A Redescription of Nematode Parasites of *Periplaneta americana* in India

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Abstract

Nematodes associated with different groups of arthropods are commonly known as Arthropod Parasitic Nematodes or APN's. After extensive research interest have been grown in the use of insect parasitic nematodes as biological control agents. They are most promising bioagents for control of different arthropod groups. Particularly, the insect pest of different crops, those are eco-friendly and cost effective (Ali et al., 2005). Increased use of chemical pesticides and availability of fewer of them make an interest in IPN's for control of insect pest. This would form base for further research and add a new dimension to integrated pest management strategies.

The American cockroach Periplaneta americana (Linnaeus,1758) (Blattodea : Blattidae) is a worldwide synantropic species and live in warm moist habitat. It has successfully adjusted to live with humans. They can become a public health problem due to their association with human waste and their ability to move from sewer to home and commercial establishments. Its presence in these habitats is of epidemiological significance (Bell, Adiyodi 1981). Many Thelastomatid parasitic nematodes isolated from P. americana in many countries including Canada, USA, India, Argentina, Bulgaria and Japan. In India nematode parasites of P. americana are investigated in several states as– Uttar Pradesh, Andhra Pradesh, West Bengal, Maharashtra, Manipur, Nepal, Delhi etc.

Historical Review

Arthropod parasitic nematodes have been known since 17th century and perhaps earlier (Nguyen and Smart,2004). Extensive studies were carried out in the 19th and 20th centuries but during last one Decade, remarkable progress has been made in the taxonomy of arthropod parasitic nematodes.

In India, many authors have reported different species of nematodes of cockroach (*Periplaneta americana* L.) from different parts of India at different times and was started by M. A. Basir in 1940 and he has done a lot of work during 1940-1970. In North India it 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. In South India, significant contributions 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 (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 Centres, working on insect parasitic nematodes in India are Aligarh Muslim University, Aligarh; Meerut University, Meerut; Imphal, Manipur, North-East India; Ropar, Punjab, North-West India; Osmania University, Hyderabad and Andhra University, Medak, Nandyal, Guntur, Rajamundry, Visakhapatnam of Andhra Pradesh; Aurangabad of Maharashtra; Indian Agricultural Research Institute, New Delhi, 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.

Literature Review

In the present work an attempt has been made to compile all the research information and the relevant literature made on nematodes of India parasitizing *P. americana*. Here, we review all the parasitic nematode species of *P. americana* described and reported so far from India considering synonyms, type host, type locality, museum of type deposition etc. The taxonomic status up to generic level has been followed after Poinar (1977).

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

SYSTEMATIC ACCOUNT

Phylum- NEMATODA Rudolphi, 1808 (Lankester, 1877)

Class- SECERNENTEA Von Linstow, 1905

Order -OXYURIDA Weinland, 1858

Synonym: OXYURATA Skrjabin, 1923

Super Family- THELASTOMATOIDEA Travassos, 1929

Family -THELASTOMATIDAE Travassos, 1929

Subfamily -PROTRELLOIDINAE Travassos, 1929

Genus- *Protrellus* Cobb, 1920

Synonyms*: Protrellina* Chitwood, 1932 Aglaopterixia Kloss, 1961

Type host: *Periplaneta americana* L. Type habitat: Intestine. Type locality: Imphal, Manipur, North-East India. Type collector: M. Manjur Shah. Type material: Specimens were deposited in the nematode collection of the Department of Zoology, Aligarh Muslim University, Aligarh, Uttar Pradesh, India. Distribution: India: Manipur (Imphal).

Remarks: It is endemic to India.

2. *Binema chauhani* Singh and Singh, 1989

Super Family- THELASTOMATOIDEA Travassos, 1929

Family -THELASTOMATIDAE Travassos, 1929

Subfamily BINEMATINAE Travassos, 1925

Genus *Binema* Travassos, 1925

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.

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

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

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. 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.

4. *Hammerschmidtiella basiri* Singh and Kaur, 1988

Family -THELASTOMATIDAE Travassos, 1929

Subfamily HAMMERSCHMIDTIELLINAE Chitwood, 1932

Genus *Hammerschmidtiella* Chitwood, 1932

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.

5. *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.

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

6. *Blattellicola guptai* Duggal and Aulakh, 1988

Family -THELASTOMATIDAE Travassos, 1929

Subfamily BLATTICOLINAE Travassos, 1929

Genus *Blattellicola* Basir, 1940

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 were deposited in the nematode collections of Zoology Department of Panjab University, Chandigarh, Panjab, India. Distribution: India: Punjab (Ropar). The species is endemic to India.

7. *Cephalobellus singhi* Singh and Singh, 1989

Subfamily THELASTOMATINAE Travassos, 1929

Genus *Cephalobellus* Cobb, 1920

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 para type females were deposited in the nematode collections of Zoology Department of Meerut University, Meerut, Uttar Pradesh, India. Distribution: India: Uttar Pradesh (Meerut). The species is endemic to India.

8. *Leidynema periplaneti* Farooqui, 1967

Subfamily THELASTOMATINAE Travassos, 1929

Genus *Leidynema* Schwenk, 1929

Type Host: *Periplaneta americana* L. Type Habitat: Posterior gut. 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.

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

Subfamily THELASTOMATINAE Travassos, 1929

Genus *Thelastoma* Leidy, 1849

Synonym: *Aorurus* Leidy, 1849

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.

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.

10. *Thelastoma guptai* Duggal and Aulakh, 1989

Subfamily THELASTOMATINAE Travassos, 1929

Genus *Thelastoma* Leidy, 1849

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 para type female were deposited in the Helminthological Collections, Department of Zoology, Punjab University, Chandigarh, Punjab, India. 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.

11. *Thelastoma kherai* Duggal and Aulakh, 1989

Subfamily THELASTOMATINAE Travassos, 1929

Genus *Thelastoma* Leidy, 1849

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. 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.

12. *Schwenkiella basiri* Parveen and Jairajpuri, 1980

Subfamily THELASTOMATINAE Travassos, 1929

Genus *Schwenkiella* Basir, 1956

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. 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.

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

Subfamily THELASTOMATINAE Travassos, 1929

Genus *Schwenkiella* Basir, 1956

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

Type host: *Periplaneta americana*, *Xenobolus comifex* (Fabr.) and *Thyropygus* sp. Type habitat: Intestine and rectum., India. Distribution: Brazil (Sao 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.

14. *Schwenkiella periplaneticola* Parveen and Jairajpuri, 1981

Subfamily THELASTOMATINAE Travassos, 1929

Genus *Schwenkiella* Basir, 1956

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

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

Summary

In this review work we have discussed about fourteen species of nematodes, parasitizing *Periplaneta americana*. They all belongs to Family Thelastomatoidae, Travassos, 1929 and eight genera. Here we discussed about host, habitat, locality, distribution and taxonomic status up to generic level of fourteen nematode species. Habitat of these species are mainly intestine and rectum. These nematode species are found in many states of India.

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