New Record of *Leidynema appendiculata* (Leidy, 1850) Chitwood, 1932. (*Oxyuroidea: Thelastomatidae*) from the Cockroaches *Blatta orientalis* (*Dictyopetra: Blattidae*) from Kashmir

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**Abstract**

During the present study, for the first time Nematode parasites were from the colon region of the intestine of *Blatta orientalis* from Srinagar. On close examination, they were found to resemble to those of *Leidynema appendiculata* in all their morphological and biological features. Both male and female specimens were recovered but male specimens were lesser in comparison to females. Measurements and camera lucida drawings are also given.

**Key to the Families of Superfamily Oxyuroidea**

1. Corpus of oesophagus not extremely short; male with one or zero spicules - Corpus of oesophagus extremely short and thick; male with two or zero spicules - *Atractidae*.

2. External circle of 4-double cephalic papillae - External circle of 8-cephalic papilla - *Thelastomatidae*.

3. Adults usually in hindgut of vertebrates chiefly amphibians, reptiles and mammal - *Oxyuridae*.

Adults found in gut of millipedes - *Rhingonematidae*

**Diagnostic Characters of the Family Thelastomatidae**

The thelastomatid, parasites of insects and myriapods, throughout the literature and descriptions of between 60 and 70 species have been provided but usually not much other information is available. However, studies by Dobrovolny and Ackert [5] and other indicate that most of these species probably have the same type of the life-cycle which is comparatively simple. Eggs pass out of the host with feces. Eggs do not hatch in the intestine to re-infect the same host but must first undergo some development on the outside to reach an infective stage. The various arthropod hosts acquire their parasites by swallowing these infective eggs.

Mouth of female surrounded by eight sub median papillae or labiopapillae. Amphids represented externally by circular or oval openings; esophagus consisting of an anterior corpus, which may or may not be modified; a more or less distinct isthmus and a posterior valvular bulb. Females with one or more ovaries. Male with single testis, a single spicule or none, and one to five pairs of caudal papillae [6,7].

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Key to the Genera of Family Thelastomatidae

1. Vulva posterior to base of esophagus - Vulva anterior to base of esophagus - 7
2. Esophagus with a pseudo bulb - 3 - Esophagus without a pseudo bulb - Blattelicola
3. Vulva in anterior part of body - Hammerschmidtiiella - Vulva about middle or posterior to middle of body
4. Anterior and posterior parts of corpus not distinctly set off, the whole corpus forming a pear-shaped pseudo bulb - Aorurus - Anterior and posterior parts of corpus distinctly set off
5. Corpus distinctly enlarged in form of a sub spherical swelling at base of buccal cavity - Blatophil a
6. Corpus not distinctly enlarged in form of a sub spherical swelling at base of buccal cavity
7. Corpus terminated by sub-cylindrical swelling - Leidynema
8. Corpus terminated by sub-spherical swelling - Leidynemella
9. Tail of female short and conical
10. Tail of female long and filiform - Linstowiiella
11. Female esophagus long and narrow, forming about ¼ of body length - Protrelloides
12. Female esophagus not as long as narrow - Protrellus.

Diagnostic Characters of the Genus Leidynella

Mouth surrounded by very large sub median labiopapillae, amphids or lateral organs appearing externally as small circular openings. Esophagus of female consisting of an anterior part which is subdivided into cylindrical parts of which the posterior is somewhat larger in diameter than the anterior, a distinct isthmus, and a valvular bulb. Excretory pore posterior to base of esophagus. Intestine may or may not be enlarged anteriorly to form a cardia; a posteriorly directed caecum may or may not be present; the intestine may have a loop in the posterior part of the body. Vulva near middle of body; amphidelphic [8-10]. Eggs ellipsoidal. Esophagus of male without distinct posterior swelling in anterior part of corpus. Tail of female attenuated or filiform. Tail of male short, rounded, filiform. One pair of large preanal caudal papillae, two pairs of postanal papillae. One spicule.

Leidynema appendiculata (Leidy, 1850) Chitwood, 1932

Host: Blatta orientalis Linn.

Site of infection: Large intestine

Location: Srinagar

Twenty-eight female and two male nematode parasites from ten Cockroaches (Blatta orientalis) from Srinagar, were recovered. It favored more anterior position and was more restricted in its distribution in the colon and was found to be a lumen dweller. A brief description of the parasite is given as under.

Description

Female

2.14 mm long by 0.27 mm (270 µ) wide. Cuticle closely annulated throughout the length of body. Lateral alae

prominent, each ala terminating posteriorly in a spine-like projection. Buccal capsule is 0.02 mm long and 0.01 mm wide. Esophagus 0.43 mm (430 µ) long consisting of an anterior corpus 0.32 mm (320 µ) long, subdivided into an anterior part 0.17 mm (170 µ) long by 0.035 mm (35 µ) wide and a posterior pseudo bulb 0.14 mm (140 µ) long by 0.06 mm (60 µ) wide, an isthmus 0.03 mm (30 µ) long by 0.04 mm (40 µ) wide, set off distinctly from the anterior cylindrical pseudo bulb, and a posterior valvular bulb 0.09 mm (90 µ) long by 0.12 mm (120 µ) wide. Nerve ring 0.16 mm (160 µ) from the anterior end of body; Anterior part of intestine greatly enlarged, provided with a posteriorly directed intestinal caecum or diverticulum (Figures 1-3; Pmgs 1-4; Table 1) posterior part of intestine forming a loop in mature specimens. Anus 0.36 mm from the tip of the tail. Tail filiform. Vulva slightly posterior to middle of body, 1.12 mm from anterior end of the body. Ovaries two; amphidelphic. Eggs oval, elongate and flattened slightly on one side, 94 µ long by 40 µ Wide.

Male

0.088 mm 880 µ long by 0.055 mm (55 µ) wide; cuticle striated, striations prominent near the anterior end, 0.003 mm (3.33 µ) apart. Buccal capsule 0.003 mm (3.33 µ) by 0.001 mm (1.66 µ). Esophagus 0.14 mm (140 µ) long; anterior part 0.105 mm (105 µ) long by 0.01 mm (10 µ) wide; isthmus 0.010 mm (17.5 µ) long by 0.01 mm (10 µ) wide, not distinctly set off; bulb 0.025 mm (25 µ) long by 0.02 (20 µ) wide. Nerve ring 0.09 mm (90 µ) from anterior end of body. Intestine simple without a diverticulum or a loop, anus 0.01 mm (10 µ) from posterior end of body. Tail much attenuated and very small, provided with one pair of large sub-ventral preanal papillae, one pair of sub-ventral post anal papillae, and one pair of small, sub-dorsal papillae. One spicule 0.026 mm (26.666 µ) long (Figures 4-6; Pmgs 5-12; Table 2) [11].

Remarks

The genus Leidynema was proposed by Schwenk in Travassos, 1929 to accommodate Oxyuris blattae orientalis.
### Table 1: Measurements of *Leidynema appendiculata* (Female).

| Measurements                                | (Leidy and Chitwood) [3,8] | Dobrovolony and Ackert [5] | Present specimen |
|---------------------------------------------|-----------------------------|-----------------------------|------------------|
| Length                                      | 1.9-4.025 mm                | 2.27-4.025 mm               | 2.14 mm          |
| Width                                       | 140-350 µ                   | 0.238-0.35 mm               | 0.27 mm (270 µ)   |
| Buccal capsule                              |                             |                             |                  |
| Length                                      | -                           | -                           | 0.02 mm          |
| Width                                       | -                           | -                           | 0.01 mm          |
| Nerve ring                                  | 120-195 µ                   | 0.135-0.195 mm              | 0.16 mm (160 µ)   |
| Anterior corpus length                      | 290-330 µ                   | 0.32 mm (320 µ)             |                  |
| Anterior part                               |                             |                             |                  |
| Length                                      | 144-180 µ                   | 0.17 mm (170 µ)             |                  |
| Width                                       | 30-36 µ                     | 0.045-0.085 mm              | 0.035 mm (35 µ)   |
| Posterior Pseudo bulb                       |                             |                             |                  |
| Length                                      | 140-148 µ                   | 0.14mm (140 µ)              |                  |
| Width                                       | 30-36 µ                     | 0.06mm (60 µ)               |                  |
| Isthmus                                     | 16-45 µ                     | 0.021-0.045 mm              | 0.03 mm (30 µ)    |
|  | Width                                       | 35-40 µ                     | 0.035-0.04 mm              | 0.04 mm (40 µ)    |
|  | Length                                      | 90-106 µ                    | 0.09-0.106 mm              | 0.09 mm (90 µ)    |
|  | Width                                       | 100-148 µ                   | 0.1-0.148 mm               | 0.12 mm (120 µ)   |
|  | Anus from tip of tail                       | 420-825 µ                   | 0.42-0.825 mm              | 0.44 mm (440 µ)   |
| Vulva from ant. end                         | 1.05-1.985 mm               | 1.12 mm                     |                  |
| Cuticular Striations                        | At ant. end                 | -                           | 0.02 mm          |
|  | at post. end                                | -                           | -                           | 0.04 mm          |
| Eggs                                        | 100-112 µ                   | 0.106-0.112 mm              | 94 µ             |
|  | Width                                       | 45-53 µ                     | 0.045-0.048 mm              | 40 µ             |

### Table 2: Measurements of *Leidynema appendiculata* (Male).

| Measurements                                | (Leidy and Chitwood) [3,8] | Dobrovolony and Ackert [5] | Present specimen |
|---------------------------------------------|-----------------------------|-----------------------------|------------------|
| Length                                      | 0.525-0.850 mm (525-850 µ)  | 0.525-0.850 mm              | 0.88 mm (880 µ)  |
| Width                                       | 0.045-0.087 mm (45-87 µ)    | 0.045-0.087 mm              | 0.045 mm (45 µ)   |
| Buccal capsule                              |                             |                             |                  |
| Length                                      | -                           | -                           | 0.0033 mm (3.3 µ) |
| Width                                       | -                           | -                           | 0.0016 mm (1.66 µ) |
| Nerve ring from ant end of body             | 0.075-0.155 mm (75-155 µ)   | 0.075-0.105 mm              | 0.09 mm (90 µ)    |
| esophagus                                   | 0.133-0.185 mm (133-216 µ)  | 0.133-0.185 mm              | 0.17 mm (170 µ)   |
| Anterior part                               |                             |                             |                  |
| Length                                      | 80-166 µ                    | 0.08-0.125 mm               | 0.105 mm (105 µ)  |
| Width                                       | 8-20 µ                      | 0.015-0.02 mm               | 0.01 mm (10 µ)    |
| Isthmus                                     |                             |                             |                  |
| Length                                      | 17-20 µ                     | 0.017-0.02 mm               | 0.06175 mm (17.5 µ) |
| Width                                       | 0.009-0.12 µ (9-12 µ)        | 0.009-0.12 µ                | 0.01 mm (10 µ)    |
| Bulb                                        |                             |                             |                  |
| Length                                      | 0.034-0.04 mm (34-40 µ)     | 0.034-0.04 mm               | 0.025 mm (25 µ)   |
| Width                                       | 0.020-0.036 mm (20-36 µ)    | 0.027-0.036 mm              | 0.02 mm (20 µ)    |
| Anus from post end                          | 0.01-0.20 mm (10-20 µ)      | 0.01-0.15 mm                | 0.01 mm (10 µ)    |
| Cuticular striations (length at anterior end)| 0.003 mm (3 µ)              | 0.003 mm                    | 0.0033 mm (3.3 µ) |
| Spicule                                     | 0.026-0.035 mm (26-35 µ)    | 0.026-0.035 mm              | 0.0266666 mm (26.6666 µ) |
Figure 2: Anterior end (Enlarged view).

Figure 3: Posterior end (Enlarged view).

Figure 4: Leidynema appendiculata (Male, Entire Specimen).

Figure 5: Anterior end (Enlarged view).

Figure 6: Posterior end (Enlarged view).

Pmg 3: Posterior end with spine like projections 100X.
Ham., 1847. From Hammer Schmidt's original description and figures of this worm it becomes apparent that he had only re-described and redrawn his previously described *O. diesingi*, and the latter has been placed in the genus *Aorurus* by Travassos 1929. Apparently, Schwenk agrees with Leidy (1851) who cites *O. blattae orientalis* as being the same species as his *Thelastomum appendiculatum*. Butschli (1871), Galeb (1878) and Magalhaes (1900) have followed Leidy in this matter. *O. blattae orientalis* now being regarded as a synonym of *Hammer Schmidtiella diesingi* (*O. diesingi*), the type species of the genus *Leidynema* will have the name of *L. appendiculatum*, this being the original name of the species and meant for the type species of this genus by Schwenk. Chitwood (1932) added two species, *L. cranifera* and *L. delatorrei* to this genus and Chitwood and Chitwood, 1933 added a fourth, *L. nocalum*. Serrano Sanchez 1947 divided the type species, *L. appendiculatum*, into three varieties, *L. appendiculata* var. *americana*, *L. appendiculata* var. *indiana* and *L. appendiculata* var. *hispana*.

On comparing the present specimens with the *Leidynema appendiculata* (Leidy, 1850) Chitwood, 1932 type species of the genus *Leidynema* Schwenk and by Dobrovolony and Ackert [5] the present specimen is very close to it in all its measurements except for some size differences. The morphological features, like the presence of pseudo and valvular bulb [12] in anterior corpus of females and presence of isthmus, presence of filiform tail and oval eggs and presence of one spicule in males confirms its resemblance to *L. appendiculata*.

From the above discussion, it becomes clear that the present specimens possess all the diagnostic features of the species *Leidynema appendiculata* (Leidy, 1850) Chitwood, 1932 except for some size variations and locality hence the present specimens are assigned to it. While Kashmir Valley is the new locality record for this species.

References

1. Butschli O (1871) Untersuchungen über die beiden Nematoden der Periplaneta (Blatta) orientalis L. Zeitschrift wiss Zool 21: 252-293.

2. Chitwood BG (1932) A synopsis of the nematodes parasitic in insects of the family Blattidae. Z Parasitenkd 5: 14-50.
3. Chitwood BG, Chitwood MB (1933) Nematodes parasitic in Philippine cockroaches. Philippine J Sci 52: 381-393.
4. Magalhaes PD (1900) Notes d'helminthologie bresilienne. Archives de Parasitologie (Paris) 3: 34-69.
5. Dobrovolny CG, Ackert JE (1934) The life history of Leidynema appendiculata (Leidy), a nematode of cockroaches. Parasitol 26: 468-480.
6. Galeb O (1878) Oxyurides parasites des insects. Rev Int Sci 2: 432-434.
7. Hammerschmidt KE (1847) Beschreibung einiger Oxxuris-Arten. Naturwiss Abh Wien 1: 279-288.
8. Leidy J (1850) Description of some nematoid entozoan infesting insects. Proc Acad Nat Sci Philadelphia 5: 100-106.
9. Leidy J (1851) Description of new species of Entosoa. Proc Natl Acad Sci Philadelphia 5: 155-156.
10. Schwenk JM (1926) Fauna parasitologica dos blattideos do Brasil. Sci Medica 4: 491-504.
11. Serrano Sanchez A (1947) Nematodes parasitos intestinales de los artropodos en Espana. Rev Iberica Parasitologia 7: 279-332.
12. Travassos L (1929) Contribuicao preliminary a systematica dos nematoideos dos arthropodes. Mem Inst Oswaldo Cruz Suppl 5: 19-25.