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CATALOGUE OF ARTHROPOD PARASITIC NEMATODES OF INDIA

V. VENKAT GANTAIT
K. VENKATARAMAN

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Catalogue of Arthropod Parasitic Nematodes of India

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PREFACE

Nematodes are primitive group of invertebrates, highly diversified next to insects. A very large number of species are found to parasitize different animals including various kinds of arthropods. The parasitic species of arthropods are of considerable agricultural as well as clinical importance. They have significant interest due to their economic importance and because of their potential as biological control agents of different insect pests, which is beneficial to mankind.

In India, studies on nematodes associated with different groups of arthropods started only from past few decades, though it was started from long back in the world. Few works on arthropod parasitic nematodes have been done in Aligarh Muslim University, Aligarh in North India as well as in Andhra University, Hyderabad in South India. Apart from these, Indian Agricultural Research Institute, New Delhi; Zoological Survey of India, Kolkata and Dehradun; Indian Institute of Pulse Researches, Kanpur; Project Directorate of Biological Control, Bangalore and few other universities and institutions are working in this field.

All the nematode species parasitizing different groups of arthropods, described and recorded so far from India, including synonyms, type hosts, type localities, type specimens, type accession numbers etc. are reported herein. Total 80 species under 2 subgenera, 29 genera, 7 subfamilies, 11 families, 6 superfamilies, one suborder and 4 orders have been reported in this article. Amongst 80 species, one belongs to the order Enoplida, 12 belong to the order Tylenchida, 50 are under the order Oxyurida and the remaining 17 species belong to the order Rhabditida. Enoplida includes one superfamily, one family and one genus; Tylenchida includes 2 superfamilies, 3 families and 6 genera; Oxyurida includes 2 superfamilies, 4 families, 7 subfamilies and 19 genera; Rhabditida includes one suborder, one superfamily, 3 families, 3 genera and 2 subgenera.

There has been a long felt need in India by the student, teachers and the researchers for a comprehensive book on nematodes of different arthropod groups. From this point of view, we are taking an effort to prepare this Catalogue, the first book in India as a comprehensive account on arthropod parasitic nematodes, described and recorded so far from India. We are very much hopeful that this will be helpful to the students, researchers and extension workers especially those are interested to taxonomy of nematodes associated with arthropods. Valuable suggestions from any corner are always well accepted.

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INTRODUCTION

Nematodes associated with different groups of arthropods are commonly referred to as arthropod parasitic nematodes or simply as APNs. After extensive research, including many successful field trials, interests have been grown in the use of APNs specially the insect parasitic nematodes (IPNs) as biological control agents. They are potential and most promising bio-agents for control of different arthropod groups particularly the insect pests of different crops; those are eco-friendly and cost effective (Ali *et al.*, 2005). Increasing environmental concerns about the use of chemical pesticides and the availability of fewer of them reawakened interest in IPNs for control of insect pests. They have added a new dimension to Integrated Pest Management (IPM) strategies. Research information of APNs are, however, meager and scattered which need to be synthesized. This would form base for further research and their successful and promising use in IPM.

Arthropod parasitic nematodes have been known since the 17th century and perhaps the earlier (Nguyen and Smart, 2004). Extensive studies on APNs were carried out in the 19th and 20th centuries. During the last one decade, remarkable progress has been made in the taxonomy of APNs. Studies on the economic importance and life histories of two mermithid parasites of grasshoppers, *Agamermis decaudata* Cobb *et al.*, 1923 and *Mermis subnigrescens* Cobb, 1926 were excellent contributions and stand as classic in insect nematology (Christie, 1936; Nguyen and Smart, 2004). Basir (1956) has done an excellent work on oxyuroid parasites of Arthropoda. Poinar (1977) gave a generic key of entomophilic nematodes. Globally, remarkable studies on parasitic nematodes of arthropods were made by Hammerschmidt (1835-1850), Leidy (1845-1860), Cobb (1910-1930), Travassos (1920-1960), Steiner (1920-1930), Artigas (1925-1930), Christie (1930-1940), Chitwood and Chitwood (1930-1950), Nickle (1960-1984), Poinar (1970-1995), Nguyen and Smart (1985- till date) and many others.

In India, work on nematode parasites of different groups of arthropods was started by Basir in 1940 and he has done a lot during 1940-1970, which was followed by Siddiqi (1960- till date), Farooqui (1967), Duggal and Aulakh (1988, 1989), Singh and Singh (1988, 1989), Parveen and Jairajpuri (1980-1990), Rijvi and Jairajpuri (1995- till date), Ganguly (2000-till date), Ali (2000-till date) and few others, mainly in North India. In South India, significant contribution and series of reports were made by Narayan Rao (1962-1995), followed by Meena Kumari (1965-1975), Jagannath Rao (1966-1985), Rukmini Devi (1990-1995), Narsi Reddy (1980-1997), Hussaini (1995-till date) and others. Gantait and Chatterjee (2005) described a new oxyuroid nematode species from *Spirobolus* sp. from West Bengal, India. Gantait and Chatterjee (2007) reported 30 species of parasitic nematodes of arthropods from Andhra Pradesh, India including two new subgenera and one new species. Very recently, Gantait and Chatterjee (2011) published a check-list of insect parasitic nematodes of India.

The centers, working on arthropod parasitic nematodes in India are Aligarh Muslim University, Aligarh; Meerut University, Meerut; Indian Institute of Pulse Researches, Kanpur and Allahabad University, Allahabad, all are from Uttar Pradesh;

Osmania University, Hyderabad and Andhra University, Visakhapatnam of Andhra Pradesh; Indian Agricultural Research Institute, New Delhi; Project Directorate of Biological Control, Bangalore of Karnataka; Northern Regional Station of Zoological Survey of India, Dehradun of Uttarakhand and Head Quarter of Zoological Survey of India, Kolkata of West Bengal and few others.

Lack of adequate taxonomic expertise and non-availability of literature on various described species have been major constraints to identify the species of nematode parasites of different groups of arthropods (Gangly, 2001). In this context, in the present work an attempt has been made to compile all the research information and the relevant literature made on the arthropod parasitic nematode species of India. Here, we represent a catalogue of all the parasitic nematode species of different groups of arthropods, described and reported so far from India considering synonyms, type host, type locality, museum of type deposition, type accession number (where available), measurements etc. Due to lack of original literature, the detail information of five species viz. *Chitwoodiella tridentata* Rizvi *et al.*, 1998; *Cameronia klossi* Parveen and Jairajpuri, 1984; *Steinernema carpocapsae* (Weiser, 1995) Wouts *et al.*, 1982; *Steinernema feltiae* (Filipjev, 1934) Wouts *et al.*, 1982 and *Steinernema tami* Luc *et al.*, 2000 are not possible to provide herein. The taxonomic status up to generic level has been followed after Poinar (1977). The species under any genus have been arranged according to alphabet.

The following abbreviations are used in the measurements of different species according to de Man's Formula (de Man, 1884) :

L = body length

a = body length/maximum body width

b = body length/ oesophageal length

c = body length/tail length

c′ = tail length/body width at anus

D = distance from head end to excretory pore x 100/pharyangeal length

E = distance from head end to excretory pore x 100/tail length

V = distance from head end to vulva x 100/body length

V′ = distance from head end to vulva x 100/distance from head end to anus

G_1 = anterior genital branch x 100 / body length

G_2 = posterior genital branch x 100 / body length

T = distance from cloacal aperture to anterior of testis x 100 / body length

n = number of specimens

SYSTEMATIC ACCOUNTS

Phylum NEMATODA Rudolphi, 1808 (Lankester, 1877)

Class SECERNENTEA von Linstow, 1905

Order ENOPLIDA Filipjev, 1929

Superfamily MERMITHOIDEA (Braun, 1883) Wuler, 1924

Family MERMITHIDAE Braun, 1883

Genus ***Romanomermis*** Coman, 1961 (syn. *Reesimermis* Tsai & Grundmann, 1969)

1. ***Romanomermis manjeerensis*** Reddy & Rajashekhar, 1996

1996. Reddy, Y. N. and Rajashekhar, A. V. Studies on the biology of mermithid parasite *Romanomermis manjeerensis* n. sp. from *Anopheles* sp. larvae in Manjeera reservoir of Andhra Pradesh. *Indian Journal of Nematology*, **26** (2) : 131-138.

Type host : *Anopheles* sp.

Type habitat : Haemocoel of adult insect.

Type locality : Manjeera reservoir of Sanga Reddy district, Andhra Pradesh, India.

Type collector : A. Venkat Rajashekhar.

Type material : Holotype male, allotype female and six paratypes (3 males and 3 females) deposited in the Museum of Zoology Department, University College of Science, Osmania University, Hyderabad, Andhra Pradesh, India.

Measurements (all are in µm, except L in mm) :

Characters	**Female (n=11)**	**Male (n=9)**	**Postparasitic Juvenile (n=14)**	**Preparasitic Juvenile (n=13)**
L	11.8-18.2	7.6-10.5	1.28-1.48	1.15-1.26
a	81.1-106.6	-	-	-
Body width at the cephalic papillae	32-44	25-34	-	-
Body width at the nerve ring	71-95	74-99	-	-
Width at midbody	-	111-131	19.8	14.0-17.2
Body width at the vagina	122-154	-	-	-
Body width at the posterior end of the trophosome	94-138	-	-	-
Body width at cloaca	-	76-111	-	-
Stylet length	54-62	-	-	11.5-14.4

Characters	Female (n=11)	Male (n=9)	Postparasitic Juvenile (n=14)	Preparasitic Juvenile (n=13)
Excretory pore from anterior end	164-216	-	-	-
Nerve ring from anterior end	133-176	148-222	-	28.8-40.3
Egg length	57-71	-	-	-
Egg width	42-58	-	-	-
V	45	-	-	-
Spicule length	-	247-353	-	-
Tail length	-	88-139	-	339-391

Distribution : India : Andhra Pradesh (Hyderabad).

Remarks : *Romanomermis* spp. are the obligatory endoparasites of different insects including mosquitoes. *Romanomermis manjeerensis* has been found in natural population of *Anopheles* spp. mosquito larvae. It could be used as promising biological control agent against culicids. The species is endemic to India.

Order TYLENCHIDA (Filipjev, 1934) Thorne, 1949

SuperFamily APHELENCHOIDEA (Fuchus, 1937) Thorne, 1949

Family ENTAPHELENCHIDAE Nickle, 1970

Genus ***Praecocilenchus*** Poinar Jr., 1969

2. ***Praecocilenchus ferruginophorus*** Rao and Reddy, 1980

1980. Rao, P. N. and Reddy, Y. N. Description of a new nematode *Praecocilenchus ferruginophorus* n. sp. from weevil pests (coleoptera) of coconut palms in south India. *Rivista di Parassitologia.* **XLI** (1) : 93-98.

Type host : Palm Weevil pests *Rhynchophorus ferrugineus* (Fabr) (Curculionidae : Coleoptera).

Type habitat : Haemocoel of adult insect.

Type locality : Central Plantation Crop Research Institute, Regional Station Kayangulum, Kerala, India.

Type collector : Y. Narsi Reddy.

Type material : Specimens were deposited in the Museum of Zoology Department, University College of Science, Osmania University, Hyderabad, Andhra Pradesh, India.

Measurements (all are in μm, except L in mm) :

Characters	Gravid parasitic female (n=10)	Intrauterine or free living female (n=11)	Intrauterine or free living male (n=9)
L	1.82-2.40	316-338	519-642
Width at midbody	70-111	16-19	20-25
Body width at the vulva	63-85	-	-
Distance from head end to base of oesophageal bulb	47-59	53-61	40-52
Width of oesophageal bulb	12-20	8-9	6-7
Stylet length	11-14	12-16	
Excretory pore from anterior end	Not visible	73-84	118-120
Egg length	56	-	-
V	76-85	-	-
Spicule length	-	-	17-19

Distribution : India : Kerala (Kayangulum).

Remarks : This is the first record of a nematode parasite belonging to the genus *Praecocilenchus* from India. It is the important parasite of weevil pests, found on coconut palms in India. It is endemic to India.

Genus ***Schistonchus*** Cobb, 1927

3. ***Schistonchus racemosa*** Reddy and Rao, 1986

1986. Reddy, Y. N. and Rao, P. N. *Schistonchus racemosa* sp. n., a nematode parasite of wasp (*Ceratosolen* sp.) associated with the fig, *Ficus racemosa* L. *Indian Journal of Nematology*, **16** (1) : 135-137.

Type host : Fig pollinating wasp *Ceratosolen* sp.

Type habitat : Abdominal folds of the wasps.

Type locality : Garden of Osmania University campus, Hyderabad, Andhra Pradesh, India.

Type collector : Y. Narsi Reddy.

Type material : Holotype female, allotype male and paratypes were deposited in the Museum of Zoology Department, University College of Science, Osmania University, Hyderabad, Andhra Pradesh, India. Two paratype slides were deposited with the National Nematode Collections, Indian Agricultural research Institute, New Delhi, India.

Measurements (all are in µm) :

Characters	Holotype female	Paratype female (n=36)	Paratype male (n=34)
L	730	600-800	500-660
a	17.2	14-21	24-26
b	5.8	5.2-6.2	5.2-6.2
c	21.6	18-22	22-28
V	75	60-76	-
G_1	19	18-29	-
Stylet length	23	21-24	21-24
Median bulb (length x width)	16 x 13	13-17 x 12-15	13-17 x 10-13
T	-	-	30-48
Spicule length	-	-	18-21

Distribution : India : Andhra Pradesh (Hyderabad).

Remarks : The invading fig pollinating female wasps, *Ceratosolen* spp. carry the second stage juvenile nematodes of the species in their abdominal folds, while transferring the pollen from male to female flowers and larval nematodes from fig to fig, deposit eggs in the inflorescence where they hatch. It is endemic to India.

Superfamily NEOTYLENCHOIDEA Thorne, 1949

Family NEOTYLENCHIDAE (Thorne, 1941) Thorne, 1949

Genus ***Physitylenchus*** Rao and Reddy, 1982

4. ***Physitylenchus aenea*** Rao and Reddy, 1982

1982. Rao, P. N. and Y. N. Reddy. *Physitylenchus aenea* n. gen., n. sp. (Nematoda : Neotylenchida) Entomophagous-mycetophagous nematode parasitic in *Physiphora aenea* Fabricus and *Physiphora demandata* Fabricus. *Proc. Sym. Vectors and Vector-borne Diseases*, 119-123.

Type host : *Physiphora aenea* Fabricus (Ottidae : Diptera).

Other hosts : *Physiphora demandata* Fabricus, *P. demandata* Fabricus.

Type habitat : Haemocoel of adult insect.

Type locality : Fields of Attapur, Hyderabad district, Andhra Pradesh, India.

Type collector : Y. Narsi Reddy.

Type material : Holotype female, allotype male and paratypes were deposited in the Museum of Zoology Department, University College of Science, Osmania University, Hyderabad, Andhra Pradesh, India. Two paratype slides were deposited with the National Nematode Collections, Indian Agricultural research Institute, New Delhi, India.

Measurements (all are in μm, except L in mm) :

Characters	Adult parasitic female (n=30)	Adult parthenogenetic female (n=30)	Infective stage female (n=30)
L	2.27 (2.06-4.18)	0.566 (0.524-0.567)	0.42 (0.41-0.45)
a	13.4 (13-24)	20 (20-24)	16 (15-18)
b -	11 (10-12)	9 (8-10)	
c	36 (35-54)	13 (11-14)	17 (13-17)
V	92 (87-93)	87 (85-89)	88 (77-88)
G_1	-	65 (43-67)	17 (12-17)
Stylet length	13 (13-14)	5 (4-5)	10 (9-10)
Egg L x W	57 x 27 (53-57 x 24-28)	-	-

Distribution : India : Andhra Pradesh (Attapur, Ramanthapur, Tandur, Bhongir, Ghatkesar of Hyderabad district).

Remarks : It is endemic to India.

Family ALANTONEMATIDAE (Pereira, 1931) Chitwood and chitwood, 1937

Genus ***Howardula*** Cobb, 1921

Synonym : *Tylenchinema* Goodey, 1930

5. ***Howardula aptini*** (Sharga, 1932) Wachek, 1955

Synonym : *Tylenchus aptini* Sharga, 1932

1932. Sharga, U. S. A new nematode *Tylenchus aptini* n. sp. parasite of Thysanoptera (Insecta : *Aptinothrips rufus* Gmelin). *Parasitology*, **24** : 268-279.

1955. Wachek, F. Die entomoparasitischen Tylenchiden. *Parasit. Schr. Reihe.* **3** : 1-119.

Host : *Megaluriothrips* sp. (Thripidae : Thysanoptera).

Habitat : Haemocoel of adult insect.

Locality : Hyderguda, Upperpalli, Vikarabad, Tandur, Bhongir, Miryalguda and Sangareddy villages of Rangareddy district of Andhra Pradesh, India.

Collector : Y. Narsi Reddy, W. R. Nickle and P. N. Rao.

Material : Specimens were deposited in the Museum of Zoology Department, University College of Science, Osmania University, Hyderabad, Andhra Pradesh, India. Two paratype slides were deposited with the National Nematode Collections, Indian Agricultural research Institute, New Delhi, India.

Measurements (all are in μm) :

Characters	Free living impregnated female (n=35)	Adult parasitic female (n=35)	Male (n=35)
L	265 (250-285)	160 (150-225)	325 (230-330)
a	21.3 (20-26.6)	1.7 (1.6-1.8)	19.9 (16.2-20.0)
b	4.3 (4.0-4.9)	-	9.3 (7.2-9.3)
c	9.9 (8.5-11.5)	-	12.2 (12.2-15.2)
V	89 (85-90)	-	-
G_1	26 (26-30)	-	-
Stylet length	10.5 (10.5-12.5)	12.4 (10.6-12.5)	-
Egg L x W	-	28-30 x 15-17	-
T -	-	88 (82-89)	
Spicule length	-	-	14.2 (14.2-15.8)
Gubernaculum	-	-	4.4 (4.0-4.4)

Distribution : Europe, Canada, India : Andhra Pradesh (Hyderguda, Upperpalli, Vikarabad, Sangareddy, Bhongir and Tandur of Rangareddy district).

Remarks : *Howardula aptini* was reported first time from India by Reddy *et al.* (1982); parasitising a new host the thrip *Megaluriothrips* sp. infesting the flowers of leguminous crops in Andhra Pradesh. The present nematode specimens differ slightly from European and Canadian specimens (Sharga, 1932; Nickle and Wood, 1964). These differences may be because of the new host and if cross infections are not possible they may lead to separation as distinct species.

Reddy *et al.* (1982) opined that *H. aptini* seems to be a natural enemy of these insects. In parasitized thrips tissues of the ovary is damaged and their size is also reduced. Heavily infected insects produce non viable eggs. These nematodes can be used for biological control of *Megaluriothrips* sp. They also opined that it is possible to infect the nymphal stages of the host in the laboratory and infected hosts can be introduced into the thrip population on the plants, hopefully these would spread the infection and control the thrip population.

6. ***Howardula belgaumensis*** Raj and Reddy, 1989

1989. Raj, K. D. and Reddy, Y.N. Parasitism of *Longitarsus belgaumensis* Jacoby (Coleoptera : Chrysomelidae) by nematode of the Genus *Howardula. Indian Journal of Nematology*, **19** (1) : 82-84.

Type host : *Longitarsus belgaumensis* Jacoby (Coleoptera : Chrysomelidae). It is a phytophagous insect pest of jute.

Type habitat : Haemocoel of adult insect.

Type locality : The adjoining fields of Sankarpally of Rangareddy district, Andhra Pradesh, India.

Type collector : K. Daniel Raj.

Type material : Holotype female and paratypes were deposited in the Museum of Zoology Department, University College of Science, Osmania University, Hyderabad, Andhra Pradesh, India.

Measurements : In original description of the species, measurements are absent.

Distribution : India : Andhra Pradesh (Rangareddy), Tamil Nadu (Madras), Maharashtra (Bombay), Assam and Nilgiri hills.

Remarks : The nematode parasite reduces the fecundity of the host and the size of the insect ovaries and controls the population of the host. This parasite acts as a good potential agent to control the pest insects. It is endemic to India.

7. ***Howardula marginatis*** Reddy and Rao, 1981

1981. Reddy, Y. N. and Rao, P. N. Description of morphology, biology, life history of a new species *Howardula marginatis* sp. n. from flies. *Rivista di Parassitologia*, **XLII** (1) : 127-134.

Type host : Flies, *Copromyza marginatis* Adams (Diptera : Sphaeroceridae). These are found on the dung heaps.

Type habitat : Haemocoel, ovaries and ovipositor of adult insect.

Type locality : On dung heaps; from the dairies in the outskirts of Hyderabad city and in the surrounding villages of Hyderabad district, Andhra Pradesh, India.

Type collector : Y. Narsi Reddy.

Type material : Holotype female and paratypes were deposited in the Museum of Zoology Department, University College of Science, Osmania University, Hyderabad, Andhra Pradesh, India.

Measurements (all are in μm) :

Characters	**Infective stage female (n = 30)**	**Adult parasitic female (n = 30)**	**Free living male (n=30)**
L	302 (278-321)	246 (142-229)	285 (230-300)
a	18.8 (17-20.8)	11.7 (9.2-12.0)	23.2 (18.2-24.5)
b	4.6 (4.3-5.3)	-	4.5 (4.4-5.2)
c	7.9 (6.5-8.3)	24.6 (23-28)	7.2 (7.0-9.3)
V	81.1 (73.6-81.8)	94.3 (92.0-96.8)	-
G_1	12.5 (12.0-17.9)	-	-
Stylet length	11 (10-13)	9 (8-11)	-
Egg L x W	-	35-40 x 20-27 (35-42 x 20-27)	-
T	-	-	31.8 (24.8-32.0)
Spicule length	-	-	8.8 (8.5-10.6)
Gubernaculum	-	-	-

Distribution : India : Andhra Pradesh (Hyderabad).

Remarks : The species is unique from all other species of the Genus in having 'Perivaginal cells' (spindle shaped gland cells) surrounding the vagina, in the gravid females. It can be used as biological control agent of the host flies. It is endemic to India.

8. ***Howardula mutilatus*** Devi, Rao and Reddy, 1991

1991. Devi, T. R., Rao, P. N. and Reddy, Y. N. A new nematode parasite *Howardula mutilatus* n. sp. of the maize kernel pest *Carpophilus mutilatus. Current Nematology,* **2** (1) : 23-26.

Type host : *Carpophilus mutilatus* (Coleoptera : Nitidulidae). This is an important pest of maize.

Type habitat : Haemocoel of the insect.

Type locality : Maize field of the Maize Research Station, Amberpet, Hyderabad district, Andhra Pradesh, India.

Type collectors : T. Rukmini Devi and Y. Narsi Reddy.

Type material : The holotype and the paratypes were deposited in the Museum of Zoology Department, University College of Science, Osmania University, Hyderabad, Andhra Pradesh, India.

Measurements (all are in μm) :

Characters	**Infective stage female (n = 38)**	**Gravid parasitic female (n = 38)**	**Free living male (n=38)**
L	404 (398-417)	2256 (2051-2342)	479 (422-480)
a	16.8 (16.0-19.1)	10.6 (9.35-11.39)	17.4 (16-18)
b	4.7 (3.7-4.7)	-	5.2 (4.8-5.3)
c	11.5 (9-12)	59.1 (56-59.1)	36 (33-37)
V	89 (82-95.5)	95.8 (95-96)	-
G_1	32.2 (25-32.2)	-	-
Stylet length	-	9.6 (9.6-10.2)	-
Egg L x W	-	30 x 32	-
T	-	-	66 (56-68)
Spicule length	-	-	14.2 (14.2-14.3)
Gubernaculum	-	-	5

Distribution : India : Andhra Pradesh (Hyderabad).

Remarks : *Howardula mutilates* is an obligate parasite of *Carpophilus mutilates* which is an important pest of maize and feed on kemels of stored cobs. It is endemic to India.

9. ***Howardula phyllotreta*** Oldham, 1933

1933. Oldham, J. N. *Howardula phyllotreta* n. sp. a nematode parasite of the flea beetle (Chrysomelidae : Coleoptera) with some observations on its incidence. *Journal of Helminthology,* **11** : 119-136.

Host : *Phyllotreta chotanica* Duvivier (Chrysomelidae : Coleoptera).

Habitat : Haemocoel of the insect host.

Locality : The radish fields of villages around Hyderabad, Boinpally, Attapur and Osmania University campus of Hyderabad district, Andhra Pradesh, India.

Collector : T. Rukmini Devi.

Material : The specimens were deposited in the Museum of Zoology Department, University College of Science, Osmania University, Hyderabad, Andhra Pradesh, India.

Measurements (all are in μm) :

Characters	**Infective stage female (n = 38)**	**Gravid parasitic female (n = 38)**	**Free living male (n=38)**
L	576 (560-622)	1977 (1194-1978)	526 (500-567)
a	25.2 (18.0-28.3)	16.5 (11-23)	38 (31-38)
b	5.9 (5.7-6.2)	-	-
c	12.5 (12.2-12.7)	-	17.6 (17-18)
V	82.5 (75.0-86.9)	96 (96-99)	-
G_1	18.6 (15-22)	-	-
Stylet length	24.5 (23.0-24.5)	12.4 (12-16)	-
T -	-	42 (30-45)	
Spicule length	-	-	14 (14-17)
Gubernaculum	-	-	1.6

Distribution : Europe, USA, India : Andhra Pradesh (Hyderabad, Boinpally and Attapur).

Remarks : *Howardula phyllotreta* Oldham, 1933 is a parasite of radish flea beetle *Phyllotreta chotanica* Duvivier that damages the radish. The species was reported first time from India by Devi and Reddy (1990). It damages the reproductive system of the insect host and could be used as biological control of the insect pest.

Genus ***Parasitylenchus*** Micoletzky, 1922

Synonyms : *Polymorphotylenchus* Rühm, 1956

Vastotylenchus Slankis, 1967

10. ***Parasitylenchus coccinellae*** Iperti and Waerebeke, 1968

1968. Iperti, G. and Waerebeke, D. V. Description, biologie et importance d'une nouvelle espece d'Allantonematidae (Nematode) parasite des coccinelles Aphidiphages, *Parasitylenchus coccinellae* n. sp. *Entomophaga*, **13** (2) : 107-119.

Host : Aphidophagous beetles, *Menochilus sexmaculatus* (F) and *Illeis indica* Timb (Coleoptera : Coccinellidae).

Habitat : Haemocoel of the adult insect host.

Locality : Adjoining area of Hyderabad district, Andhra Pradesh, India.

Collector : Y. Narsi Reddy and P. Narayan Rao.

Material : The specimens were deposited in the Museum of Zoology Department, University College of Science, Osmania University, Hyderabad, Andhra Pradesh, India.

Measurements (all are in μm) :

Characters	**Free living impregnated female**	**Adult parasitic female**	**Male**
L	400-482	1400-3800	400-492
a	21-28	10-17.5	25-31
b	3-4	-	-
c	10-17	65-72	14-23
V	80-91	70-83	-
Stylet length	14-16	17-20	7-9
T -	-	78-86	
Spicule length	-	-	14-16
Gubernaculum	-	-	3.0-4.5

Distribution : France, India : Andhra Pradesh (Hyderabad).

Remarks : *Parasitylenchus coccinellae* was described by Iperti and Waerebeke (1968) from coccinellid beetles in France. Reddy and Rao (1984) reported the species from Hyderabad, Andhra Pradesh, India, as a new infection in the Indian aphidophagous coccinellids.

Genus ***Heterotylenchus*** Bovien, 1937

11. ***Heterotylenchus crassirostris*** Reddy and Rao, 1981

1981. Reddy, Y.N. and Rao, P.N. Studies on *Heterotylenchus crassirostris* sp. n. parasitic in *Musca crassirostris* Stein and *Stomyxis calcitrans* L. *Indian Journal of Nematology*, **11** (1) : 19-24.

Type host : *Musca crassirostris* Stein

Other host : *Stomyxis calcitrans* L.

Type habitat : Haemocoel and ovaries of the insect.

Type locality : Upperpally, Hyderabad district, Andhra Pradesh, India.

Type collector : Yatham Narsi Reddy.

Type materials : All the specimens were deposited in the Museum of Zoology Department, University College of Science, Osmania University, Hyderabad, Andhra Pradesh, India.

Measurements (all are in μm) :

Characters	**Infective stage female (n=30)**	**Adult gamogenetic female (n=30)**	**Adult parthenogenetic female (n=30)**	**Male (n=30)**
L	856 (850-954)	2870 (1490-4500)	817 (683-923)	625 (607-717)
a	29.3 (29-36)	13 (12-25)	8 (7.9-8)	23 (23-28)
b	6 (6-7)	-	-	6.7 (6.5-7.2)
c	7.4 (6.2-7.5)	9.7 (7-12)	12.8 (11-13)	9 (8-9)
V	76 (74-86.6)	28 (82-85)	86 (75-93)	-
G_1	19.2 (18-19.6)	46 (45-69)	-	-
Stylet length	-	21 (18-22)	10 (10-13)	5 (4-6)
Egg L x W	-	119 x 50	67 (65-83)	-
T	-	-	-	69 (63-80)
Spicule length	-	-	-	43 (40-45)

Distribution : India : Andhra Pradesh (Upperpally, Ghatkesar, Vikarabad, Hyderabad and Bhongir of Hyderabad district).

Remarks : The parasites damage the ovaries of the host flies and can be used for biological control of insect pests. It is endemic to India.

12. ***Heterotylenchus hydrabadensis*** Reddy and Rao, 1980

1980. Reddy, Y.N. and Rao, P.N. Studies on *Heterotylenchus hydrabadensis* sp. n. parasitic in the fly *Morellia hortensia* (Widemann). *Proc. Indian Acad. Parasitol.*, **1** (2) : 51-54.

Type host : Pasture fly *Morellia hortensia* (Widemann) (Diptera : Muscidae).

Type habitat : Haemocoel and ovaries of the insect hosts.

Type locality : Adjoining area of Hyderabad district, Andhra Pradesh, India.

Type collector : Yatham Narsi Reddy.

Type materials : The holotype female and the paratypes (males, females and parthenogenetic females) were deposited in the Museum of Zoology Department, University College of Science, Osmania University, Hyderabad, Andhra Pradesh, India.

Measurements (all are in μm) :

Characters	Infective stage female (n=30)	Adult gamogenetic female (n=30)	Adult parthenogenetic female (n=30)	Male (n=30)
L	896 (810-958)	2500 (2000-2800)	567 (510-620)	723 (592-740)
a	27 (22-29)	12 (11-13)	11 (10-14)	26 (22-29)
b	9 (8.0-9.5)	-	-	5.8 (5.6-6.4)
c	10 (8-12)	20 (20-23)	8 (8-12)	11 (8.7-11.0)
V	80 (77-89)	86 (83-87)	80 (79-85)	-
G_1	16 (15-16)	-	-	-
Stylet length	27 (24-27)	26 (23-27)	18 (17-20)	11 (10-12)
Egg L x W	-	-	-	-
T	-	-	-	65 (52-65)
Spicule length	-	-	-	25 (24-26)

Distribution : India : Andhra Pradesh (Adjoining Hyderabad).

Remarks : The parasites damage the ovaries of the host flies and can be used for biological control of insect pests. It is endemic to India.

13. ***Heterotylenchus xanthomelas*** Reddy and Rao, 1987

1987. Reddy, Y.N. and Rao, P.N. Studies on *Heterotylenchus xanthomelas* sp. n. parasitic in *Musca xanthomelas* Wiedemann (Muscidae : Diptera). *Indian Journal of Nematology*, **17** (2) : 180-183.

Type host : Pasture fly *Musca xanthomelas* Wiedemann (Muscidae : Diptera).

Type habitat : Haemocoel and ovaries of the insect hosts.

Type locality : Ghatkesar, Hyderabad district, Andhra Pradesh, India.

Type collector : Yatham Narsi Reddy.

Type materials : The holotype male and the paratypes (females and parthenogenetic females) were deposited in the Museum of Zoology Department, University College of Science, Osmania University, Hyderabad, Andhra Pradesh, India.

Measurements (all are in μm) :

Characters	Infective stage female (n=35)	Adult gamogenetic female (n=35)	Adult parthenogenetic female (n=35)	Male (n=35)
L	527-617	2280-6200	1120-1520	530 (502-566)
a	35-47	21-33	10-13	28 (25-33)
b	7.8	-	-	7.3 (6.0-7.4)
c	6-8	16-22	16-21	7.2 (7-8)
V	75-82	80-85	79-93	-
G_1	15-17	14-18	-	-
Stylet length	11-15	17-20	9-11	11 (9-12)
Egg L x W	-	96-107 x 23-43	33-41 x 23-28	-
T	-	-	-	67 (66-75)
Spicule length	-	-	-	23 (19-23)

Distribution : India : Andhra Pradesh (Ghatkesar, Attapur, Vikarabad and Bhongir of Hyderabad district).

Remarks : The parasites damage the germarium layer of the ovarioles of the female host flies and could be used for biological control of insect pests, which feeds on cattle blood and lacrimal secretions and act as a vector for transmitting bacterial and viral diseases. It is endemic to India.

Order OXYURIDA Weinland, 1858

Synonym : OXYURATA Skrjabin, 1923

Super Family HYSTRIGNATHOIDEA Travassos, 1920

Family CHITWOODIELLIDAE Basir, 1948

Genus ***Mirzaiella*** Basir, 1942

14. ***Mirzaiella alii*** Farooqui, 1967

1967. Farooqui, M.N. On a known and some new species of insect nematodes. *Zool. Anz.*, **176** : 276-296.

Type host : *Gryllotalpa africana* Beauv.

Type habitat : Intestine.

Type locality : Maharashtra.

Type collector : M. N. Farooqui.

Type material : Specimens were deposited in the nematode collection of the Department of Zoology, Aligarh Muslim University, Aligarh, Uttar Pradesh, India.

Measurements (all are in µm) (after Rizvi, 2006) :

Characters	Female (n=3)	Male (n=4)
L	2.01-3.02	1.18-1.50
a	7.10-8.82	7.8-9.6
b	3.24-4.28	4.66-5.60
c	8.61-11.53	-
V	44.01-54.22	-
Length of oesophagus	620-690	240-290
Nerve ring from anterior end	220-270	140-190
Excretory pore from anterior end	520-550	400-500
Egg L x W	60-65 x 30-36	-
Spicule absent; length of accessory piece	-	22-28
Tail length	223-226	160-180

Distribution : India : Maharashtra, Uttarakhand (Dehra Dun).

Remarks : Rizvi (2006) redescribed the species from Dehra Dun, Uttarakhand, collected from *Gryllotalpa africana* Beauv (the specimens closely conform to the measurements and description of the type species). After its description it was the first report of the species from North India. It is endemic to India.

15. ***Mirzaiella asiatica*** Basir, 1942

1942. Basir, M.A. Nematodes parasitic in *Gryllotalpa. Records of Indian Museum,* **44** : 95-106.

Type host : *Gryllotalpa africana* Beauv.

Type habitat : Posterior intestine.

Type locality : Aligarh, Uttar Pradesh, North India.

Type collector : M. A. Basir.

Type material : Specimens were deposited in the nematode collection of Zoology Department of Aligarh Muslim University, Aligarh, Uttar Pradesh, India.

Measurements (all are in µm) :

Characters	Female	Male
L	700-1080	2250-2980
Maximum body width	60	400
Buccal cavity L xW	25 x 4	85 x 25-30
Length of oesophagus	160	650

Characters	Female	Male
Corpus L x W	155 x 12	530 x 30-55
Isthmus L x W	-	10 x 30
Oesophageal bulb L x W	35 x 25	110 x 120
Excretory pore from anterior end	-	560
Nerve ring from anterior end	-	290
Vulva from anterior end	-	1.67
Egg L x W	-	66-70 x 42-45
Spicule length	Absent	-
Tail length	30	200

Distribution : India : Uttar Pradesh (Aligarh).

Remarks : It is the type species of the Genus *Mirzaiella.* It is endemic to India.

16. ***Mirzaiella haroldi*** Farooqui, 1968

1968. Farooqui, M.N. On a new species of *Mirzaiella* Basir, 1942 from *Gryllotalpa africana. Rivista di Parassitologia*, **29** : 21-24.

Type host : *Gryllotalpa africana* Beauv.

Type habitat : Midgut.

Type locality : Maharashtra.

Collector : M. N. Farooqui.

Material : Specimens were deposited in the nematode collection of Zoology Department of Aligarh Muslim University, Aligarh, Uttar Pradesh, India.

Measurements (all are in mm except egg in µm) (after Rizvi, 2006) :

Characters	Female (n=4)	Male (n=3)
L	2.25-3.02	1.08-1.52
a	7.58-9.62	9.09-11.84
b	3.34-4.35	4.13-5.75
c	10.26-12.70	-
V	60.7-62.1	-
Length of oesophagus	0.530-0.671	0.236-0.262
Nerve ring from anterior end	0.25-0.31	0.17-0.23
Excretory pore from anterior end	0.52-0.60	-
Egg L x W	60-66 x 30-39	-
Tail length	0.21-0.25	-

Distribution : India : Maharashtra, Uttar Pradesh (Aligarh) and Uttaranchal (Dehradun).

Remarks : After 33 years of its original description, Rizvi and Jairajpuri (2002) reported the species first time from North India. Rizvi (2006) redescribed the species from Dehra Dun, Uttarakhand (the specimens closely conform to the measurements and description of the type species). It is endemic to India.

Genus ***Chitwoodiella*** Basir, 1948

17. ***Chitwoodiella tridentata*** Rizvi *et al.*, 1998

1998. Rizvi, A.N., Jairajpuri, D.S. and Shah, M.M. *Citwoodiella tridentata* sp. n. (Travassosinematidae) from a mole cricket from India, with SEM observations on *Leidynema appendiculatum* (Thelastomatidae). *International Journal of Nematology*, **8** : 13-16.

Distribution : India : Uttar Pradesh (Aligarh).

Remarks : Due to lack of original literature the detail of the species are not to be provided herein.

18. ***Chitwoodiella ovofilamenta*** Basir, 1948

1948. Basir, M.A. *Chitwoodiella ovofilamenta*, gen. et. sp. nov., a nematode parasite of *Gryllotalpa. Can. J. Res., D*, **26** : 4 -7.

Type host : *Gryllotalpa africana* Beauv.

Other hosts : *Scapteriscus vicinus* Scudder (Gryllidae); "Manicou" (Opossum).

Type habitat : Posterior intestine.

Other habitat : Stomach of Opossum.

Type locality : Aligarh, Uttar Pradesh, North India.

Type collector : M. A. Basir.

Type material : Specimens were deposited in the nematode collection of Zoology Department of Aligarh Muslim University, Aligarh, Uttar Pradesh, India.

Measurements (all are in µm except L in mm) :

Characters	**Female**	**Male**
L	1.38 (1.30-1.48)	1.11-2.15
Maximum body width	110	200
Buccal cavity L xW	30 x 10	-
Length of oesophagus	302	300-475
Corpus L x W	232 x 20	225-370 x 30
Isthmus L x W	20 x 10	22-25 x 20
Oesophageal bulb L x W	50 x 45	60-80 x 60-85
Nerve ring from anterior end	145	105-180
Vulva from anterior end	-	780-1250
Egg L x W	-	80 x 40
Tail length	18	150-290

Distribution : India : Uttar Pradesh (Aligarh), British West Indies.

Remarks : It is the type species of the Genus *Chitwoodiella.*

Super Family THELASTOMATOIDEA Travassos, 1929
Family THELASTOMATIDAE Travassos, 1929
Subfamily PROTRELLOIDINAE Travassos, 1929
Genus ***Protrellus*** Cob, 1920
Synonyms : *Protrellina* Chitwood, 1932
Aglaopterixia Kloss, 1961
Protrellina phyllodromi (Basir, 1942) Basir, 1956
Synonym : *Protrellina phyllodromi* Basir, 1942

1942. Basir, M. A. Nematodes parasitic in *Gryllotalpa. Records of Indian Museum,* **44** : 95-106.

1956. Basir, M. A. Oxyuroid parasites of Arthropoda. A monographic study 1. Thelastomatidae 2. Oxyuridae. *Zoologica* (Stuttgart). 79 pp., 13 plates.

Type host : *Phyllodromia humbertiana* Sauss.

Other host : *Blatta orientalis* Linn.

Type habitat : Intestine (rectum).

Type locality : Aligarh, Uttar Pradesh, North India.

Type collector : M. A. Basir.

Type materials : Specimens were deposited in the nematode collection of Zoology Department of Aligarh Muslim University, Aligarh, Uttar Pradesh, India.

Measurements (all are in µm except L in mm) :

Characters	**Female**	**Male**
L	2.3	Unknown
Maximum body width	160	
Buccal cavity L xW	15 x 10	
Length of oesophagus	300	
Corpus L x W	210 x 32	
Isthmus L x W	-	
Width of oesophageal bulb	65	
Nerve ring from anterior end	130	
Excretory pore from anterior end	150	
Egg L x W	75 x 35	
Tail length	145	

Distribution : India : Uttar Pradesh (Aligarh), Punjab (Ropar).

Remarks : The species has been recorded by Duggal and Aulakh (1988) from Ropar, Punjab, North India. It is endemic to India.

20. ***Protrellus shamimi*** Shah *et al.*, 2005

2005. Shah, M.M., Rizvi, A.N. and Jairajpuri D. *Protrellus shamimi* n. sp. (Protrelloididae : Thelastomatoidea) from cockroach *Periplaneta americana* from Manipur, North-East India. *Journal of Parasitic Diseases,* **29** (1) : 47-52.

Type host : *Periplaneta americana* L.

Type habitat : Intestine.

Type locality : Imphal, Manipur, North-East India.

Type collector : M. Manjur Shah.

Type material : Specimens (holotype female on slide *Protrellus shamimi* n. sp./8, paratype females on slides *Protrellus shamimi* n. sp./1-7, 9-11; paratype male on slides *Protrellus shamimi* n. sp./1-5) were deposited in the nematode collection of the Department of Zoology, Aligarh Muslim University, Aligarh, Uttar Pradesh, India.

Measurements (all are in mm) :

Characters	**Holotype female**	**Paratype female (n=10)**	**Paratype male (n=5)**
L	4.057	2.865-4.917	0.711-1.118
a	21.81	19.82-26.76	10.51-12.25
b	11.36	8.57-13.88	3.52-5.29
c	37.22	25.81-48.86	7.03-10.55
V	5.54	4.39-7.53	-
Maximum body width	0.186	0.137-0.216	0.058-0.088
Buccal cavity L xW	0.009 x 0.01	0.009-0.01 x 0.01-0.02	0.007-0.01 x 0.004-0.007
Length of oesophagus	0.357	0.334-0.385	0.157-0.208
Corpus L x W	-	0.247-0.288	0.109-0.153 x 0.014-0.019
Isthmus L x W	-	0.014-0.019	0.014-0.019 x 0.009-0.014
Oesophageal bulb L x W	-	0.068-0.082 x 0.060-0.072	0.034-0.053 x 0.031-0.046
Excretory pore from anterior end	0.191	0.171-0.201	0.291
Nerve ring from anterior end	0.147	0.142-0.162	0.114-0.150
Vulva from anterior end	0.225	0.206-0.235	-
Egg L x W	0.07 x 0.04	0.07-0.08 x 0.03-0.04	-
Spicule length	-	-	0.03-0.04
Tail length	0.109	0.097-0.131	0.080-0.135

Distribution : India : Manipur (Imphal).

Remarks : It is endemic to India.

Genus ***Linstowiella*** Basir, 1956

21. ***Linstowiella basiri*** Soota and Chaturvedi, 1971

1971. Soota, T.D. and Chaturvedi, Y. On some nematode parasites of arthropods. *Indian Journal of Helminthology*, **XXIII** (1) : 48-53.

Type host : An undetermined insect.

Type habitat : Intestine.

Type locality : Kerala, South India.

Type materials : The holotype female (Reg. No. W7040/1) and two paratype females (Reg. No. W7041/1) were deposited in the National Zoological Collections of the Zoological Survey of India, Kolkata, West Bengal, India.

Measurements (all are in mm) :

Characters	**Females (Holotype & 2 paratypes)**	**Male**
L	3.2-5.0	Unknown
Maximum body width	0.24-0.38	
Length of oesophagus	0.32-0.34	
Oesophageal bulb L x W	0.066-0.077 x 0.088	
Vulva from anterior end	0.22-0.26	
Egg L x W	0.12-0.13	
Tail length	0.50-0.68	

Distribution : India : Kerala.

Remarks : Soota and Chaturvedi (1971) while working on the unnamed helminth collection of Zoological Survey of India, Kolkata, came across the nematode specimens and described as new species. It is endemic to India.

Subfamily BINEMATINAE Travassos, 1925

Genus ***Binema*** Travassos, 1925

22. ***Binema anulinervus*** Shah and Rizvi, 2004

2004. Shah, M.M. and Rizvi, A.N. Some studies on three known and a new species of the Genus *Binema* Travassos, 1925 (Travassosinematidae : Thelastomatoidea) from Manipur, North-East India. *Parassitologia*, **46** : 317-326.

Type host : *Gryllotalpa africana* Beauvois.

Type habitat : Intestine.

Type locality : Imphal, Manipur, North East India.

Type collector : M. Manjur Shah.

Type material : Specimens (holotype female on slide *Binema anulinervus* sp. n./4; paratype females on slides *Binema anulinervus* sp. n./1-3, 5-21; paratype male on slide *Binema anulinervus* sp. n./22-25) were deposited in the nematode collections of the Department of Zoology, Aligarh Muslim University, Aligarh, Uttar Pradesh, India.

Measurements (all are in mm) :

Characters	**Holotype female**	**Paratype female (n=20)**	**Paratype male (n=5)**
L	2.423	2.424-3.273	1.080-1.412
a	15.94	12.04-16.65	7.15-10
b	6.96	6.96-9.54	4.23-5.16
c	11.76	11.76-15.88	4.65-6.275
V	57.49	56.16-60.21	-
Maximum body width	0.158	0.149-0.265	0.108-0.181
Length of oesophagus	0.348	0.333-0.373	0.23-0.288
Corpus L x W	0.254 x 0.036	0.232-0.276 x 0.032-0.038	0.170-0.216 x 0.020-0.024
Isthmus L x W	0.021 x 0.026	0.019-0.024 x 0.024-0.029	0.046-0.017 x 0.013-0.014
Oesophageal bulb L x W	0.065 x 0.075	0.065-0.075 x 0.072-0.085	0.046-0.058 x 0.044-0.048
Excretory pore from anterior end	0.520	0.481-0.623	0.255-0.392
Nerve ring from anterior end	0.147	0.137-0.157	0.176-0.204
Vulva from anterior end	1.393	1.413-1.895	-
Egg L x W	0.06-0.07 x 0.03	0.05-0.06 x 0.03-0.04	-
Tail length	0.217	0.176-0.216	0.211-0.255

Distribution : India : Manipur (Imphal).

Remarks : It is endemic to India.

23. ***Binema chauhani*** Singh and Singh, 1989

1989. Singh, H.S. and Singh, K. On two new nematodes from *Periplaneta americana* Linn., from India. *Dr. B.S. Chauhan Commemoration Volume*, 149-153.

Type host : *Periplaneta americana* Linn.

Type habitat : Intestine.

Type locality : Meerut University Campus, Meerut, Uttar Pradesh, North India.

Type collector : H. S. Singh and Kiran Singh.

Type material : Specimens were deposited in the nematode collection of Zoology Department of Meerut University, Meerut, Uttar Pradesh, India.

Measurements (all are in mm) :

Characters	**Female (Holotype & 6 paratypes)**	**Male**
L	2.16-2.18	Unknown
Maximum body width	0.22-0.23	
Length of oesophagus	0.51-0.52	
Corpus L x W	0.42-0.43 x 0.03-0.04	
Isthmus L x W	0.01-0.02 x 0.04-0.05	
Oesophageal bulb L x W	0.10-0.11 x 0.18-0.19	
Excretory pore from anterior end	0.40-0.41	
Nerve ring from anterior end	0.22-0.23	
Vulva from posterior end	1.00-1.20	
Egg L x W	43-44 x 29-30	
Tail length	0.60-0.62	

Distribution : India : Uttar Pradesh (Meerut).

Remarks : It is endemic to India.

24. ***Binema korsakowi*** (Sergiev, 1923) Basir, 1956

Synonyms : *Oxyuris korsakowi* Sergiev, 1923; *Binema binema* Travassos, 1925; *Gryllocola gryllocola* Basir, 1942; *Binema* (*Binema*) *hispana* Serrano Sánchez, 1947; *Binema* (*Binema*) *medinae* Serrano Sánchez, 1947; *Binema* (*Binema*) *binema* (Travassos, 1925) Serrano Sánchez, 1947.

1923. Sergiev, P.G. Two new nematodes from the intestine of *Gryllotalpa vulgaris*. Rapport de 21^{e} séance de la commission pour 1'étude de la faune helminthologique de Russie 1923. (In Russian.) Trans. State Inst. Exp. Vet. Sci., Moscow, **1** : 183-190.

1925. Travassos, L. Quelques nematodes du *Gryllotalpa*. C. R. Soc. Biol., **93** : 140-141.

1942. Basir, M.A. Nematodes parasitic in *Gryllotalpa*. *Records of Indian Museum*, **44** : 95-106.

1947. Serrano Sánchez, A. 1947. Nematodes parasites intestinales de los arthropods en Espana. Rev. Iberica Parasitologia, **7** : 279-332.

1956. Basir, M.A. Oxyuroid parasites of Arthropoda. A monographic study 1. Thelastomatidae 2. Oxyuridae. *Zoologica* (Stuttgart). 79 pp., 13 plates.

Hosts : *Gryllotalpa vulgaris, G.europeus* L., *G. africana* Beauv., *Neocurtilla hexadactyla* Perty.

Habitat : Posterior intestine.

Measurements (all are in µm except L in mm) (after Basir, 1956) :

Characters	Female	Male
L	1.35-4.10	Unknown
Maximum body width	230	
Buccal cavity	Inconspicuous	
Length of oesophagus	420	
Corpus L x W	310 x 30	
Isthmus L x W	10 x 20	
Oesophageal bulb L x W	100 x 105	
Excretory pore from anterior end	560	
Nerve ring from anterior end	150	
Vulva from anterior end	1610	
Egg L x W	59-64 x 34-40	
Tail length	265	

Measurements (all are in mm) (after Shah & Rizvi, 2004) :

Characters	Female (n=4)	Male (n=3)
L	1.539-1.796	0.710-0.807
a	8.71-10.46	8.65-10.48
b	4.38-4.98	4.43-5.20
c	9.27-11.43	7.91-12.68
V	61.56-65.59	-
Maximum body width	0.147-0.206	0.077-0.085
Length of oesophagus	0.309-0.373	0.153-0.160
Corpus L x W	0.225-0.281 x 0.030-0.034	0.104-0.106 x 0.012-0.014
Isthmus L x W	Indistinct	0.009-0.012 x 0.009-0.010
Oesophageal bulb L x W	0.077-0.089 x 0.080-0.089	0.036-0.080 x 0.036
Excretory pore from anterior end	0.392-0.422	0.235-0.262
Nerve ring from anterior end	0.127-0.137	-
Vulva from anterior end	0.971-1.178	-
Egg L x W	0.051-0.053 x0.029	-
Spicule length	-	0.036-0.041
Tail length (in mm)	0.157-0.166	0.058-0.102

Distribution : U. S. S. R. (Crimea), Brazil (Rio de Janeiro), India : Uttar Pradesh (Aligarh), Manipur (Imphal), Spain.

Remarks : Basir (1942) reported the species first time from India (Aligarh, Uttar Pradesh), collected from intestine of *Gryllotalpa africana.* The species was redescribed by Shah and Rizvi (2004) from Imphal, Manipur, North East India, collected from intestine of *Gryllotalpa africana.*

25. ***Binema mirzaia*** (Basir, 1942) Basir, 1956

Synonyms : *Periplaneticola mirzaia* (Basir, 1940); *Periplaneticola periplaneticola* (Basir, 1942).

1940. Basir, M.A. Nematodes parasitic in Indian cockroaches. *Proc. Indian Acad. Sci.*, **12** (Sec. B) : 8-16.

1942. Basir, M.A. Nematodes parasitic in *Gryllotalpa. Records of Indian Museum*, **44** : 95-106.

1956. Basir, M.A. Oxyuroid parasites of Arthropoda. A monographic study 1. Thelastomatidae 2. Oxyuridae. *Zoologica* (Stuttgart). 79 pp., 13 plates.

Type host : *Gryllotalpa africana* Beauv.

Other hosts : *Periplaneta americana* Linn., *Gryllotalpa africana* Beauv.

Type habitat : Posterior intestine.

Other habitat : Midgut.

Type locality : Aligarh, Uttar Pradesh, North India.

Type collector : M. A. Basir.

Type material : Specimens were deposited in the nematode collection of Zoology Department of Aligarh Muslim University, Aligarh, Uttar Pradesh, India.

Measurements (all are in μm except L in mm) (after Basir, 1956) :

Characters	Female	Male
L	2.5-4.94	Unknown
Maximum body width	380	
Buccal cavity L x W	22 x 10	
Length of oesophagus	450	
Corpus L x W	345 x 40	
Isthmus L x W	10 x 20	
Oesophageal bulb L x W	95 x 100	
Excretory pore from anterior end	700	
Nerve ring from anterior end	200	
Vulva from anterior end	2120	
Egg L x W	60-66 x 36-42	
Tail length	90	

Measurements (all are in mm) (after Shah & Rizvi, 2004) :

Characters	Female (n=10)	Male (n=8)
L	2.178-3.689	0.508-0.818
a	11.26-15.33	7.57-11.68
b	5.04-7.54	4.57-6.49
c	27.92-53.38	14.11-34.28
V	69.05-71.06	-
Maximum body width	0.142-0.304	0.058-0.092
Buccal cavity L x W	0.097 x 0.013-0.014	0.047 x 0.041
Length of oesophagus	0.432-0.5	0.111-0.133
Corpus L x W	0.329-0.383 x 0.024-0.036	0.068-0.077 x 0.013-0.014
Isthmus L x W	0.017-0.029 x 0.021-0.029	-
Oesophageal bulb L x W	0.077-0.092 x 0.075-0.099	-
Excretory pore from anterior end	0.667-0.834	0.382-0.456
Nerve ring from anterior end	0.145-0.196	0.048-0.053
Vulva from anterior end	1.531-2.581	-
Egg L x W	0.043-0.059 x 0.026-0.031	-
Spicule length	-	0.029-0.038
Tail length	0.068-0.088	0.021-0.036

Distribution : India : Uttar Pradesh (Aligarh, Siddharth Nagar), Manipur (Imphal) and Uttarakhand (Dehra Dun).

Remarks : The species has been recorded by Rizvi and Jairajpuri (2000) from Siddharth Nagar, Uttar Pradesh, India. It was redescribed by Shah and Rizvi (2004) from Imphal, Manipur, North-East India. Rizvi (2006) redescribed the species from Dehra Dun, Uttarakhand. It is endemic to India.

26. ***Binema ornata*** Travassos, 1925

Synonyms : *Talpicola talpicola* Basir, 1942; *Binema* (*Ornata*) *ornata* (Travassos, 1925) Serrano Sánchez, 1947; *Binema* (*Ornata*) *techae* Serrano Sánchez, 1947; *Binema* (*Ornata*) *carmeloi* Serrano Sánchez, 1947;

1942. Basir, M.A. Nematodes parasitic in *Gryllotalpa. Records of Indian Museum,* **44** : 95-106.

1925. Travassos, L. Quelques nematodes du *Gryllotalpa.* C. R. Soc. Biol., **93** : 140-141.

1947. Serrano Sánchez, A. Nematodes parasites intestinales de los arthropods en Espana. Rev. Iberica Parasitologia, 7 : 279-332.

Hosts : *Neocurtilla hexadactyla* Perty., *Gryllotalpa africana* Beauv., *Gryllotalpa europeus* Linn.

Habitat : Posterior intestine.

Measurements (all are in µm except L in mm) (after Basir, 1942) :

Characters	**Female**	**Male**
L	2.5-3.5	0.67
Maximum body width	225	50
Buccal cavity L x W	20 x 10	-
Length of oesophagus	345	150
Corpus L x W	240 x 30	80 x 10
Isthmus L x W	15 x 24	-
Oesophageal bulb L x W	90 x 90	25 x 25
Excretory pore from anterior end	520	130
Nerve ring from anterior end	130	-
Vulva from anterior end	1800	-
Egg L x W	56-62 x 32-36	-
Spicule length	-	20
Tail length	115	40

Measurements (all are in mm) (after Shah & Rizvi, 2004) :

Characters	**Female**	**Male**
Characters	Female (n=12)	Male (n=3)
L	2.208-3.562	0.722-0.966
a	11.41-15.76	9.85-12.03
b	6.43-10.59	4.97-5.25
c	23.89-35.04	13.63-24.89
V	55.15-62.22	-
Maximum body width	0.147-0.284	0.060-0.098
Buccal cavity L x W	0.048-0.072 x 0.014	0.048 x 0.047
Length of oesophagus	0.294-0.368	0.145-0.184
Corpus L x W	0.218-0.268 x 0.034-0.042	0.094-0.121 x 0.012-0.014

Characters	Female	Male
Isthmus L x W	0.017-0.024 x 0.026-0.034	0.021-0.026 x 0.009-0.012
Oesophageal bulb L x W	0.065-0.075 x 0.075-0.087	0.029-0.036 x 0.029-0.036
Excretory pore from anterior end	0.461-0.579	0.259-0.353
Nerve ring from anterior end	0.137-0.157	Not visible
Vulva from anterior end	1.374-2.061	-
Egg L x W	0.051-0.060 x 0.026-0.029	-
Spicule length	-	0.034-0.046
Tail length	0.088-0.108	0.029-0.065

Distribution : Brazil (Rio de Janeiro), India : Uttar Pradesh (Aligarh), Manipur (Imphal), Spain.

Remarks : Basir (1942) reported the species first time from India (Aligarh, Uttar Pradesh), collected from intestine of *Gryllotalpa africana.* The species was redescribed by Shah and Rizvi (2004) from Imphal, Manipur, North East India, collected from intestine of *Gryllotalpa africana.*

27. ***Binema parva*** Parveen and Jairajpuri, 1985

1985. Parveen, R. and Jairajpuri, D.S. *Binema parva* n. sp., a parasitic nematode of the mole cricket, *Gryllotalpa africana. Rivista di Parasitologia,* **46**(3) : 347-349.

Type host : *Gryllotalpa africana* Beauv.

Type habitat : Midgut.

Type locality : Aligarh, Uttar Pradesh, North India.

Type collector : R. Parveen.

Type material : Specimens (Holotype female and paratype male and females) were deposited in the nematode collection of Zoology Department of Aligarh Muslim University, Aligarh, Uttar Pradesh, India.

Distribution : India : Uttar Pradesh (Aligarh).

Remarks : The species is endemic to India.

28. ***Binema striatum*** Rizvi and Jairajpuri, 2000

2000. Rizvi, A.N. and Jairajpuri, D.S. Studies on a new and two known species of Travassosinematidae (Oxyuridae). *International Journal of Nematology,* **10** (1) : 112-117.

Type host : *Gryllotalpa africana* Beauv.

Type habitat : Midgut.

Type locality : Aligarh, Uttar Pradesh, North India.

Type collector : Anjum Nasreen Rizvi.

Type material : Specimens (Holotype female, 7 paratype females and one paratype male) were deposited in the nematode collection of Zoology Department of Aligarh Muslim University, Aligarh, Uttar Pradesh, India.

Measurements (all are in µm except L in mm) :

Characters	Holotype female	Paratype female (n=7)	Male
L	2.9	1.9-2.9	0.84
a	8.8	8.1-9.4	11.2
b	7.2	4.6-7.6	6.6
c	10	8.6-12.1	24.7
V	57.6	57.6-68.1	-
Buccal cavity L x W	-	12-15 x 7-8	7
Length of oesophagus	403	341-409	126
Corpus L x W	-	254-330 x 25-31	90 x 18
Oesophageal bulb L x W	-	79-105 x 35	36 x 30
Excretory pore from anterior end	-	500-670	-
Nerve ring from anterior end	-	130-170	70
Egg L x W	51	51-56 x 28-35	-
Spicule length	-	-	36
Tail length	-	176-320	36

Distribution : India : Uttar Pradesh (Aligarh).

Remarks : The species is endemic to India.

Subfamily HAMMERSCHMIDTIELLINAE Chitwood, 1932

Genus ***Hammerschmidtiella*** Chitwood, 1932

29. ***Hammerschmidtiella basiri*** Singh and Kaur, 1988

1988. Singh, H.S. and Kaur H. On a new nematode *Hammerschmidtiella basiri* n. sp. from *Periplaneta americana* Linn. *Indian Journal of Parasitology*, **12** (1) : 187-189.

Type host : *Periplaneta americana* Linn.

Type habitat : Intestine.

Type locality : Meerut University Campus, Meerut, Uttar Pradesh, North India.

Type collector : Haridaya S. Singh and Hardeep Kaur.

Type material : Specimens (9 females) were deposited in the nematode collection of Zoology Department of Meerut University, Meerut, Uttar Pradesh, India.

Measurements (all are in mm) :

Characters	Female	Male
L	2.7-3.0	Unknown
Maximum body width	0.29-0.30	
Corpus (anterior cylindrical part)	0.11-0.12	
Corpus (posterior oval pseudobulb part)	0.09-0.10	
Isthmus	0.16-0.17	
Oesophageal bulb	0.07-0.08	
Excretory pore from anterior end	0.32-0.33	
Nerve ring from anterior end	0.09-0.10	
Egg L x W	0.09-0.10 x 0.04-0.05	
Tail length	0.9-1.0	

Distribution : India : Uttar Pradesh (Meerut).

Remarks : The species is endemic to India.

30. ***Hammerschmidtiella diesingi*** (Hammerschmidt, 1838) Chitwood, 1932

Synonyms : *Oxyuris diesingi* Hammerschmidt, 1838; *Oxyuris blattae orientalis* Hammerschmidt, 1847; *Streptostomum gracile* Leidy, 1850; *Anguillula macrura* Diesing, 1851; *Aorurus diesingi* (Hammerschmidt, 1838) Travassos, 1929; *Aorurus* (*Streptostoma*) *diesingi* (Hammerschmidt, 1838) Walton, 1927; *Aorurus* (*Streptostoma*) *blattae-orientalis* (Hammerschmidt, 1847) Walton, 1927.

1838. Hammerschmidt, K.E. Helminthologische Beiträge. *Isis (Oken), Leipzig*, **5** : 351-358.

1932. Chitwood, B.G. A synopsis of the nematodes parasitic in insects of the Family Blattidae. *Z. Parasitenkde*, **5** : 14 -50.

1847. Hammerschmidt, K. E. Beschreibung einiger *Oxyuris*-Arten. *Naturwiss. Abh. Wien*, **1** : 279-288.

1850. Leidy, J. Description of some nematode entozoan infesting insects. *Proc. Acad. Nat. Sci., Philadelphia*, **5** : 100-102.

1851. Diesing, K.M. Systema helminthum. 2 vols. Vindobonae.

1929. Travassos, L. Contribuição preliminary á systemic dos nematoideos dos artropodes. *Mem. Inst. Oswaldo Cruz, Suppl.*, **5** : 19-25.

1927. Walton, A.C.A revision of the nematodes of the Leidy collections. *Proc. Acad. Nat. Sci., Philadelphia*, **79** : 49-163.

Hosts : *Blatta orientalis* Linn. and *Periplaneta americana* Linn.

Habitat : Rectum.

Measurements (all are in μm except L in mm) (after Basir, 1956) :

Characters	Female	Male
L	2.2-3.0	0.82-0.87
Maximum body width	134-225	52-64
Length of oesophagus	260-320	126-190
Corpus (anterior cylindrical part) L x W	100-140 x 20-30	60-85 x 18-28
Corpus (posterior oval pseudobulb part) L x W	80-90 x 56-60	-
Isthmus L x W	30-34 x 16-20	-
Width of oesophageal end bulb	60-70	-
Nerve ring from anterior end	80	70-90
Excretory pore from anterior end	340-450	200-330
Vulva from anterior end	520-580	-
Egg L x W	76-80 x 30-32	-
Spicule length	-	20-25
Tail length	620-920	80-95

Distribution : Europe; North America; South America; India : Uttar Pradesh (Aligarh), West Bengal (Howrah), Punjab (Chandigarh), Uttarakhand (Dehra Dun), Andhra Pradesh (Anantapur); Russia.

Remarks : Basir (1956) redescribed *Hammerschmidtiella diesingi* from Aligarh, Uttar Pradesh. Soota and Chaturvedi (1971) reported it from Howrah district of West Bengal; collecting from rectum and junction of intestine and rectum of *Periplaneta americana* (thirty Females; Z.S.I. Reg. Nos. W7069 – 73/1; collector- Y. Chaturvedi, 19-22. 7. 1967). Gupta and Kaur (1978) reported the species from *P. americana* at Chandigarh, Punjab. Rizvi (2006) redescribed the species from Dehra Dun, Uttarakhand, collected from posterior gut of *P. americana.* Gantait and Chatterjee (2007) recorded it from Anantapur, Andhra Pradesh; collected from rectum of cockroach host, *Blatta orientalis.*

31. ***Hammerschmidtiella singhi*** Rao and Rao, 1965

1965. Rao, P.N. and Rao, V.J.A description of a new species of the Genus *Hammerschmidtiella* Chitwood, 1932 (Nematoda : Oxyuridae). *Rivista di Parassitologia,* **XXVI** (1) : 9-12.

Type host : Spotted roach, *Corydia* sp.

Type habitat : Intestine.

Type locality : Vicinity of Osmania University, Hyderabad district, Andhra Pradesh, India.

Type collectors : V. Jaganath Rao and P. Narayan Rao.

Type materials : The type specimens were deposited in the Museum of Zoology Department, University College of Science, Osmania University, Hyderabad, Andhra Pradesh, India.

Measurements (all are in mm) :

Characters	Female	Male
L	1.81	0.83
Maximum body width	0.164	0.046
Buccal cavity L x W	0.011 x 0.006	-
Length of oesophagus	-	0.111
Corpus (anterior cylindrical part) L x W	0.094 x 0.016	0.053 x 0.012
Corpus (posterior oval pseudobulb part) L x W	0.047 x 0.070	-
Isthmus L x W	0.037 x 0.015	0.039 x 0.009
Width of oesophageal end bulb	0.063	0.022
Vulva from anterior end	0.481	-
Spicule length	-	0.02
Tail length	0.658	0.11

Distribution : India : Andhra Pradesh (Hyderabad).

Remarks : The species is endemic to India.

Subfamily GYOERYIINAE Travassos, 1929

Genus ***Pseudonymus*** Diesing, 1857

Synonyms : *Ptycocephalus* Diesing, 1861; *Oxyuris* (*Helicothrix*) Galeb, 1878; *Galebiella* Basir, 1941

32. ***Pseudonymus basiri*** Shah and Rizvi, 2004

2004. Shah, M.M. and Rizvi, A.N. *Pseudonymus basiri* sp.n. and *Zonothrix alata* sp.n. (Pseudonymidae : Thelastomatoidea) from water beetle *Hydrophilus triangularis*. *International Journal of Nematology*, **14** (2) : 229-235.

Type host : Water beetle, *Hydrophilus triangularis*.

Type habitat : Anterior gut.

Type locality : Imphal, Manipur, North East India.

Type collector : M. Manjur Shah.

Type material : Specimens (holotype female on slide *Pseudonymus basiri* sp. n./1; paratype females on slides *Pseudonymus basiri* sp. n./2-9; paratype male on slide *Pseudonymus basiri* sp. n./1-5) were deposited in the nematode collections of the Department of Zoology of Aligarh Muslim University, Aligarh, Uttar Pradesh, India.

Measurements (all are in µm except L in mm) :

Characters	Holotype female	Paratype female (n=9)	Paratype male (n=5)
L	2.689	1.618-3.372	0.760-1.261
a	13	11.8-16.2	12.1-19.3
b	7	5.17-8.86	3.98-5.65
c	8.3	6.9-12.5	40-63
V	61.3	51-63	-
Maximum body width	206	137-245	59-83
Buccal cavity L x W	9.7 x 7.3	7.3-9.7 x 7.3	3.7-4.8 x 2.4-3.7
Length of oesophagus	-	309-386	191-223
Corpus (anterior cylindrical part) length	294	235-304	143-173 x 17-18
Corpus (posterior pseudobulb part) L x W		53-72 x 46-63	-
Isthmus L x W	-	12-17 x 19-26	9-14 x 12-13
Oesophageal end bulb L x W	77 x 82	58-77 x 65-87	34-41 x 31-41
Excretory pore from anterior end	471	373-549	206-300
Nerve ring from anterior end	225	176-225	126-145
Vulva from anterior end	-	824-826	-
Egg L x W	75.3 x 41.3	70.5-77.7 x 41.3-43.7	-
Spicule length	-	-	25.6-28.3
Tail length	-	216-324	18-24

Distribution : India : Manipur (Imphal).

Remarks : The species is endemic to India.

33. ***Pseudonymus hydrophili*** (Galeb, 1878) Stiles and Hassall, 1905

Synonyms : *Oxyuris* (*Helicothrix*) *hydrophilic* Galeb, 1878; *Galebiella galebiella* Basir, 1941; *Pseudonymous brachycercus* Todd, 1944; *Pseudonymous leptocercus* Todd, 1944.

1878. Galeb, O. Recherches sur les entozoaires des insects. Organization et development des oxyurides. *Arch. Zool. Exper. Et Gen.*, **7** : 283-390.

1905. Stiles, C.W. and Hassall, A. The determination of generic types and a list of roundworm genera with their original and type species. *U. S. Dept. Agric. Bur. Animal Industry, Bull.*, **79**, 150 pp.

1941. Basir, M.A. Two new nematodes from an aquatic beetle. *Proc. Indian Acad. Sci.*, **13**, Sec B : 163-167.

1944. Todd, A. C. Two new nematodes from the aquatic beetle *Hydrous triangularis* (Say). *Journal of Parasitology*, **30** : 269-272.

Hosts : *Hydrous triangularis* (Say), *Tropisternus nimbatus* Say, *Hydrophilus piceus*, aquatic beetle (unspecified).

Habitat : Intestine.

Measurements (all are in µm except L in mm) (after Basir, 1956) :

Characters	Female	Male
L	1.85-4.11	1.0-1.5
Maximum body width	145-295	-
Buccal cavity L x W	20 x 8	-
Corpus L x W	265-385 x 35-47	-
Isthmus L x W	10-20 x 25	-
Oesophageal bulb L x W	65-103 x 75-113	-
Excretory pore from anterior end	390-650	-
Nerve ring from anterior end	200-295	-
Vulva from anterior end	1170-2616	-
Egg L x W	68-82 x 42-52	-
Tail length	255-483	-

Distribution : Europe, India (Uttar Pradesh), United States of America (Nebraska, Louisiana).

Remarks : Basir (1956) redescribed the species from Aligarh, Uttar Pradesh, India. This was the first report from India.

34. ***Pseudonymus islamabadi*** (Basir, 1941) Basir, 1956

Synonym : *Galebiella islamabadi* Basir, 1941

1941. Basir, M.A. Two new nematodes from an aquatic beetle. *Proc. Indian Acad. Sci.*, **13**, Sec B : 163-167.

1956. Basir, M.A. Oxyuroid parasites of Arthropoda. A monographic study 1. Thelastomatidae 2. Oxyuridae. *Zoologica* (Stuttgart). 79 pp., 13 plates.

Type host : Aquatic beetle (unspecified).

Other host : *Hydrophilus piceus.*

Type habitat : Intestine.

Type locality : Aligarh, Uttar Pradesh, North India.

Type collector : M. A. Basir.

Type material : Specimens were deposited in the nematode collections of Zoology Department of Aligarh Muslim University, Aligarh, Uttar Pradesh, India.

Measurements (all are in µm except L in mm) :

Characters	Female	Male
Maximum body width	375	Unknown
Buccal cavity L x W	25 x 12	
Corpus L x W	350 x 45-55	
Isthmus L x W	15 x 30	
Oesophageal bulb L x W	85 x 90	
Excretory pore from anterior end	600	
Nerve ring from anterior end	270	
Vulva from anterior end	2600	
Egg L x W	82 x 50	
Tail length	260	

Distribution : India : Uttar Pradesh (Aligarh).

Remarks : The species is endemic to India.

Genus ***Zonothrix*** Todd, 1942

35. ***Zonothrix alata*** Shah and Rizvi, 2004

2004. Shah, M.M. and Rizvi, A.N. *Pseudonymus basiri* sp.n. and *Zonothrix alata* sp.n. (Pseudonymidae : Thelastomatoidea) from water beetle *Hydrophilus triangularis*. *International Journal of Nematology*, **14** (2) : 229-235.

Type host : Water beetle, *Hydrophilus triangularis*.

Type habitat : Fore gut.

Type locality : Imphal, Manipur, North East India.

Type collector : M. Manjur Shah.

Type material : Specimens (holotype female on slide *Zonothrix alata* sp. n. / 26; paratype females on slides *Pseudonymus basiri* sp. n. / 27-29) were deposited in the nematode collections of the Department of Zoology of Aligarh Muslim University, Aligarh, Uttar Pradesh, India.

Measurements (all are in ìm except L in mm) :

Characters	Holotype female	Paratype female (n=3)	Male
L	3.745	3.277-4.274	Unknown
a	17.8	16.3-18.9	
b	9.3	8.4-9.7	
c	10.1	10.1-12.3	
V	62.8	61-64	
Maximum body width	211	201-235	
Buccal cavity L x W	9.7 x 7.3	9.7 x 7.3-10.9	
Length of oesophagus	-	391-441	
Corpus length	324	304-343	
Isthmus L x W		14-24 x 24-29	
Oesophageal end bulb L x W	85 x 94	58-85 x 80-94	
Excretory pore from anterior end	618	608-746	
Nerve ring from anterior end	255	265-284	
Vulva from anterior end	-	2099-2719	
Egg L x W	77.76 x 43.74	72.9-77.8 x 41.3-43.7	
Tail length	-	324-348	

Distribution : India : Manipur (Imphal).

Remarks : The species is endemic to India.

Subfamily CAMERONIINAE Basir, 1948

Genus ***Cameronia*** Basir, 1948

36. ***Cameronia aspiculata*** (Farooqui, 1970) Adamson and Waerebeke (1992)

Synonym : *Psilocephala aspiculata* Farooqui, 1970

1970. Farooqui, M.N. Some known and new genera and species of the Family Thelastomatidae Travassos, 1929. *Rivista di Parassitologia*, **31** : 1-7.

1992. Adamson, M.L. and Waerebeke, D. Revision of the Thelastomatoidea, Oxyurida of invertebrate hosts. 1. Thelastomatidae. *Systemic Parasitology*, **21** : 21-63.

Host : *Gryllotalpa africana.*

Habitat : Midgut.

Locality : Aligarh (North India).

Collector : Anjum Nasreen Rizvi.

Material : Specimens were deposited in the nematode collections of Zoology Department of Aligarh Muslim University, Aligarh, Uttar Pradesh, India.

Measurements (all are in mm) (after Rizvi and Jairajpuri, 2002) :

Characters	Female (n=6)	Male
L	1.77-2.14	Unknown
a	8.35-9.07	
b	5.65-6.53	
c	14.75-15.77	
V	60.6-62.14	
Buccal cavity L x W	0.013-0.015	
Length of oesophagus	0.313-0.328	
Corpus L x W	0.218-0.230 x 0.026-0.030	
Isthmus L x W	0.017-0.018 x 0.019-0.022	
Oesophageal end bulb L x W	0.078-0.080 x 0.074-0.084	
Nerve ring from anterior end	0.18-0.19	
Egg L x W	0.105-0.110 x 0.040-0.049	
Tail length	0.12-0.14	

Distribution : India : Maharashtra, Uttar Pradesh (Aligarh).

Remarks : Rizvi and Jairajpuri (2002) redescribed the species after its original description by Farooqui (1970) from Maharashtra. This was the first report from North India. The species is endemic to India.

37. ***Cameronia basiri*** Rizvi and Jairajpuri, 2002

2002. Rizvi, A.N. and Jairajpuri, D.S. Studies on a new and some known species of insect oxyurid nematodes. *Revista Ibérica de Parasitologia,* **62** (1-2) : 1-7.

Type host : *Gryllotalpa africana.*

Type habitat : Midgut.

Type locality : Aligarh (North India).

Type collector : Anjum Nasreen Rizvi.

Type material : Specimens (holotype female on slide *Cameronia basiri* sp. n. /1; paratype females on slides *C. basiri* sp. n. /2-10; paratype male on slide *C. basiri* sp. n. /11) were deposited in the nematode collections of Zoology Department of Aligarh Muslim University, Aligarh, Uttar Pradesh, India.

Measurements (all are in mm) :

Characters	Holotype female	Paratype female (n=9)	Paratype Male
L	4.25	3.05-4.66	0.97
a	12.91	9.71-15.03	10.83
b	9.44	7.27-10.32	6.41
c	28.33	20.33-33.28	-
V	77.77	75.50-79.58	-
Buccal cavity L x W	-	0.014-0.018	-
Length of oesophagus	0.45	0.39-0.49	0.152
Corpus L x W	-	0.305-0.389 x 0.030-0.035	0.177 long
Isthmus L x W	-	-	-
Oesophageal end bulb L x W	-	0.087-0.105 x 0.087-0.102	0.035 wide
Nerve ring from anterior end	-	0.13-0.20	0.099
Excretory pore from anterior end	-	0.89-0.94	-
Egg L x W	0.100 x 0.039	0.100-0.112 x 0.039-0.048	-
Spicule length	-	-	0.019
Tail length	0.15	0.14-0.15	-

Distribution : India : Uttar Pradesh (Aligarh).

Remarks : The species is endemic to India.

38. ***Cameronia biovata*** Basir, 1948

1948. Basir, M.A. *Cameronia biovata*, gen. et sp. nov., (Thelastomatidae), a new nematode parasite of the mole cricke, *Gryllotalpa africana* Beauv. *Canadian J. Res., D*, **26** : 201-203.

Type host : *Gryllotalpa africana* Beauv.

Type habitat : Intestine (rectum).

Type locality : Aligarh, Uttar Pradesh, North India.

Type collector : M.A. Basir.

Type material : Specimens were deposited in the nematode collections of Zoology Department of Aligarh Muslim University, Aligarh, Uttar Pradesh, India.

Measurements (all are in μm except L in mm) :

Characters	Female	Male
L	2.35-2.50	Unknown
Maximum body width	400	
Buccal cavity L x W	10 x 10	
Oesophageal length	440-465	
Corpus L x W	317-335 x 45	
Isthmus L x W	20 x 40	
Oesophageal bulb L x W	125-150 x 230	
Excretory pore from anterior end	500	
Nerve ring from anterior end	200	
Vulva from anterior end	1700	
Egg L x W	130 x 50	
Tail length	180-190	

Distribution : India : Uttar Pradesh (Aligarh), Andhra Pradesh (Vishakhapatnam).

Remarks : The species has been redescribed by Gantait and Chatterjee (2007) from Vishakhapatnam, Andhra Pradesh, India; collected from rectum of *Gryllotalpa africana.* The species is endemic to India.

39. ***Cameronia klossi*** Parveen and Jairajpuri, 1984

1984. Parveen, R. and Jairajpuri, D.S. *Revista Iberica de Parasitologia,* **44** : 153-158.

Distribution : India : Uttar Pradesh (Aligarh).

Remarks : Due to lack of original literature the details are not to be provided. The species is endemic to India.

Subfamily BLATTICOLINAE Travassos, 1929

Genus ***Blatticola*** Schwenk, 1926

40. ***Blatticola blattae*** (Graeffe, 1860) Chitwood, 1932

Synonyms : *Oxyuris blattae* Graeffe, 1860; *Oxyuris blatticola* Galeb, 1878; *Blatticola blattae* (Galeb, 1878) Schwenk, 1926.

1860. Graeffe, E. Beobachtungen über Radiaten und Würmer in Nizza. *N. Denkschr. Allg. Schweiz. Ges. Naturwiss., Zurich,* **17** : 59 pp.

1878. Galeb, O. Recherches sur les entozoaires des insects. Organization et development des oxyurides. *Arch. Zool. Exper. Et Gen.,* **7** : 283-390.

1926. Schwenk, J.M. Fauna parasitological dos blattideos do Brasil. *Sci. Medica, Rio de Janeiro,* **4** : 491-504.

1932. Chitwood, B.G. A synopsis of the nematodes parasitic in insects of the Family Blattidae. *Z. Parasitenkde*, **5** : 14 -50.

Hosts : *Blatta aegyptiaca* Linn., *Blattella germanica* Linn., *Ectobia lapponica* Linn. and *E. livida* Fab.

Habitat : Rectum.

Measurements (all are in µm except L in mm) :

Characters	Female	Male
L	2-3	0.78-1.0
Maximum body width	165	54-75
Oesophageal length	158-280	132-170
Corpus L xW	230-270 long	84 x 12
Isthmus	-	22 x 7.5
Width of oesophageal bulb	-	16
Excretory pore from anterior end	-	218-280
Nerve ring from anterior end	110-220	85-100
Vulva from anterior end	1650-2500	-
Egg L x W	122-126 x 38-42	-
Spicule length	-	20
Tail length	160-240	62-80

Distribution : Europe; North America; South America; India : Uttar Pradesh (Aligarh), Himachal Pradesh (Solan), and Haryana (Panchkula) and Andhra Pradesh (Araku Valley); U.S.S.R.

Remarks : It is the type species of the Genus *Blatticola.* Basir (1956) redescribed the species from Aligarh, Uttar Pradesh, India. Duggal and Aulakh (1988) recorded this species from the states Himachal Pradesh and Haryana. Rizvi and Jairajpuri (2002) also redescribed the species from Aligarh, Uttar Pradesh, collected from posterior gut of *Blatella germanica.* Gantait and Chatterjee (2007) redescribed it from Araku Valley of Vishakhapatnam district, Andhra Pradesh, India; collected from rectum of *Blatta orientalis.*

41. ***Blatticola supellaimae*** Rao and Rao, 1965

1965. Rao, P.N. and Rao, V.J. A description of a new nematode of the Genus *Blatticola* Schwenk (1926). *Annals and Magazine of Natural History*, **8** (Ser. 13) : 273-275.

Type host : Roaches, *Supellima* sp.

Type habitat : Rectum.

Type locality : Hyderabad, Andhra Pradesh, India.

Type collectors : V. Jaganath Rao and P. Narayan Rao.

Type materials : The type specimens (2 females and 2 males) were deposited in the Museum of Zoology Department, University College of Science, Osmania University, Hyderabad, Andhra Pradesh, India.

Measurements (all are in mm) :

Characters	Female (n=2)	Male (n=2)
L	3.235	0.990
Maximum body width	0.301	0.070
Oesophageal length	0.415	0.160
Corpus L xW	0.280 x 0.050	0.105 x 0.015
Isthmus L x W	0.027 x 0.032	0.025 long
Oesophageal end bulb L x W	0.108 x 0.100	0.030 x 0.027
Nerve ring from anterior end	0.195	0.042
Vulva from anterior end	0.337	-
Egg L x W	0.162 x 0.072	-
Spicule length	-	0.025
Tail length	0.175	0.050

Distribution : India : Andhra Pradesh (Hyderabad).

Remarks : The species is endemic to India.

Genus ***Blattellicola*** Basir, 1940

42. ***Blattellicola blattellicola*** Basir, 1940

1940. Basir, M.A. Nematodes parasitic in Indian cockroaches. *Proc. Indian Acad. Sci.*, **12**(Sec. B) : 8-16.

Type host : *Blattella germanica* Linn.

Type habitat : Intestine.

Type locality : Aligarh, Uttar Pradesh, North India.

Type collector : M. A. Basir.

Type materials : Specimens (females; male unknown) were deposited in the nematode collections of Zoology Department of Aligarh Muslim University, Aligarh, Uttar Pradesh, India.

Measurements (all are in µm except L in mm) :

Characters	Female	Male
L	1.75-2.15	Unknown
Maximum body width	225	
Buccal cavity L xW	15 x 30	
Oesophageal length	300	
Corpus L xW	220 x 30	
Isthmus L x W	10 x 25	
Oesophageal end bulb L x W	70 x 75	
Nerve ring from anterior end	130	
Excretory pore from anterior end	380	
Vulva from anterior end	1200	
Egg L x W	76-80 x 35-40	
Tail length	200	

Distribution : Northern India.

Remarks : It is the type species of the genus *Blattellicola.* The species is endemic to India.

43. ***Blattellicola guptai*** Duggal and Aulakh, 1988

1988. Duggal, C.L. and Aulakh, A. On some nematode parasites infecting household insects in North-West India. *Research Bulletin (Science) of the Panjab University*, **39**, Parts I-II : 21-25.

Type host : *Periplaneta americana* Linn.

Type habitat : Intestine.

Type locality : Ropar, Panjab, North-West India.

Type collector : C.L. Duggal and Arvind Aulakh.

Type material : Specimens (holotype female, one paratype female; male unknown) were deposited in the nematode collections of Zoology Department of Panjab University, Chandigarh, Panjab, India.

Measurements (all are in µm except L in mm) :

Characters	Holotype female	Paratype female (n=1)	Male
L	3.58	3.42-3.58	Not found
a	13.8	11.2	
b	8.4	8.2	

Characters	Holotype female	Paratype female (n=1)	Male
c	15.8	15.7	
V	55	55	
Maximum body width	-	248-320	
Length of oesophagus	-	404-436	
Corpus L x W	-	288-316 x 44	
Isthmus L x W	-	10-20 x 30-36	
Oesophageal end bulb L x W	-	100 x 96	
Vulva from anterior end	-	1800-1960	
Egg L x W	-	70-76 x 30-36	
Tail length	-	216-220	

Distribution : India : Panjab (Ropar).

Remarks : The species is endemic to India.

Subfamily THELASTOMATINAE Travassos, 1929

Genus ***Cephalobellus*** Cobb, 1920

44. ***Cephalobellus brevicaudatum*** (Leidy, 1851) Chriestie, 1933

Synonyms : *Thelastoma brevicaudatum* (Leidy, 1851); *Thelastomum brevicaudatum* (Leidy, 1853); *Aorurus* (*Thelastoma*) *brevicaudatus* (Leidy, 1851) Walton, 1927; *Scarabanema brevicaudatum* (Leidy, 1851) Chriestie, 1931; *Thelastoma indiana* Basir, 1940; *Cephalobellus lloydi* Baylis, 1946.

1851. Leidy, J. Contribution to helminthology. *Proc. Acad. Nat. Sci. Philadelphia,* **5** : 205-209.

1933. Chriestie, J. R. The generic names *Cephalobellus* Cobb, 1920 and *Scarabanema* Chriestie, 1931 (Nematoda). *J. Washington Acad. Sci.,* **23** : 358.

1853. Leidy, J. 1853. A flora and fauna within living animals. *Smithsonian Cont. Know., Washington,* **5**, Art. 2 : 1- 67.

1927. Walton, A.C. A revision of the nematodes of the Leidy collections. *Proc. Acad. Nat. Sci., Philadelphia,* **79** : 49-163.

1931. Chriestie, J.R. Some nemic parasites (Oxyuridae) of coleopterous larvae. *J. Agric. Res.,* **42** : 463- 482.

1940. Basir, M.A. Nematodes parasitic in Indian cockroaches. *Proc. Indian Acad. Sci.,* **12** (Sec. B) : 8-16.

1946. Baylis, H.A. A nematode parasite of Tipulid larvae. *Ann. Mag.Nat. Hist.,* Ser. 11, **13** : 53-59.

Hosts : Larva of *Ligyrodes relictus* (Say) (= *Scarabaeus relictus*); *Leucophaea* sp. (Blattidae), Larvae of Tipulids (craneflies) possibly *Tipula peliostigma* Schummel and *T. oleracea* Linn.

Habitat : Intestine.

Measurements (all are in µm except L in mm) (after Basir, 1956) :

Characters	Female	Male
L	2.48-4.23	0.66-1.2
Maximum body width	260	40-80
Length of oesophagus	350-486	150-260
Isthmus L x W	-	46-80 x 26-50
Oesophageal end bulb L x W	90-102 x 90	-
Nerve ring from anterior end	150	84-110
Vulva from anterior end	1.48	-
Egg L x W	75-89 x 25-33	-
Spicule length	-	25-55
Tail length	310	50-100

Distribution : Near Philadelphia, India (Uttar Pradesh), United States of America, England.

Remarks : The species had been redescribed by Basir (1956) from Uttar Pradesh, India.

45. ***Cephalobellus singhi*** Singhi and Singhi, 1989

1989. Singh, H.S. and Singh, K. On two new nematodes from *Periplaneta americana* Linn., from India. *Dr. B.S. Chauhan Commemoration Volume*, 149 -153.

Type host : *Periplaneta americana* Linn.

Type habitat : Intestine.

Type locality : Meerut University Campus, Meerut, Uttar Pradesh, India.

Type collector : C.L. Duggal and Arvind Aulakh.

Type material : The holotype female and eight paratype females were deposited in the nematode collections of Zoology Department of Meerut University, Meerut, Uttar Pradesh, India.

Measurements (all are in mm) (after Basir, 1956) :

Characters	Female (n=9)	Male
L	2.20-2.30	Unknown
Maximum body width	0.22-0.23	
Corpus length	0.30-0.32	
Isthmus length	0.05-0.06	
Oesophageal end bulb L x W	0.35-0.36 x 0.09-0.10	
Nerve ring from anterior end	0.15-0.17	
Vulva from anterior end	1.60-1.62	
Eggs diameter	0.02-0.03	
Tail length	0.55-0.56	

Distribution : India : Uttar Pradesh (Meerut).

Remarks : The species is endemic to India.

Genus ***Isobinema*** Rao, 1958

46. ***Isobinema dimorphicauda*** Parveen and Jairajpuri, 1982

1982. Parveen, R. and Jairajpuri, D.S. A new nematode, *Isobinema dimorphicauda* from the intestine of mole cricket, *Gryllotalpa africana* from Aligarh. *Rivista di Parassitologia.* **XLIII** (1) : 113-115.

Type host : Mole cricket, *Gryllotalpa africana*.

Type habitat : Intestine.

Type locality : Aligarh, Uttar Pradesh, India.

Type collector : Rafia Parveen.

Type material : The type specimens (single male with few females) were deposited in the nematode collections of Zoology Department of Aligarh Muslim University, Aligarh, Uttar Pradesh, India.

Measurements (all are in mm) :

Characters	**Female**	**Male**
L	2.57	0.36
Maximum body width	0.18	0.045
Buccal cavity L x W	0.014 x 0.011	-
Length of oesophagus	0.45	0.015
Corpus L x W	0.35 x 0.025-0.029	0.07 x 0.011
Isthmus L x W	0.02 x 0.02	0.007 x 0.007
Oesophageal end bulb L x W	0.08 x 0.08	0.028 x 0.025
Nerve ring from anterior end	0.166	0.037
Excretory pore from anterior end	0.65	0.117
Vulva from anterior end	1.66	-
Egg L x W	0.052-0.056 x 0.030-0.032	-
Spicule length	-	0.025
Tail length	0.09	0.093

Distribution : India : Uttar Pradesh (Aligarh).

Remarks : The species is endemic to India.

47. *Isobinema neoflagellocerca* Padmaja and Bharatha Lakshmi, 1994

1994. Padmaja B. and Bharatha Lakshmi, B. A new species of the Genus *Isobinema* (Nematoda : Thelastomatidae) from the rectum of *Gryllotalpa africana* from Narsipatnam, South India. *Indian Journal of Parasitology*, **18** (2) : 207-209.

Type host : Mole cricket, *Gryllotalpa africana*.

Type habitat : Rectum.

Type locality : Narsipatnam, Visakhapatnam district, Andhra Pradesh, India.

Type collector : Bunga Padmaja.

Type materials : The female type specimens (male not found) were deposited with the nematode collections of Department of Zoology, Andhra University, Visakhapatnam, Andhra Pradesh, India.

Measurements (all are in mm) :

Characters	Female	Male
L	3.520	Unknown
Maximum body width	0.288	
Oesophageal length	0.448	
Corpus length	0.352	
Isthmus L x W	0.015 x 0.040	
Oesophageal end bulb L x W	0.096 x 0.080	
Vulva from anterior end	1.472	
Eggs diameter	0.064-0.072 x 0.048	
Tail length	0.128	

Distribution : India : Andhra Pradesh (Narsipatnam).

Remarks : This was the second report of the Genus from India. The species is endemic to India.

Genus *Leidynema* Schwenk, 1929

48. *Leidynema appendiculatum* (Leidy, 1850) Chitwood, 1932

Synonyms : *Aorurus (Thelastoma) appendiculatum* Leidy, 1850; *Thelastomum appendiculatum* Leidy, 1853; *Oxyuris blattae* Hammerschmidt, 1847, of Galeb, 1878; *Oxyuris blattae orientalis* Hammerschmidt, 1847, of Bütschli, 1878; *Oxyuris blattae-orientalis* Hammerschmidt, 1847, of Magalhães, 1900; *Aorurus (Thelastoma) appendiculatus* (Leidy, 1850), Walton, 1927; *Leidynema blattae-orientalis* (Hammerschmidt, 1847) of Schwenk, in Travassos, 1929; *Leidynema appendiculata* var. *americana* (Leidy, 1850) Serrano Sánchez, 1947; *L. appendiculata* var. *hispana* Serrano Sánchez, 1947; *L. appendiculata* var. *indiana* Serrano Sánchez, 1947;

1847. Hammerschmidt, K. E. Beschreibung einiger *Oxyuris*-Arten. *Naturwiss. Abh. Wien*, **1** : 279-288.

1850. Leidy, J. Description of some nematode entozoan infesting insects. *Proc. Acad. Nat. Sci., Philadelphia,* **5** : 100-102.

1853. Leidy, J. 1853. A flora and fauna within living animals. *Smithsonian Cont. Know., Washington,* **5**, Art. 2 : 1- 67.

1878. Galeb, O. Recherches sur les entozoaires des insects. Organization et development des oxyurides. *Arch. Zool. Exper. Et Gen.,* **7** : 283-390.

1878. Bütschli, O. Untersuchungen über die beiden Nematoden der *Periplaneta (Blatta) orientalis* L.*Z. Wiss. Zool.,* **21** : 252-293.

1900. De Magalhães, P. S. Notes d'helminthologie brésilienne. 10. Matériaux pour server á l'histoire de la flore et de la faune parasitaire de la *Periplaneta ámericana* Fabricus. Une nouvelle espèce d'*Oxyuris, O. bulhõesi,* Arch. *Parasitologie,* Paris, **3** : 34-69.

1927. Walton, A.C. A revision of the nematodes of the Leidy collections. *Proc. Acad. Nat. Sci., Philadelphia,* **79** : 49-163.

1929. Travassos, L. Contribuição preliminary á systemic dos nematoideos dos artropodes. *Mem. Inst. Oswaldo Cruz, Suppl.,* **5** : 19-25.

1932. Chitwood, B.G. A synopsis of the nematodes parasitic in insects of the Family Blattidae. *Z. Parasitenkde,* **5** : 14-50.

1947. Serrano Sánchez, A. Nematodes parasites intestinales de los arthropods en Espana. *Rev. Iberica Parasitilogia,* **7** : 279-332.

Host : *Blatta orientalis* Linn., *Periplaneta americana* Linn. and *Blaberus atropus* Stoli.

Habitat : Large intestine, posterior gut.

Measurements (all are in mm) (after Rizvi, 2006) :

Characters	**Female (n=8)**	**Male (n=2)**
L	3.12-4.02	1.05-1.07
a	8.00-9.57	11.66-11.83
b	7.85-9.66	6.06-6.12
c	5.67-7.88	-
V	54.72-55.44	-
Buccal cavity L x W	0.015-0.018	0.010-0.012
Length of oesophagus	0.384-0.451	0.173-0.174
Corpus (anterior cylindrical part) L x W	0.140-0.165 x 0.03-0.04	-
Corpus (posterior broader part) L x W	0.140-0.152 x 0.051-0.059	-
Corpus (uniform diameter) length		0.118-0.120
Isthmus length	0.015-0.021	0.015-0.018
Oesophageal end bulb diameter	90-102	0.033-0.037
Intestinal diverticulum length	0.48-0.70	-
Excretory pore from anterior end	0.65-0.75	-
Nerve ring from anterior end	0.11-0.15	0.07-0.08
Egg L x W	0.100-0.109 x 0.037-0.054	-
Spicule length	-	0.038-0.040
Tail length	0.51-0.57	-

Distribution : North America, South America, Europe, China, U.S.S.R. and India : Uttaranchal (Dehradun).

Remarks : Rizvi (2006) redescribed the species from Dehradun, Uttaranchal, India. This is the first report from India.

49. ***Leidynema periplaneti*** Farooqui, 1967

1967. Farooqui, M.N. On a known and some new species of insect nematodes. *Zool. Anz.*, **176** : 276-296.

Host : *Periplaneta americana* L.

Habitat : Posterior gut.

Measurements (all are in mm) (after Rizvi, 2006) :

Characters	Female (n=4)	Male (n=1)
L	2.34-2.70	0.75
a	8.42-10.58	10.0
b	6.07-6.80	4.09
c	4.25-4.90	-
V	47.5-48.7	-
Length of oesophagus	0.375-0.397	0.183
Corpus (anterior cylindrical part) L x W	0.131-0.140 x 0.028-0.031	-
Corpus (posterior broader part) L x W	0.131-0.140 x 0.051-0.052	-
Isthmus length	0.013-0.015	-
Oesophageal end bulb diameter	0.090-0.102	-
Intestinal diverticulum length	0.220-0.435	-
Excretory pore from anterior end	0.57-0.60	-
Nerve ring from anterior end	0.14-0.16	0.05
Egg L x W	0.102-0.106 x 0.041-0.046	-
Spicule length	-	0.034
Tail length	0.51-0.55	0.02

Distribution : India : Maharashtra, Uttaranchal (Dehra Dun).

Remarks : Rizvi (2006) redescribed the species from Dehra Dun, Uttaranchal, collected from *Periplaneta americana* L. After its description it was the first report of the species from North India. The species is endemic to India.

Genus ***Thelastoma*** Leidy, 1849

Synonym : *Aorurus* Leidy, 1849

50. ***Thelastoma atheri*** (Parveen and Jairajpuri, 1983) Rizvi and Jairajpuri, 1995

1983. Parveen, R. and Jairajpuri, D.S. *Schwenkiella atheri* sp. nov. (Nematoda : Thelastomatidae), a new nematode parasite of the common cockroach, *Periplaneta americana. Indian J. Nematol.*, **13** (2) : 209-241.

1995. Rizvi, A.N. and Jairajpuri, D.S. Scanning electron microscopy of *Thelastoma atheri* n. comb. (Nematoda : Thelastomatidae), from the cockroach *Periplaneta americana. J. Parasit. Appl. Anim. Biol.*, **4** (1) : 9-13.

Type host : Common cockroach, *Periplaneta americana* L.

Type habitat : Intestine.

Type locality : Aligarh, Uttar Pradesh, India.

Type collector : Rafia Parveen.

Type materials : The holotype and paratypes were deposited in the Helminthological Collections, Department of Zoology, Aligarh Muslim University, Aligarh, Uttar Pradesh, India.

Measurements (all are in mm) :

Characters	**Female**	**Male**
L	2.7	1.21-1.26
a	15.2	14.8
b	5.7	
c	3.4	
V	49	
Maximum body width		
Length of oesophagus	0.43	
Corpus L x W	0.307 x 0.032	
Isthmus L x W	0.036 x 0.032	
Oesophageal end bulb L x W	0.086 x 0.083	
Excretory pore from anterior end	0.46	
Nerve ring fromanterior end	0.187	
Egg L x W	0.083-0.086 x 0.057-0.065	
Tail length	0.9	

Distribution : India : Uttar Pradesh (Aligarh), Andhra Pradesh (Tirupati-Tirumala, Chittor).

Remarks : Rizvi and Jairajpuri (1995) transferred the species from the Genus *Schwenkiella* to *Thelastoma.* They redescribed the species from Aligarh, Uttar Pradesh, India, collected from the intestine of *Periplaneta americana.* They also performed the SEM studies of the species to conform the present status of it. Gantait and Chatterjee (2007) reported the species from Tirupati-Tirumala of Chittor district of Andhra Pradesh, India.

51. ***Thelastoma guptai*** Duggal and Aulakh, 1989

1989. Duggal, C.L. and Aulakh, A. *Thelastoma kherai* sp. nov. and *Thelastoma guptai* sp. nov. (Nematoda : Thelastomatidae) from *Periplaneta americana* (Linnaeus) in Delhi, India. *Research Bulletin (Science) of the Panjab University,* **40**, Parts I-II : 95-98.

Type host : Common cockroach, *Periplaneta americana* L.

Type habitat : Intestine.

Type locality : Delhi, India.

Type collector : C.L. Duggal and Arvind Aulakh.

Type materials : One holotype female and one paratype female were deposited in the Helminthological Collections, Department of Zoology, Punjab University, Chandigarh, Punjab, India.

Measurements (all are in ìm except L in mm) :

Characters	Holotype female	Paratype female (n=1)
L	3.61	3.0
a	11.3	11.3
b	6.2	5.3
c	3.8	3.6
V	50.3	49.8
Maximum body width	320	208
Buccal cavity L x W	16 x 12	16 x 12
Length of oesophagus	564	544
Corpus length	428	408
Isthmus L x W	32 x 40	28 x 36
Oesophageal end bulb L x W	110 x 112	104 x 104
Excretory pore from anterior end	544	544
Vulva from anterior end	1800	1540
Egg L x W	86 x 56	84 x 56
Tail length	928	864

Distribution : India : Delhi, Andhra Pradesh (Medak).

Remarks : Gantait and Chatterjee (2007) reported the species from Medak, Andhra Pradesh, India. The species is endemic to India.

52. ***Thelastoma kherai*** Duggal and Aulakh, 1989

1989. Duggal, C.L. and Aulakh, A. *Thelastoma kherai* sp. nov. and *Thelastoma guptai* sp. nov. (Nematoda : Thelastomatidae) from *Periplaneta americana* (Linnaeus) in Delhi, India. *Research Bulletin (Science) of the Panjab University*, **40**, Parts I-II : 95-98.

Type host : Common cockroach, *Periplaneta americana* L.

Type habitat : Intestine.

Type locality : Delhi, India.

Type collector : C. L. Duggal and Arvind Aulakh.

Type materials : One holotype female and three paratypes (two female and one male) were deposited in the Helminthological Collections, Department of Zoology, Punjab University, Chandigarh, Punjab, India.

Measurements (all are in µm except L in mm) :

Characters	**Holotype female**	**Paratype female (n=2)**	**Male**
L	2.94	2.78-2.80	Unknown
a	15.3	14.5	
b	5.3	5.2-5.3	
c	3.4	3.3	
V	50	50	
Maximum body width	192	192	
Length of oesophagus	548	512-520	
Corpus L x W	424 x 36	392-400 x 36	
Isthmus L x W	28 x 32	28 x 32	
Oesophageal end bulb L x W	96 x 96	94-96 x 92	
Excretory pore from anterior end	512	512	
Vulva from anterior end	1470	1.39-1.41	
Egg L x W	84 x 56	76-80 x 52	
Tail length	880	800-824	

Distribution : India : Delhi, Andhra Pradesh (Nandyal, Karnool).

Remarks : Gantait and Chatterjee (2007) reported the species from Nandyal of Karnool district, Andhra Pradesh, India. The species is endemic to India.

53. *Thelastoma pterygoton* Poinar Jr., 1973.

1973. Poinar, G.O. Jr. Description and observations on a cuticular infection of *Thelastoma pterygoton* sp. n. (Thelastomatidae : Nematoda) from *Oryctes* spp. (Scarabaeidae : Coleoptera). *Proceedings of the Helminthological Society of Washington*, **40**(1) : 37-42.

Host : *Oryctes monoceros* (Coleoptera : Scarabaeidae), *Hydrophilus* sp.

Habitat : Intestine of third stage larvae of the beetles.

Measurements (all are in mm) (after Gantait & Chatterjee, 2007) :

Characters	Female	Male
L	1.42-2.90	Unknown
a	11.15-11.83	
b	4.43-6.30	
c	4.58-4.91	
V	51-54	
Maximum body width	0.12-0.26	
Buccal cavity L x W	0.011-0.012 x 0.009-0.010	
Length of oesophagus	0.32-0.46	
Excretory pore from anterior end	0.37-0.52	
Nerve ring fromanterior end	0.18-0.20	
Tail length	0.31-0.59	

Distribution : Ivory Coast, West Africa; India : Andhra Pradesh (Cuddaph).

Remarks : The species was described by Poinar Jr. (1973) from Abidjan, Ivory Coast, West Africa. Gantait and Chatterjee (2007) reported the species from Cuddaph, Andhra Pradesh, India. This was the first report from India.

Genus *Schwenkiella* Basir, 1956

54. *Schwenkiella basiri* Parveen and Jairajpuri, 1980

1980. Parveen, R. and Jairajpuri, D.S. A new species of the Genus *Schwenkiella* Basir, 1956 from the cockroach, *Periplaneta americana*, from Aligarh. *Indian Journal of Parasitology*, **4** (1) : 41-43.

Type host : Common cockroach, *Periplaneta americana* L.

Type habitat : Intestine.

Type locality : Aligarh, Uttar Pradesh, India.

Type collector : Rafia Parveen.

Type materials : The holotype and paratypes were deposited in the Helminthological Collections, Department of Zoology, Aligarh Muslim University, Aligarh, Uttar Pradesh, India.

Measurements (all are in mm) :

Characters	Female	Male
L	2.53-3.25	0.73
Maximum body width	0.20-0.24	0.06
Buccal cavity L x W	0.016 x 0.014-0.015	0.01 x 0.005
Length of oesophagus	0.43-0.49	0.16
Corpus L x W	0.31-0.35 x 0.03-0.05	0.016 x 0.02
Isthmus L x W	0.03 x 0.032-0.036	0.014 x 0.008
Oesophageal end bulb L x W	0.09-0.12 x 0.09-0.12	0.04 x 0.04
Nerve ring from anterior end	0.20-0.24	0.08
Excretory pore from anterior end	0.50-0.58	0.17
Vulva from anterior end	1.2-1.7	-
Egg L x W	0.06-0.08 x 0.05-0.06	-
Spicule length	-	0.04
Tail length	0.67-0.73	0.11

Distribution : India : Uttar Pradesh (Aligarh), Andhra Pradesh (Guntur).

Remarks : Gantait and Chatterjee (2007) reported the species from Guntur of Guntur district, Andhra Pradesh, India. The species is endemic to India.

55. ***Schwenkiella icemi*** (Schwenk, 1926) Basir, 1956

Synonyms : *Bulhõesia icemi* Schwenk, 1926; *Thelastoma aligarhica* Basir, 1940; *Thelastoma icemi* Schwenk, (1926) Travassos, 1929

1926. Schwenk, J.M. Fauna parasitological dos blattideos do Brasil. *Sci. Medica, Rio de Janeiro,* **4** : 491-504.

1929. Travassos, L. Contribuicão preliminary á systematica dos nematoideos dos arthropods. *Mem. Inst. Oswaldo Cruz., Suppl.*, **5** : 19-25.

1940. Basir, M.A. Nematodes parasitic in Indian cockroaches. *Proc. Indian Acad. Sci.*, **12** (Sec. B) : 8-16.

1956. Basir, M.A. Oxyuroid parasites of Arthropoda. A monographic study 1. Thelastomatidae 2. Oxyuridae. *Zoologica* (Stuttgart). 79 pp., 13 plates.

Host : *Periplaneta americana, Xenobolus cornifex* (Fabr.) and *Thyropygus* sp.

Habitat : Intestine and rectum.

Measurements (all are in µm except L in mm) (after Basir, 1956) :

Characters	Female	Male
L	2.0-3.3	1.1
Maximum body width	200-300	70
Buccal cavity L x W	12-15 x 10	-
Oesophageal length	360-460	160
Corpus L x W	260-340 x 30-37	130 x 24
Isthmus L x W	21-34 x 30-42	-
Oesophageal end bulb L x W	77-105 x 80-100	33 x 34
Nerve ring from anterior end	160-210	100
Excretory pore from anterior end	380-580	200
Vulva from anterior end	1220-1580	-
Eggs diameter	65-75 x 46-57	-
Spicule length	-	30
Tail length	360-650	180

Distribution : Brazil (São Paulo); India : Uttar Pradesh (Aligarh), West Bengal (Howrah, South 24 Parganas); United States of America.

Remarks : Basir (1956) redescribed the species from Aligarh of Uttar Pradesh, collected from intestine of *Periplaneta americana*. Soota and Chaturvedi (1971) reported it from South 24 Parganas (Baruipur and Bhajna) and Howrah districts of West Bengal, collected from rectum of *Periplaneta americana*, *Xenobolus cornifex* (Fabr.) and *Thyropygus* sp.

56. ***Schwenkiella indica*** Rao and Rao, 1966

1966. Rao, P.N. and Rao, V.J. *Schwenkiella indica* sp. nov., (Nematoda : Thelastomatidae), a new nematode parasite of spotted roach with comments on the two allied genera *Schwenkiella* Basir, 1956 and *Cephalobellus* Cobb, 1920. *Indian Journal of Helminthology*, **XVIII** : 92-96.

Type host : Spotted roach, *Corydia* sp.

Type habitat : Intestine of the insect hosts.

Type locality : Osmania University campus, Hyderabad district, Andhra Pradesh, India.

Type collector : V. Jagannath Rao.

Type materials : The types were deposited in the Museum of Zoology Department, University College of Science, Osmania University, Hyderabad, Andhra Pradesh, India.

Measurements (all are in mm) :

Characters	Female	Male
L	2.33	1.11
Maximum body width	0.235	0.12
Buccal cavity L x W	0.009 x 0.012	0.009 x 0.006
Oesophageal length	0.406	0.198
Corpus L x W	0.290 x 0.023	0.136 x 0.025
Isthmus L x W	0.027 x 0.03	0.015x 0.012
Oesophageal end bulb L xW	0.086 x 0.086	0.046 x 0.035
Nerve ring from anterior end	0.195	-
Vulva from anterior end	1.19	-
Eggs diameter	0.081 x 0.065	-
Spicule length	-	Absent
Tail length	0.588	0.27

Distribution : India : Andhra Pradesh (Hyderabad).

Remarks : The species is endemic to India.

57. ***Schwenkiella periplaneticola*** Parveen and Jairajpuri, 1981

1980. Parveen, R. and Jairajpuri, D.S. Twonew species of insect nematodes of the Family Thelastomatidae. *Rivista di Parassitologia.* **XLII** (2) : 261-266.

Type host : Common cockroach, *Periplaneta americana* L.

Type habitat : Rectum.

Type locality : Aligarh, Uttar Pradesh, India.

Type collector : Rafia Parveen.

Type materials : The types were deposited in the Helminthological Collections, Department of Zoology, Aligarh Muslim University, Aligarh, Uttar Pradesh, India.

Measurements (all are in mm) :

Characters	Female	Male
L	2.8-3.1	0.86-0.92
Maximum body width	0.18-0.20	0.066-0.072
Buccal cavity L x W	0.014-0.015	0.011-0.015 x 0.004-0.007
Length of oesophagus	0.44-0.50	0.151-0.174
Corpus L x W	0.32-0.35 x 0.03-0.04	0.096-0.125 x 0.015-0.020
haracters	**Female**	**Male**
Isthmus L x W	0.03-0.04 x 0.04	0.013-0.022 x 0.008-0.009
Oesophageal end bulb L x W	0.09-0.10 x 0.08-0.09	0.033-0.038 x 0.033-0.037
Nerve ring from anterior end	0.19-0.20	0.08
Excretory pore from anterior end	0.50-0.56	0.215-0.243
Vulva from anterior end	1.3-1.5	-
Egg L x W	0.05-0.08 x 0.05-0.06	-
Spicule length	-	0.032-0.035
Tail length	0.87-0.94	0.286-0.360

Distribution : India : Uttar Pradesh (Aligarh), Andhra Pradesh (Rajamundry, Easr Godavari).

Remarks : Gantait and Chatterjee (2007) reported the species from Rajamundry of East Godavari district, Andhra Pradesh, India. The species is endemic to India.

Genus ***Gryllophila*** Basir, 1942

Synonyms : *Thelastomum* Leidy, 1850; *Neyraiella* Serrano Sánchez, 1947

58. ***Gryllophila basiri*** Parveen and Jairajpuri, 1981

1981. Parveen, R. and Jairajpuri, D.S. Two new species of insect nematodes of the Family Thelastomatidae. *Rivista di Parassitologia.* **XLII** (2) : 261-266.

Type host : Mole cricket, *Gryllotalpa africana.*

Type habitat : Rectum.

Type locality : Aligarh, Uttar Pradesh, India.

Type collector : Rafia Parveen.

Type materials : The type specimens (one male and few females) were deposited in the Helminthological Collections, Department of Zoology, Aligarh Muslim University, Aligarh, Uttar Pradesh, India.

Measurements (all are in mm) :

Characters	Female	Male
L	1.46-1.68	0.9
Maximum body width	0.164-0.165	0.1
Buccal cavity L x W	0.015-0.016 x 0.012-0.014	0.021 x 007
Length of oesophagus	0.370-0.386	0.171
Corpus L x W	0.26 x 0.028-0.029	0.107 x 0.018
Isthmus L x W	0.040-0.043 x 0.025-0.029	0.014 x 0.014
Oesophageal end bulb L x W	0.086 x 0.080-0.083	0.050 x 0.043
Nerve ring from anterior end	0.197-0.200	0.107
Excretory pore from anterior end	0.66-0.70	0.307
Vulva from anterior end	1.07-1.29	-
Egg L x W	0.050-0.064 x 0.028-0.043	-
Spicule length	-	0.050
Tail length	0.179-0.180	0.118

Distribution : India : Uttar Pradesh (Aligarh), Andhra Pradesh (Gudur, Nellore).

Remarks : Gantait and Chatterjee (2007) reported the species from Gudur of Nellore district, Andhra Pradesh, India. The species is endemic to India.

59. ***Gryllophila nihali*** Rizvi *et al.*, 2002

2002. Rizvi, A.N., Jairajpuri, D.S. and Shah, M.M. *Gryllophila nihali* sp. n. and *Protrellatus indicus* sp. n. (Oyurida : Thelastomatoidea). *International Journal of Nematology*, **12** (1) : 29-34.

Type host : Mole cricket, *Gryllotalpa africana.*

Type habitat : Midgut.

Type locality : Siddharth Nagar, Uttar Pradesh, India.

Type collectors : M. Manjur Shah and Anjum Nasreen Rizvi.

Type materials : Holotype female on slide *Gryllophila nihali* sp. n./1; paratype females on slides *G. nihali* sp. n./2-9; paratype males on slide *G. nihali* sp. n./10-12 were deposited in the Nematode Collections, Department of Zoology, Aligarh Muslim University, Aligarh, Uttar Pradesh, India.

Measurements (all are in µm except L in mm) :

Characters	Holotype female	Paratype female (n=8)	Paratype male (n=3)
L	2.44	2.20-2.25	0.72-0.97
a	8.15	7.57-8.25	7.57-9.95
b	5.75	5.23-5.81	3.93-5.53
c	10.18	10.0-10.41	8-13
V	77.7	77.27-78.00	-
Buccal cavity depth	-	17-25	15-20
Length of oesophagus	425	418-435	176-183
Corpus L x W	-	290-307 x 30-32	124-146 x 15-18
Isthmus length	-	35-36 x 26-28	-
Oesophageal end bulb L x W	-	93-95 x 85-87	-
Excretory pore from anterior end	-	830-850	-
Nerve ring from anterior end	-	220-240	0.08-0.09
Egg L x W	138 x 68	135-138 x 56-68	-
Spicule length	-	-	54-57
Tail length	0.24	170-240	0.059-0.090

Distribution : India : Uttar Pradesh (Siddharth Nagar).

Remarks : The species is endemic to India.

60. ***Gryllophila skrjabini*** (Sergiev, 1923) Basir, 1956

Synonyms : *Thelastomum skrjabini* Sergiev, 1923; *Gryllophila gryllophila* Basir, 1942; *Neyraiella neyrae* Serrano Sánchez, 1947.

1923. Sergiev, P.G. Two new nematodes from the intestine of *Gryllotalpa vulgaris*. Rapport de 21^{e} séance de la commission pour 1'étude de la faune helminthologique de Russie 1923. (In Russion.) *Trans. State Inst. Exp. Vet. Sci., Moscow*, **1** : 183-190.

1942. Basir, M.A. Nematodes parasitic in *Gryllotalpa*. *Records of Indian Museum*, **44** : 95-106.

1947. Serrano Sánchez, A. Nematodes parasites intestinales de los arthropods en Espana. *Rev. Iberica Parasitilogia*, **7** : 279-332.

1956. Basir, M.A. Oxyuroid parasites of Arthropoda. A monographic study 1. Thelastomatidae 2. Oxyuridae. *Zoologica* (Stuttgart). 79 pp., 13 plates.

Host : *Gryllotalpa africana, G. europaeus* L., *G. vulgaris.*

Habitat : Intestine.

Measurements (all are in μm except L in mm) (after Basir, 1956) :

Characters	Female	Male
L	2.25-3.10	1.17
Maximum body width	410	170
Buccal cavity L x W	20 x 10	12 x 8
Length of oesophagus	420	200
Corpus L x W	290 x 45	115 x 20
Isthmus L x W	30 x 35	40 x 10
Oesophageal end bulb L x W	100 x 110	45 x 40
Excretory pore from anterior end	-	440
Nerve ring from anterior end	240	125
Vulva from anterior end	2250	-
Egg L x W	170-190 x 100-110	-
Spicule length	-	50
Tail length	325	115

Distribution : USSR; India : Uttar Pradesh (Aligarh), Andhra Pradesh (Kakinada); Spain.

Remarks : Basir (1956) redescribed the species from Aligarh of Uttar Pradesh, North India. Gantait and Chatterjee (2007) recorded the species from Kakinada of Andhra Pradesh, South India.

Family PROTRELLOIDIDAE Travassos, 1929

Genus ***Protrellatus*** Farooqui, 1970

61. ***Protrellatus indicus*** Rizvi *et al.*, 2002

2002. Rizvi, A.N., Jairajpuri, D.S. and Shah, M.M. *Gryllophila nihali* sp. n. and *Protrellatus indicus* sp. n. (Oyurida : Thelastomatoidea). *International Journal of Nematology*, **12** (1) : 29-34.

Type host : *Gryllus domesticus.*

Type habitat : Midgut.

Type locality : Siddharth Nagar, Uttar Pradesh, India.

Type collectors : M. Manjur Shah and Anjum Nasreen Rizvi.

Type materials : Holotype female on slide *Protrellatus indicus* sp. n./1; paratype females on slides *P. indicus* sp. n./2-11; paratype male on slide *P. indicus* sp. n./12 were deposited in the Nematode Collection, Department of Zoology, Aligarh Muslim University, Aligarh, Uttar Pradesh, India.

Measurements (all are in µm except L in mm) :

Characters	Holotype female	Paratype female (n=10)	Paratype male (n=1)
L	7.8	5.4-8.3	1.20
a	20	16.4-21.1	20
b	11.6	8.5-13.2	9
c	18.1	15.8-22.6	6.15
V	2.11	1.6-2.7	-
Buccal cavity depth	-	14-21	7
Length of oesophagus	671	590-670	133
Corpus L x W	-	514-577 x 40-46	100 x 12-20
Oesophageal end bulb diameter	-	90-99	-
Excretory pore from anterior end	-	114-130	-
Nerve ring from anterior end	-	107-110	52
Egg L x W	118 x 44	115-118 x 40-48	-
Spicule length	-	-	25
Tail length	430	330-480	195

Distribution : India : Uttar Pradesh (Siddharth Nagar).

Remarks : The species is endemic to India.

Family BLATTOPHILIDAE Cobb, 1920

Genus ***Blattophila*** Cobb, 1920

62. ***Blattophila indica*** Rao and Rao, 1965

1965. Rao, P.N. and Rao, V.J. A description of a new species of the nematode Genus *Blattophila* Cobb, 1920 (Thelastomatidae). *Secretaria Da Agricultura-São Paulo, Brasil*, **18**(Part. 8) : 61-63.

Type host : Spotted roach, *Corydia* sp., Blattaria.

Type habitat : Rectum of the insect hosts.

Type locality : Hyderabad, Andhra Pradesh, India.

Type collector : V. Jagannath Rao.

Type materials : The types were deposited in the Museum of Zoology Department, University College of Science, Osmania University, Hyderabad, Andhra Pradesh, India.

Distribution : India : Andhra Pradesh (Hyderabad).

Remarks : The species is endemic to India.

63. ***Blattophila supellaima*** Basir, 1941

1941. Basir, M.A. A new species of the nematode Genus *Blattophila* Cobb, 1920 from a cockroach. *Current Science*, **10** : 443- 444.

Type host : *Supella supelleciillum* Serv.

Type habitat : Rectum.

Type locality : Aligarh, Uttar Pradesh, India.

Type collector : M. A. Basir.

Type materials : Holotype and paratype females (male unknown) were deposited in the Nematode Collection, Department of Zoology, Aligarh Muslim University, Aligarh, Uttar Pradesh, India.

Measurements (all are in μm except L in mm) :

Characters	**Female**	**Male**
L	2.5	Unknown
Maximum body width	360	
Buccal cavity L x W	10 x 20	
Length of oesophagus	387	
Corpus L x W	262 x 17-40	
Isthmus L x W	40 x 27	
Oesophageal end bulb L xW	85 x 90	
Nerve ring from anterior end	175	
Egg L x W	80 x 60	
Tail length	380	

Distribution : India : Uttar Pradesh (Aigarh).

Remarks : The species is endemic to India.

Order RHABDITIDA (Oerley, 1880) Chitwood, 1933

Suborder RHABDITINA (Oerley, 1880) Chitwood, 1933

Superfamily RHABDITOIDEA (Oerley, 1880) Travassos, 1920

Family DIPLOGASTERIDAE Micoletzky, 1922

Genus ***Cephalobium*** Cobb, 1920

Subgenus ***Adenticum*** Gantait and Chatterjee, 2007

64. ***Cephalobium (Adenticum) aodus*** Rao, 1982

1982. Rao, V.J. Description of a new nematode belonging to the Genus *Cephalobium* Cobb, 1920 with generic diagnosis. *Indian Journal of Nematology*, **12** (1) : 185-188.

Type host : *Gryllus* sp.

Type habitat : Intestine.

Type locality : Medak, Andhra Pradesh, India.

Type collector : V. Jagannath Rao.

Type materials : The types were deposited in the Museum of Zoology Department, University College of Science, Osmania University, Hyderabad, Andhra Pradesh, India.

Measurements (all are in mm) :

Characters	**Female (n=20)**	**Male (n=8)**
L	3.619-3.690	2.86-3.20
Maximum body width	0.133-0.146	0.117-0.125
Buccal cavity L x W	0.025-0.031 x 0.007-0.008	0.025-0.031 x 0.012-0.018
Length of oesophagus	0.362-0.383	0.313-0.364
Corpus L x W	0.235-0.248 x 0.022-0.027	0.199-0.218 x 0.015
Median bulb L x W	0.042-0.046 x 0.039-0.046	0.034-0.047 x 0.034-0.038
Post bulbal portion length	0.039-0.085	0.081-0.099
Vulva from anterior end	1.75-1.89	-
Egg L x W	0.054-0.070 x 0.036-0.050	-
Spicule length	-	0.124-0.133
Gubernaculum L x W	-	0.025-0.050 x 0.008-0.010
Tail length	0.325-0.345	0.294-0.314

Distribution : India : Andhra Pradesh (Medak).

Remarks : The species is endemic to India.

65. ***Cephalobium* (*Adenticum*) *caudatum*** Gantait and Chatterjee, 2007

2007. Gantait, V.V. and Chatterjee, A. Parasitic nematodes of arthropods. *Fauna of Andhra Pradesh, State fauna Series, Zoological Survey of India,* **5**(Part- 4) : 81-123.

Type host : Mole cricket, *Gryllotalpa africana.*

Type habitat : Rectum of the insect hosts.

Type locality : Dakili Forest Rest House garden, Dakili, Nellore district, Andhra Pradesh, India.

Type collector : Viswa Venkat Gantait.

Type materials : The male holotype and paratypes (8 males and 13 females) were deposited in the National Zoological Collections of Zoological Survey of India, Kolkata, West Bengal, India.

Measurements (all are in mm) :

Characters	Holotype Male	Paratype Male(n=8)	Paratype Female (n=13)
L	2.85	2.64-2.97	2.88-3.23
Maximum body width	0.096	0.072-0.106	0.080-0.112
Buccal cavity L x W	0.032	0.03-0.04	0.03-0.04
Length of oesophagus	0.540	0.512-0.568	0.560-0.584
Corpus L x W	0.40 x 0.02	0.40-0.41 x 0.02-0.03	0.41-0.43 x 0.02
Median bulb L x W	0.05 x 0.05	0.04-0.06 x 0.02-0.03	0.05-0.06 x 0.03-0.04
Post bulbal portion L x W	0.09 x 0.03	0.08-0.11 x 0.02-0.03	0.08-0.09 x 0.02
Nerve ring from anterior end	0.21	0.18-0.22	0.20-0.22
Vulva from anterior end	-	-	1.44-1.61
Egg L x W	-	-	0.064-0.072 x 0.032
Spicule length	0.144	0.133-0.152	-
Tail length	0.20	0.19-0.22	0.34-0.40

Distribution : India : Andhra Pradesh (Dakili, Nellore district).

Remarks : The species is endemic to India.

Subgenus ***Denticum*** Gantait and Chatterjee, 2007

66. ***Cephalobium* (*Denticum*) *gryllodes*** Rao, 1980

1980. Rao, V.J. Description of a new nematode belonging to the Genus *Cephalobium* Cobb, 1920 (Cephalobidae : Nematoda). *Proceedings of the Indian Academy of Parasitology*, **1** (1) : 66-68.

Type host : *Gryllodes* sp.

Type habitat : Intestine.

Type locality : Nizamabad, Andhra Pradesh, India.

Type collector : V. Jagannath Rao.

Type materials : The types were deposited in the Museum of Zoology Department, University College of Science, Osmania University, Hyderabad, Andhra Pradesh, India.

Distribution : India : Andhra Pradesh (Nizamabad).

Remarks : The species is endemic to India.

67. ***Cephalobium* (*Denticum*) *microvata*** Rao and Rao, 1965

1980. Rao, P.N. and Rao, V.J. A description of a new species of the Genus *Cephalobium* Cobb, 1920 with comments on other species of the genus. *Annals and Magazine of Natural History*, **VIII** : 360-364.

Type host : *Gryllus* sp.

Type habitat : Rectum of the insect hosts.

Type locality : Hyderabad, Andhra Pradesh, India.

Type collector : V. Jagannath Rao.

Type materials : The types were deposited in the Museum of Zoology Department, University College of Science, Osmania University, Hyderabad, Andhra Pradesh, India.

Measurements (all are in mm) :

Characters	Female	Male
L	4.29-4.45	2.80-2.98
Maximum body width	0.164-0.187	0.117-0.122
Buccal cavity depth	0.025	-
Length of oesophagus	0.397-0.400	0.298
Corpus L x W	0.252-0.260 x 0.027	0.17 x 0.02
Median bulb diameter	0.034-0.043	0.32
Post bulbal portion length	0.097-0.105	0.093
Vulva from anterior end	2.028-2.200	-
Egg L x W	0.050-0.055 x 0.030-0.035	-
Spicule length	-	0.114
Gubernaculum length	-	0.020
Tail length	0.363-0.375	0.298

Distribution : India : Andhra Pradesh (Hyderabad).

Remarks : The species is endemic to India.

Family HETERORHABDITIDAE Poinar, 1976

Genus ***Heterorhabditis*** Poinar, 1976

Synonym : *Chromonema* Khan, Brooks and Hirschmann, 1976

68. ***Heterorhabditis bacteriophora*** Poinar, 1976

1976. Poinar, G.O. Jr. Description and biology of a new insect parasitic rhabditoid, *Heterorhabditis bacteriophora* n. gen., n. sp. (Rhabditida : Heterorhabditidae n. fam.) *Nematologica*, **21** : 463-470.

Type host : *Heliothis punctigera* Hall (Noctuidae : Lepidoptera).

Type habitat : Body cavity of the insect hosts.

Type locality : Brecon, South Australia.

Type collector : George O. Poinar, Jr.

Type materials : Holotype (hermaphroditic female), allotype (male) and paratype (dioecious female) deposited in the nematology collection at the University of California at Davis, Calif., U.S.A.

Measurements (all are in µm except L in mm) :

Characters	**Infective third-stage juvenile (n=15)**	**Mature hermaphroditic female (n=15)**	**Mature dioecious female (n=15)**	**Male (n=15)**
L	0.57 (0.52-0.60)	4.03 (3.63-4.39)	3.50 (3.18-3.85)	0.82 (0.78-0.96)
Maximum width	24 (21-31)	165 (160-180)	190 (160-220)	43 (38-46)
Length of stoma	-	8 (6-9)	7 (6-9)	3 (2-4)
Width of stoma	-	8 (6-9)	7 (6-9)	2 (1-3)
Length of pharynx	125 (119-130)	197 (189-205)	168 (155-183)	103 (99-105)
Nerve ring from anteroir end	83 (81-88)	126 (121-130)	103 (93-118)	72 (65-81)
Excretory pore from anterior end	104 (94-109)	209 (189-217)	192 (174-214)	121 (114-130)
V	-	44 (41-47)	47 (42-53)	-
Body width at anus	-	46 (40-53)	28 (22-31)	23 (22-25)
Length of spicule	-	-	-	40 (36-44)
Length of gubernaculum	-	-	-	20 (18-25)
Tail length	91 (83-99)	90 (81-93)	82 (71-93)	28 (22-36)

Distribution : South Australia (Brecon); India : Tamil Nadu (Coonoor), Assam, Meghalaya.

Remarks : *Heterorhabditis bacteriophora* is the first entomopathogenic nematode, described from India. It has potential as a biological control agent, appeared to be an important pathogen of *Heliothis punctigera.* It is capable of destroying larvae of *Culex pipiens* L.

69. ***Heterorhabditis indica*** Poinar *et al.*, 1992

1992. Poinar, G.O. Jr., Karunakar, G.K. and David, H. *Heterorhabditis indicus* n. sp. (Rhabditida : Nematoda) from India : separation of Heterorhabditis spp. by infective juveniles. *Fundamental and Applied Nematology*, **15** : 467- 472.

Type host : *Scirpophaga excerptalis* (Pyralidae : Lepidoptera) used as a trap insect in soil.

Type locality : Coimbatore, Tamil Nadu, India.

Type collector : George O. Poinar, Jr.

Type materials : Holotype (male) and allotype (hermaphroditic female) deposited in the Nernatology Collection at the University of California, Davis, California. Paratypes (one male, one female) deposited in the Laboratoire des Vers, museum at national d' Histoire Naturelle, Paris.

Measurements (all are in ìm) :

Characters	**Infective third-stage juvenile (n=25)**	**Mature hermaphroditic female (n=12)**	**Mature dioecious female (n=15)**	**Male (n=15)**
L	528 (479-573)	2700 (2300-3100)	1600 (1200-1800)	721 (573-788)
Maximum width	20 (19-22)	132 (107-145)	95 (76-113)	42 (35-46)
Length of stoma	10 (8-11)	6 (5-8)	5 (4-8)	3 (2-4)
Width of stoma	-	8 (6-10)	7 (5-8)	5 (4-6)
Length of pharynx	117 (109-123)	172 (163-179)	131 (120-139)	101 (93-109)
Nerve ring from anteroir end	82 (72-85)	115 (104-123)	92 (88-96)	75 (72-85)
Excretory pore from anterior end	98 (88-107)	173 (163-187)	127 (118-138)	123 (109-138)
V	-	47 (45-50)	48 (40-53)	-
Body width at anus	-	11 (5-14)	26 (22-32)	23 (19-24)
Length of spicule	-	-	-	43 (35-48)
Length of gubernaculum	-	-	-	21 (18-23)
Tail length	101 (93-109)	92 (72-110)	76 (66-88)	28 (24-32)

Distribution : India : Tamil Nadu (Coimbator), Karnataka (Bangalore), Manipur, Meghalaya and Kerala.

Remarks : The species has a potential to use as biological control agents against hive beetles. According to Ellis *et al.* (2010) and Shapiro-Ilan *et al.* (2010) *H. indica* can causes over 76% and 78% mortality of a hive beetle *Aethina tumida* Murray (Coleoptera : Nitidulidae) respectively.

Family STEINERNEMATIDAE Chitwood and Chitwood, 1937

Synonym : Neoaplectanidae Sobolev, 1953

Genus ***Steinernema*** Travassos, 1927

70. ***Steinernema bicornutum*** Tallosi *et al.*, 1995

1995. Tallosi, B., Peters, A. and Ehlers, R. *Steinernema bicornutum* sp. n. (Rhabditida : Steinernematidae) from Vojvodina, Yugoslavia. *Russian Journal of Nematology*, **3** : 71-80.

Type host : No type host can be named as the species was isolated using wax moth larvae as bait.

Type locality : Strazilovo, Vojvodina, south of Novi Sad, Yugoslavia, in the Furska Gora Mountains.

Type collector : B. Tallosi.

Type materials : Holotype and paratypes deposited in the German Nematode Collection at Biologische Bundesanstalt, Institute for Nematology and Vertebrate Research, Miinster, Germany. The strain designation of the type population is YuS-Wo 6.

Measurements (all are in μm) :

Characters	**Infective third-stage juvenile (n=15)**	**Male (n=15)**
L	770	1352
a	27 (23-29)	-
b	6.2 (5.6-6.9)	-
c	10.7 (9.7-12.0)	-
Maximum width	30 (25-33)	109 (80-128)
Oesophageal length	124 (113-135)	156 (138-168)
Nerve ring from anteroir end	92 (88-100)	123 (108-137)
Excretory pore from anterior end	61 (53-65)	82 (68-98)
Length of spicule	-	65 (53-70)
Length of gubernaculum	-	48 (38-50)
Tail length	72 (63-78)	32 (25-35)

Distribution : Yugoslavia (Vojvodina); India : Karnataka, New Delhi (IARI farm).

71. ***Steinernema carpocapsae*** (Weiser, 1995) Wouts *et al.*, 1982

Synonym : *Neoaplectana carpocapsae* Weiser, 1955

1955. Weiser, J. *Vestnik Ceskoslovenske Spolecnosti Zoologicke*, **19** : 44 -52.

1982. Wouts, W.M., Mracek, Z., Gerdin, S. and Bedding, R.A. *Systematic Parasitology*, **4** : 147-154.

Distribution : India : Andhra Pradesh, Tamil Nadu, Gujarat (Dantiwada, Deesa and Palanpur of Banaskantha district).

Remarks : Due to lack of original literature the details of the species are not to be provided herein.

72. ***Steinernema feltiae*** (Filipjev, 1934) Wouts *et al.*, 1982

1982. Wouts, W.M., Mracek, Z., Gerdin, S. and Bedding, R.A. *Systematic Parasitology*, **4** : 147-154.

Distribution : India : Karnataka (Bangalore), Andhra Pradesh (ICRISAT), Kerala (CPCRI, Kayangulam, Idukki).

Remarks : Due to lack of original literature the details of the species are not to be provided herein.

73. ***Steinernema glaseri*** (Steiner, 1929) Wouts *et al.*, 1982

1929. Steiner, G. *Journal of the Washington Academy of Sciences*, **19** : 436-440.

1982. Wouts, W.M., Mracek, Z., Gerdin, S. and Bedding, R.A. *Systematic Parasitology*, **4** : 147-154.

Type host : Dead larvae of Japanese beetle (*Popillia japonica*)

Type locality : Tavistock Golf Course near Haddonfield, New Jersey, USA.

Type collector : Glaser, R. W. and Fox, H.

Measurements (all are in µm) :

Characters	**Infective third-stage juvenile (n=15)**	**Male (n=15)**
L	1130 (864-1448)	1700 (1500-1900)
a	29 (26-35)	-
b	70.3 (6.3-7.8)	-
c	14.7 (13.6-15.7)	-
Maximum width	43 (31-50)	72 (54-92)
Oesophageal length	162 (158-168)	160 (155-187)
Nerve ring from anteroir end	120 (112-126)	132 (99-183)
Excretory pore from anterior end	102 (87-110)	145 (121-178)
Length of spicule	-	77 (62-90)
Width of spicule	-	9 (6-12)
Length of gubernaculum	-	46 (40-50)
Width of gubernaculum	-	8 (6-9)
Tail length	78 (62-87)	30 (28-44)

Distribution : New Jersey, Louisiana, Mississippi, North Carolina, Florida, Texas, Alabama in the United States; Santa Rosa, Brazil; India : Karnataka (Bangalore).

Remarks : *S. glaseri* is the first nematode which was investigated extensively as a biocontrol agent of insects. It attacks mainly soil insects, especially insects in the order Coleoptera including the families Chrysomelidae, Curculionidae, Elateridae and Scarabidae. It also parasitizes some insects in the orders Lepidoptera, Orthoptera and may be others.

74. ***Steinernema masoodi*** Ali *et al.*, 2005

2005. Ali, S.S., Shaheen, A., Pervez, R. and Hussain, M.A. *International Journal of Nematology*, **15** (1) : 89-99.

Type host : Unknown, but likely to be *Helicoverpa armigera* (Hubner).

Type locality : Sandy soil in pigeonpea (*Cajanus cajan* L.) fields in Bithoor village, Kanpur district, Uttar Pradesh, India.

Type collector : Ali *et al.*

Type materials : Holotype male, 8 paratype males 8 paratype femals and 10 paratype juveniles, deposited at Nematology Unit, Indian Institute of Pulses Research, Kanpur; 2 each paratype females, males and juveniles deposited at CAB Bioscience (UK) Centre, Egham, U.K.

Measurements (all are in µm) :

Characters	**Holotype male**	**First generation male (n=9)**	**Second generation male (n=10)**	**First generation female (n-12)**	**Second generation female (n-10)**	**Mature female (n=5)**	**Third stage juvenile (n=10)**
L	924.4	652-839	537-971	1011.1-1871.8	809-1576	5227-6750	405-585
a	17.0	12.5-14.6	9.2-17.0	12.9-22.5	10.6-18.8	28-34	10.7-20.2
b	6.2	4.7-6.7	4.8-5.5	6.8-11.2	5.2-9.8	24-30	4.2-5.2
c	59.6	35-50.8	30-54	29.4-75.2	20.7-37.6	193-251	9.8-12.9
V	-	-	-	49.8-62.7	50.9-58.5	49-52	-
Maximum width	59.3	45.2-63.0	44.6-76.2	93.4-132.0	61.5-147.0	167-217	17.2-41.8
Length of stoma	10.7	8.7-10.6	8.7-9.7	8.7-9.7	8.7-9.7	12.6-19.4	3.8-5.8
Width of stoma	5.3	5.8-6.8	5.8-7.7	5.8-7.7	5.8-7.7	11.6-12.6	3-4
Length of pharynx	149.3	123-147	109-157	140-182	124-167	210-225	83.4-99.9
Nerve ring from anteroir end	118.3	91-106	87.3-113.0	30.2-48.2	89-119	150-161	63.0-72.7
Excretory pore from anterior end	58.2	46-59	50.4-71.3	52.3-88.9	46.5-61.3	73.111	31.33
Body width at anus	31	28.1-36.9	25.2-34.4	29.5-46.7	24.2-36.8	67-123	11.6-17.4
Length of spicule	49.4	51.6-61.1	44-59	-	-	-	-
Width of gubernaculum	4.8	3.8-4.8	3.8-4.8	-	-	-	-
Tail length	15.5	16.4-22.1	15.5-21.3	24.6-43.0	30.7-39.3	24-34	37.8-43.6

Distribution : India : Uttar Pradesh (Kanpur).

Remarks : *S. masoodi* is endemic to India. *Helicoverpa armigera* is the most devastating insect pest of pigeonpea (*Cajanus cajan* L.) in India; *S. masoodi* act as an effective biological control agent against this pest.

75. ***Steinernema meghalayansis*** Ganguly *et al.*, 2011

2011. Ganguly, S., Rathour, K.S., Kumar, S. and Singh, M. *Indian Journal of Nematology*, **41** (1) : 83-97.

Type host : Natural insect host unknown. Nematode specimens were isolated by baiting the soil samples with larvae of *Galleria mellonella.*

Type locality : Soil in the farm area of Upper shilling, Meghalaya, India.

Type collector : K. S. Rathour and Sushil Kumar.

Type materials : Holotype male (first generation), allotype female (first generation) and paratypes comprising 13 first generation males, 18 first generation females, 13 second generation males and 21 second generation females and 20 infective juveniles were deposited in the National Nematode Collection of India at Division of Nematology, IARI, New Delhi (NNCT/Type/2304 -2363). Permanent mounts of 2 paratypes each of first generation males and females, second generation males and females, 10 infective juveniles were deposited in the University of California Nematode Collection, Davis, California, USA.

Measurements (all are in μm) :

Characters	Holotype male	First generation male (n=15)	Second generation male (n=15)	First generation female (n-19)	Second generation female (n-23)	Allotype female	Third stage juvenile (n=10)
L	1260	1210-1450	800-1190	5100-7530	1550-2410	6150	430-630
a	14	11.3-14.7	12.4-19.5	23.9-32.2	16.5-22.3	24.6	17.1-22.0
b	9.92	9.6-11.1	6.66-9.83	22.8-35.5	10.2-15.1	27.9	4.3-6.2
c	84	52.9-84.0	43.6-74.7	143-262	32.91-50.20	246	9.0-11.6
V	-	-	-	49.5-63.9	50.5-58.0	50.4	-
Maximum width	90	86-125	50-94	168-254	80-136	250	22-30
Length of pharynx	127	122-140	112-138	194-250	142-160	220	100-110
Excretory pore from anterior end	32-40	60	60-80	50-70	74-94	62-74	84
Body width at anus	30	28-34	22-32	50-82	34-46	50	12-16
Length of spicule	68	65-78	54-76	-	-	-	-
Length of gubernaculum	-	45	45-60	42-60	-	-	-
Tail length	15	15-26	15-24	21-40	42-54	25	48-58

Distribution : India : Meghalaya.

Remarks : *S. meghalayensis* is endemic to India. This species may prove to be extremely useful bioagent against insect pests of crops, not only for north eastern states but also for any hilly area of the world having high rainfall and moderate temperature, not exceeding 30°C.

76. ***Steinernema riobrave*** Cabanillas *et al.*, 1994.

1994. Cabanillas, H.E., Poinar, G.O. Jr. and Raulston, J.R. *Fundamental and Applied Nematology*, **17** : 123-131.

Type host : Unknown, but likely to be *Helicoperva* (*Heliothis*) *zea* (Boddie) (Lepidoptera : Noctuidae).

Type locality : Corn field at the United States Department of Agriculture South Farm, in the lower Rio Grande Valley near Weslaco, Texas, USA.

Type collector : H. E. Cabanillas.

Measurements (all are in μm) :

Characters	**First generation male (n=10)**	**First generation female (n=10)**	**Third stage juvenile (n=20)**
L	1500-1900	3700-8300	561-701
a	-	-	20.1-23.5
b	-	-	4.9-6.0
c	-	-	10.1-12.4
D	0.6-0.8	0.42-0.62	45-55
V	-	49-56	-
Maximum width	116-160	200-390	26-30
Stoma length	-	4.3-6.3	-
Stoma width	-	7.1-8.8	-
Length of pharynx	128-154	171-211	109-116
Nerve ring from anterior end	106-134	131-168	84-89
Excretory pore from anterior end	94-111	80-118	51-64
Reflextion of testis	185-257	-	-
Length of spicule	63-75	-	-
Width of spicule	11.2-13.7	-	-
Length of gubernaculum	47.5-56.2	-	-
Width of gubernaculum	7.1-8.7	-	-
Tail length	29-35	41-50	46-59

Distribution : Texas, USA; India : Uttar Pradesh (Kanpur), Gujarat (Anand).

Remarks : *Steinernema riobrave* act as a potential biocontrol agent and also commercially uses against corn earworm (*Helicoverpa zea*).

77. ***Steinernema seemae*** Ali *et al.*, 2005

2005. Ali, S.S., Shaheen, A., Pervez, R. and Hussain, M.A. *International Journal of Nematology*, **15** : 89-99.

Type host : Unknown, but likely to be *Helicoverpa armigera* (Hubner).

Type locality : Sandy soil in pigeonpea (*Cajanus cajan* L.) fields in Hamirpur, Uttar Pradesh, India.

Type collector : Ali *et al.*

Type materials : Holotype male, 5 paratype males 3 paratype femals and 8 paratype juveniles, deposited at Nematology Unit, Indian Institute of Pulses Research, Kanpur; 2 each paratype females, males and juveniles deposited at CAB Bioscience (UK) Centre, Egham, U.K.

Measurements (all are in µm) :

Characters	Holotype male	First generation male (n=5)	Second generation male (n=5)	First generation female (n-5)	Second generation female (n-4)	Allotype female (n-3)	Third stage juvenile (n=8)
L	808	702.2-808	600-685	718.7-1122.2	1241-1538	4305-6014	400.6-428.7
a	13.67	12.4-19.4	12.9-18.1	13.7-17.6	13.5-16.7	23.9-26.0	15.2-23.0
b	6.4	4.7-6.4	4.5-5.7	5.5-7.9	8.2-9.9	21.8-27.9	4.5-5.5
c	41.6	27.5-41.6	26.9-37.3	25.5-36.5	30.2-39.2	159-194	8.2-13.3
V	-	-	-	57.9-59.7	53.0-58.7	50.5-58.1	-
Maximum width	59.1	54.5-71.8	37.8-48.5	40.7-74.9	84.3-97.0	179-251	22.3-24.2
Length of stoma	8.7	8.7-10.6	9.7-10.7	8.7-8.7	8.7-10.7	12.6-13.5	2.9-4.4
Width of stoma	6.7	4.8-6.8	5.5-5.8	4.8-6.8	7.7-8.7	11.6	2.0-2.9
Length of pharynx	125.1	125.1-141.0	118.3-132.0	129.0-151.3	144-174	196-216	81.4-84.3
Nerve ring from anteroir end	97	97.0-101.8	87.3-102.8	100.8-118.3	109-131	142-155	54.0-85.2
Excretory pore from anterior end	56.8	48.5-57.2	47.5-48.5	54.3-62.0	50.4-69.8	73.8-110.0	24.2-31.0
Body width at anus	28.13	28.1-30.1	22.3-29.1	21.3-26.1	29.1-38.8	76.7-78.7	7.7-8.7
Length of spicule	46.6	44.6-46.5	34.9-58.2	-	-	-	-
Length of gubernaculum	41.7	26.1-41.7	29.1-43.6	-	-	-	-
Width of gubernaculum	4.8	3.8-4.8	2.9-4.8	-	-	-	-
Tail length	19.4	19.4-24.2	16.4-25.2	28.1-30.0	37.8-38.8	27.0-31.9	32.9-37.8

Distribution : India : Uttar Pradesh (Hamirpur).

Remarks : The species is endemic to India. It acts as an effective biocontrol agent against insect pest of pigeonpea, *Helicoverpa armigera.*

78. ***Steinernema siamkayai*** Stock *et al.*, 1998

1998. Stock, S.P., Somsook, V. and Reid, A. *Steinernema siamkayai* n.sp. (Rhabdita : Steinernematidae), an entomopathogenic nematode from Thailand. *Systematic Parasitology,* **41** : 105-113.

Type host : Unknown in nature, from bait-insect *Galleria mellonella* (L.) in sandy-clay loam soil under sweet tamarind *Tamarindus indicus* L.

Type locality : Lohmsak district (16.4° N, 101.2° E), Petchabun Province, Thailand.

Type collector : Stock *et al.*

Type materials : Holotype male first generation (UCDNC 3645), allotype female first generation (UCDNC 3646), 5 paratype males first generation (UCDNC 3647), 5 paratype femals first generation (UCDNC 3648), 5 paratype third stage infective juveniles (UCDNC 3649), deposited in the University of California Nematode Collection, Davis, California, USA; 5 paratype males first generation, 5 paratype femals first generation; 5 paratype third-stage infective juveniles deposited in Division of Entomology and Zoology, Department of Agriculture, Bangkok, Thailand.

Measurements (all are in μm) :

Characters	**First generation male (n=20)**	**Second generation male (n=20)**	**First generation female (n-20)**	**Second generation female (n-20)**	**Third stage juvenile (n=20)**
L	1035-1278	716-952	3161-5172	1410-2560	398-495
b	-	-	-	-	4.0-6.1
c	-	-	-	-	10.3-14.8
V	-	-	-	48-53	53-58
Maximum width	107-159	47-75	170-280	83-128	18-24
Length of stoma	3-4	7-10	6-10	6-8	-
Width of stoma	3-5	5-8	7.5-12.0	7-10	-
Length of pharynx	123-141	108.5-121.0	152-199	141-169	80-107
Nerve ring from anterior end	81-101	80-91	116-147	113-130	68-80
Excretory pore from anterior end	47.5-67.0	54-68	50-84	65.0-70.5	29-38
Body width at anus	37-54	25-31	48-53	30-49	9.0-15.5
Testis reflextion	296-355	90-120	-	-	-
Length of spicule	75-80	55-73	-	-	-
Width of spicule	7.5-9.0	5.0-6.5	-	-	-
Length of gubernaculum	47-65	37-55	-	-	-
Width of gubernaculum	4-7	3.0-4.5	-	-	-
Tail length	22-32	19-23	22.0-37.5	28-52	31-41

Distribution : Thailand; India : Uttaranchal (Champawat), Tamil Nadu.

Remarks : The species has great potentiality to act as an biological control agent against soil-inhabiting insect pests of different crops.

79. ***Steinernema tami*** Luc *et al.*, 2000

2000. Luc, P.V., Nguyen, K.B., Reid, A.P. and Spiridonov, S. E. *Russian Journal of Nematology*, **8** : 33- 43.

Distribution : Vietnam (Cat Tien Forest); India : Assam (Jorhat).

Remarks : Due to lack of original literature the details of the species are not to be provided herein.

80. ***Steinernema thermophilum*** Ganguly and Singh, 2000

2000. Ganguly, S. and Singh, L. K. *International Journal of Nematology*, **10** : 183-191.

Type host : The nematode specimens were isolated by baiting the soil samples with larvae of *Corcyra cephalonica.*

Type locality : Soil around roots of green gram (*Vigna aureus*) growing at farm area of Indian Agricultural Research Institute, New Delhi, India.

Type collector : Collected in August, 1999 by the senior author i.e. Sudershan Ganguly.

Type materials : Holotype first generation male, allotype first generation female, 8 paratypes of first generation females, 15 paratypes of second generation females, 18 paratypes of first generation males, 16 paratypes of second generation males and 20 paratypes of third stage juveniles deposited in the Nation Nematode Collection of India, IARI, New Delhi. One paratype each of males and females of both the generations and 5 paratypes of third stage infective juveniles deposited with CABI Biosciences, U.K. Centre, Egham, U.K.

Measurements (all are in µm) :

Characters	Holotype male	First generation male (n=20)	Second generation male (n=18)	First generation female (n-10)	Second generation female (n-17)	Allotype female	Third stage juvenile (n=20)
L	1330	990-780	760-980	2100-7100	1300-1630	5000	510-620
a	13.3	12.8-17.8	18-19	15.5-36.5	16.0-19.8	22.9	24-28
b	11.1	8.0-12.5	7.5-8.8	16.2-39.8	9.5-19.7	29.4	5.8-7.1
c	63	48-63	41-49	80.8-253.0	28-39	142.8	11.5-12.8
V	-	-	-	49.2-58.7	50-56	51	-
Maximum width	100	60-100	43-52	85-218	80-95	218	21-23
Length of stoma	7	6-8	5-8	9-10	5-9	9	-
Width of stoma	8	7-8	5-8	9-12	6-9	11	-

Characters stage female (n-10)	Holotype juvenile (n-17)	First male (n=20)	Second gene-	First gene-ration	Second gene-ration male	Allotype gene-ration male (n=20)	Third female ration female (n=18)
Length of pharynx	120	97-165	102-122	130-205	134-150	170	80-100
Nerve ring from	90 anterior end	80-110	76-95	95-145	95-108	128	65-79
Excretory pore from	72 anterior end	64-92	56-65	52-122	52-74	78	37-46
Body width at anus	39	28-49	30-42	30-75	25-32	73	12-15
Length of spicule	72	44-72	45-62	-	-	-	-
Length of	36 gubernaculum	30-42	27-35	-	-	-	-
Tail length	21	19-34	19-21	18-35	40-52	35	40-52

Distribution : India : New Delhi (IARI farm).

Remarks : *S. thermophilum* is the first record of a new species of the Genus *Steinernema* from India. The species is well adapted for high temperature i.e. 30-35°C. Due to this affinity for high temperature conditions, it may be extremely useful bioagent against insect pests of different crops of in tropical and subtropical climatic conditions.

SUMMARY

The present work deals with an account of all the parasitic nematodes of arthopods, described and recorded so far from India. Total 80 species belonging to 2 subgenera, 29 genera, 7 subfamilies, 11 families, 6 superfamilies, one suborder and 4 orders have been recorded in this article. The order Enoplida includes one superfamily, one family, one genus and only one species. The order Tylenchida includes 2 superfamilies, 3 families, 6 genera and 12 species. Oxyurida includes 2 superfamilies, 4 families, 7 subfamilies, 19 genera and 50 species. Order Rhabditida includes one suborder, one superfamily, 3 families, 3 genera, 2 subgenera and 17 species.

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GENERIC INDEX

SPECIES INDEX