CHAPTER XII

Hoplolaimus indicus Sher, 1963
HOPLOLAIMUS Daday, 1905

The genus **Hoplolaimus** was erected by Van Daday 1905 for the species **Hoplolaimus tylenchiformis**. Cobb described this genus under the name of **Nemonchus**. Menzed (1917) proposed the genera **Iota** Cobb, 1913, **Criconema** Hofmanner and Menzel, 1914 and ogma Southern, 1914 as synonyms of genus **Hoplolaimus**. In 1923 Cobb emended the genus **Hoplolaimus** Daday 1905 and redescribed as coarsely annulated typical tylenchid with straight larger body, prominently set off lobed lip region composed of several annules. Male having lobed bursa encompassing tail. He clearly indicated that a number of species, placed in this genus, did not belong to **Hoplolaimus**.

In 1949, Thorne emended the diagnosis of the genus **Hoplolaimus** mentioning the following characters: The cuticle of lip region divided into minute blocks by transverse and longitudinal striations, basal portion of oesophagus lobe-like well developed spear with strong knobs, massive cephalic frame-work, female tail shorter than anal body diameters.

Goodey (1957) redescribed and separated the genus **Hoplolaimus** (lance nematode) from **Rotylenchus**
(spiral nematodes) on the basis of the larger size of body, offset lip region, and peculiar cephalic framework. Thorne's emendment on the basis of the cuticle of the lip region divided into minute plates did not hold up after Goodey's description of *H. proporicus*, in which only basal annule is so divided. He also recognized the lateral titillae on the male gubernaculum of some value in generic separation.

In 1958 Loof and Oostenbrink studied de Man's original collection and concluded that *Tylenchus robustus* is the same as *Hoplolaimus uniformis*. Andrassy (1958) revising the genera of *Hoplolaiminae* on the basis of the position and size of phasmids. He considered large, scutellum like phasmids one in posterior part of body and one in anterior part. The characteristics of lip region and the cephalic framework appear most valuable for generic separation. The cross striae of lateral field appears too variable to stand up as a generic character.

Luc (1958) described *H. seinhorsti* and in 1959 White head described *H. angustalatus*. These two species are somewhat similar to *H. proporicus* but *H. angustatalus* can apparently be separated on the basis
of narrow lateral field present one differences in the cuticular marking of the lip region. Androssy synonymized Cobb's *H. coronatus* with Daday's *Htylechifornis* after careful examination and comparison of both specimens. Some of the leading American nematologists do not accept this synonymy. Once again closer examination is needed to settle the question.

Sher (1961) diagnosed the genus and listed five valid species. In 1963 he again presented fresh diagnosis and gave a key of eight species. Later on Jairajpuri and Bagri (1973) recorded a key of identification of fifteen species of *Hoplolaimus*. Shamsi (1979) proposed a genus *Basirolaimus* for the species of *Hoplolaimus* having six nuclei in the esophageal gland lobe. Luc (1981) rejected genus *Basirolaimus* considering that the number of oesophageal gland nuclei is not considered a unique generic character. Robbins (1982) supported the view of Luc.

Several species of *Hoplolaimus* have been described from India. Kannan (1961) describe *H. steineri* from Madras, Sher (1963) reported *H. indicus* from the soil around the roots of sugarcane (*Saccharum officinarum*). Suryawanshi (1971) reported *H. Sheri* from the rhizosphere of *Cynodon dactylon*. Jairajpuri and Bagri
(1973) described. *H. chambus* from the soil around the roots of banana and sugarcane. *H. obelmoschus* was recorded from the roots of ladyfinger by Tandon and Singh (1973). Mulk and Jairajpuri (1976) described *H. seshadrii* from the rhizosphere of *Archis hypogaea*, *H. singhi* reported from Hyderabad by a Das and Shivaswany (1977). Chaturvedi and Khera (1979) described *H. dubius* associated with Jute crop. Shasmi (1979) described a new species of *Hoplolaimus* as *Basirolaimus sacchari* from the rhizosphere of *papaver somniferum*.

Several common plants like maize, croton, ladyfinger, onion, cabbage and brinjal were found mostly infected with *Hoplolaimus indicus*. These worms were obtained in the epidermis of the roots of ladyfinger and in soil around the roots of other plants.
Hoplolaimus indicus Sher, 1963
(Plate 22 Fig.46; Plate 23 Fig.47,48; Plate 24 Fig.49,50,51,52)

Thirteen Female (Paratype)

L = 1.25 (1.25-1.38) mm ; a = 22.55 (18.25-25.55)
b' = 8.18 (5.32-11.42) ; b = 10.22 (6.75-12.50)
b1 = 12.81 (10.65-14.21) ; B = 0.95 (0.95-1.00)
G1 = 23.59 (18.74-31.25) ; G2 = 24.15 (15.60-28.80)
C = 51.94 (37.65-62.52) ; C' = 0.75 (0.68-0.85)
V = 55.68 (55.00-56.95) ; V' = 56.85 (56.28-56.83)
VL/VB = 9.87 - 12.00 ; m = 48.95 (43.32-55.15)
MB = 53.25 (43.73-66.00) ; Spear = 34.02 (33.00-35.00) \( \mu \text{m} \)

Female (Holotype)

L = 1.25 mm ; a = 21.68
b' = 5.54 ; b = 6.75
b1 = 10.85 ; B = 1.00
G1 = 31.55 ; G2 = 28.15
C = 37.65 ; C' = 0.85
V = 55.66 ; V' = 55.65
VL/VB = 9.35 ; m = 43.32
MB = 50.00 ; Spear = 34.2 \( \mu \text{m} \)
**Five Males (Paratype)**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Value</th>
<th>Ranges</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>1.32 (1.15-1.15)mm</td>
<td>a = 26.35 (21.45-31.35)</td>
</tr>
<tr>
<td>b</td>
<td>9.75 (0.45-13.05)</td>
<td>b = 10.85 (7.45-14.35)</td>
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<tr>
<td>b₁</td>
<td>16.85 (13.65-20.28)</td>
<td>B = 1.00 (1.00-1.00)</td>
</tr>
<tr>
<td>C</td>
<td>73.50 (42.00-105.00)</td>
<td>C = 1.02 (0.74-1.32)</td>
</tr>
<tr>
<td>MB</td>
<td>55.75 (47.23-64.35)</td>
<td>T = 35.10 (34.00-36.00)</td>
</tr>
<tr>
<td>Sp/L</td>
<td>0.025 (0.017-0.029)</td>
<td>Spicules = 32.00 (30.00-34.00)</td>
</tr>
</tbody>
</table>

Gubernaculum = 19.00 (18.00-20.00) μm

**FEMALE CHARACTERS**

(Plate 22 Fig.46 Plate 24 Fig.49, 50, 51, 52)

The shape of body is Ventrally arcuate, more or less spindle like when fixed in hot water. It tapers towards both extremities. Body 1.25 (1.25-1.38) μm long and 58.00 (45.00-70.00) μm wide. Cuticle is transversely striated and the striae being 2.5-2.8 μm apart at mid body. The normal lateral fields marked by single incisure which is distinct in the tail region only. In some specimen three more weakly marked and incomplete incisures were found to be present in lateral field at mid body.
The lip region is distinctly set-off, hemispherical marked with 3-4 annules and measures about 13-15 μm in length and 6-7 μm in breadth. The cophalic framework is more massive and yellowish in appearance. The spear is strongly built. Metenchium is 17-20μ long. The spear knob's are best observed in living specimens. They are furnished with 2-3 anteriorly projecting processes and measuring 5-7 μm long and 5μm in breadth. The distance of orifice of dorsal esophogeal gland from spear base is 5-8 μm.

The procorbus is narrow. measures 39.00 (35.00-43.00) in length. Median oesophageal bulb appears typically oval measuring 18-20 μm in length and 15-18 μm breadth located 100.45 (90.00-120.00) μm from anterior end with well developed crescentric value in the centre. The oesophageal gland lobe 88.00 (70.00-120.00) μm long. It overlaps the anterior part of intestine dorsally and laterally, situated 200.00 (160.00-240.00) μm from the anterior end with six nuclei. Oesophago-intestinal valve is well developed. The intestine covers the whole of the space of the body and is packed with large granules. It overlaps the rectum beyond the level of the anus.

The nerve ring surrounds the isthums below the median oesophageal bulb. It is placed at about 101
(92-110) \( \mu \)m from the anterior end. The excretory system has not been thoroughly studied although the excretory pore opens ventrally in the region of nerve ring or infront of oesophago-intestinal junction or anywhere between these two position. It is located 120 (115-135) \( \mu \)m from the anterior end.

Hemizonid usually present 4-7 annules posterior to excretory pore. Anterior phasmid is 30-35 \( \mu \)m anterior end of the body and posterior phasmid is 78-82 \( \mu \)m from anterior end of the body. The rectum is short tube 19.00 (15.00-26.00) \( \mu \)m long.

There are two ovaries which are out streched. The vulva is a transverse slit like aperture, located 705.00 (675.00-725.00) \( \mu \)m from anterior end, the outer margins of which may not have small lateral flaps. It leads in to short vagina which is placed at 18.26 (18.00-22.00) \( \mu \)m distance. The epiptygma is present in one specimen and attached posteriorly. Spermathecae are present at the junction of the ovary with oviduct, these are usually obscured by intestine.

The tail is short about 20.8 (15-25) \( \mu \)m long and bears 8-12 tail annules. The tail terminus is rounded and annulated.
MALE CHARACTERS
(Plate 23 Fig. 47, 48)

Male is similar to female in general body shape and morphology except for sexual dimorphism. The head is broadly rounded with 2-3 annules. The hemizoind is 3-4 annules wide and 4 annules posterior to excretory proe.

Testis is single. Two spicules are present, which are tylenchoid in shape and of equal in length. They measure 32.00 (30.00-34.00) μm in length. The gubernaculum is well developed which measures 19 (18.00-20.00) μm in length and has characteristic shape of the genus.

The tail of male specimen enveloped by crenated bursa with the phasmid. It is small 20.32 (12.30-29.33) μm in length.

Habitat - Collected from the soil around the root of bean (Dolichos lablab).

Locality - Agriculture College Campus Rewa.
DISCUSSION

This species was originally described by Sher 1963 from the soil around the roots of sugarcane in Karnal India. The specimens collected by the author closely related with the description of the species as given by Sher 1963. Although these species are quite similar in many respects but, the closer and critical examination reveals that there are certain differences in description and illustration. Sher described three annules in the holotype in the lip region whereas his diagram shows four annules. In the present collection of the author the number of lip annules varies from 3-4.

The position of hemizonid and excretory pore in relation to oesophago-intesinal junction is apparently variable. Sher laid considerable emphasis on the position of hemizoid and excretory pore. The value of "o" distance from stylet knobs to opening of dorsal gland expressed as a percent of stylet length is a character quite valuable in separating species. The value of "o" of present specimen is also some what larger rather than the given by Sher.

The epiptygma is usually absent in this population, if present it is normally attached posteriorly. Considering the subsequent observations by
Banerji and Banerji (1966), Gupta and Gupta (1967), Husain and Rashid (1969), Dasgupta et al. (1970), Khan and Chawla (1975) and Chawla and Yadava (1981 a and 1981 b) these differential characters are regarded as intraspecific variations.

*Hoplolaimus indicus* is reported only from India where it is widely distributed (Sitaramaiah et al. 1971, Khan and Chawala, 1975). It is polyphagus plant parasite which mainly feeds on various roots, thus effecting the growth of plant and yield.

It is highly pathogenic to rice (Das and Rao 1970; Rao 1970); Sugarcane (Singh and Misra, 1976), Maize (Haider et al. 1978), Citrus (Lenman, 1981) and cotton (Gaur and Mishra, 1981) and is capable of causing stunted and patchy growth of these plants. It is also responsible for the failure of a number of crops in west Bengal (Banerji and Banerji, 1966).
PLATE 22

Explanation of figure

*Hoplolaimus indicus* Sher, 1963

**Fig. 46** Entire body of female.
PLATE 23

Explanation of figures

_Hoplolaimus indicus_ Sher, 1963

Fig. 47 Tail region of male.

Fig. 48 Anterior region of male.
PLATE 24

Explanation of figures

_Hoplolaimus indicus_ Sher, 1963

**Fig. 49** Tail region of female showing phasmid.

**Fig. 50** Anterior region of female.

**Fig. 51** Lateral line incisures.

**Fig. 52** Tail region of female.