b = 4.4 - 4.8 (4.6), c = 14, c' = 3.5 - 3.8 (3.6), V = 55 - 57 (56), stylet = 17.6 μm, dorsal oesophageal gland orifice at 11 μm from stylet base, oesophagus = 141 - 146 μm (143 μm) from anterior end, nerve ring at 104 μm from
anterior end, excretory pore at 107 - 110 um (109 um) from anterior end, female reproductive system amphidelphic and outstretched, tail = 45 - 48 um (46 um).

Male: Not found.

HABITAT AND LOCALITIES

Detected from soil around the roots of banana, local name Changbi (AB group) from (1) Ningthoukhong, (2) Potsangbam, Bishnupur district, Manipur.

REMARKS

The present specimens fit well with those dimensions and descriptions given by Hashim (1984). This species is the first record from Manipur. Several workers reported the common occurrence of the male of this genus. In the present study a thorough search failed to locate any male.
FAMILY PSILENCHIDAE PARAMONOV, 1967
SUB FAMILY PSILENCHINAE PARAMONOV, 1967
GENUS PSILENCHUS DE MAN, 1921.

GENERIC CHARACTERS

Body size ranges from 0.7 - 1.7 mm, usually curved upon relaxation. Lateral fields each with four incisures. Cephalic region elevated, rounded or conoid, smooth or striated, framework lightly sclerotized. Amphidial apertures transverse, slit-like, at base of lateral lip areas. Stylet cylindrical, conus distinctly shorter than shaft, stylet knob absent. Median bulb prominent, generally oval behind middle of oesophagus. Basal bulb small, pyriform, cardia discoidal or rounded, Female Reproductive system didelphic and amphidelpic, outstretched in opposite direction. Vulva near middle. Spermatheca elongate, axial. Tail elongate, with clavate or non-clavate round tip. Bursa prominent, adanal. Spicules tylenchoid. Gubernaculum simple trough shaped.

Type species: Psilenchus hilarulus De Man, 1921

SPECIES RECORDED FROM OTHER HABITATS OF MANIPUR:

P. hilarulus De Man, 1921.
P. intermedius Thorne & Malek, 1968.
In the soil samples analysed during the present work only one known species of *Pseudenchus* was recovered. Their dimensions and locality are presented.

**Pseudenchus Hilarulus** De Man, 1921

**Dimensions**

Females (7): L = 0.8 - 1.4 mm (1.2 mm), a = 40 - 44 (42), b = 6.7 - 8.7 (7.9), c = 7.8 - 9.3 (8.5), c' = 6.2 - 8.7 (7.3), G1 = 20.8 - 26.4 (22.7), G2 = 19.2 - 20.9 (20.2), V = 47.8 - 50.5 (48.8), stylet = 14 - 18 um (16 um), dorsal oesophageal gland orifice at 2 - 3 um from stylet base, nerve ring at 106 - 122 um (116 um) from anterior end, reproductive system didelphic and amphidelphic with outstretched ovaries, tail 126 - 158 um (145 um) long and filiform with a clavate terminus, phasmids 92.8 - 105 um from tail tip and posterior to anal opening.

Male: L = 1.1 mm, a = 43, b = 5.4, c = 8.1, c' = 7.0, T = 290, stylet = 15 um, dorsal oesophageal gland orifice at 2 um from stylet base, nerve ring at 123 um from anterior end, excretory pore at 132 um from anterior end, tail 131 um long and filiform with clavate terminus, phasmids 92.8 um from tail tip and posterior to anal opening.
HABITAT AND LOCALITY

Detected from soil around roots of banana, local name Changbi (AB group) from Ukhongsang, Thoubal district, Manipur.

REMARKS

The present specimens have slight variations in the size of stylet as compared to those dimensions given by Thorne and Malek (1968). These may be regarded as intra specific variations.
SUPERFAMILY  Hoplolaimoidea Filipjev, 1934.

FAMILY  Hoplolaimidae (Filipjev, 1934)

Wieser, 1953

SUBFAMILY  Hoplolaiminae Filipjev, 1934.

GENUS  Hoplolaimus Daday, 1905.

**GENERIC CHARACTERS**

Body moderately large sized, ranging from 1 to 2 mm long. Lateral fields usually with 4 incisures, outer bands usually aereolated. Lip region offset, marked by prominent transverse and longitudinal striae, dividing the basal annule into small squares. Cephalic framework very heavily sclerotized. Stylet massive with a compact lotus shaped basal knobs having 1-2 anterior tooth-like projections. Excretory pore usually located posterior to hemizonid and oesophago-intestinal junction. Oesophageal gland overlapping intestine dorsally and laterally. Female reproductive system didelphic and amphidelphic. Epityagma present, indistinct. Female tail hemispherical, annulated, phasmids large scutellum-like, not opposite to each other, one pre another post-vulval except in H. californicus in which both phasmids are post-vulval. Spicules massive, somewhat cylindroid. Gubernaculum large, protrusible, with titillae and telamon.

Type species: *Hoplolaimus tylenchiformis* Daday, 1905
SPECIES RECORDED FROM OTHER HABITATS OF MANIPUR:

- **H. seinhorsti** Luc, 1958
- **H. columbia** Sher, 1963.
- **H. indicus** Sher, 1963.

Analysis of soil samples during the present work yielded three known species of the genus *Hoplolaimus* viz., *H. columbia*, *H. indicus* and *H. seinhorsti*. Their dimensions and localities are provided.

**HOPLOLAIMUS COLUMBUS SHER, 1963**

**DIMENSIONS**

Females (7): L = 1.3 - 1.6 mm (1.5 mm), a = 34 - 39 (38), b = 9.4 - 11.6 (10.2), b' = 6.7 - 9.2 (7.9), c = 42 - 56 (49), V = 53 - 57 (54), spear = 42 - 46 um (44 um), dorsal oesophageal gland opening = 10 - 12 um (11 um) from stylet base, oesophagus = 174 - 194 um (182 um) from anterior end of body, female reproductive system amphidelphic and outstretched, tail = 28 - 31 um (29 um) long, anterior phasmid = 32 - 42 um (38 um), posterior phasmid = 82 - 86 um (83 um).

Males (2): L = 1.1 - 1.2 mm (1.15 mm), a = 28 - 32 (30), b = 10 - 11 (10.5), c = 28 - 31 (29.5), spear = 41 - 42 um (41 um), dorsal oesophageal gland opening = 5 um from base.
of stylet, oesophagus = 109 - 110 um (100 um) from anterior end, tail = 38 - 39 um (38.5 um) long, anterior phasmid = 38 - 41 um (39.5 um), posterior phasmid = 78 - 79 um (78.5 um), spicule = 38 - 40 um (39 um), gubernaculum = 20 - 21 um (20.5 um) long.

HABITAT AND LOCALITY

Detected from soil around the roots of banana, Musa sp. from Jiribam, Imphal district, Manipur.

REMARKS

The present specimens fit well with those described by Sher (1963).

HOPLOLAIMUS INDICUS SHER, 1963

DIMENSIONS

Females (8) : L = 1.2 - 1.5 mm (1.3 mm), a = 28 - 33 (31), b = 8.5 - 9.5 (9.1), b' = 6.5 - 7.2 (6.9), c = 60 - 68 (65), c' = 0.5 - 0.7 (0.6), V = 55 - 58 (56), G1 = 18 - 22 (20), G2 = 18 - 21 (20), stylet = 32 - 35 um (33 um), dorsal oesophageal gland orifice = 7 - 10 um (9 um) from stylet base, lip annules = 3 - 4, oesophageal gland lobe with 6 nuclei, reproductive system amphidelphic and outstretched, tail hemispherical, 18 - 19 um (18 um) long, phasmids large and situated at different locations, anterior phasmid = 30 - 33 um (31 um), and posterior phasmids = 80 - 83 (82 um) from tail tip.
Male: Not found.

HABITAT AND LOCALITY

Detected from soil around the roots of banana, variety Jahaji (AAA group) from Canchipur, Imphal district, Manipur

REMARKS

The present specimens adjusted well with those dimensions and descriptions given by Sher (1963)

HOPLOLAIMUS SEINHORSTI LUC. 1958

DIMENSIONS

Females (5): L = 1.1 - 1.6 mm (1.3 mm), a = 25 - 34 (30), b = 8.8 - 10.1 (9.3), b' = 6.0 - 10.1 (8.0), c = 38 - 74 (59), V = 52 - 60 (56), Spear = 40 - 49 um (44 um), dorsal oesophageal gland orifice at 3 - 4 um from base of stylet, oesophagus = 156 - 176 um (164 um) from anterior end of body, female reproductive system amphidelphic and outstretched, tail = 21 - 28 um (25 um) long, anterior phasmid = 31 - 44 um (38 um), posterior phasmid = 74 - 83 um (78 um).
Male: Not found.

HABITAT AND LOCALITY

Detected from soil around the roots of banana, *Musa* sp. from Kangkhui Khulen, Ukhrul district, Manipur.

REMARKS

The present specimen comes close to *Hoplolaimus seinhorstii* Luc (1958).
GENUS SCUTELLONEMA ANDRASSY, 1958

GENERIC CHARACTERS

Body small to moderately large ranging from 0.5 - 1.3 mm. Lateral fields distinct, each with 4 incisures, areolated only anteriorly and usually at phasmids. Cephalic region offset or continuous, annulated or smooth, with or without indentation of basal annule. Stylet of medium strength with rounded or anteriorly cupped knobs. Oesophageal glands forming short to large overlap on intestine dorsally and laterally. Excretory pore distinct. Female reproductive system amphidelphic and outstretched. Epiptygma distinct or indistinct. Female tail short rounded or dorsally convex - conoid, without terminal mucro. Males have bursa enveloping tail, usually not indented, spicules large and tylenchoid. Phasmids large, scutellum-like located opposite or nearly opposite to each other in or close to anal region.

Type species: Scutellonema blaberium (Steiner, 1937)
Andrassy, 1958.

SPECIES RECORDED FROM OTHER HABITATS OF MANIPUR:

S. africanum Smit, 1971
S. brevistyletum Siddiqi, 1972
S. grande Sher, 1963
In this present study, many specimens of the genus *Scutellonema* are recorded. Detail study revealed that these represent two known species and three newly recorded species from India. Their measurements and localities are provided.

**SCUTELLONEMA AFRICANUM** SMIT, 1971

**DIMENSIONS**

Females (15) :  
L = 0.57 - 0.75 mm (0.66 mm), a = 18 - 21 (20), b = 5.3 - 6.1 (5.8), c = 37 - 46 (43), c' = 0.62 - 0.87 (0.72), V = 55 - 58 (57), G₁ = 19 - 23 (21), G₂ = 20 - 22 (21), Stylet = 21 - 29 um (25 um), dorsal oesophageal gland orifice at 8 - 11 um (9 um) from stylet base, lip annules = 4, oesophagus = 108 - 123 um (115 um) from anterior end, excretory pore = 75 - 91 um (84 um) from anterior end, reproductive system amphidelphic and outstretched, tail rounded, 13 - 17 um (16 um) long, scutella 2.4 - 4.0 um (3.4 um) wide at the level of anus.

Male : Not found.

**HABITAT AND LOCALITIES**

Detected from soil around roots of banana, *Musa* sp. from (1) Noneh, (2) Tupul, Tamenglong district, (3) Pheiyeng, (4) Lamphel, Imphal District, (5) Thinunggei, Bishnupur district, Manipur.
REMARKS

The present specimens adjusted well with those dimensions and descriptions given by Smit (1971). According to some authors males of this species are common. But in the present study analysis of a number of soil samples collected at different seasons failed to produce any males.

SCUTELLONEMA GRANDE HER, 1983.

DIMENSIONS

Females (10) : L = 0.85 - 0.97 mm (0.89 mm), a = 24 - 34 (28), b = 6.9 - 9.8 (8.3), b' = 5.2 - 7.1 (6.2), c = 32 - 57 (44), V = 50 - 59 (55), stylet = 32 - 35 um (33 um), dorsal oesophageal gland orifice at 4 - 5 um from stylet base, lip annules = 6 - 7, oesophagus = 137 - 163 um (149 um) from anterior end, excretory pore = 85 - 92 um (89 um) from anterior end of body, reproductive system amphidelphic and outstretched, tail rounded, 17 - 27 um (22 um) long, scutella 3 um wide, situated anterior to anus.

Male : Not found.

HABITAT AND LOCALITIES

Detected from soil around the roots of banana, Local name Changbi (AB group) from (1) Mahadeva, (2) Kangkhui Khulen, Ukhrul district,(3) Thoubal proper, Thoubal district, Manipur.
The present specimens fit well in its dimensions and descriptions with those given by Sher (1963). Several workers reported the common occurrence of the males of this species. In the present study a thorough search failed to locate any males.

**SCUTELLONEMA CLATHRICAUDATUM** WHITEHEAD, 1959

*(FIG. 6 A,B)*

**DIMENSIONS**

Females (12) :  \( L = 0.66 - 0.84 \text{ mm} (0.75 \text{ mm}) \),  \( a = 18 - 22 \) (20),  \( b' = 7.2 - 8.4 \) (7.7),  \( b = 5.3 - 6.9 \) (5.9),  \( c = 39 - 46 \) (41),  \( c' = 0.63 - 0.86 \) (0.79),  \( V = 57 - 60 \) (58),  \( G_1 = 16 - 18 \) (17),  \( G_2 = 16 - 18 \) (17),  \( \text{stylet} = 24 - 26 \text{ um} (25 \text{ um}) \)

**DESCRIPTIONS**

Female : Body c-shaped upon fixation. Cuticle with fine transverse annulations. Lateral fields marked with four incisures, areolated in anterior and posterior parts of body. Lip region continuous with body contour, with 5 (five) to 6 (six) annules. Hemizonid and hemizonion situated anterior and posterior to excretory pore.
Excretory pore located at level of oesophageal glands, 98 - 122 um from anterior end of body. Stylet = 24 - 26 um long with rounded knobs. Orifice of dorsal oesophageal gland located at 5 - 6 um behind stylet base. Median oesophageal bulb located at 9 - 12% of the total oesophageal length. Nerve ring at 81 - 88 um from the anterior end of the body encircling the isthmus region. Basal bulb 35 - 38 um long.

Reproductive system amphidelphic and outstretched. Vulva a transverse slit. Epitygma single. Oocytes arranged in a single row. Spermatheca absent. Vulva to anus distance 256 - 336 um long. Scutella situated at the anal region, measuring 3 - 4 um in diameter, Tail 0.63 - 0.86 anal body widths long, ending in a rounded terminus having 10 - 14 cuticular rings.

HABITAT AND LOCALITY

Detected from soil around roots of banana, local name Changbi (AB group) from Lairenjam, Imphal district, Manipur.

Collected in April, 1992. Female specimens are mounted on slides ANeo/Scutellonema glathricula/1 - 12 and deposited in the Parasitology Laboratory, Life Sciences Department, Manipur University, Canchipur, Imphal - 795 003.
The dimensions and morphological characters of female specimens agree well with those described by Whitehead (1959). *Scutellonema clathricaudatum* described is the first record of its kind from India.

**SCUTELLONEMA COMMUNE** VAN DEN BERG AND HEYNs, 1973  
(FIG. 6 C,D)

**DIMENSIONS**

Females (5) : $L = 0.83 - 0.96$ mm (0.89 mm), $a = 25 - 31$ (28), $b = 5.8 - 7.2$ (6.9), $b' = 5.4 - 7.1$ (6.4), $c = 43 - 54$ (49), $c' = 0.8 - 0.9$ (0.8), $V = 55 - 59$ (57), $G_1 = 24 - 33$ (29), $G_2 = 27$, stylet = 29 um, tail = 17 - 19 um (18 um) long.

**DESCRIPTIONS**

Female : Body curves ventrally forming a circle upon fixation. Cuticle distinctly annulated. Lateral fields with four incisures, areolated in anterior part of body. Lip region semispherical, slightly setoff from body contour, with 4 - 6 annules. Internal framework of lip region well developed. Excretory pore located at the posterior part of oesophagus, 110 - 128 um from anterior

Reproductive system amphidelphic and outstretched. Vulva a transverse slit. Epiptygma paired. Spermaphetca absent. Scutella 3 - 5 um wide and situated one annule anterior to and six annules posterior to anus. Lateral fields not areolated in the region of scutella. Tail about 0.78 - 1.0 anal body widths long with a rounded terminus having 14 - 16 cuticular rings.

HABITAT AND LOCALITY

Detected from soil around roots of banana, Musa sp. from Kangkhui Khulen, Ukhrul district, Manipur.

Collected in April 1992. Female specimens are mounted on slides ANsa/Scutellonema commune/1-5 and deposited in the parasitology Laboratory, Life Sciences Department, Manipur University, Canchipur - 795 003.

REMARKS

The present specimens conform well with those described by Van den Berg and Heyns (1973). This species is first report from India.
**SCUTELLONEMA TRUNCATUM** SHER, 1963

(FIG. 6 E,F)

**DIMENSIONS**

Females (6) : $L = 0.61 - 0.86 \text{ mm} (0.75 \text{ mm})$, $a = 23 - 30 \text{ (28)}$, $b = 5.7 - 8.1 (7.0)$, $b' = 4.8 - 6.1 (5.5)$, $c = 38 - 49 \text{ (43)}$, $c' = 0.37 - 0.83 (0.78)$, $V = 50 - 58 (54)$, stylet $= 25 - 27 \text{ um} (26 \text{ um})$, Tail $= 16 - 18 \text{ um} (17 \text{ um})$ long.

**DESCRIPTIONS**

Female : Body spiral shaped upon fixation. Cuticle with fine annulations. Lateral fields marked with four incisures areolated at the region of scutella. Lip region form a blunt cone, not demarcated from general shape of body with slightly developed annules. Labial disc well developed. Excretory pore situated at the level of oesophageal glands, about $104 - 110 \text{ um}$ from anterior end of body. Stylet $25 - 27 \text{ um}$ long with oval shaped basal knobs. Orifice of dorsal oesophageal gland located at $5 - 6 \text{ um}$ behind stylet base. Median oesophageal bulb located at $10 - 14\%$ of oesophageal length. Nerve ring located at $84 - 94 \text{ um}$ from the anterior end of body encircling the isthmus region. Basal bulb $22 - 26 \text{ um}$ long.

Reproductive system amphidelphic and outstretched. Vulva a transverse slit. Epiptygma absent.
Oocytes arranged in a single row. Spermatheca absent. Scutella situated three annules posterior to anal region measuring 3 - 4 um in diameter. Tail about 0.73 - 0.83 anal body widths long, irregularly rounded at tip and have 10 - 13 cuticular rings.

HABITAT AND LOCALITY

Detected from soil around roots of banana, *Musa* sp. from Noneh, Tamenglong district, Manipur.

Collected in August 1991. Female specimens are mounted on slides AN2e/Scutellonema truncatum/1-3 and deposited in the parasitology Laboratory, Life Sciences Department, Manipur University, Canchipur, Imphal - 795 003.

REMARKS

The present specimens conform well with those dimensions and descriptions given by Sher(1963) except some slight variations in tail length. *Scutellonema truncatum* is reported for the first time from India.
SUBFAMILY  ROTYLENCHOIDINAE GOLDEN, 1971
GENUS  HELICOTYLENCHUS STEINER, 1945.

GENERIC CHARACTERS

Body small to medium sized ranging from 0.4 - 1.2 mm. Female spirally coiled or rarely arcuate. Cephalic region low to elevated, continuous to rarely offset, with or without annulation. Stylet robust about 3 - 4 times labial-width long. Orifice of dorsal oesophageal gland situated at about one-fourth to half of stylet length behind stylet base. Excretory pore behind hemizonid, near base of isthmus. Oesophageal gland forming a wrap over anterior end of intestine, longest overlap being ventral. Oesophago-intestinal junction with a small cuticular valvula. Female reproductive system amphidelphic with outstretched ovaries. Tail short, hemispherical, dorsally convex-conoid, with or without a ventral to terminal projection. Male bursa enveloping entire tail tip or rarely subterminal. Gubernaculum trough or rod-shaped, fixed, telamon not seen.

Type species : Helicotylenchus nannus Steiner, 1945.

SPECIES RECORDED FROM OTHER HABITATS OF MANIPUR :

H. dihystera (Cobb, 1890) Sher, 1961
H. erythrinae (Zimmermann, 1904) Golden, 1956
H. multicinctus (Cobb, 1893) Golden, 1956
H. pseudorobustus (Steiner, 1914) Golden, 1956
Soil samples analysed during the present work revealed the presence of many specimens of *Helicotylenchus* belonging to the following four known species, viz., *H. dihystera*, *H. erythrinae*, *H. indicus*, *H. multicinctus* and one new species. Detail dimensions of the known species and descriptions of the new species are provided with suitable illustration.

**HELCOTYLENCHUS DIHYSTERA** (COBB, 1890) SHER, 1961.

**DIMENSIONS**

Females (20) :  
- \( L = 0.62 - 0.71 \, \text{mm} \) (0.65 mm), \( a = 24 - 32 \) (28), \( b = 4.5 - 5.5 \) (5.0), \( b' = 4.2 - 5.1 \) (4.9), \( c = 49 - 62 \) (57), \( c' = 0.8 - 1.1 \) (1.1), \( V = 81 - 69 \) (65), \( G_1 = 25 - 28 \) (27), \( G_2 = 25 - 28 \) (27), stylet = 16 - 27 µm (24 µm), dorsal oesophageal gland orifice at 8 - 13 µm (11 µm) from stylet base, lip annules = 4 - 5, oesophagus = 122 - 157 µm (137 µm) from anterior end, nerve ring at 82 - 90 µm (86 µm) from anterior end, excretory pore at 91 - 134 µm (110 µm) from anterior end, female reproductive system amphidelphic and outstretched, tail 10 - 14 µm (13 µm) long.

**Male** : Not found.

**HABITAT AND LOCALITIES**

Detected from soil around the roots of banana, varieties - champakola (AAB group), Jahaji (AAA group), and Bhimkola (ABB group), from (1) Ukhongsang, Thoubal district, (2) Leimatak, Churachandpur district, (3) Wangoo
Naodakhong, Bishnupur district, (4) Saparmaina village, Senapati district, (5) Kakching Khunou, Thoubal district, (6) Viewland, Ukhrul district and (7) Noneh, Tamenglong district, Manipur.

REMARKS

Helicotylenchus dihystrera is the most widely and abundantly distributed species of this genus in and around the roots of banana. The present specimens adjusted well with those dimensions and descriptions given by Sher (1961).

HELICOTYLENCHUS ERITRINAE (ZIMMERMANN, 1904) GOLDEN, 1958

DIMENSIONS

Females (28) : L = 0.33 - 0.62 mm (0.51 mm), a = 15 - 32 (22), b = 2.1 - 5.1 (3.6), b' = 2.1 - 5.2 (3.9), c = 21 - 45 (34), c' = 0.8 - 1.8 (1.2), V = 84 - 134 (88), G1 = 28, G2 = 28, stylet = 21 - 26 um (24 um), dorsal oesophageal gland orifice = 8 - 10 um (8.5 um). from stylet base, lip annules = 3 - 4, oesophagus = 110 - 160 um (137 um) from anterior end, excretory pore at 91 - 130 um (109 um) from anterior end, female reproductive system amphidelphic and outstretched, tail 13 - 18 um (15 um) long.

Male : Not found.
HABITAT AND LOCALITIES

Detected from soil around the roots of banana, Musa sp. from (1) Meitram, Imphal district, (2) Pallel, Chandel district, (3) Tupul, Tamenglong district, (4) Leimram, (5) Kumbi, Bishnupur proper, Bishnupur district, and (6) Tentha, (7) Waithou, (8) Ukhongsang, Thoubal district, Manipur.

REMARKS

The species Helicotylenchus erithrinae is widely distributed plant parasitic nematode of the genus Helicotylenchus in Banana plants of Manipur. The present specimens conform well with those described by Golden (1956). In the present study a thorough search failed to locate any males. This species is recorded for the first time from Manipur.

HELCOTYLENCHUS INDICUS SIDDIQI, 1963

DIMENSIONS

Females (20) : $L = 0.55 - 0.58 \text{ mm} (0.55 \text{ mm}), a = 24 - 27 (25.5), b = 5.0 - 5.6 (5.3), c = 27 - 31 (29.8), c' = 1.41 - 1.60 (1.54), V = 57 - 61 (60.5), G_1 = 16 - 21 (18.3), G_2 = 13 - 19 (15.5), \text{ stylet} = 18 - 19 \text{ um} (18 \text{ um}), \text{ dorsal oesophageal gland orifice} at 9 - 11 \text{ um} (9 \text{ um}) from \text{ stylet}.$
base, lip annules = 3 - 4, oesophagus = 130 - 135 um (132 um) from anterior end, nerve ring at 80 - 90 um (85 um) from anterior end, excretory pore at 99 - 110 um (104 um) from anterior end, female reproductive system amphidelphic and outstretched, tail = 16 - 25 um (20 um) long.

Male: Not found.

HABITAT AND LOCALITIES

Detected from soil around the roots of banana, Musa sp. from (1) Meitram, Imphal district, (2) Nambol, (3) Moirang, (4) Irengbam, and (5) Kabowakching, Bishnupur district and (6) Mahadeva, (7) Siroii, (8) Viewland, Ukhrul district, Manipur.

REMARKS

Helicotylenchus indicus is also another plant parasitic nematode of the genus Helicotylenchus which is found in large numbers in banana plants. The present specimens fit well with those described by Sher (1961).

HELCOTYLENCHUS MULTICINCTUS(COBB, 1893) GOLDEN, 1956

DIMENSIONS

Females (10): L = 0.65 - 0.67 mm (0.66 mm), a = 28 - 33 (30), b = 5.61 - 6.62 (5.62), b' = 5.1 - 5.6 (5.4), c = 43 - 52 (47), c' = 0.76 - 0.95 (0.86), V = 70 - 71 (70), G1
= 22-24 (23), Ga = 16 -21 (18), stylet = 23 - 24 um (24 um), dorsal oesophageal gland orifice at 14 um from stylet base, lip annules = 3 - 4, oesophagus = 119 - 128 um (123 um) from anterior end, excretory pore at 115 -117 um (116 um) from anterior end of body, female reproductive system amphidelphic and outstretched, tail = 13 - 15 um (14 um) long.

Male : Not found.

HABITAT AND LOCALITIES

Detected from soil around the roots of banana, local name Meitei Hei (ABB group) from (1) Singda, (2) Iroisenba (3) Jiribam, Imphal district, (4) Thinunggei, (5) Wangoo, Bishnupur district, and (6) Lambui Village, (7) Thawai, Ukhrul district, Manipur.

REMARKS

The present specimens fit well with those descriptions and dimensions given by Golden (1956). Males of this species are found to be common according to some workers. In the present study a thorough analysis of additional number of soil samples collected at different time of the year failed to produce any males.
HELICOTYLENCHUS DISTINCTUS N. SP.  
(FIG.- 7)

DIMENSIONS

Paratype females (3) :  L = 0.64 - 0.77 mm (0.70 mm), a = 30 - 36 (34), b = 4.6 - 6.5 (5.3), b' = 4.4 - 6.2 (5.2), c = 36-48 (44), c' = 1.0 - 1.6 (1.2), V = 60 - 63 (61.8), G1 = 26 - 30 (28) G2 = 22 - 27 (24), stylet = 24 um, tail = 14 - 18 um (16 um), ABD = 11-14 um (13 um).

Holotype female :  L = 0.68 mm, a = 30, b = 5.1, b' = 4.5, c = 42, c' = 1.0, V = 63, G1 = 36, G2 = 26, stylet = 24 um, tail = 16 um, ABD = 16 um.

Paratype males (3) :  L = 0.57 - 0.59 mm (0.58 mm), a = 36 - 37 (36), b = 4.1 - 5.4 (4.8), b' = 4.1 - 5.0 (4.7), c = 37 - 40 (39), c' = 1.5, T = 31 - 39 (34), stylet = 19 - 21 um (20 um), spicule = 21 - 22 um (21.6 um), tail = 14 - 18 um (14.6 um), ABD = 10 um.

DESCRIPTION

Female :  Body in loose spiral shape. Cuticle finely and transversely striated. Lip region semispherical with four or five annules. Lateral fields with four incisures. Excretory pore situated in the region of basal oesophageal bulb. Stylet 24 um long, with strong, slightly cupped basal
knobs. Orifice of dorsal oesophageal gland located at about 11 - 16 um behind stylet base. Median oesophageal bulb located at 52 - 67% of the total oesophageal length. Nerve ring at 91 - 98 um from the anterior end of the body encircling the isthmus region. Basal bulb of oesophagus pyriform, 36 - 40 um long.

Reproductive system amphidelphic, outstretched, oocytes arranged in a single row, Spermatheca oval, filled with spermatozoa. Vulva- anus distance 217 - 308 um long or about 17 - 22 tail length. Phasmid situated about 1-4 annules anterior to the level of anus. Tail with well developed ventral outgrowth or projection, about one anal body widths long and ventral projection about 3 - 4 um long. Incisures of lateral fields continues upto the posterior end in front of the ventral projection.


TYPE HABITAT AND LOCALITY

Detected from soil around roots of banana, local name Changbi (AB group) from Sekmai, Imphal district, Manipur.
TYPE SPECIMENS

Collected in May, 1991, Holotype female on slide AN4/Helicotylenchus distinctus n.sp./1 and paratype females and males on slides AN4/Helicotylenchus distinctus n.sp./2-4 and 1-3, deposited in the Parasitology Laboratory, Life Sciences Department, Manipur University, Canchipur - 795 003.

DIFFERENTIAL DIAGNOSIS

Helicotylenchus distinctus n.sp. comes close to H. crenacauda Sher, 1966 and H. pteracercus Singh, 1971. From H. crenacauda it differs in the value of 'm' and 'o', in the shape of basal bulb, in having lateral lines extending up to the posterior end of the body without fusing, in its posteriorly located phasmid and in the presence of male (m = 44 - 46, 0 = 32 - 42, inner lines of lateral field fused on tail, position of phasmid at 6 annules anterior from the level of anus, male absent in H. crenacauda). From H. pteracercus it differs in having larger value of 'm' and 'o', strongly developed spear knob, differently shaped basal bulb, lateral lines extending posteriorly without fusing and in the presence of male specimens (m = 41 - 48, 0 = 25 - 46, lateral lines fused on tail, male absent in H. pteracercus).
FAMILY PRATYLENCHIDAE (THORNE, 1949)
SIDDIQI, 1963
SUB FAMILY PRATYLENCHINAE THORNE, 1949
GENUS PRATYLENCHUS FILIPJEV, 1936

GENERIC CHARACTERS

Body small to medium size, below the range of 1 mm. Lateral fields each with 4 - 6 incisures, occasionally with oblique median markings. Cephalic region low, flattened anteriorly or rarely rounded, continuous with body contour. Cephalic framework heavily sclerotized with inconspicuous labial disc. Amphidial apertures pore-like near labial disc, indistinct stylet about 20 μm less long with round, anteriorly flat or indented basal knobs. Median bulb oval to round, very muscular. Oesophageal glands usually less than two body-widths long, extending over intestine mostly ventrally. Female reproductive system pseudo-mono-prodelphic with only anterior ovary functional. Vulva in posterior region. Post vulval uterine sac present, with or without rudiments of posterior ovary. Spermatheca large, rounded, usually axial. Female tail sub cylindrical to conoid with smooth or annulated terminus devoid of mucro. Males with bursa enveloping tail terminus. Spicules with sub terminal pore on dorsal side. Gubernaculum simple, trough-shaped, fixed.
Type Species: Pratylenchus pratensis (De Man, 1880) Filipjev, 1936

Species recorded from other habitats of Manipur:

- Pratylenchus coffeae (Zimmermann, 1898) Filipjev and Stekhoven, 1941
- Pratylenchus tumidiceps Merzheevska, 1951.

Analysis of soil samples yielded two known species of the genus Pratylenchus i.e. Pratylenchus coffeae and Pratylenchus flakkensis. Dimensions and localities are provided.

Pratylenchus coffeae (Zimmermann, 1897) Filipjev and Stekhoven, 1941.

Dimensions:

Females (28): L = 0.45 - 0.70 mm (0.58 mm), a = 20 - 35 (27), b = 5 - 7 (6), c = 17 - 26 (22), V = 76 - 83 (81), stylet = 15 - 18 um (16 um), dorsal oesophageal gland orifice at 4 - 5 um from base of stylet, lip annules = 2, Oesophagus = 90 - 100 um (97 um) from anterior end of body, female reproductive system monoprodelphic and outstretched, posterior uterine sac one body width long, tail = 22 - 26 um (24 um) long.
Hales (3) : L = 0.40 - 0.69 mm (0.56 mm), a = 25 - 42 (34), b = 5 - 6 (5.3), c = 16 - 25 (20), T = 36 - 52 (47), stylet = 14 - 16 um (15 um), dorsal oesophageal gland orifice at 4 um from base of stylet, oesophagus = 80 - 115 um (95 um) from anterior end of body, tail = 25 - 28 um (27 um).

HABITAT AND LOCALITIES

Detected from soil around the roots of banana, variety Champakola (AAB group), ABB group and AAB group of the local names Meitei Hei and Mayang Hei from (1) Tentha, (2) Ukhogsang, (3) Kakching Khunou, Thoubal district, (4) Nambol, Bishnupur district, (5) Elangbam Leikai, (6) Pheiyeng, (7) Lairenjam, Imphal district, (8) Noneh, Tamenglong district, (9) Chakpikarong, Chandel district, Manipur.

REMARKS

The present specimens fit well with the dimensions and descriptions given by Filipjev and Steckhoven (1941).

**P. RATYLENCHUS FLAKKENSIS** SEINHORST, 1968.

DIMENSIONS

Females (15) : L = 0.46 - 0.59 mm (0.52 mm), a = 21 - 34 (29), b = 4.6 - 6.1 (5.3), b' = 3.4 - 5.1 (4.2), c = 18 - 20 (19), c' = 2.0 - 2.8 (2.5), V = 78 - 81 (80), stylet =
11 - 14 um (13 um), dorsal oesophageal gland orifice at 2.4 - 3.2 um (2.9 um) from stylet base, lip annules = 2, oesophagus = 114 - 133 um (122 um) from anterior end, excretory pore at 76 - 83 um (77 um) from anterior end of body, tail = 24 - 30 um (27 um) long.

Male : Not found.

HABITAT AND LOCALITIES

Detected from soil around the roots of banana, local name Changbi (AB group) from (1) Zinthiang, Churachandpur district, (2) Ukhongsang, Thoubal district and (3) Sekmai, Imphal district, Manipur.

REMARKS

The present specimens agree well in its dimensions and descriptions with those described by Seinhorst (1968). According to some workers males of this species are common. But in the present study a thorough search failed to locate any males. P. flakkensis is reported for the first time from Manipur.
SUBFAMILY HIRSCHMANNIELLINAE FOTEDAR AND HANOO, 1978
GENUS HIRSCHMANNIELLA LUC AND GOODEY, 1964

GENERIC CHARACTERS

Body long and slender, straight to arcuate upon fixation. Lateral field with four incisures, areolated towards extremities. Cephalic region continuous, anteriorly flattened or hemispherical, framework heavily sclerotized, labial disc indistinct. Amphidial apertures labial, indistinct, transverse slit-like. Stylet massive, conus tubular, basal knobs large, rounded. Orifice of dorsal oesophageal bulb round to oval, slightly offset from procorpus, with distinct valve plates, Oesophageal gland elongated, lying ventral to intestine, Excretory pore near oesophago-intestinal junction. Female reproductive system didelphic and amphidelphic, Vulva transverse, lips not modified. Ovaries outstretched. Spermatheca round to oval, axial. Male with outstretched testis. Spicules with subterminal pore appearing to be on dorsal side. Gubernaculum fixed. Tail in both sexes, elongate-conoid, usually with a terminal mucro. Male tail carrying a simple crenate, subterminal bursa lacking phasmidal pseudoribs.

Type species: Hirschnannella spinicaudata (Sch.Stek, 1944).
SPECIES RECORDED FROM OTHER HABITATS OF MANIPUR:


Soil samples analysed during the present work yielded two known species of Hirschmanniella. Measurements and localities are presented.

Hirschmanniella oryzae (Soltwedel, 1889) Luc and Goodey, 1963

DIMENSIONS

Females (4) : L = 1.14 - 1.20 mm (1.18 mm), a = 45 - 49 (47), b = 9.1 - 10.4 (9.9), b' = 4.5 - 5.7 (5.1), c = 14 - 17 (16), V = 49 - 51 (50), G1 = 17 - 19 (18), G2 = 19 - 20 (20), stylet = 14 - 15 um (15 um), dorsal oesophageal gland orifice at 3 - 4 um from stylet base, nerve ring at 94 - 95 um (95 um) from anterior end, excretory pore at 95 - 99 um (97 um) from anterior end, female reproductive system didelphic and amphidelphic, tail = 66 - 75 (69 um) long, conoid.

Males (2) : L = 0.97 - 1.01 mm (0.99 mm), a = 43 - 47 (45), b = 7.7 - 8.9 (8.3), b' = 3.7 - 3.9 (3.8), c = 14 - 15 (14.5), T = 38 - 39 (38.5), stylet = 14 - 15 um (14.5 um),
dorsal oesophageal gland orifice at 3 - 4 μm from stylet base, nerve ring at 94 - 95 μm (94.5 μm) from anterior end, excretory pore at 95 - 97 μm (96 μm) from anterior end, spicules = 22 - 25 μm (24 μm), gubernaculum = 6 - 8 μm (7 μm), bursa = 67 - 79 μm (73 μm), tail = 68 - 70 μm (69 μm) long and conoid.

HABITAT AND LOCALITY

Detected from soil around the roots of banana, Musa sp. from Canchipur, Imphal district, Manipur.

REMARKS

The dimensions and morphological characters of the present specimens fit well with those described by Sher and Allen (1953) and Thorne (1961).


DIMENSIONS

Females (4) : L = 1.93 - 2.00 mm (1.98 mm), a = 57 - 68 (62), b = 10 - 13 (11), b' = 7.5 - 8.6 (7.9), c = 19 - 23 (21), V = 45 - 50 (48), G1 = 19 - 21 (20), G2 = 19 - 21 (20), stylet = 20 - 22 μm (21 μm), dorsal oesophageal gland orifice at 3 - 5 μm from stylet base, lip annules = 4 - 6, Oesophagus = 232 - 253 μm (243 μm) from anterior end of
body, female reproductive system didelphic and amphidelphic, tail annules = 50 - 55 (53), tail = 83 - 105 um (95 um) long.

HABITAT AND LOCALITY

Detected from soil around the roots of banana, local name Changbi (AB group) from Nambol, Bishnupur district, Manipur.

REMARKS

The present specimens conform well with those described by Das (1960) but these have a slightly longer and slender body, smaller tail and spicules.
SUBFAMILY RADOPHOLINAE ALLEN AND SHER, 1967
GENUS RADOPHOLUS THORNE, 1949

GENERIC CHARACTERS

Body ranging from 0.4 - 0.9 mm in length, not very slender, straight to arcuate upon relaxation. Lateral fields each with 3 - 7 incisures, not areolated. Deirids indistinct. Phasmid usually in anterior region of tail. Cephalic region in female low, continuous or slightly offset, annulated or smooth; framework strongly sclerotized, stylet well developed in juveniles and females, conus about as long as shaft. Males have higher, rounded and more offset cephalic region and cephalic framework, stylet and oesophagus markedly reduced. Oesophageal glands elongated, dorsal to intestine, reaching almost to midbody in some species; sub ventral glands symmetrical or asymmetrical, much longer than the dorsal gland; nuclei of the three glands lie behind oesophago-intestinal junction, sometimes in a row. Excretory pore near oesophago-intestinal junction. Female reproductive system didelphic, amphidelphic. Vulva at 50 - 70% of body length, usually about 55 - 65%. Spermatheca round to oval, axial, in most species with rod-like, rarely round sperm. Female tail elongate-conoid to subcylindroid, usually 2 - 4 times anal body width long. Male tail generally more tapering than that of female; bursa subterminal or terminal, spicules cephalated, slightly arcuate. Gubernaculum large, protrusible.
Type species: *Radopholus similis* (Cobb, 1893) Thorne, 1949

Species recorded from other habitats of Manipur: Not yet found

In the present work, soil samples analyzed revealed the presence of many specimens of *Radopholus similis* from only one locality. But majority of the population were juveniles. This species is first report from Manipur. Dimensions are presented with locality.

**RADOPHOLUS SIMILIS** (COBB, 1893) THORNE, 1949

**DIMENSIONS**

Females (10): $L = 0.39 - 0.44$ mm (0.41 mm), $a = 27 - 33$ (30), $b = 3.2 - 4.2$ (3.8), $c = 15 - 19$ (17), $c' = 2.7 - 4.0$ (3.4), $V = 58 - 69$ (61), stylet = 16 - 17 um (16 um), nerve ring = 74 - 83 um (79 um) from anterior end, excretory pore at 85 - 96 um (89 um) from anterior end of body, tail = 21 - 29 um (26 um) long.

Male: Not found.

**HABITAT AND LOCALITY**

Detected from soil around the roots of banana of the local name Meitei Hei (ABB group) from Meitram, Imphal district, Manipur.

**REMARKS**:

The present specimens agree well with those described by Thorne(1949).
SUBORDER CRICONEMATINA SIDIQI, 1980
SUPERFAMILY CRICONEMATOIDEA TAYLOR, 1936 (1914).
FAMILY CRICONEMATIDAE TAYLOR, 1936 (1914) 
(THORNE, 1949)
SUBFAMILY MACROPOSTHONIINAE SKARBILOVISH, 1959
GENUS MACROPOSTHONIA DE MAN, 1880

GENERIC CHARACTERS

Female: Body moderately large about 0.3 - 0.78 mm long. Annules coarse, 40 - 150 in number, posterior margins rounded, smooth, slightly rough or crenate. Cephalic region with 2 - 3 annules, generally not modified or offset. Stylet from very small to large rigid. Conus markedly longer than the shaft, basal knobs prominent, appearing anchor shaped. Orifice of dorsal oesophageal gland 3 - 6 μm behind stylet base. Oesophagus criconematoid. Female reproductive system mono-prodelphic and outstretched. Valval lips open, directed outwards, anterior lip often lobed or spined. Tail short, rounded or pointed. Males with four incisures in lateral field, rounded cephalic region and a distinct bursa and spicules.

Type species: Macroposthonia annulata De Man (1880).

GENERIC REMARKS

De Man (1880) described the genus Macroposthonia based on male only. The genus was immediately recognized
because of its rounded lip region, submedian lobes, labial plates and smooth or rough annules of the posterior region. De Man (1921) in a subsequent paper added more descriptions and illustrations to the type species. Filipjev (1936) considered *M. annulata* male as a male of *paratylenchus*. Thorne (1949) agreed with Filipjev (1936). Goodey (1951) agreed to the presence of a true Bursa but regarded *Macroposthonia* as *incertae sedis*. Skarbilovich (1959) stated that the bursa is absent but recognized *Macroposthonia* as a valid genus. Goodey (1963) listed *Macroposthonia* as a valid genus of the paratylenchinae. De Grisse and Loof (1965) reported males and females resembling De Man's specimens and they identified them as *Criconemoides kirjanovae* Andrassy (1962). Later on *C. kirjanovae* was synonymised with *Macroposthonia annulata*. Luc and Raski (1981) rejected *Macroposthonia* and transferred the species in the genus *Criconemella*. But Siddiqi (1986) strongly believed that *Macroposthonia* should be retained as a separate genus and accordingly brought all the transferred species back to *Macroposthonia*. Raski and Luc (1987) again synonymised the species of *Macroposthonia* to *Criconemella* De Grisse and Loof (1965). Since then this process of synonymisation has been going on. The present author does not support the synonymy of the genus *Macroposthonia* De Man (1880) with *Criconemella* De Grisse and Loof (1965) and regards *Macroposthonia* as a valid genus.
SPECIES RECORDED FROM OTHER HABITATS OF MANIPUR:


M. onostris Phukan and Sanwal, 1980.


M. Paraxeste Dhanachand and Renubala, 1991


In the present study, two species of the genus Macroposthonia are recorded. The two species are Macroposthonia onoensis and Macroposthonia onostris respectively. Their measurements are provided.

MACROPOSTHONIA ONOENSIS (LUC, 1959) DE GRISSE & LOOF, 1965

DIMENSIONS

Females (18) L = 0.45 - 0.51 mm (0.48 mm), a = 8 - 11 (9),
b = 3.7 - 4.7 (4.1), c = 13 - 14 (13), V = 92 - 93 (93), G1 = 35 - 50 (42), R = 120 - 128 (124), Rat = 18 - 22 (20),
Ros = 30 - 39 (35), Rv = 8 - 10 (9), Ran = 7 - 9 (8), stylet = 56 - 61 um (59 um), prorhabdion = 42 - 48 um (45 um), tail = 32 - 38 um (36 um), ABD = 30 - 43 um (37 um).
HABITAT AND LOCALITIES

Detected from soil around the roots of banana of the local variety Changbi (AB group) from (1) Thawai, Ukhrul district (2) Pangei, (3) Ningomthong, (4) Kyamgei, and (5) Jiribam, Imphal district, Manipur.

REMARKS

The present specimens adjusted well with those described by Raski and Golden (1965).

MACROPOSTHONIA ONOSTRIS PHUKAN AND SANWAL, 1980

DIMENSIONS

Females (15) : $L = 0.52 - 0.55 \text{ mm} \ (0.54 \text{ mm})$, $a = 10 - 11 \ (10.7)$, $b = 4.6 - 4.9 \ (4.8)$, $c = 13 - 14 \ (13.3)$, $V = 71 - 83 \ (85.6)$, $G_1 = 38 - 45 \ (41.8)$, $R = 145 - 148 \ (147)$, $R_{m = 20 - 23} \ (21.3)$, $R_{m = 35 - 38} \ (36.3)$, $R_{v = 9 - 10} \ (9.3)$, $R_{m = 8 - 9} \ (8.3)$, stylet $= 54 - 56 \ \mu \text{m} \ (55.5 \ \mu \text{m})$, prorhabdion $= 42 - 45 \ \mu \text{m} \ (43.7 \ \mu \text{m})$, tail $= 37 - 42 \ \mu \text{m} \ (39.5)$, ABD $= 32 - 35 \ \mu \text{m} \ (33.6)$.

HABITAT AND LOCALITY

Detected from soil around roots of banana, Musa sp. from (1) Kabowakching (2) Thinunggei, Bishnupur District (3) Kakching Khunou, Thoubal District (4)
Leimatak, Churachandpur District, (5) Kamkhugong, Tamenglong district and (6) Chandel proper, Chandel district, Manipur.

REMARKS

The present specimens conform well with those described by Phukan and Sanwal (1980) except that they have a slightly longer tail. This is the species of Macroposthonia which was reported for the first time from Manipur.
SUBFAMILY HEMICRICONEMOIDINAE ANDRASSY, 1979
GENUS HEMICRICONEMOIDES CHITWOOD AND BIRCHFIELD, 1957

GENERIC CHARACTERS

Body elongate- cylindrical, Cuticle double, outer one sheath-like, attached to body at head, vulva and sometimes at tail tip, annules of sheath and body round and flat or rarely retrose; scales, spines or other appendages absent; 50 - 158 in number with or without lateral grooves. Cephalic region offset or continuous with two and rarely three annules, pseudolips inconspicuous. Submedian lobes absent. Stylet elongate, with anteriorly cupped knobs appearing anchor shaped (rarely spheroidal). Vulva open or closed, with or without lateral cuticular flaps. Tail bluntly rounded to pointed. Males usually with 4 incisures in lateral field, cephalic region rounded or conoid-rounded. Tail conoid to subcylindroid. Bursa when present, low, subterminal or terminal. Spicules setose, arcuate, Gubernaculum simple and small. Juveniles with single cuticle, with smooth, dentate or spined scales, arranged in longitudinal, usually alternating rows, or irregularly on body. Stylet knobs anchor shaped.

Type species: *Hemicriconemoides wessoni* Chitwood & Birchfield, 1957.
SPECIES RECORDED FROM OTHER HABITATS OF MANIPUR:


In the present work only one known species of the genus *Hemicriconemoides* i.e. *H. mangiferae* was found. Measurements and locality are presented.

**HEMICRICONEMOIDES MANGIFERAE** SIDDIQI, 1961

**DIMENSIONS**

Females (4) : $L = 0.52 - 0.56$ mm ($0.54$ mm), $a = 18 - 21$ (20), $b = 4.2 - 5.0$ (4.6), $c = 19 - 24$ (22), $V = 91 - 93$ (92), $R = 130 - 140$ (135), $R_m = 32 - 34$ (33), $R_v = 12 - 15$ (14), $R_{van} = 3 - 5$ (4), $R_{an} = 6 - 10$ (8), stylet = 73 - 74 um (74 um), prorhabdion = 53 um, lip annule = 2, tail = 23 - 27 um (25 um).

**HABITAT AND LOCALITY**

Detected from soil around the roots of banana of the variety (local) Champakola (AAB group) from Singda, Imphal district, Manipur.

**REMARKS**

The present specimens conform well with those dimensions and descriptions given by Siddiqi (1961).
SUPERFAMILY  HEMICYCLOPHOROIDEA  SKARBILOVICH, 1959

FAMILY  CALOOSIIDAE  SIDDIQI, 1980.

SUBFAMILY  CALOOSIINAE  SIDDIQI, 1980

GENUS  HEMICALLOOSIA  RAY AND DAS, 1978

GENERIC CHARACTERS

Body slightly ventrally arcuate upon fixation. Body cuticular sheath very closely adpressed to inner body cuticle. Annules usually separated by grooves, cuticle not folded between annules. Lateral field on body sheath marked by two incisures. Head with two annules not very much differentiated from the following body annules except for the margins of annules which are little angular in outline. Labial framework hexaradiate. Amphids slit-like, stylet strong arcuate with a long anterior slender part, Stylet knob sloped posteriorly. Oesophagus criconematoid. Vulval opening a narrow slit with the anterior lip overlapping. Testis single, spicules almost straight and directed posteriorly. Gubernaculum distinct, Caudal alae adanal with crenate margins. Tail short and conical. Cuticle sheath distinct in tail region.

Type species: Hemicaloosia americana Ray and Das, 1978
SPECIES RECORDED FROM OTHER HABITATS OF MANIPUR:

H. americana Ray and Das, 1978
H. Luci Dhanachand and Jairajpuri, 1979

In the soil samples analysed during the present work only one known species of Hemicaloosia was recovered. Their dimensions and locality are provided.

HEMICALOOSIA LUCI DHANACHAND AND JAIRAJPURI, 1979

DIMENSIONS
Females (5): L = 0.88 - 0.89 mm (0.88 mm), a = 26 - 28 (27), b = 6.5 - 6.72 (6.61), c = 7.0 - 7.2 (7.1), V = 82 - 84 (83), R = 278 - 292 (285), Rest = 24, Roem = 44, Rv = 42, Ran = 30 - 32 (31), stylet = 66 - 67 um (66.6 um), prorhabdion = 56 um, tial = 125 um, ABD = 21 um.

HABITAT AND LOCALITY
Detected from soil around the roots of banana, variety Champakola (AAB group) from Singda, Imphal district, Manipur.

REMARKS
The present specimens agree well with those dimensions and descriptions given by Dhanachand & Jairajpuri(1979).
SUPERFAMILY  TYLENCHULOIDEA (SKARBILOVICH, 1947)
FAMILY  PARATYLENCHIDAE (THORNE, 1949)
SUBFAMILY  PARATYLENCHINAE THORNE, 1949
GENUS  PARATYLENCHUS MICOLETZKY, 1922

GENERIC CHARACTERS.

Body moderately large about 0.3 to 0.5 mm long. Annules fine or moderately coarse, round, smooth, not ornamented with tubercles. Cephalic region continuous, round, conoid or truncate, smooth or finely annulated. Female stylet 12 – 120 um long, knobs spheroidal. Isthmus slender, basal bulb round to pyriform. Excretory pore variable in position from near stylet knobs to base of oesophagus. Ovary outstretched. Postvulval uterine sac absent. Lateral vulval membrane present or absent, Male stylet degenerated or absent. Oesophagus degenerate. Bursa absent. Spicules and gubernaculum usually 15 – 23 um and 3 – 5 um long, respectively.

Type species: Paratylenchus bukowinensis Micoletzky, 1922.

Analysis of soil samples yielded two species of the genus Paratylenchus viz., P. lepidus and P. longicaudatus. Measurements and localitites are presented.
PARATYLENCHUS LEPIDUS RASKI, 1975

DIMENSIONS

Females (9) :  L = 0.36 - 0.38 mm (0.37 mm), a = 25 - 30 (27), b = 4.1 - 4.4 (4.2), c = 11 - 12 (11.8), c' = 3.3 - 4.0 (3.8), V = 83, G₁ = 61 - 64 (62), stylet = 22 - 24 um (23 um), prohrobion = 14 - 16 um (15 um), dorsal oesophageal gland orifice at 6 - 8 um (7 um) from stylet base, oesophagus = 83 - 91 um (89 um) from anterior end, excretory pore at 76 - 80 um (78 um) from anterior end of body, female reproductive system monoprodelphic and outstretched, tail = 30 - 32 um (31 um) long.

Male : Not found.

HABITAT AND LOCALITY

Detected from soil around the roots of banana, variety Champakola (AAB group) from Elangbam Leikai, Imphal district, Manipur.

REMARKS

The present specimens adjusted well with those dimensions and descriptions given by Raski (1975).
PARATYLENCHUS LONGICAUDATUS RASKI, 1975.

(Fig. - 8)

DIMENSIONS

Females (12) : $L = 0.34 - 0.38 \text{ mm} (0.36 \text{ mm})$, $a = 22 - 26 (24)$, $b = 4.1 - 4.3 (4.2)$, $c = 14 - 18 (16)$, $c' = 2.6 - 3.1 (2.9)$, $V = 82 - 83 (83)$, $G_1 = 29 - 31 (30)$, stylet = 20 - 24 um (22 um), tail = 25 - 27 um (26 um), ABD = 8 - 10 um (9 um).

DESCRIPTION


Reproductive system monoprodelphic and outstretched. Spermatheca oval shaped, with small
spermatozoa. Vulval flaps large and rounded. Vulva-Anus distance 32 - 48 um or more than one tail length long. Tail 26 - 31 um long, tapering gradually to a finely rounded terinus or about 2 - 3 anal body width in length.

Male: Not found.

HABITAT AND LOCALITY

Detected from soil around the roots of banana, Musa sp. from Elangbam Leikai, Imphal district, Manipur.

Collected in January, 1993. Female specimens mounted on slides AN84/Paratylenchus longicaudatus/ 1-12 and deposited in the Parasitology Laboratory, Life Sciences Department, Manipur University, Canchipur, Imphal - 3.

REMARKS

The morphological characters and dimensions of the present specimens conform well with those described by Raski (1975).
SUBORDER HEXATYLINA SIDDIQI, 1980
SUPERFAMILY AGUINOIDEA NICOLL, 1935 (1926)
FAMILY AGUINIDAE NICOLL, 1935 (1926)
SUBFAMILY ANGUININAE NICOLL, 1935 (1926)
GENUS DITYLENCHUS FILIPJEV, 1936

GENERIC CHARACTERS

Body size usually under 1.5 mm, slightly curved upon fixation. Lateral field with four or six incisures. Median bulb muscular with valve plates. Isthmus not marked off from basal bulb. Basal bulb a thin elastic sac containing oesophageal glands, base of bulb may extend over intestine. Intestine with two normal sized but often hyaline cells at its anterior end, lumen of intestine not considerably narrowed in anterior region. Female reproductive system monoprodelphic, Ovary outstretched, with 1 or 2 rows of oocytes. Crustaformeria in form of a quadricolumella of 4 rows of 4 cells each. Vagina at right angle to body axis, not directed forward. Postvulval uterine sac present. Testis outstretched. Bursa adanal to subterminal. Tail elongate-conoid to subcylindrical or filiform.

Type species: Ditylenchus dipsaci (Kuhn, 1857) Filipjev 1936.
Analysis of soil samples collected from different localities yielded one known species of *Ditylenchus* i.e. *D. microdens*. Dimensions and descriptions are provided with suitable illustrations.

**DITYLENCHUS MICRODENS FILIPJEV, 1934**

(FIG. 9)

**DIMENSIONS**

Females (8) : $L = 0.52 - 0.69 \text{ mm} (0.61 \text{ mm})$, $a = 28 - 32 (30)$, $b = 4.4 - 5.5 (5.1)$, $c = 9 - 10 (9.3)$, $c' = 4.6 - 5.1 (4.9)$, $V = 68 - 83 (77)$, $G_1 = 23 - 31 (28)$, $G_2 = 6.2 - 6.6 (6.4)$, stylet $= 7-8 \text{ um} (7 \text{ um})$, tail $= 56 - 74 \text{ um} (65 \text{ um})$, short and terminus pointed.

**DESCRIPTION**

Body slightly curved ventrally upon fixation. Cuticle with fine transverse striations, about 1.3 um apart in mid-body region. Lateral fields with four incisures. Lip region continuous with body contour. Excretory pore and hemizonid situated anterior to basal bulb. Stylet 7 - 8 um long with moderate sized basal knobs. Guiding ring situated just before junction of conical part and shaft. Orifice of dorsal oesophageal gland located at about 1 - 2 um behind stylet base. Median oesophageal bulb elongate fusiform with strong refractive valve near centre. Basal bulb elongate pyriform with 3 large nuclei, 17 - 20 um long.
Female reproductive system monoprodelphic. Vulva transverse, slit-like. Oocytes of ovary arranged in a single row. Post-vulval uterine sac 20 - 23 μm or about one body width long. Distance between vulva and anus 43 - 51 μm. Anal body width 11 - 16 μm. Tail length 56 - 74 μm or about four-five anal body diameters long, ending to a pointed terminus.

HABITAT AND LOCALITY

Soil around the roots of banana, *Musa* sp. from Kanglatombi, Imphal District, Manipur.

Collected in December, 1992, Female specimens are mounted on slides ANsa/ Ditylenchus microdens/1-8 and deposited in the Parasitology Laboratory, Life Sciences Department, Manipur University, Canchipur, Imphal.

REMARKS

The present specimens agree well with those dimensions and descriptions given by Filipjev (1934) But these specimens have slight variations in tail length.
GENUS PSEUDHALENCHUS TARJAN, 1958

GENERIC CHARACTERS

Body size under 1 mm. Lateral field with 4 incisures, not areolated. Cephalic region low, finely striated, framework lightly sclerotized, Stylet slender, less than 12 um long; conus with distinct lumen, shorter than shaft, knobs distinct, rounded. Median bulb oval, muscular, valvate, Isthmus slender, Dorsal oesophageal gland elongated, extending over anterior end of intestine; subventral glands neither enlarged nor extending over intestine. Cardia absent. Excretory pore behind nerve ring. Vulva at 72 - 74% in type species. Reproductive system monoprodelphic and outstretched. Post vulval uterine sac present. Spermatheca rounded but axial, sperm small or moderately large rounded. Rectum and anus distinct. Tails in both sexes elongate, conoid. Bursa adanal, may extend to one-third of tail. Spicules slender, arcuate, cephalated. Gubernaculum small, fixed.

Type species: Pseudhalenchus minutus Tarjan, 1958

Soil samples collected and analysed from around banana plants grown in different localities of this state revealed the presence of one known species, Pseudhalenchus anchilisposomus. Dimensions and locality are provided.
PSEUDHALENCUS ANCHILISPOSOMUS TARJAN, 1958

DIMENSIONS

Females (6) : L = 0.52 - 0.59 mm (0.56 mm), a = 39 - 44 (41), b = 4.3 - 4.5 (4.4), c = 10 - 12 (11), c' = 5.0 - 5.8 (5.4), V = 76 - 79 (78), G₁ = 37 - 52 (44), G₂ = 4.9 - 6.1 (5.4), stylet = 7 μm, dorsal oesophageal gland orifice at 1 - 2 μm from stylet base, oesophagus = 123 - 134 (130 μm) from anterior end, excretory pore at 62 - 80 μm (72 μm) from anterior end of body, female reproductive system monoprodelpic and outstretched, posterior uterine sac well developed, tail 48 - 51 μm (50 μm) long, elongate, conoid.

Male : L = 0.59 mm, a = 52, b = 4.5, c = 14, c' = 5.3, T = 45, stylet = 7 μm, oesophagus = 131 μm from anterior end, excretory pore at 78 μm from anterior end of body, spicules 16 μm long, gubernaculum 4.8 μm long, bursa = 24 μm, tail = 42 μm.

HABITAT AND LOCALITY

Detected from soil around the roots of banana, Musa sp. from Mahadeva, Ukhrul district, Manipur.
REMARKS

The present specimens conform well with the dimensions and descriptions given by Tarjan (1958) except a slight difference in the length of spear, spicule and gubernaculum. This species is reported for the first time from Manipur.