



A List of the Insect Parasitic Nematodes of Uttar Pradesh

Malti

Department of Zoology, C.C. S. University Campus, Meerut

ABSTRACT

A survey of insect parasitic nematodes carried out different localities of Uttar Pradesh revealed the occurrence of over 26 species of nematodes belonging to the family Thelastomatidae and Oxyuridae. A list of such nematodes associated with various localities has been given.

KEYWORDS

Nematodes constitute a compact group of lower invertebrates, highly diversified and most numerous multicellular animals on the earth. They are second to only insects in the number of individuals. At present about 15000 different species of nematodes have been documented by workers but the estimated numbers of existing species is supposed to be about 5×10^5 .

In India, enthusiastic work in the field of nematology started only during the last 25 years. However, a limited work on insect parasitic nematodes of the U.P., India. Brief historical perspective of the growth and development of nematology in India have been reported by various authors from time to time like Prasad (1964), Swarup and Koshy (1965), Sheshadari (1970) and Swarup and Sheshadari (1974).

Basir monograph (1956) summarized the description of some important insect parasitic nematodes described from India upto 1955. It also includes the complete revision of the existing genera and species belonging to the families Thelastomatidae and Oxyuridae. Rao (1958) also tried to give a consolidated description of insect parasitic nematodes of peninsular part of India. The result of the qualitative survey is presented in the following table in which the insect inhabiting nematodes listed below.

TABLE -1. List of insect parasitic nematodes of U.P.

Name of the species	Host	Locality
<i>Psilocephala gryllotalpae</i> Singh and Malti, 2003	<i>Gryllotalpa africana</i>	Meerut
<i>Gryllophila basiri</i> Singh and Malti, 2003	<i>Gryllotalpa africana</i>	Meerut
<i>Binema atrophicaudata</i> Singh and Malti 2003	<i>Gryllotalpa africana</i>	Meerut
<i>Binema ornata</i> (Travassos, 1925) Singh and Malti 2003	<i>Gryllotalpa africana</i>	Meerut
<i>Isobinema jairajpurii</i> Singh and Malti, 2003	<i>Gryllotalpa africana</i>	Meerut
<i>Chitwoodiella asiatica</i> Singh and Malti 2003	<i>Gryllotalpa africana</i>	Meerut

<i>Mirzaiella meerutensis</i> Singh and Malti, 2003	Aquatic beetle	Meerut
<i>Pseudonymous hydrophilic</i> (Galeb 1878, Sties and Hassall 1905) Singh and Malti 2004	Peripleneta americana	Meerut
<i>Leidynema orientalis</i> Singh and Malti, 2004		Meerut
<i>Thubunaea impar</i> (Basir 1941)	<i>Supella</i> sp.	Meerut
<i>Leidynema appendiculata</i> Chaudhary, et al.,	Peripleneta americana	Meerut
<i>Blattophila supellaima</i> Basir, 1941	<i>Supella supellectilum</i>	Aligarh
<i>Protrellus phyllodromi</i> Basir, 1942	Phyllodromia humbertiana	Aligarh

<i>Thelastoma indiana</i> Basir 1940	<i>Leucophaca</i> sp.	
<i>Thelastoma aligarhica</i> Basir, 1940	Peripleneta americana	Aligarh
<i>Blattelicola blattelicola</i> Basir, 1940	Peripleneta americana	Aligarh
<i>Parplenetica mirza</i>	Peripleneta americana	Aligarh
<i>Hammerchmidtella diesingi</i> Basir, 1940	Peripleneta americana	Aligarh
<i>Schwenkiella icemi</i> Basir, 1956	Peripleneta americana	Aligarh
<i>Schwenkiella longicudata</i> Basir, 1956		Aligarh
<i>Mirzaiella asiatica</i> Basir, 1942	Peripleneta americana	Aligarh
<i>Rhigonema meyrde</i>		
<i>Thelastoma ornata</i>	Peripleneta americana	

<i>Schwenkiella icemi</i> (Basir, 1956) Singh et, al., 2007	<i>Grylotalpa africana</i>	Lucknow
<i>Chitwoodiella asiatica</i> (Singh and Malti 2003) Singh et, al., 2007	Milliped <i>Thyroglutus malayus</i>	Lucknow
<i>Gryllophila basiri</i> (Singh and Malti 2003) Singh et, al., 2007	Milliped <i>Thyroglutus malayus</i> Periplaneta americana	Khurja
	<i>Grylotalpa africana</i>	Khurja
	<i>Grylotalpa africana</i>	Khurja

Thlastoma basiri Farooqui, 1970

Farooqui (1970) first of all described *T. alli* from intestine of *Spirostreptus* species at Aurangabad, Maharashtra. Specimens at disposal of writer exhibit some variation in organisms of various body structure and measurements. It is, therefore, briefly redescribed. Redescription based on the fresh material collected by the author. Besides this, species of genus *Thlastoma* being recorded for the first time from *Periplaneta americana*. Thus, it is a new host record.

Hammerchmidtella indicus Singh and Malti, 2003

Worms small, mouth surrounded by eight submedian labial papillae. Two amphids also presents. Oesophagus consisting of an anterior corpus, a distinct isthmus, and a posterior valvular bulb. In female, posterior part of the corpus forms a distinct swelling in the form of a pseudo-bulb. Swelling not as prominent as in the male. Excretory pore, post oesophageal. Alae absent.

Thelastoma alli farooqui, 1970 Singh and Malti, 2003

Farooqui (1970) first of all described *T. alli* from intestine of *Spirostreptus* species at Maharashtra. Specimens at disposal of writer exhibit some variation in organisms of various body structure and measurements. It is, therefore, briefly redescribed. Besides this, species of genus *Thelastoma* is being recorded for the first time from *Periplaneta americana*. Thus, it is a new host record.

Psilocephala grylotalpae Singh and Malti, 2003

Worms small. Male with truncated tail and females with attenuated tail without any terminal spike. Body cuticle thin, bears transverse striations throughout the length. Head end markedly set off from the body proper. Mouth surrounded by eight labial papillae which are arranged in an inner and an outer circle of 4 papillae each. A pair of amphid situated laterally. Excretory pore, post oesophageal. slightly anterior to equator.

Gryllophila basiri Singh and malti, 2003

Body cylindrical, female mouth opening sub-triangular, surrounded by a circumoral elevation and eight labial papillae. Outer cuticle exhibit striations throughout the length in either sexes. Male tail abruptly set off from the body proper. Excretory pore much behind the base of oesophagus.

Binema atrophicaudata Singh and malti , 2003

Worms small, spindle shaped. Mouth opening prismatic, surrounded by eight sub median labial papillae and a pair of amphids. Excretory pore, post oesophageal. Nerve ring at about middle of the corpus. Vulva post-equatorial in location. Female tail short, conical. Male tail spike like structure.

Binema ornata (Travassos, 1925) Singh and Malti, 2003

Travassos (1925) described *Binema ornata* for the first time from *Grylotalpa* sp., at Rio de Janeiro, Brazil. Subsequently,

it was redescribed by Basir (1942), Serrano Sanchez (1947). But worms at disposal of writer exhibit several variations from those described by Travassos (1925) and other workers besides measurements. It is, therefore, briefly redescribed as such.

Isobinema jairajpurii Singh and Malti, 2003

Small worms. Mouth surrounded by eight submedian labial papillae. Buccal cavity sunken in the anterior part of corpus. Nerve ring at about middle of the oesophagus. Excretory pore, post oesophageal. Female tail, long and terminate in elongated flagellate caudal appendage. Male tail is larger than female and bear large caudal appendage. Body cuticular covering is alate

Chitwoodiella asiatica Singh and Malti , 2003

Worms small. Cuticle annulated. Lateral alae present both sexes. Mouth surrounded by 3 distinct but very small lips. 1 pair amphids present. Oesophagus long occupying about 1/3 of the anterior body length and consisting of a long cylindrical corpus, a narrow isthmus and a bulb. Eggs elliptical, connected with each other, enveloped by filamentous threads arising in the form of a tuft from each pole. Eggs segmented before deposition and laid in the form of a chain. Caudal papillae 5 pairs.

Mirzaiella meerutensis Singh and Malti, 2003

Mouth terminal situated on protruded cone of the body. It is surrounded by 3lips. No sensory structures like papillae, amphids etc. could be observed. Males much smaller than females. Entire cuticular covering of female body annulated, but in case of male, the annulations are restricted to anterior part only. Tail of male is too small and truncated but in female it is well developed and longer than males.

Pseudonymous hydrophili (Galeb 1878, Sties and Hassall 1905) Singh and Malti, 2004

Galeb (1878) described *Pseudonymous hydrophili* for the first time as *Oxyuris hydrophili*, which was later transferred to the genus *Pseudonemous* by Diesing (1857). Species was later described by Basir (1941), from India from several hosts like *Hydrophilus triangularis*, *Tropisternus nimbatus*, *Hydrophilus piceus* and also from some unidentified aquatic beetles. Basir (1941) described it as *Galebiella galebiella*. Which he himself synonymised with *Pseudonymous hydrophili* in 1956. Subsequently, Rao (1958) also redescribed this species from the rectum of an unidentified beetle at Vijaynagram, Andhra Pradesh. Author also collected a few specimens of this parasite from an aquatic beetle. Specimen at the disposal of the writer exhibit minor variations besides measurements of different parts of the body. It is, therefore, redescribed briefly.

Leidynema orientalis Singh and Malti, 2004

worms small. Males with evenly tapering anterior end and a very short tail, the caudal appendage in female elongated. Mouth surrounded by very large submedian labial papillae bearing amphids or lateral organs in the form of circular protruberances. Body both sexes provided with well developed lateral alae. Cuticular covering of body bears transverse striations, which coarse in anterior region in either sexes. Excretory pore marked in post oesophageal part of body in either sex.

Thubunaea impar Basir, 1941

Supella sp. Infected with some cyst and a few free larval forms of varying size. Size of infection being body cavity of insect. On the detail morphological examination, it was found to be the third larval stage of the genus *Thubunaea* Seurat, 1914.

Leidynema appendiculata Chaudhary, et al., 2011

worms small. Males with evenly tapering anterior end and a very short tail, the caudal appendage in female elongated. Mouth surrounded by very large submedian labial papillae bearing amphids or lateral organs in the form of circular protruberances. Body of the worm both sexes provided with well developed lateral alae. Cuticular covering of body bears transverse striations, which coarse in anterior region in either sexes. excretory pore marked in post oesophageal part of body in ei-

ther sex.

Blattophila supellaima Basir, 1941

Male much smaller than female. Body cylindrical. Anterior extremity tapering but the posterior end conical in the case of whereas in the case of male it gradually ends into a short appendages.

Protrellus phyllodromi Basir, 1942

Female long than male. Head end of female markedly expanded at long of valve. Just behind vulva a constriction marks off the head exactly from the rest of the oesophageal region. Body gradually expands and reaches its maximum width in the posterior third of the body. Posterior end is bluntly rounded and possess 2 small triangular cuticular projections. Head is not marked off in the male both the end attenuated, the posterior being more sharply conical and pointed. Cuticle smooth & devoid of striations. Mouth is triangular & surrounded by 4 pairs of papillae and a pair of laterally situated amphids.

Thelastoma indiana Basir, 1940

This worm collected from the intestine of *Leucophaea* sp. (family Blattidae) at Aligarh. Cuticle conspicuously striated throughout the whole length of body except the tail. Oral opening sub triangular surrounded by 8 papillae. Amphids appear as round openings. Buccal cavity short and wide containing one dorsal and two sub ventral cuticular elevations. Intestine enlarged anteriorly to form slight cardia. Tail attenuated. Valva between middle and posterior third of the body. Vagina directed anteriorly, uteri divergent. Eggs oval or ellipsoidal, segmented at deposition.

Thelastoma aligarhica Basir, 1940

This worm collected from the intestine of *Periplaneta americana* at Aligarh. Oral opening surrounded by 8 papillae. Amphids appear as round openings enlarged anteriorly to form distinct cardia. Tail filiform. Vulva middle of body. Vagina directed anteriorly amphidelphic. Eggs nearly spherical.

Blattelicola blattelicola Basir, 1940

Female with a simple cylindrical buccal cavity, a short oesophagus, about 1/6 of body length, consisting of a corpus, an isthmus and a bulb. Tail short attenuated, definitely not filiform. Excretory pore posterior to base of oesophagus. Vulva between middle and posterior third of body, ovary single, eggs oval or ellipsoidal. Male with a short attenuated tail, not filiform, caudal papillae 4 pairs, 2 pairs preanal and 2 pairs post anal near the anal opening.

Parpleneticola mirzaia

This worm collected from the intestine of *Periplaneta americana* at Aligarh. Cuticle striated throughout the whole length of body except the tail. Oral opening sub triangular surrounded by 8 papillae. Buccal cavity cylindrical and sufficiently wide. Excretory pore not observed. Intestine enlarged anteriorly to form a cardia. Tail short and blunt with a very small caudal appendage distinctly set off from the body. Uteri divergent. Ovaries two.

Hammerchmidtella diesingi Basir, 1940

Hammerchmidtella diesingi has been collected from the intestine of *Periplaneta americana*. The present form differs from all the known species of this genus on the basis of having short isthmus and rod like longer spicule and more elongated testis in male.

Schwenkiella longicauda Basir, 1956

This worm was first of all described by Meyer (1896) as *Oxyuris longicauda* from *Julus* sp. at, Sri Lanka. It was subsequently transferred to the genus *Schwenkiella* by Basir (1956). *S. longicauda* specimens collected from *Periplaneta americana* by the investigator show minor differences besides measurements. It is therefore, redescribed as such. A comparative account of male and female worms of *S. longicauda* described by different workers is given in a tabulated form.

Mirzaella asiatica Basir, 1942

Mouth terminal situated on protruded cone of the body. It is surrounded by 3 lips. No sensory structures like papillae, amphids etc. could be observed. Males much smaller than females. Entire cuticular covering of female body annulated, but in case of male, the annulations are restricted to anterior part only. Tail of male is too small and truncated but in female it is well developed and longer than males.

Rhigonema meyrde Singh, 1955

Cuticle is devoid of transverse striations but it is provided with very fine retrorse bristle, extending up to the middle of the body. Three lips slightly developed and form a triangular opening. A circumoral ring and 4 labial papillae. Amphids absent. Thomas (1931) Skjrabin (1914) and others have described 6 paired rod like structure in the oesophagus. Excretory pore present on the ventral side. Vagina leads to a slightly muscular unpaired sac, the vagina uterina, which contains segmented eggs and a coil of sperms. The vagina uterina is absent. Vagina uterina leads to two opposite uteri which run anteriorly and posteriorly i.e., they are amphidelphic. The junction of the uterine branch with the oviduct is marked by the presence of enlarged bulb like structure which has been termed the spermatheca (Chitwood & Chitwood, 1940).

Thelastoma ornata Singh, 1955

Cuticle is transversely striated. Lateral alae absent. Terminal mouth opening leads to a small vestibule. Isthmus is of moderate size, and slightly less in diameter than the oesophagus. The tail is long and filiform. Vulva leads to a short cuticle lined vagina. The vagina runs anteriorly and leads to a longer sac, vagina uterina, which is thinwalled and devoid of cuticle. Two uteri run in opposite direction and lead to ovaries in the opposite halves of the body. Uterine eggs are provided with a smooth shell. Eggs in the distal portion of the uterus and the vagina uterina are segmented. Testis single reflexed which leads to a wider vasculosa seminalis and ductus ejaculatorius. Spicule single.

Schwenkiella icemi (Basir, 1956) Singh et al., 2007

Worm was collected from the intestine of *Periplaneta americana*. This parasite was described by Schwenk (1966) for the first time. Subsequently, it was transferred to genus *Thelastoma* by Basir (1956) and later Rao (1958) redescribed it from *Periplaneta americana* and *Barata selvatem* at, Hyderabad. The specimens at the disposal of author exhibit minor variations besides measurements, from the earlier described worms. Moreover, the description of Basir (1956) suffers from many lapses in description. Body of worm is elongate, cylindrical and striated all along the length. Mouth is surrounded by 8 labial papillae arranged in two rows and excretory pore is posterior to base of oesophagus. Thus, it is briefly redescribed. A comparative account of measurements of *S. icemi* male and female worms described by different workers is given in tabulated form.

Chitwoodiella asiatica (Singh and Malti 2003) Singh et al., 2007

This worm has also been collected from *Gryllotalpa africana* infecting the intestine of the host. The present form differs from all the known species of the genus in having difference in shape of buccal cavity and number and dimension of papillae of male.

Worm small. Lateral alae present. Mouth surrounded by lips. Amphids 1 pair. Oesophagus long occupying 1/3 of anterior body length and consisting of a long cylindrical corpus, a narrow isthmus and a bulb. Eggs elliptical, connected with each other and enveloped by filamentous threads arising in the form of tuft from each pole. Eggs segmented before deposition and laid in form of a chain. Caudal papillae 5 pairs.

Gryllophila basiri (Singh and Malti 2003) Singh et al., 2007

Body cylindrical, female mouth opening sub-triangular, surrounded by a circumoral elevation & 8 labial papillae. Outer cuticle exhibit striations. Male tail abruptly set off from body

proper.

The survey of insect parasitic nematodes carried out in different localities of U.P. state revealed a large number of important and potentially zoophagous species of nematode associated with various insect hosts. The nematodes species collected during the survey belonging to the family Thelastomatidae and Oxyuridae have been reported under 16 Genera 26 species and 2 families. So far 31 species have been identified belonging to Thelastomatidae and Oxyuridae.

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REFERENCES

1. Basir, M. A. 1940. Nematodes parasitic in Indian cockroaches. Proc. Ind. Acad. Sci. 8-16.
2. Basir, M. A. 1956. Oxyuroid parasites of Arthropods. A monographic study. 1. Thelastomatidae 2. Oxyuridae. Zoologica, 38: 1-79.
3. Chaudhary, A.; Sangeeta, Malti and Singh, H.S. 2011. Genomic DNA sequence of *Leidynema appendiculata* from Meerut U.P. India. Asian Journal of Animal Science. 1-3.
4. Chitwood, B. G. & Chitwood, M. B. 1910. In an Introduction to nematology, section I, 135-158.
5. Farooqui, M. N. 1970. Some known genera and species of the family Thelastomatidae Travassos 1929 Riv Parasit 31: 195-214.
6. Parveen, R. and Jairajpuri, D.S. 1980. A new species of the genus *Schwenkella* basir 1956 from the cockroach, *Periplaneta americana* from Aligarh. Indian journal of parasitology, 4(1) 41-43.
7. Prasad, S. K. 1964. Entomology in India. 397-406.
8. Rao, P.N. 1958. Studies on nematode parasites of insect and other arthropods. Archos. Mus. Nac. Rio de Janeiro. 46: 33-84.
9. Singh, H. S. and Malti 2003. On a known and some unknown species of nematode parasites of *Grylotalpa africana*. J. Exp. Zool. India. 6: 329-350.
10. Singh, H. S. and Malti 2004. On a known nematode parasites from an aquatic beetle J. Parasit Appl. Anim Bid. (13) 33-38.
11. Singh, H. S. and Malti 2004. Morphological and karyological studies on an insect parasitic nematode *Leidynema orientalis* n. sp. J. ent. Res 28(2) 157-164.
12. Singh, H. S. ; Malti and Chaudhary, A. 2011. Larval form of the genus *Thubunea* Seurat 1914 from the body cavity of an insect *Supella* sp. at Meerut (U.P.) India. J. of applied Natural Science 3(1) 54-57.
13. Singh, H. S. and Kaur, H. 1988. On a new nematode *Hammershmidtella basiri* *Periplaneta americana* Linn. 12. 187-189.
14. Singh, H. S. and Malti 2003. Study of some nematode parasites of *Periplaneta americana* Linn at Meerut, U. P. India. Flora and Fauna 4(2) 56-66.
15. Sheshadri, A. R. 1970. News vistas in crop yields. ICAR New Delhi, pp. 370-411.
16. Swarup, G and Sheshadri, A.R. 1974. In Current trends in plant pathology Lucknow University 301-311 pp.
17. Thomas, J. J. 1930. *Rhigonema nigella* spec. nov., a nematode and its plant commensal, *Enterobus* sp. from the millipede. Jour. Parasit., 17 (1) 30-34.