SOME STUDIES ON THE RHABDITID NEMATODES OF JAMMU AND KASHMIR

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BY
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This is to certify that the research work presented in the dissertation entitled "Some studies on the Rhabditid nematodes of Jammu and Kashmir", by Mr. Ali Asghar Shah is original and was carried out under my supervision. I have permitted Mr. Shah to submit it to the Aligarh Muslim University, Aligarh, in fulfilment of the requirements for the degree of Master of Philosophy in Zoology.

Irfan Ahmad
Professor
“Dedicated to my dearest Uncle
Who is no more here to see the
fruit of my labour.”
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Ali Asghar Shah
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INTRODUCTION
Nematodes belonging to free-living group are found in almost all the terrestrial and aquatic habitats, and abundantly occur in decaying organic matter, humus, decaying plant parts, or farmyard manure. This group includes a vast array of nematodes belonging to diverse orders. In contrast, the phytophagous species of nematodes are restricted to only two orders. Keeping in view the diversity of the free-living nematodes and the restricted area of this study, what follows is a brief history of taxonomy of the sub-orders Rhabditina Chitwood, 1933 and Diplogastrina Micoletzky, 1922.

Although the first free-living nematode was reported as early as 1653 by Borellus it was not till the middle of nineteenth century that work on these nematodes started in earnest. The genus *Rhabditis* was established by Dujardin, (1845), but diagnosed rather recently, especially by modern standards. Dujardin listed four species; the type species, *Rhabditis terricola* was not however clearly defined until more than one hundred years later (Dougherty, 1955). Bastian (1865) described four new species and suggested that Dujardin had probably included more than one species in his definition of *Rhabditis terricola*. Schneider (1866) in his monograph rejected the name *Rhabditis*, and Dujardin divided the genus into two genera: *Leptodera* and *Pelodera*. He redefined a number of old species and described twelve species new to science. Orley (1880) was the first to try to fit the genus *Rhabditis* into the system of Nematoda, and proposed the family Rhabditidae for the genera *Anguillula, Cephalobus, Oxyrus, Rhabditis* and *Teratocephalus*. He placed this family in the higher category “Rhabditi formae” which formed a connecting link between free-living and animal parasitic
nematodes. Orley (1880) compiled a synopsis of 42 *Rhabditis* species described by Dujardin, Linstow, Rudolf, Clause, Bastian, Butschli, DeMan and Orley was the first to provide a key to the species. In his monograph (1885) he (*l.c.*) published several new data on the biology, taxonomy and pathology of the genus *Rhabditis* and listed 36 species. De Man (1876, 1880, 1884) added many new species and accepted thirty seven species in *Rhabditis*. Micoletzky (1922) described seven species. His system was, however, rather artificial so far as he united all nematodes having a prismatic, unarmed (toothless) stoma under the family Rhabditidae, viz. the subfamilies Cylindrolaiminae, Plectinae, Rhabditinae and Bunonematinae. The subfamily Rhabditinae was itself heterogenous, and composed of the following genera: *Rhabditis, Diploscapter, Cephalobus, Chambersiella, Teratocephalus* and *Rhodolaimus*. Micoletzky (1922) listed 55 species in the genus *Rhabditis*.

The scientists of the University of Erlangen added greatly to knowledge of Rhabditidae. During studies of saprobiotic habitats and breeding of rhabditids, they described 60 new species in all, and published some new data on ecology and biology of the Rhabditidae. They were Volk (1950) Sachs (1949, 1950) Osche (1952), Hirschmann (1952), Korner (1954) and Ruhm (1956). Osche deserves special mention as the one who laid the foundation of the modern systematics of Rhabditidae. He (*l.c.*) emphasized the role of the fine structure of the stoma in the taxonomy of rhabditids and split *Rhabditis* into eight subgenera. He listed altogether 163 species as valid and seven species inquirendae. Dougherty (1953) added three more subgenera to *Rhabditis* and at the same time elevated the subgenera *Mesorhabditis, Caenorhabditis, Teratorhabditis* and *Protorhabditis* to

The systematics of rhabditids became complex as many more species and genera became known. So, higher taxonomic categories were proposed for related genera. Goodey (1963) put the subfamilies Alloionematinae, Protorhabditinae, Diploscaptrinae and Rhabditinae under Rhabditidae and he also proposed Pterygorhabditinae under Bunonematidae and accepted Bunonematinae Micoletzky (1922). Paramonov (1964) proposed the family Odontorhabditidae for the genus *Odontorhabditis*. Andrassy (1970) proposed the subfamily Stomachorhabditinae for the genus *Stomachorhabditis* under Rhabditidae, and in 1971 he erected Craspedonematinae.

Andrassy (1976) accepted three superfamilies viz., Alloionematoida Chitwood and McIntosh, 1954, Rhabdiotoidea Orley, 1880 and Bunonematoidea Micoletzky, 1922 under Rhabditina. Under Rhabditidae he put seven subfamilies including three new ones, viz., Mesorhabditinae, Peloderinae and Ablechroiiulinae. He (1.c) split *Mesorhabditis* to create *Bursilla*, and from *Rhabditis* he split *Oschius* and *Colporhabditis*. The subfamily Pterygorhabditinae was shifted to Bunonematoidea. Sudhaus (1976) did not accept the subfamilies Protorhabditinae Dougherty, 1955, Prodontorhabditinae Timm, 1961 and Parasitorhabditinae Lazarevskaja, 1955 and placed *Protorhabditis*, *Prodontorhabditis* and
Parasitorhabditis in Rhabditinae. Fifteen subgenera were accepted under the genus Rhabditis one of which Xylorhabditis was newly proposed. The extensive and valuable informations on the biology, ecology, evolution and systematics of rhabditids were nevertheless provided by Sudhaus (1974 a, b and c, 1976 a and b; 1977 and 1978) besides his conservation in generic ranking. Andrassy (1978) proposed Amphidirhabditinae for the genus Amphidirhabditis within Rhabditidae.

In his monograph Andrassy (1983) more or less followed his earlier classification on Rhabditina with three superfamilies, seven families and fourteen subfamilies. He proposed two new genera within the subfamily Peloderinae viz., Dolichorhabditis and Rhomborhabditis and upgraded Xylorhabditis Sudhaus, 1976 to generic rank. In Rhabditinae he proposed Discoditis and Rhitis and upgraded Curviditis Dougherty, 1953. He also proposed Rhodonema in Bunonematinae.

The extensive work has not been done on the taxonomy of Rhabditids and Diplogastrids from India. Most of the work done during the late 60s and 70s and very few scientist worked on these groups. The earliest report is the description of the genus Tridontus longicaudatus Khera, 1965 (= Monochoides longicaudatus). Later Khera (1969) described Mesodiplogasteroides and in 1970 Paradoxogaster (= Anchidiplogaster) and Gobindonema (= Koerneria). Tawdemma was described by Suryawanshi (1971) and was synonymised with Acrostichus and Syedella was also synonymised with Pareudiplogaster. Tridontus longicaudatus was redescribed by Jairajpuri et. al. (1973) and they synonymised Syedella with Tridontus. Khera (1969) described the genera Saprorhabditis in Protorhabditinae (now in Rhabditonematinae), Praeputirhabditis (= Cicutaria) in Rhabditinae and
Opercularhabditis in Rhabditinae (now in Mesorhabditinae) and 1971 Paradoxorhabditis in Rhabditinae (now in Protorhabditinae). Tahseen and Jairajpuri (1988) recently reported Teratorhabditis andrassyi and also described its biology.
Collection of samples: Fortythree samples were collected from different parts of Jammu and Kashmir. Most samples collected were rich in organic matter, humus, decaying plant parts and farmyard manure and were kept in polythene bags. All relevant informations such as locality, date of collection etc. were noted. The samples were brought to the laboratory for further processing.

Processing of samples: To extract the nematodes the soil was processed by the modified Cobb’s sieving and decantation technique. The sample was put in a bucket and thoroughly mixed in a small amount of water. Stones and debris were removed by hand and the bucket was then filled with water. This suspension was stirred gently by hand to make it homogeneous and left undisturbed for about 30 sec. to allow the heavy particles to settle down at the bottom. The suspension was then poured into another bucket through a coarse sieve (2mm pore size) which retained debris and leaves. The suspension in the second bucket was then poured through a 300 mesh sieve (53 pore size). The nematodes and fine residue were retained on the sieve. The process was repeated thrice for better recovery of nematodes and the residue were collected in a beaker.

Isolation of nematodes: The residue collected in the beaker was poured on a small coarse sieve lined with tissue papper. The sieve was then placed in a Baermann’s funnel filled with water sufficient to touch the bottom of the sieve. During the placement of sieve special care was taken to avoid trapping air bubbles at the bottom of the sieve. The stem of the funnel was fitted with rubber tubing provided with a stopper. The nematodes migrated from the sieve into the clear water of the funnel and settled at bottom. After 24 hours a small amount of water was taken
from the funnel through the rubber tubing into a cavity block. The nematodes isolated as above were fixed and processed for mounting on slides.

**Killing and fixation:** The collected nematodes in cavity blocks were left undisturbed for a few minutes so as to allow them to settle. Excess water was removed with a fine dropper and hot F.A. (4:1) was poured into the nematode suspension. This simultaneously killed and fixed the nematodes.

**Dehydration, mounting and sealing:** After 24 hours of fixation the nematodes were transferred to a mixture of glycerine – alcohol (95 parts 30% alcohol + 5 parts glycerine) in a small cavity block which was kept in a desiccator containing anhydrous calcium chloride. In 2-3 weeks the nematodes were dehydrated and ready to be mounted. A drop of anhydrous glycerene was placed on a glass or metallic slide and the nematodes were transferred from the cavity block to this drop and three pieces of glasswool of same thickness as of the nematodes were placed around nematodes to prevent flattening. A cover slip was gently placed over the drop and sealed with glyceel or nail polish.

**Measurements and drawing:** All measurements were made on specimens mounted in dehydrated glycerine with the ocular micrometer. De Man’s (1884) formula for denoting dimension of nematodes was used. All diagrams were drawn using a drawing tube.

**Abbreviations used in the text**

- \( L \) = Total body length
- \( a \) = Body length / greatest body width
\[ b = \text{Body length / distance from anterior end to the oesophago-intestinal junction} \]

\[ c = \text{Body length / tail length} \]

\[ c' = \text{Tail length / body width at anus or cloaca} \]

\[ V = \text{Distance of vulva from anterior end X 100 / body length} \]

\[ ABD = \text{Anal body diameter} \]
SYSTEMATICS
ORDER RHABDITIDA Chitwood, 1953

**Diagnosis:** Lips three or six, rarely four in number. Amphids on the lateral lips, pore-like, rarely circular or slit-like and rarely post-labial. Stoma prismatic, longer than wide, composed of three basic elements viz., Cheilostom, Gymnostom and Stegostom. Stegostom with denticles or well developed teeth or fine warts. Pharynx with either median or terminal vulvular bulb. Excretory system consisting of a double collecting canal connected to a common duct. Intestine with wide lumen. Three rectal glands generally present. Female reproductive system amphidelphic or monodelphic, if monodelphic then prodelphic. Males with paired genital papillae. Bursa may be present or absent, if present always having papillae. Spicules occasionally fused distally. Phasmids distinct.

Type suborder : Rhabditina Chitwood, 1933

Other suborders : Cephalobina Andrassy, 1974

Diplogastrina Micoletzky, 1922

Teratocephalina Andrassy, 1974

SUBORDER RHABIDITINA Chitwood, 1933

**Diagnosis:** Cuticle usually striated. Lip region smooth, exceptionally notched, lips three or six, rarely four. Labial papillae very small or setiform. Amphids pore-like, on the lateral lips, discernible in general from oral view only, rarely enlarged, circular in shifted behind the labial region. Stoma prismatic in almost every case longer than wide. Cheilostom generally not cuticularized. Gymnostom usually
closed and forming a buccal tube. Stegostom with three swellings (glottoid apparatus) each bearing two, three are five small teeth or tubercles. Pharynx with three distinct sections; corpus, isthumus and bulb; corpus cylindrical, somewhat swollen proximally but never forming a true valvular bulb. Terminal bulb muscular, with distinct valve plates. Posterior part of the stoma (stegostom) often surrounded by thin pharyngeal collar. Excretory pore usually visible, at a level within the posterior part of pharynx. Female gonads mostly two rarely one, prodelphic, vulva median or posterior. Ovaries reflexed. Spicules separate or fused distally; gubernaculum present. Bursa present, usually well developed, occasionally more or less reduced; male tail either completely surrounded by bursa (peloderan) or projected beyond it (leptoderan). Bursal edges open or closed anteriorly. Bursa with nine or ten pairs of rod-like papillae. Tail in both the sexes similar, or female tail longer than that of males in the same species. Phasmids always distinct.

Type superfamily : Rhabditoidea Orley, 1880

Other superfamilies : Alloionematoidea Chitwood & McIntosh, 1934

Bunonematoidea Micoletzky, 1922
leptoderan, rarely small, rudimentary. Genital papillae generally nine or ten pairs in number. Tails of both sexes similar or male tail shorter than female.

Type subfamily: Rhabditinae Orley, 1880

Other subfamilies: Amphidirhabditinae Andrassy, 1976

Mesorhabditinae Andrassy, 1976
Peloderinae Andrassy, 1976
Protorhabditinae Dougherty, 1955
Stomachorhabditinae Andrassy, 1970

Subfamily Protorhabditinae Dougherty, 1955

Diagnosis: Lips low and closed i.e. hardly separate from one another. Labial papillae minute, not setiform. Amphids very small, on the lateral lips. Stoma mostly long and narrow. Cheilostom cuticularized, but short. Stegostom weakly developed without glottoid apparatus and devoid of denticles. Pharynx corpus proximally swollen, rarely cylindrical. Female reproductive system monopro- or amphidelphic, vulva in the former case quite near to anal opening. Spicules often fused in their distal position. Bursa peloderan or pseudopeloderan, open or closed in its anterior margin. Seven to eight or rarely nine pairs of bursal papillae present. Tails often showing sexual dimorphism.

Type genus: Protorhabditis (Osche, 1952) Dougherty, 1953

Other genera: Paradoxorhabditis Khera, 1971
Parasitorhabditis (Fuchs, 1937) Chitwood & Chitwood, 1950
Genus *Protorhabditis* (Osch, 1952) Dougherty, 1953

**Diagnosis:** Body usually small, 0.3-0.9 mm long. Cuticle finely transversely striated and occasionally longitudinally striated. Lips low hardly separate with very small papillae. Amphids on the lateral lips, point like. Stoma 2-4 times as long as head diameter, longer and narrower than in other genera of the family, its walls parallel. Cheilostom mostly cuticularized but quite short. Stegostom simple, devoid off glotoid apparatus and denticles. Pharyngeal collar present or absent. Pharynx corpus proximally swollen to form a median bulb. Female gonads paired, vulva equatorial. Spicules free, bursa peloderan, open or rarely closed with seven to eight pairs of papillae. Female tail elongate conoid to filiform, that of male short.

Type species: *Protorhabditis xylocola* (Korner in Osche, 1952) Dougherty, 1953

*Protorhabditis neoxylocola* sp.n.

( Fig. 1)

**Measurements**

**Paratype females (n = 3):** L = 0.46-0.49 (0.47 ± 0.01) mm; a = 21.6-22.0 (21.7 ± 0.2); b = 4.1- 4.1 (4.1 ± 0.0); V = 53.9-56.5 (55.0 ± 1.3); c = 7.5-9.0 (8.1 ± 0.7); c' = 3.9-5.5 (5.0 ± 0.9); stoma = 16.4-17.4 (16.8 ± 0.5) μm; pharynx = 111.5-118.3
(115.7±3.6) μm; anterior gonad = 74.6-102.8 (90.5±14.3) μm; posterior gonad = 72.7 – 79.5 (76.3 ± 3.4) μm; VBD = 20.3 – 23.2 (21.9 ± 1.4) μm; rectum 15.5 – 19.4 (16.8 ± 2.2) μm; tail = 59.1 – 64.9 (59.1 ± 5.8) μm; ABD = 10.6 – 13.6 (11.9 ± 1.4) μm.

**Holotype female:** L = 0.46 mm; a = 2.7; b = 4.1; c = 7.8; c’=5.5; v = 53.9; stoma = 16.4 μm; pharynx = 111.5 μm; anterior gonad = 74.6 μm; posterior gonad = 79.5; VBD = 20.3 μm; rectum = 16.5 μm; tail = 59.1 μm; ABD = 10.6 μm.

**Paratype male:** L = 0.43 mm. a = 20.3; b = 3.8; c = 19.4; c’ = 1.4; stoma = 16.4 μm; pharynx = 111.5 μm; spicule = 21.3 μm; gubernaculum= 9.7 μm; bursa = 31.0 μm; tail = 22.3 μm; ABD = 15.5 μm.

**Other Population**

**Females (n = 13):** L = 0.364 – 0.48 (0.43 ± 0.29) mm. a = 18.0 – 25.7 (21.6 ± 1.6); b = 3.5 – 4.0 (3.8 ± 0.1); V = 53.7 – 57.1 (55.1 ± 1.0); c = 6.8 – 8.0 (7.4 ± 0.3); c’ = 4.5 – 6.1 (5.1 ± 0.3); stoma = 13.5 – 18.4 (16.7 ± 1.6) μm; pharynx = 102 – 120 (112 ± 6) μm; anterior gonad = 48.5 – 89 (75.7 ± 12.3) μm; posterior gonad = 54.3 –100 (69.9 ± 12.8) μm; VBD = 15.5 – 22.3 (19.4 ± 2.1) μm; rectum = 14.5 – 23.2 (18.6 ± 2.9) μm; tail = 48.5 – 63.0 (58 ± 4) μm; ABD = 8.7 – 12.6 (11.2 ± 1.0) μm.

**Description**

**Female:** Body slender, almost straight upon fixation, tapering towards both extremities. Cuticle finely annulated, longitudinal striations absent. Labial region 8 – 9 μm wide, continuous with the body contour. Lips low, hardly separate with
very small papillae. Amphids minute, on lateral lips. Stoma elongate, two to three times as long as head diameter. Cheilostom not cuticularized but quite short; gymnostom with parallel walls. Stegostom simple, devoid of glotoid apparatus or any denticles. Pharyngeal collar absent. Metacorpus swelling well segregated to form a bulb. Nerve ring encircling isthmus at 72 - 75μm from anterior end. Excretory pore at the beginning of basal bulb, 92 - 95 μm from anterior end. Terminal bulb well developed with triradiate valve plate. Anterior pharynx 1.28 – 1.32 times longer than posterior pharynx. Intestine granulated, with wide lumen.

Reproductive system amphidelphic, vulva equatorial. Ovaries reflexed, oocytes in the germinal zone arranged in two rows. Uterus well developed with glandular and muscular parts. Vagina prominent, muscular. Rectum well dilated, 1.4 - 1.6 times anal body width long. Tail elongate conoid with pointed tip. Phasmids visible behind anal opening.

**Male:** Body small, almost straight upon fixation. Testis single reflexed. Spicule free, strongly arcuate. Gubernaculum small, slender, plate – like 45% of spicule length. Bursa peloderan 30μm long, anteriorly open with eight pairs of caudal papillae. Two pairs pre-cloacal and six pairs post cloacal.

**Type habitat and locality:** Decayed wood of Pinus collected from Ghani Mendhar, Poonch, Jammu and Kashmir

**Other locality:** Decayed wood of pinus Blar Mendhar, Poonch, Jammu and Kashmir.
Type specimens

**Holotype:** Females on slide *Protorhabditis neoxylocola* sp.n./1; deposited in the nematode collection of Department of Zoology, Aligarh Muslim University, Aligarh.

**Paratypies:** Females and males on slides *Protorhabditis neoxylocola* sp.n./2-5; deposited in the nematode collection of Department of Zoology, Aligarh Muslim University, Aligarh.

**Diagnosis and relationship**

*Protorhabditis neoxylocola* sp.n. is characterized by small body, without pharyngeal collar, well dilated rectum, and strongly arcuate spicules.

*Protorhabditis neoxylocola* sp.n. resembles *P. virgo* (Korner in Osche, 1952) Dougherty, 1955 in body size, a and b values and position of vulva. It also resembles *P. xylocola* (Korner in Osche, 1952) Dougherty, 1953 in the number of caudal papillae, position of phasmids, b-value and shape of tail. However, it can be differentiated from both the species in having a dilated rectum, strongly arcuate spicules, and absence of pharyngeal collar (*rectum not dilated; spicules not as arcuate and pharyngeal collar present in* *P. virgo* and *P. xylocola*).
Subfamily *Mesorhabditinae* Andrassy, 1978

**Diagnosis:** Lips well developed, separate, each with a setiform papilla. Amphids small, on the lateral lips. Stoma fairly wide, well developed. Cheilostom simple; gymnostom mostly with parallel walls; stegostom with glottoid apparatus and small denticles. Pharyngeal collar generally absent. Pharynx corpus proximally swollen, bulb-like. Female genital organs always unpaired, prodelphic; vulva far back. Spicules often fused distally, in some cases very long and slender. Bursa peloderan proximally open, generally well developed, only rarely rudimentary. Genital papillae nine to ten pairs if bursa normal and five to nine pairs if bursa reduced. Tail of female conoid, occasionally, cupola-shaped, that of male short, conoid.

Type genus: *Mesorhabditis* (Osche, 1952) Dougherty, 1953

Other genera: *Bursilla* Andrassy, 1976

*Crustorhabditis* (Sudhaus, 1974) Andrassy, 1976

*Cruznema* Artigas, 1927

*Marispelodera* Belogurov, 1977

*Operculorhabditis* Khera, 1969

*Rhabpanus* Massey, 1971

*Teratorhabditis* (Osche, 1952) Dougherty, 1953
Genus *Mesorhabditis* (Osche, 1952) Dougherty, 1953

**Diagnosis:** Body 0.4 to 1.0 mm long. Cuticle conspicuously annulated. Head offset. Lips well separated, rounded, each with one to three setiform papillae. Amphids small, on the lateral lips. Stoma well developed 2-3 times head diameter long. Cheilostom simple exceptionally cuticularized but small; gymnostom tubular, with parallel walls; stegostom with glottoid apparatus each swelling bearing two setose denticles. Pharyngeal collar absent. Pharynx corpus, proximally swollen. Female gonad unpaired, reproductive system prodelphic; a short post vulval uterine sac may be present. Vulva far back. Spicules distally fused from 1/3 times to 1/2 of their length, often very long and slender, two to three times longer than tail. Bursa well developed, peloderan, exceptionally reduced, anteriorly open; gential papillae 9-10 pairs (two pairs preanal). Tail of female conical rarely cupola-shaped, moderately long. Phasmids near anus.

Type species: *Mesorhabditis spiculigera* (Steiner, 1936) Dougherty, 1953

*Mesorhabditis spiculigera* (Steiner, 1936) Dougherty, 1953

(Fig. 2)

**Measurements**

**Females** (n = 7): L = 0.42 - 0.48 (0.46 ± 0.18 mm); a = 15.2 - 20.3 (17.6 ± 1.6); b = 3.5 - 4.1 (3.8 ± 0.2); V = 70.2 - 73.8 (72.8 ± 1.1); c = 6.2 - 8.5 (7.9 ± 0.7); c' = 4.0 - 6.0 (4.8 ± 0.5); stoma = 16.4 - 19.4 (17.7 ± 1.0) μm; pharynx = 113.4 - 121.2 (118.0 ± 3.1) μm; anterior gonad = 128.2 - 156.1 (142.7 ± 11.6) μm.
Females (n = 9): L = 0.43 - 0.59 (0.5 ± 0.05) mm; a = 12.5 - 18.3 (15.7 ± 2.2); b = 3.6 - 5.4 (4.3 ± 0.5); V = 72.5 - 76.3 (74.4 ± 1.0); c = 8.0 - 9.6 (8.64 ± 0.5); c' = 3.6 - 5.0 (4.4 ± 0.5); stoma = 15.2 - 19.4 (18.0 ± 1.2) μm; pharynx = 109.61 - 127.0 (119.3 ± 6.3) μm; anterior gonad = 82.4 - 261.9 (166.9 ± 59.3) μm; rectum = 10.6 - 29.1 (23.9 ± 5.4) μm; tail = 46.9 - 68.8 (58.6 ± 8.3) μm; ABD = 11.6 - 16.4 (13.6 ± 1.4) μm.

Females (n = 10): L = 0.50 - 0.63 (0.5 ± 42.9) mm; a = 16.5 - 20.0 (18.1 ± 1.1); b = 4.1 - 4.5 (4.4 ± 0.2); V = 72.9 - 78.8 (75.4 ± 2.0); c = 8.2 - 12.4 (9.6 ± 1.4); c' = 3.1 - 4.3 (3.8 ± 0.3); stoma = 15.5 - 19.4 (17.4 ± 1.37) μm; pharynx = 111.5 - 138.7 (124.5 ± 10.3) μm; anterior gonad = 130.9 - 245.4 (196.0 ± 42.5) μm; rectum = 22.3 - 30.0 (25.4 ± 2.2) μm; tail = 47.5 - 64.0 (58.4 ± 5.7) μm; ABD = 14.5 - 17.4 (15.2 ± 0.9) μm.

Description

Female: Body almost straight upon fixation, tapering at both the ends. Cuticle transversely annulated, longitudinal striations absent. Lateral fields with four ridges. Lip region distinctly set-off by a constriction, lips large, prominent, each with a setose papilla. Amphids minute, indistinct. Stoma tubular, cheilostom simple, not cuticularized. Gymnostom with parallel walls. Stegostom isoglossoid, each swelling with two prominent denticles. Pharyngeal collar absent. Stoma 1/


**Male:** Not found.

**Remarks**

Though the specimens of *Mesorhabditis spiculigera* recorded in our sample conform well with the measurements and description given by (Steiner, 1936) Dougherty, 1953 slight variation have been observed in the body length (0.42 – 0.48 against 0.41 – 0.94) mm and c-value (6.2 – 8.5 against 8 – 14).

**Genus** *Teratorhabditis* (Osche, 1952) Dougherty, 1953

**Diagnosis:** Body length between 0.7-1.5 mm. Cuticle annulated. Head continuous with neck contour or slightly offset. Lip margins strongly cuticularized, refractive, axils separating lips tubular at base. Dorsal and ventral lips differently shaped than lateral lips. Amphids minute, on the lateral lips. Stoma 1.5-2.5 times as long as
head diameter. Cheilostom cuticularized, homologus with cuticularization of lip margins. Gymnostom tubular, with parallel walls. Stegostom mostly anisomorphic, bearing very small wart like denticles various in number. Pharyngeal collar present or absent. Pharyngeal corpus with bulb-like swelling, terminal bulb strong. Female genital organs unpaired, prodelphic, without postvulval uterine branch. Vulva far back on body near anal opening. Spicules fused at distal ends. Bursa peloderan open, with nine or ten pairs of papilla. Tail of female conical or cupola-shaped, spicate, that of male short, conical. Phasmids at level of anus or slightly anterior to it.

Type species: *Teratorhabditis dentifera* (Volk, 1950) Dougherty, 1953

*Teratorhabditis mangiferae sp.n.*

(Fig. 3)

Measurements

Paratype females (n = 10): L = 1.32 - 1.78 (1.51 ± 1.53) mm; a = 14.3-19.5 (16.9 ± 1.4); b = 5.9 - 7.9 (6.8 ± 0.6); V = 83.9 - 87.4 (85.8 ± 1.0); c = 11.4 - 14.9 (13.0 ± 1.1); c' = 3.4 - 4.8 (3.9 ± 0.3); stoma = 31.0 - 36.8 (33.5 ± 1.5) μm, pharynx 208.5 - 233.7 (221.6 ± 9.5) μm; anterior gonad = 780.8 - 1201.8 (1011.7 ± 138.9) μm; rectum = 39.7 - 63.0 (49.2 ± 7.4) μm; tail = 100.8 - 124.1 (114.2 ± 7.7) μm; ABD = 25.2 - 31.0 (28.7 ± 1.9) μm.
**Holotype female:** L = 1.56 mm; a = 16.1; b = 7.3; V = 85.8; c = 13.7; c' = 4.0; stoma = 33.9 µm; pharynx = 212.4 µm; anterior gonad = 1059.2 µm; VBD = 61.1 µm; rectum = 54.3µm; tail = 113.4 µm; ABD 28.1 µm.

**Paratype male (n = 1):** L = 1.20 mm; a = 18.3; b = 6.2; c = 27.7; c'=1.1; stoma = 32.0 µm; pharynx = 194.9 µm; spicule = 64.9 µm; gubernaculum = 41.7 µm; bursa = 95.0 µm; tail = 43.6 µm.

**Description**

**Female:** Body large, straight upon fixation, tapering at both the ends. Cuticle transversely annulated and marked with transverse rows of punctations over the entire body. Labial region continuous, lips six, large, separate. Lips with smooth edges but internally lined by sclerotized thickenings. Six inner labial sensilla setose, directed inward towards oral aperture. Six sensilla of outer circlet papillae form. Cephalic papillae not observed. Amphidial openings small elliptical on lateral lips. Stoma prismatic and tubular. Cheilostom not cuticularized; gymnostom with parallel walls; stegostom isoglotoid, each swelling with three denticles. Pharyngeal collar present. Pharynx with well developed procorpus, a distinct avalvate median bulb, slender isthmus and prominent terminal bulb with triradiate valve plate. Nerve ring 141-183 µm from anterior end. Excretory pore 177 – 219 µm from anterior end in the region of terminal bulb. Intestine granulated with distinct lumen.

Ovary reflexed with two or more rows of oocytes. Reproductive system monoprodelphic. Uterus well developed, muscular. Vulval opening elliptical with
prominent raised lips and with strong circular and oblique muscles. Post-uterine sac absent. Rectum 1.3-2.5 anal body widths long. Tail elongate conoid, attenuated. Phasmids conspicuous just posterior to anus.

**Male:** Similar to females but smaller in size. Testis single reflexed. Spicules slender, fused at tips. Gubernaculum simple, 64% of spicule length. Bursa pelodera, anteriorly open with smooth margins. Posterior cloacal lips with a pair of subventral setose papillae. A distinct submedian papilla on the anterior cloacal lip. Caudal papillae nine paris, two pairs precloacal and seven pairs post-cloacal arranged 2+1+4+2 pattern. Tail short conical.

**Type habitat and locality:** Soil around roots of Mango (*Mangifera indica*) Channi himmat, Jammu (J&K).

**Type specimens**

**Holotype:** Female on slide *Teratorhabditis mangiferae* sp.n./1; deposited in the nematode collection of Department of Zoology, Aligarh Muslim University, Aligarh.

**Paratypes:** Females and males on slides *Teratorhabditis mangiferae* sp.n./2 – 4; deposited in the nematode collection of Department of Zoology, Aligarh Muslim University, Aligarh.

**Diagnosis and relationship**

*Teratorhabditis mangiferae* sp.n. is characterized by large – sized body, a long, conoid and attenuated tail in females, nine pairs of caudal papillae arranged in 2 + 1 + 4 + 2 pattern and spicules fused at the tip.
Teratorhabditis mangiferae sp.n. resembles T. dentifera (Volk, 1950) Dougherty, 1953 in body size, b-value and position of vulva. It also resembles T. stiannula Anderson, 1979 in the shape of tail, c-value, and position of vulva. It can be differentiated from T. dentifera in having long conoid tail, number and arrangement of caudal papillae, and in the nature of fusion of spicules (tail cupola shaped; caudal papillae ten pairs and fusion of spicules 25% in T. dentifera). From T. stiannula in the number and arrangement of caudal papillae, size, shape and fusion of spicules, absence of spindle-shaped sphincter at the junction of uterus and gonoduct (caudal papillae ten pairs, arranged in 2+4+1+3 pattern; spicules 45 μm and more prominent; sphincter present in T. stiannula).
Subfamily Peloderinae Andrassy, 1976

**Diagnosis:** Lips generally hardly separate, papillae usually very small. Amphids small, on the lateral lips. Stoma well developed, fairly long. Cheilostom only exceptionally cuticularized; gymnostom parallel walled; stegostom with glottoid apparatus and either with small warts or with bristle-like denticles. Pharyngeal collar around proximal part of stegostom usually present. Pharyngeal corpus more or less swollen, bulb-like. Female genital organs paired, amphidelphic; vulva at or near mid-body region. Spicules free or fused distally. Bursa well developed, peloderan or rarely pseudopeloderan, provided with nine or ten pairs of papillae. Tail of female conoid or cupola-shaped, that of male short, conoid.

**Type genus:** *Pelodera* Schneider, 1866

**Genus Pelodera** Schneider, 1866

**Diagnosis:** Body length varying between 0.7 - 2.3 mm. Cuticle annulated and usually also finely longitudinally striated. Head continuous with neck contour or more or less offset. Lips separated or moderately differentiated, labial papillae minute. Amphids pore like, small, on the lateral lips. Stoma varying in length as long as head diameter to more than twice as long as that. Cheilostom not cuticularized, gymnostom with parallel walls. Each swelling of stegostom armed with three setose denticles. Pharyngeal collar present. Pharynx corpus strongly swollen. Female reproductive system amphidelphic, vulva in or a little behind middle of body. Spicules proximally fused. Bursa peloderan, open, fairly wide,
supplied with ten pairs of papillae. Tail of female of various shapes, conoid to
cupola-like.

Type species: Pelodera strongyloides (Schneider, 1860) Schneider, 1866

Pelodera strongyloides (Schneider, 1860) Schneider, 1866

(Fig. 4)

Measurements

Females (n = 5): L = 1.15 – 1.28 (1.2 ± 0.0) mm; a = 13.2 – 10.4 (14.3 ± 0.8)
b = 5.5 – 6.4 (6.0 ± 0.2); c = 23.1 – 24.9 (24.2 ± 0.7); c’ = 1.5 – 1.5 (1.4 ± 0.0)
V = 55.0 – 57.9 (56.6 ± 1.0); stoma = 28.3 – 30.0 (29.1 ± 0.6) μm; pharynx =
179.4 – 206.6 (201.7 ± 14.8) μm; anterior gonad = 354.0 – 421.9 (396 ± 26.1) μm;
posterior gonad = 339.5 – 376.3 (360.6 ± 15.5) μm; rectum = 41.7 – 43.6 (43.0 ± 1.1) μm;
tail = 47.5 – 53.3 (50.0 ± 2.3) μm; ABD = 32.0 – 36.8 (33.7 ± 1.8) μm.

Males (n = 3): L = 0.99 – 1.0 (1.1 ± 21.5) mm; a = 14.1 – 17.4 (15.7 ± 1.6); b
= 5.4 – 5.7 (5.5 ± 0.1); c = 20.6 – 22.1 (21.5 ± 0.7); stoma = 26.1 – 27.1 (26.5
± 0.5) μm; pharynx = 173.6 – 191.0 (180.7 ± 9.1) μm; spicule = 59.1 – 65.9 (62.7 ± 3.4) μm;
gubernaculum = 15.5 – 48.5 (32.6 ± 16.5) μm; bursa = 97.9 – 100.8 (99.4 ± 2.0) μm;
tail = 45.5 – 48.5 (46.8 ± 1.4) μm.
Description

**Female:** Body large robust, straight upon fixation, tapering at both the extremities. Cuticle transversely annulated, and usually also finely longitudinally striated. Labial region prominent, setoff wider than adjoining body. Lips six, large, separate and equal. Labial papillae minute. Amphids pore-like, small, on the lateral lips. Stoma varying in length 1.5 – 1.6 lip widths long. Cheilostom not cuticularized. Gymnostom with parallel walls. Stegostom isoglotoid, each swelling with three setose denticles. Pharyngeal collar present. Pharynx with well developed procorpus, distinct avalvate median bulb, slender isthmus and prominent terminal bulb. Nerve ring 129 – 146 µm from anterior end. Excretory pore in the region of terminal bulb, 175 - 206µm from anterior end. Intestine granulated with distinct lumen.

Reproductive system amphidelphic. Ovaries reflexed with several rows of oocytes. Vulva little behind middle of the body. Uterus well developed, muscular. Rectum 1.1 – 1.2 anal body-widths long. Tail cupola-shaped. Phasmids conspicuous, at the level of anus.

**Male:** Similar to females but smaller in size. Testis single, reflexed. Spicules slender straight fused to about 2/3 of its length. Gubernaculum simple, 15 – 20 µm long, 57.3 – 73.5% of spicule length. Bursa peloderan, anteriorly open, fairly wide, with ten pairs of papillae, two pairs precloacal and eight pairs post cloacal, arranged in 2 + 5 + 3 pattern. Tail short conoid.
**Habitat and locality:** Horse dung from Channi Rama, Distt. Jammu, Jammu and Kashmir.

**Remarks**

Though the specimens of Pelodera strongyloides recorded in our sample conform well with the measurements and description given by Schneider, 1866 slight variation have been observed in the body length (1.15 – 1.28 against 1.2 – 2.5) mm and in b-value (5.5 – 6.4 against 4.9 – 8.4).

Genus *Caenorhabditis* (Osche, 1952) Dougherty, 1953

**Diagnosis:** Body length varying between 0.6 and 1.8 mm. Cuticle finely striated to smooth. Head continuous with body, lips hardly separate, low. Labial papillae minute. Amphids insignificant, on the lateral lips. Stoma of moderate length, as long as head diameter or a little longer. Cheilostom not cuticularized, gymnostom relatively narrow, tubular. Stegostom isoglotoid, each swelling armed with two fine bristle-like denticles. Pharyngeal collar around buccal tube present but generally short. Pharynx corpus proximally swollen. Terminal bulb strong, spherical. Female reproductive system amphidelphic, vulva at mid-body region. Spicules separate. Bursa broad, peloderan, anteriorly closed, sucker-shaped, often with wavy edges. Nine pairs of genital papillae present, two of them lying pre-anal. Tail of female conoid, mostly long. Phasmids small but visible.

Type species: *Caenorhabditis elegans* (Maupas, 1900) Dougherty, 1953
**Caenorhabditis kashmirensis sp.n.**

(Fig. 5)

**Measurements**

**Paratype females (n = 10):**

- L = 0.76 – 0.87 (0.8 ± 0.02) mm; a = 17.4 – 20.4 (18.6 ± 1.0);
- b = 5.1 – 6.1 (5.4 ± 0.3);
- c = 9.5 – 15.4 (12.3 ± 1.5);
- c' = 2.5 – 3.8 (3.1 ± 0.3);
- V = 51.3 – 63.9 (53.4 ± 3.7);
- stoma = 17.4 – 20.3 (18.4 ± 0.8) μm;
- pharynx = 129.9 – 154.2 (146.9 ± 6.5) μm;
- anterior gonad = 216.3 – 349.2 (239.5 ± 39.4) μm;
- posterior gonad = 125.1 – 234.7 (211.6 ± 32.0) μm;
- rectum = 46.5 – 60.1 (55.1 ± 4.0) μm;
- tail = 49.4 – 81.4 (65.7 ± 8.4) μm;
- ABD = 19.4 – 22.3 (20.7 ± 1.3) μm.

**Holotype female:**

- L = 0.8 mm; a = 18.0; b = 5.3; c = 11.0; c' = 3.2; V = 51.3;
- stoma = 18.4 μm;
- pharynx = 149.3 μm;
- anterior gonad = 223.1 μm;
- posterior gonad = 234.7 μm;
- rectum = 56.2 μm;
- VBD = 48.5 μm;
- tail = 72.7 μm;
- ABD = 22.3 μm.

**Description**

**Female:** Body medium sized but robust, straight upon fixation, tapering at both the extremities. Cuticle transversely annulated. Head continuous, prominent. Lips six, hardly separate. Labial papillae setose and well developed. Amphids insignificant, on the lateral lips. Stoma tubular 1.8 – 1.9 lip-widths long. Cheilostom not cuticularized. Gymnostom with parallel walls. Stegostom isoglotoid, each swelling with two fine bristle-like denticles. Pharyngeal collar around buccal tube present. Pharynx with well developed procorpus slightly

Female reproductive system amphidelphic. Ovary reflexed with two or more rows of oocytes in germinal zone. Uterus well developed muscular. Vulva at mid-body region. Rectum long, 1.8 – 2.9 anal body-widths long. Tail elongate conoid. Phasmids conspicuous slightly behind the anus.

Male: Not found.

**Type habitat and locality:** Soil rich in organic matter from Mendhar, Distt. Poonch Jammu and Kashmir.

**Type specimens**

**Holotype:** Female on slide *Caenorhabditis kashmirensis* sp.n./1; deposited in the nematode collection of Department of Zoology, Aligarh Muslim University, Aligarh.

**Paratypcs:** Females and males on slide *Caenorhabditis kashmirensis* sp.n./2-4; deposited in the nematode collection of Department of Zoology, Aligarh Muslim University, Aligarh.
Diagnosis and relationship

*Caenorhabitis kashmirensis* sp.n. is characterized by medium-sized body, prominent labial papillae, long rectum with two distinct swellings around its anterior region, and an elongate tail.

*Caenorhabitis kashmirensis* sp.n. resembles *C. briggsae* (Dougherty and Nigon, 1949) Dougherty, 1953 in body size, a- and c-values. It also resembles *C. remanei* (Sudhaus, 1974) in the shape of lip region, b-value and shape of stoma. It can be differentiated from both the species in having prominent labial papillae, a long rectum with two distinct swellings, a long conoid tail and absence of male (labial papillae not prominent; rectum without prominent swellings; tail not as elongated and males present in *C. briggsae* and *C. remanei*).

Subfamily Rhabditinae Orley, 1880

**Diagnosis**: Lips closed or only slightly separate, usually with very small papillae. Amphids generally pore-like on the lateral lips, rarely large, oval, behind labial region. Stoma well developed, tubular, exceptionally short. Cheilostom not cuticularized. Gymnostom parallel-walled, stegostom with glotoid apparatus bearing minute warts or setiform denticles. Pharyngeal collar around buccal tube mostly present. Pharynx corpus often bulb-like. Female genital organs paired, amphidelphic; vulva medial. Spicules practically always separate. Bursa leptoderan, not reaching tail tip, open, or rarely, closed, generally narrower than in Peloderinae, occasionally quite rudimentary. Number of genital papillae 9 or 10.
pairs. Tail of female mostly conical sometimes cupola-shaped and spicate, that of male similar in shape and length.

Type genus: **Rhabditis** Dujardin, 1845

Other genera: **Colporhabditis** Andrassy, 1976

**Curviditis** (Dougherty, 1953) Andrassy, 1983

**Cuticularia** Van der Linde, 1938

**Discoditis** Andrassy, 1983

**Oscheius** Andrassy, 1976

**Poikilolaimus** Fuchs, 1930

**Rhabditiella** (Cobb, 1929) Chitwood, 1933

**Rhitis** Andrassy, 1983

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**Genus Rhabditis** Dujardin, 1845

**Diagnosis:** Body length varying from 0.5-2.9 mm. Cuticle either smooth or annulated and finely longitudinally striated. Head continuous with neck or offset, Lips low, closed or hardly separate, labial papillae minute, occasionally setose. Stoma of moderate length, cheilostom not cuticularized; stegostom with relatively large swellings provided with fine warts. Pharyngeal collar present. Pharynx corpus either cylindrical or swollen, bulb-like. Female gonads paired, vulva near middle of body. Spicules free, simple. Bursa leptoderan, open or rarely pseudopeloderan. Number of genital papillae 9 (exceptionally 8) pairs, usually three pairs lying preanal. Tail of both sexes conical, or that of female cupola-shaped with tip. Phasmids distinct.
Type species: *Rhabditis terricola* Dujardin, 1845

**Rhabditis species**

(Fig. 6)

**Measurements**

**Females (n = 3):** $L = 0.45 - 0.63$ (0.5 ± 0.0) mm; $a = 14.7 - 15.1$ (14.9 ± 0.2); $b = 3.8 - 5.1$ (4.5 ± 0.6); $V = 47.8 - 51.5$ (50.1 ± 1.9); $c = 7.2 - 8.2$ (7.6 ± 0.58); $c' = 4.4 - 5.8$ (5.1 ± 0.7); stoma = $14.5 - 16.4$ (15.8 ± 1.1) μm; pharynx = $104.7 - 125.1$ (115.7 ± 10.2) μm; anterior gonad = $80.5 - 109.6$ (96.6 ± 14.8) μm; posterior gonad = $75.6 - 117.3$ (100.9 ± 31.2) μm; rectum = $32.9 - 38.5$ (30.6 ± 10.5) μm; tail = $60.1 - 88.2$ (70.1 ± 15.71) μm; ABD = $13.5 - 16.4$ (13.5 ± 2.9) μm.

**Description**

**Female:** Small sized nematode less then one 1mm. in size almost straight upon fixation cuticle finely transversely striated, longitudinal lines not well developed, confined to both the sides of lateral fields. Lateral field with three ridges. Lip region low, continuous, 9-11 μm wide. Lips fused, labial papillae minute. Amphids small on lateral lips. Stoma prismatic, tubular. Cheilostom simple. Gymnostom with parallel walls. Stegostom isoglotoid with four denticles on each swelling. Pharyngeal collar present. Stoma 1/7th pharynx length. Median bulb not well developed. Nerve ring 71.78 - 82.45 μm from anterior end. Excretory pore
84.39 - 103.79 μm from anterior end. Terminal bulb with well developed triradiate valve plate. Anterior pharynx 1.34 - 1.37 times longer than posterior pharynx.


**Male:** Not found

**Habitat and locality:** Organic soil behind police complex, Trikutanagar Jammu.

**Remarks**

As only three specimens were found, it was difficult to identify the species hence we have not name it. We are looking for more specimens, particularly males, so that a precise identification can be made.

**Genus** *Cuticularia* Van der Linde, 1938

**Diagnosis:** Body 0.5 - 1.2 mm long. Cuticle unusually loose sac-like. Head not off-set, lips low not separate, labial papillae small. Amphids small, pore-like on the lateral lips. Stoma wide, 1.5 – 2.0 times longer than head diameter. Cheilostom not cuticularized; gymnostom tubular; stegostom slightly anisoglottoid, each swelling carrying two setose denticles. Pharyngeal collar present. Pharynx corpus not or slightly swollen, terminal bulb large. Female genital apparatus paired, vulva slightly post medial. Spicules separate. Bursa leptoderan rudimentary, hardly
discernible. Nine pairs of papillae present, of which the first pair lying far before spicules. Tail of both sexes short, cupola-shaped, with conoid tip. Phasmids small.

Type species: *Cuticularia oxycerca* (De Man, 1895) Andrassy, 1983

*Cuticularia oxycerca* (De Man, 1895) Andrassy, 1983

(Fig. 7)

**Measurements**

**Females** (*n* = 10): *L* = 0.81 - 1.02 (0.90 ± 81.45) mm; *a* = 11.98 - 17.1 (14.5 ± 1.4); *b* = 3.9 - 5.3 (4.6 ± 0.47); *V* = 47.5 - 58.3 (54.3 ± 3.4); *c* = 19.5 - 37.9 (29.8 ± 5.7); *c' =* 1.0 - 1.5 (1.3 ± 0.2); stoma = 23.2 - 27.1 (25.1 ± 1.0) μm; pharynx = 183.3 - 211.4 (197.5 ± 9.9) μm; anterior gonad = 143.5 - 334.6 (265.6 ± 58.1) μm; posterior gonad = 213.4 - 323.0 (240.0 ± 53.5) μm; rectum = 27.1 - 33.9 (30.4 ± 2.2) μm; tail = 23.2 - 52.3 (31.9 ± 9.0) μm; ABD = 18.4 - 29.1 (22.7 ± 3.4) μm.

**Males** (*n* = 2): *L* = 0.78 - 0.88 (0.83 ± 72.7) mm; *a* = 15.2 - 31.6 (23.4 ± 11.6); *b* = 4.0 - 4.1 (4.12 ± 0.04); *c* = 24.6 - 29.8 (27.2 ± 3.6); *c' =* 0.8 - 0.9 (0.9 ± 0.0); stoma = 25.2 - 26.1 (25.7 ± 0.6) μm; pharynx = 191.0 - 213.4 (202.2 ± 15.7) μm; testis = 478.2 - 528.6 (503.4 ± 35.6) μm; spicule = 36.8 - 38.8 (37.8 ± 1.3) μm; gubernaculum = 9.7 - 13.5 (11.6 ± 2.7) μm; tail = 26.1 - 35.8 (31.0 ± 6.8) μm; ABD = 30.0 - 36.8 (33.4 ± 4.8) μm.
**Females (n = 4):** L = 0.53 - 0.82 (0.67 ± 12.2) mm; a = 17.6 - 19.1 (18.5 ± 0.6); b = 3.4 - 4.0 (3.6 ± 0.2); V = 56.3 - 65.9 (59.6 ± 4.3); c = 26.1 - 37.1 (29.0 ± 5.4); c' = 1.2 - 1.3 (1.2 ± 0.1); stoma = 21.3 - 23.2 (22.3 ± 0.7) μm; pharynx = 154.2 - 203.7 (180.1 ± 22.7) μm; anterior gonad = 97.9 - 158.1 (123.6 ± 25.5) μm; posterior gonad = 95.0 - 137.7 (113.0 ± 17.8) μm; rectum = 20.3 - 29.1 (25.9 ± 3.9) μm; tail = 20.3 - 25.2 (23.0 ± 2.1) μm; ABD = 14.5 - 19.4 (18.1 ± 2.4) μm.

**Males (n = 2):** L = 0.76 - 0.83 (0.79 ± 50.0) mm; a = 14.8 - 21.5 (18.1 ± 4.7); b = 3.8 - 3.9 (3.8 ± 0.0); c = 23.2 - 23.9 (23.5 ± 0.4); c' = 1.28 - 1.9 (1.6 ± 0.4); stoma = 23.2 (23.2 ± 0.0) μm; pharynx = 197.8 - 213.4 (205.6 ± 10.9) μm; testis = 442.3 - 488.8 (465.6 ± 32.9) μm; spicule = 388 - 42.6 (407 ± 2.7) μm; gubernaculum = 11.6 - 14.5 (13.0 ± 2.0); tail = 27.1 - 43.9 (31.0 ± 5.4) μm; ABD = 27.1 - 30.0 (28.6 ± 2.0) μm.

**Description**

muscular isthmus and well developed basal bulb. Nerve ring 107 - 146 μm from anterior end. Excretory pore well developed 118 - 165 μm from anterior end. Terminal bulb large, with well developed triradiate valve plate. Intestine granulated.

Reproductive system amphidelphic, ovaries reflexed with two or more rows of oocytes. Uterus muscular with uterine eggs. Vulva transverse. Rectum 1.2 - 1.7 anal body widths long. Tail short cupola-shaped with pointed tip. Phasmids indistinct.

**Male:** Body almost straight upon fixation, anterior end similar to females. Testis single reflexed, spicules slender, arcuate 0.8 - 1.5 times anal body widths long. Gubernaculum small, 1/4th of spicule length. Bursa rudimentary, indistinguishable. Caudal papillae eight to ten pairs, arranged variably. In all the cases, first pair lying anterior to spicules outside bursa. Tail short, cupola-shaped, with fine tip.

**Habitat and Localities**

Organic Soil from Mendhar, Poonch, J&K.

In front of G.D.C. Poonch, J&K.

In front of Choudhary House, Jammu, J&K.
Remarks

Though the specimens of *Cuticularia oxycerca* recorded in our sample conform well with the measurements and description given by Andrassy (1983) slight variations have been observed in body length (0.81 – 1.0 against 0.5 – 1.1 mm and in V-value (47.5 – 58.3 against 55 – 59).

FAMILY **DIPLOSCAPTERIDAE** Micoletzky, 1922

**Diagnosis:** Head bilaterally symmetrical; dorsal and ventral lips with paired hook-like structures. Amphids on the lateral lips, small. Stoma rhabditiform tubular cheilostom not cuticularized; gymnostom with parallel walls; stegostom small unarmed, without glottoid apparatus. Pharynx corpus cylindrical or slightly swollen. Female genital organs paired. Spicules separate. Bursa narrow, peloderan, genital papillae nine pairs or less. Tails of both sexes similar, conical.

Type and only subfamily : Diploseapterinae Micoletzky, 1922

Type genus : *Diploscapter* Cobb, 1913

Genus *Diploscapter* Cobb, 1913

**Diagnosis:** Small nematodes, between 0.3 and 1.1 mm. cuticle smooth or finely annulated, occasionally with fine longitudinal striae. Head unusual among the rhabditoidea; bilaterally symmetrical ventral and dorsal with paired cuticularized, hook-like appendages, lateral lips also modified membrane - like. Amphids small,
on the lateral lips. Stoma long, tubular, 3 - 4 times longer than head diameter. Cheilostom not cuticularized, walls of gymnostom parallel. Stegostom isoglotoid unarmed. Pharyngeal collar present. Pharynx corpus cylindrical or slightly swollen. Ovaries paired, medial or postmedial. Spicules free. Bursa peloderan, open, moderately developed with six to nine pairs of papillae. Tail conoid.

Type species: *Diploscapter coronatus* (Cobb, 1913) Cobb, 1913

**Diploscapter coronatus** (Cobb, 1913) Cobb, 1913

(Fig. 8)

**Measurements**

**Females** (n = 5): L = 0.36 - 0.45 (410.85 ± 37.0) mm; a = 15.6 - 17.6 (16.8 ± 0.7); b = 3.8 - 4.3 (4.1 ± 0.1); V = 50.6 - 54.4 (52.2 ± 1.4); c = 5.4 - 6.6 (6.0 ± 0.5); c' = 5.0 - 6.6 (5.8 ± 0.6); stoma = 21.3 - 24.2 (22.8 ± 9.2) μm; pharynx = 93.1 - 104.7 (98.3 ± 5.5) μm; anterior gonad = 51.4 - 82.4 (68.8 ± 12.8) μm; posterior gonad = 54.3 - 77.6 (66.1 ± 11.9) μm; rectum = 14.5 - 19.4 (17.0 ± 1.7) μm; tail = 54.3 - 81.4 (69.0 ± 10.6) μm; ABD = 10.6 - 13.5 (11.8 ± 1.2) μm.

**Description**

**Females:** Body small, straight upon fixation, cuticle transversely striated, longitudinal striations absent. Lateral fields with two ridges. Lip region offset, 8.73 - 11.64 μm wide, bilaterally symmetrical dorsal
and ventral lips modified into paired, cuticularized hook-like appendages; lateral lips modified into membrane-like flaps with serrated margins. Amphids small, on lateral lips. Stoma tubular 2 - 3 lip-widths long. Chielostom not cuticularized; gymnostom with parallel walls; stegostom isomorphic, anisoglotoid without denticles. Pharyngeal collar short, covering about 1/5th of stoma. Stoma 1/4th of pharyngeal length. Corpus proximally swollen. Nerve ring 65.9 - 71.7 μm from anterior end. Excretory pore 56.2 – 63.0 μm from anterior end. Terminal bulb with well developed triradiate valve plate. Anterior pharynx 1.4 - 1.6 times longer than posterior pharynx. Intestine granulated.

Gonads amphidelphic ovaries reflexed. Uterus with long glandular and short muscular parts. Vagina muscular. Vulva a transverse slit. Rectum 1.3 - 1.5 anal body widths long. Tail elongate conoid. The vulva anus distance 1.9 – 2.0 times longer than tail.

**Male**: Not found

**Habitat and locality**: Compost in front of choudhary house, Jammu, Jammu and Kashmir.

**Remarks**

Though the specimens of *Diploscapter coronatus* recorded in our sample conform well with the measurements and description given by Cobb, 1913 slight variation have been observed in c-value (5.4 – 6.6 against 6 – 10) and in V-value (51 – 54 against 51 – 57).
SUMMARY
This work presents a taxonomic study of the nematodes of the suborder Rhabditina found in Jammu and Kashmir state of India. Soil samples rich in organic matter, humus, decaying plant parts and farmyard manure etc. were collected from different districts of the state. The nematodes were isolated by the Cobbs sieving and decantation and modified Baermanns funnel technique.

In all, eight species have been described in detail. All the species belonged to a single superfamily, two families, five subfamilies and eight genera. Of these three species were new to science.

I. The Order

Rhabditida

II. The suborder

Rhabditina

III. The superfamily

Rhabditoidea

IV. The families

1. Rhabditidae
2. Diploscapteridae

V. The subfamilies

1. Protorhabditinae
2. Mesorhabditinae
3. Peloderinae
4. Rhabditinae
5. Diploscapterinae

VI. The genera

1. Protorhabditis
2. Mesorhabditis
3. Teratorhabditis
4. Pelodera
VII. The new species

1. *Protorhabditis neoxylocola*
2. *Teratorhabditis mangiferae*
3. *Caenorhabditis kashmirensis*

VIII. The known species

1. *Mesorhabditis spiculigera*
2. *Pelodera strongyloides*
4. *Cuticularia oxycerca*
5. *Diploscapter coronatus*
REFERENCES


FUCHS, A.G. (1937). Neue Parasitische und halb parasitische Nematoden bei
Borken kafern und einige andere Nematoden. I. Teil. Die Parasiten
den Waldgartner Myelophilus piniperda L. Und minor Hartig und die
Genera Rhabditis Dujardin, 1845 und Aphelenchus Bastian, 1865.

sp. (Nemata:Rhabditidae): An associate of Rhyncophorus palmarum


JENKINS, W. R. (1964). A rapid centrifugal floatation technique for separating

KHERA, S. (1969). Nematodes from the banks of still and running water VI.

KHERA, S. (1971). Nematodes from the banks of still and running waters. XI.


FIGURES
FIG. 1. *Protorhabditis neoxylocola* sp.n. A. Entire female; B. Entire male; C. Anterior end; D. Pharyngeal region; E. Female reproductive tract (anterior); F. Female posterior region; G. Male posterior region.
FIG. 2. Mesorhabditis spiculigera. A. Entire female; B. Anterior end; C. Pharyngeal region; D. Reproductive tract; E. Posterior end.
FIG. 3. *Teratorhabditis mangiferae* sp. n. A. Entire female; B. Entire male; C. Anterior end; D. Pharyngeal region; E. Female reproductive tract; F. Female tail; G. Male tail (lateral); H. Male tail (dorsoventral).
FIG. 4. *Pelodera strongyloides*. A. Entire female; B. Entire male; C. Anterior end; D. Pharyngeal region; E. Female reproductive tract (anterior); F. Female tail; G. Vulval region; H. Female reproductive tract showing offset spermatheca; I. Female reproductive tract showing uterus and associated structure; J Male (dorsoventral); K. Male tail (lateral)
FIG. 5. *Caenorhabditis kashmirensis* sp.n. A. Entire female; B. Anterior end; C. Pharyngeal region; D. Reproductive tract (anterior); E. Posterior end.
FIG. 6. *Rhabditis* sp. A. Entire female; B. Anterior end; C. Pharyngeal region; D. Reproductive tract; E. Posterior end.
FIG. 7. *Cuticularia oxycerca*. A. Entire male; B. Entire female; C. Anterior end; D. Pharyngeal region; E. Female reproductive tract (anterior); F. Female tail; G. Male tail (lateral); H. Male tail (dorsoventral).
FIG. 8. Diploscapter coronatus. A. Entire female; B. Anterior end; C. Pharyngeal region; D. Reproductive tract; E. Posterior end.