

# NEMATODES PARASITIC IN *GRYLLOTALPA*.

By M. A. BASIR.

(Department of Zoology, Muslim University, Aligarh, U. P., India.)

During recent years nematodes of insects have received renewed interest because of the possibility of their use in the biological control of insect pests. In this connection several successful experiments have already been performed, but most of them are still in the experimental stage. In India little work has been done on insect nematodes and unless a thorough survey is made of the various nematodes which infest the insects of the land, the possibilities of their biological importance in the control of insects cannot be assessed. With this end in view the author has started making a general survey of nematode parasites of insects of this country.

A very large number of *Grylotalpae* were dissected from the Aligarh district. Nearly all of them were found to be infected with one or more species of nematodes. All the nematodes found are Oxyurid worms belonging to the subfamily Thelastomatinae. The material was found to consist of five different kinds of worms. Four of them were found to represent four new genera for which the following names have been proposed :—

*Gryllocola gryllocola*, gen. et sp. nov.

*Gryllophila gryllophila*, gen. et sp. nov.

*Talpicola talpicola*, gen. et sp. nov.

*Mirzaiella asiatica*, gen. et sp. nov.

One worm closely resembles *Periplaneticola mirzaia*, a genus described by the author in an earlier paper (1940), but it differs from that species in certain characters. The name *Periplaneticola periplaneticola*, sp. nov. is proposed for it.

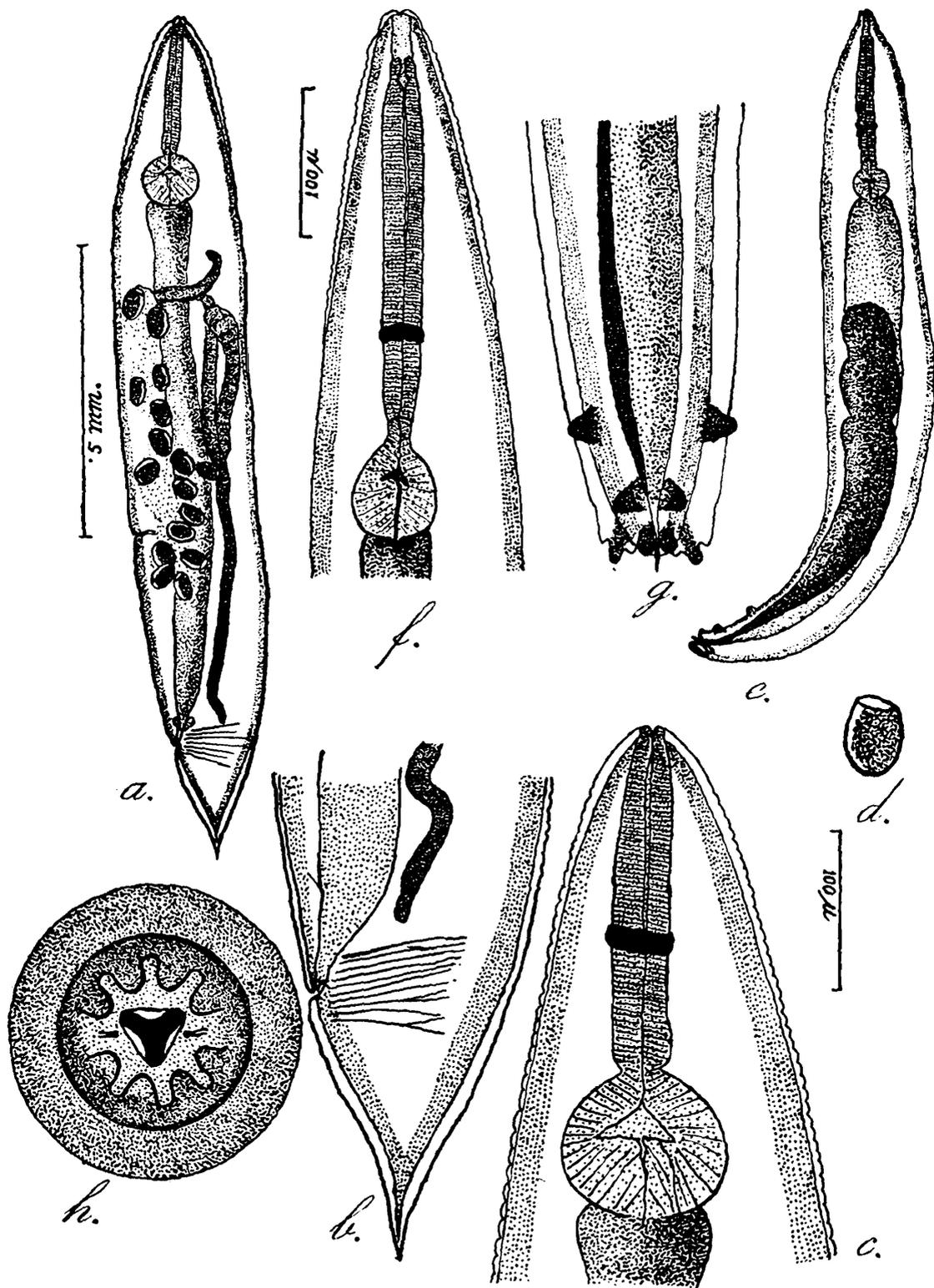
## **Gryllocola**, gen. nov.

*Generic diagnosis*.—Thelastomatinae: mouth opening prismoidal, surrounded by eight submedian labiopapillae. Cervical and caudal alae present. Oesophagus consisting of an anterior club-shaped part set off from the posterior valvular bulb by a narrow isthmus. Intestine dilated anteriorly to form a slight cardia. Vulva two-third of the body length from the anterior end. Tail of female conical. Tail of male truncated, bearing four pairs of caudal papillae; one pair of large sub-ventral preanal papillae, one pair of medioventral preanal papillae, one pair of adanal papillae, and one pair of postanal subdorsal papillae, Ovaries two; uteri divergent. Eggs oval with a conspicuous polar cap. Spicule single.

*Type species*.—*Gryllocola gryllocola*, sp. nov.

*Specific description*.—*Gryllocola*.

*Male* (Text-fig. 1 e-g).—1.08 mm. long by 150  $\mu$  wide. Cervical and caudal alae present. Cuticular striations present only in the cervical region, anterior to the nerve ring. First two annules very large,



TEXT-FIG. 1.—*Gryllocola gryllocola*, gen. et sp. nov.

a. Adult female entire. b. Female, tail, lateral view. c. Female, oesophageal region. d. Eggs. e. Male, entire, lateral view. f. Male, oesophageal region. g. Male, caudal region, ventral view. h. Female, head, en face view.

each about 18  $\mu$  wide, remaining annules 6  $\mu$  apart. Buccal cavity long and cylindrical, 30  $\mu$  deep by 15  $\mu$  wide. Oesophagus 310  $\mu$  long, consisting of a corpus 245  $\mu$  long by 25  $\mu$  wide, an isthmus 16  $\mu$  long by 10  $\mu$  wide and a posterior valvular bulb 65  $\mu$  long by 55  $\mu$  wide. Nerve ring 150  $\mu$  from the anterior end of body. Excretory pore not

observed. Anus near the posterior extremity, ventrally situated. Tail completely truncated. Caudal papillae consisting of one pair of large subventral preanal, one pair of medioventral preanal, one pair of adanal and one pair of subdorsal postanal papillae. Subventral alae present. Testis single. One spicule with a broad and blunt head, 18  $\mu$  long.

*Female* : (Text-fig. 1 *a-d, h*).—1.35 mm. long by 180  $\mu$  wide. Cuticle inconspicuously striated; striations 6  $\mu$  apart. Cervical and caudal alae present. Oral opening prismoidal with three inner cuticular projections, surrounded by eight submedian labiopapillae. Amphids or lateral organs appear as small circular openings. Buccal cavity not conspicuous. Oesophagus 310  $\mu$  long, consisting of a corpus 220  $\mu$  long by 27  $\mu$  wide, an isthmus represented by a narrow constriction 20  $\mu$  wide, and a posterior valvular bulb 90  $\mu$  long by 80  $\mu$  broad. Nerve ring 150  $\mu$  from the anterior end of body. Excretory pore not observed. Intestine enlarged anteriorly to form a slight cardia. Anus 170  $\mu$  from the posterior end of body. Tail conical. Vulva 850  $\mu$  from the anterior end of body. Ovaries two; uteri divergent. Eggs approximately oval, 45  $\mu$  to 50  $\mu$  long by 27  $\mu$  wide, with a conspicuous polar cap.

*Host*.—*Gryllotalpa*, sp.

*Location*.—Intestine (rectum).

*Type locality*.—Aligarh (Northern India).

*Type specimen*.—(Reg. No. W3456/1) is deposited in the Zoological Survey of India (*Ind. Mus.*), Calcutta.

### **Gryllophila**, gen. nov.

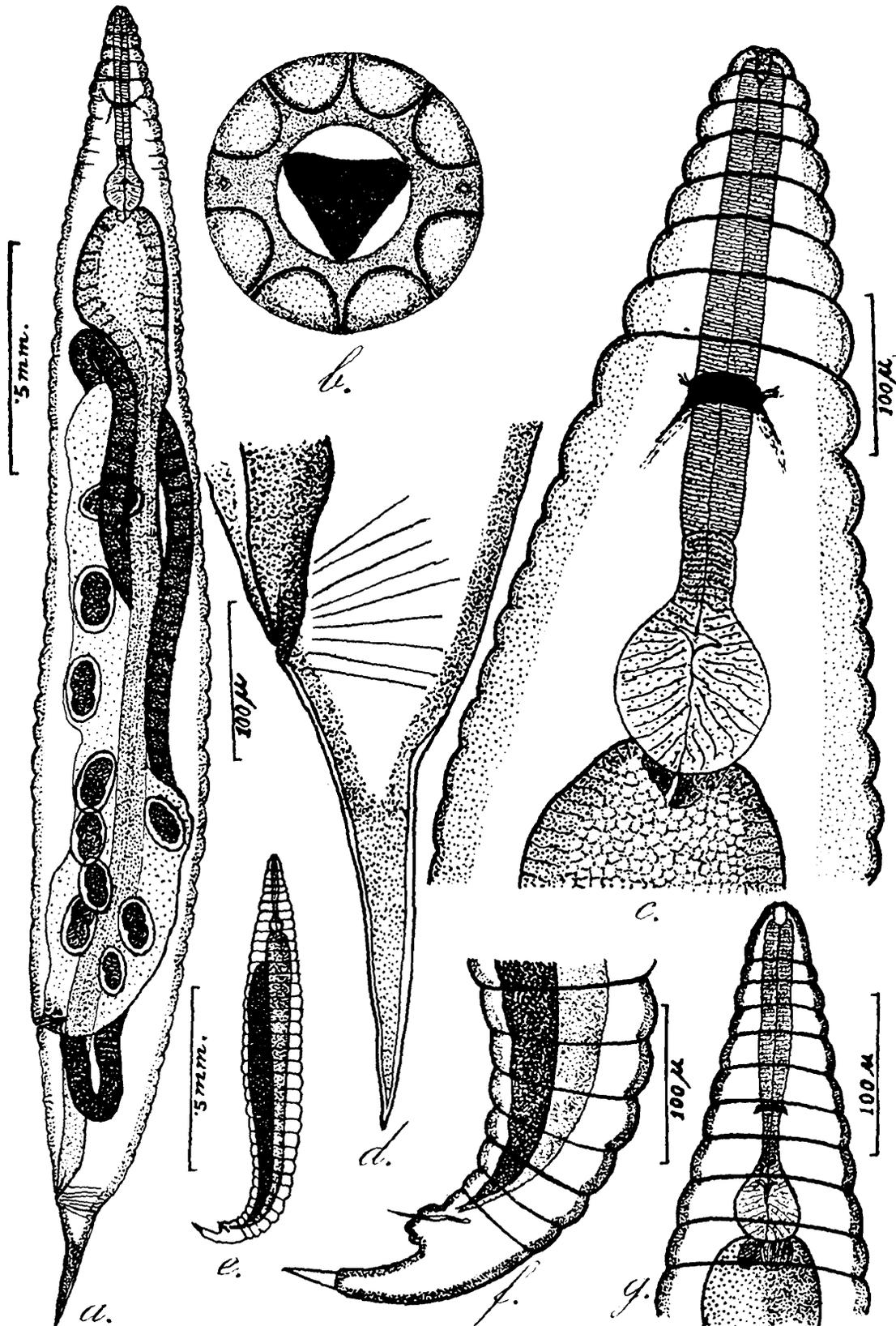
*Generic diagnosis*.—Thelastomatinae: Mouth opening triangular, surrounded by a circumoral elevation and eight labiopapillae. Oesophagus consisting of an anterior corpus, an isthmus distinctly set off from the corpus and a posterior valvular bulb. Intestine dilated anteriorly to form a big cardia. Vulva 77 per cent of the body length from the anterior end. Ovaries two; uteri parallel. Eggs ellipsoidal; segmentation begins at the time of deposition. Tail of female conically attenuated. Tail of male attenuated, ending in a short pointed appendage which is abruptly set off from the body. Spicule single.

*Type species*.—*Gryllophila gryllophila*, sp. nov.

*Specific description*.—*Gryllophila* :

*Male* : (Text-fig. 2 *e-g*).—1.17 mm. long by 170  $\mu$  wide. Body annulated throughout its whole length. First annule very big, 40  $\mu$  wide, second 15  $\mu$  wide and the third 18  $\mu$  wide. The following annules continually and regularly increase in width till about the middle of the body some of them reach the width of 40  $\mu$ . Posteriorly they regularly decrease in size, the posterior most annule being only 22  $\mu$  wide. Buccal cavity cylindrical, 12  $\mu$  deep by 8  $\mu$  wide. Oesophagus 200  $\mu$  long, consisting of a corpus 115  $\mu$  long by 20  $\mu$  in maximum width, an isthmus 40  $\mu$  long by 10  $\mu$  wide and a posterior valvular bulb 45  $\mu$  long by 40  $\mu$  wide. Nerve ring 125  $\mu$  from the anterior end of body. Excretory pore not observed. Anus 115  $\mu$  from the posterior end of body. Tail attenuated, ending in a short pointed appendage which is abruptly set off from the body. One spicule, 50  $\mu$  long.

Female: (Text-fig. 2 a-d).—2.8 mm. long by 350  $\mu$  in maximum width. Cuticle conspicuously striated. First annule 17  $\mu$  wide; width



TEXT-FIG. 2.—*Gryllophila gryllophila*, gen. et sp. nov.

a. Adult female, entire, lateral view. b. Female, head, en face view. c. Female oesophageal region. d. Female, tail, lateral view. e. Male, entire, lateral view. f. Male, caudal region, lateral view. g. Male, oesophageal region.

of the following annules increasing till it reaches its maximum in the ninth annule which is 50  $\mu$  wide. Posterior to the ninth annule a width of 30  $\mu$  is regularly maintained till we reach the position of the vulva.

behind which the width of the annules again decreases to  $10\ \mu$ . Oral opening triangular, surrounded by a circumoral elevation and eight submedian labiopapillae. Amphids present in the form of small circular openings. Buccal cavity cylindrical,  $20\ \mu$  deep by  $10\ \mu$  wide. Oesophagus  $453\ \mu$  long, consisting of a corpus  $300\ \mu$  long by  $40\ \mu$  wide, an isthmus  $43\ \mu$  long by  $35\ \mu$  wide, and a posterior valvular bulb  $110\ \mu$  long, by  $100\ \mu$  wide. Nerve ring  $210\ \mu$  from the anterior end of body. Excretory pore not observed. Intestine dilated anteriorly to form a big cardia. Anus  $320\ \mu$  from the posterior end of body. Tail conically attenuated. Vulva in the posterior third of the body,  $2.17\ \text{mm}$ . from the anterior end. Ovaries two; uteri parallel. Eggs ellipsoidal,  $150\ \mu$  long by  $80\ \mu$  wide; segmentation begins before deposition.

*Host*.—*Gryllotalpa*, sp.

*Location*.—Intestine (rectum).

*Type locality*.—Aligarh (Northern India).

*Type specimen*.—(Reg. No. W3457/1) is deposited in the Zoological Survey of India (*Ind. Mus.*), Calcutta.

### **Talpicola**, gen. nov.

*Generic diagnosis*.—Thelastomatinae: *Male* unknown.

*Female* with mouth opening sub-triangular, surrounded by eight labiopapillae. Lateral alae present. Oesophagus consisting of a cylindrical corpus followed by a very short isthmus not distinctly separated either from the corpus or from the following posterior valvular bulb. Buccal cavity broad and cylindrical. Excretory pore much behind the base of oesophagus. Tail conical. Vulva near middle of body. Vagina directed anteriorly. Ovaries two; uteri divergent. Eggs oval, with a conspicuous polar cap.

*Type species*.—*Talpicola talpicola*, sp. nov.

*Specific description*.—*Male* unknown.

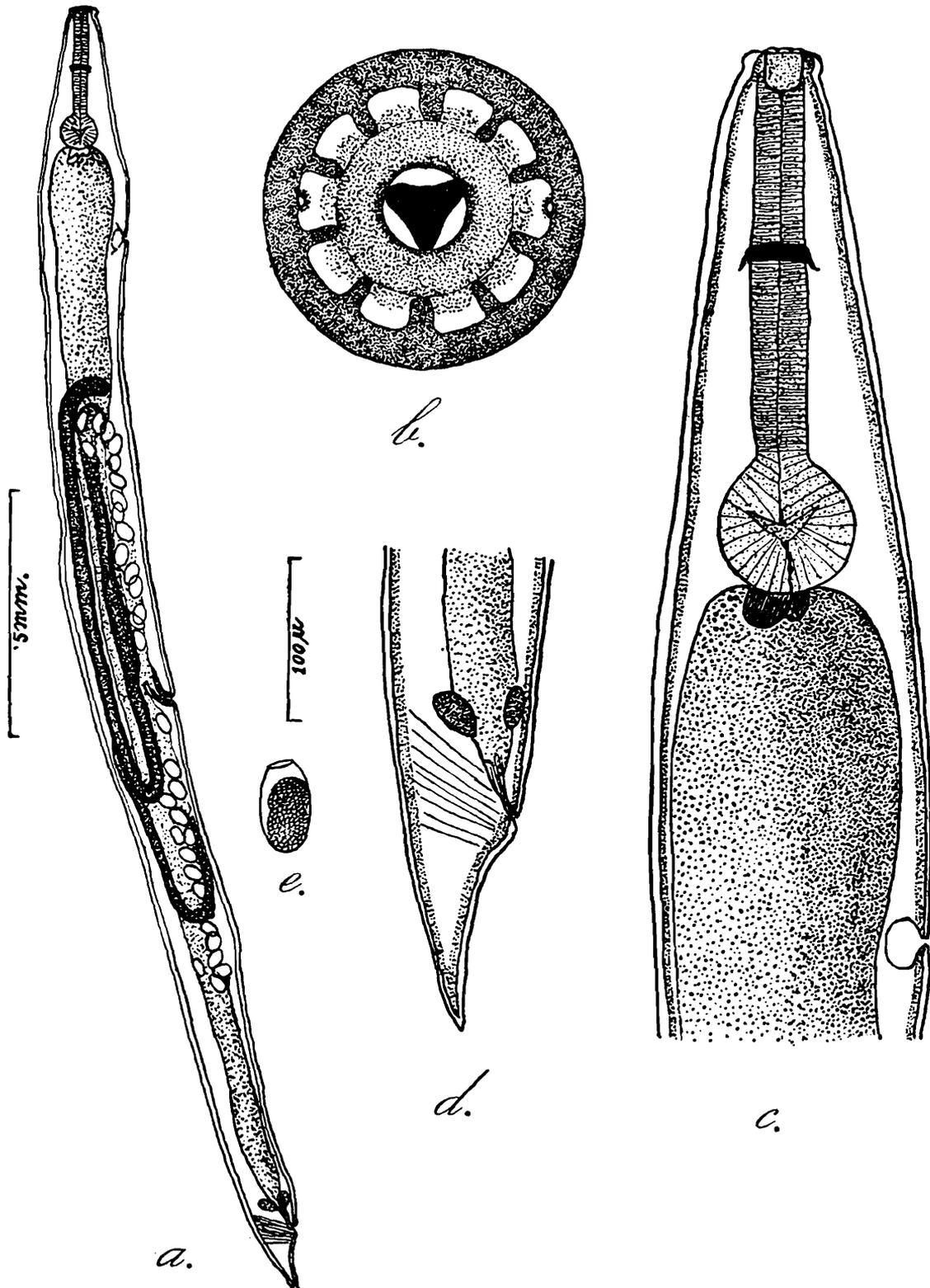
*Female*: (Text-fig. 3 a-e).— $2.7\ \text{mm}$ . long by  $170\ \mu$  wide. Lateral alae present. Body not striated. Oral opening sub-triangular, surrounded by eight submedian labiopapillae. Amphids appear as small circular openings. Buccal cavity  $25\ \mu$  deep by  $22\ \mu$  wide. Oesophagus  $325\ \mu$  long, consisting of a cylindrical corpus  $235\ \mu$  long by  $35\ \mu$  wide, an isthmus  $10\ \mu$  long by  $30\ \mu$  wide not distinctly set off, and a posterior valvular bulb  $80\ \mu$  long by  $85\ \mu$  wide. Nerve ring  $120\ \mu$  from the anterior end of body, situated near the middle of corpus. Excretory pore posterior to base of oesophagus,  $550\ \mu$  from the anterior end of body. Intestine enlarged anteriorly to form a cardia. Anus  $135\ \mu$  from the posterior end of body. Tail conical. Vulva near middle of body,  $1.42\ \text{mm}$ . from the anterior end. Vagina directed anteriorly. Ovaries two; uteri divergent. Eggs oval,  $55\ \mu$  long by  $30\ \mu$  wide, with a conspicuous polar cap; segmentation begins before deposition.

*Host*.—*Gryllotalpa*, sp.

*Location*.—Intestine (rectum).

*Type locality*.—Aligarh (Northern India).

*Type specimen.*—(Reg. No. W3458/1) is deposited in the Zoological Survey of India (*Ind. Mus.*), Calcutta.



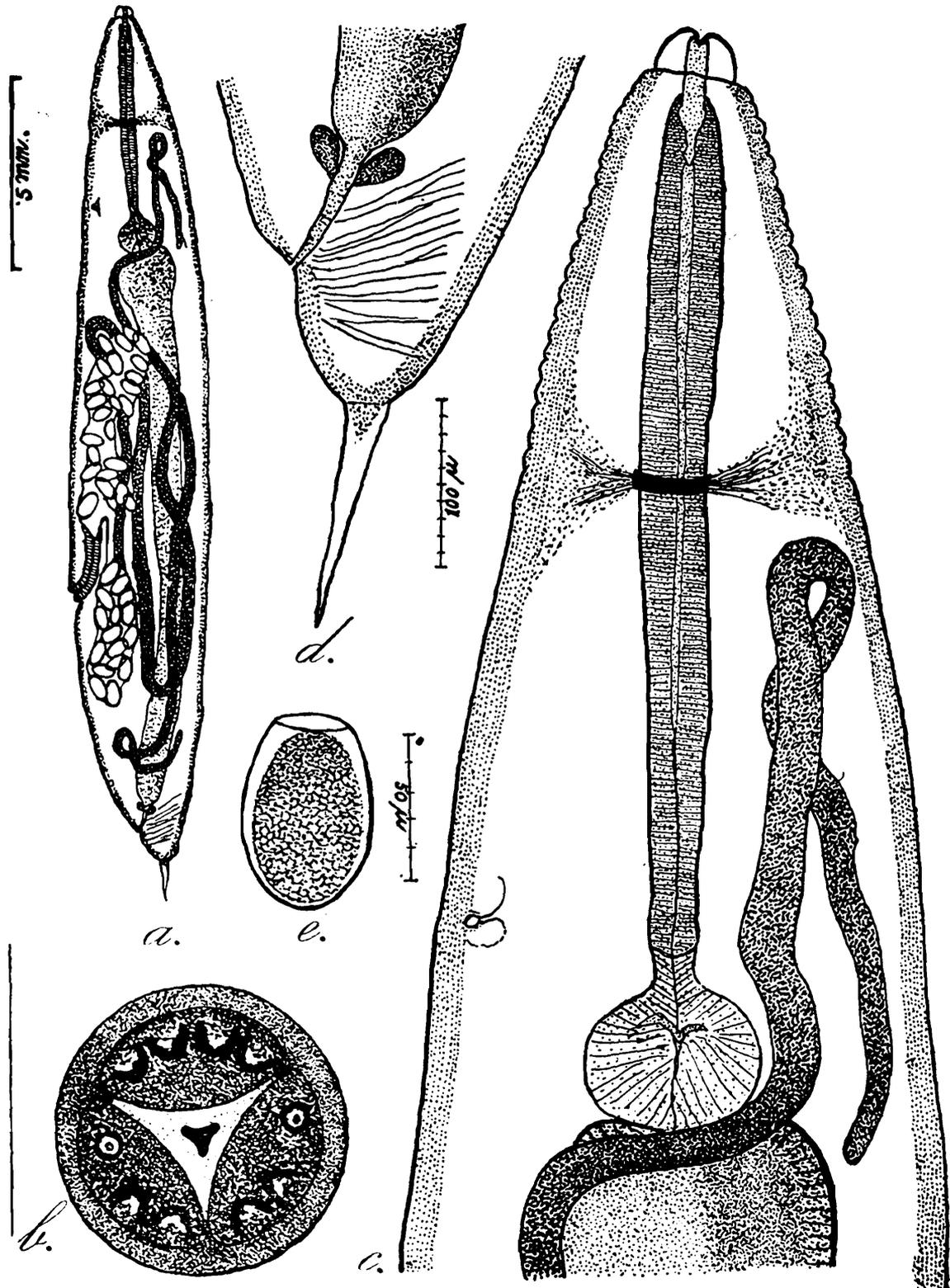
TEXT-FIG. 3.—*Talpicola talpicola*, gen. et sp. nov.

a. Adult female, entire, lateral view. b. Female, head, en face view. c. Female, anterior region. d. Female, tail, lateral view. e. Egg.

### **Mirzaiella**, gen. nov.

*Generic diagnosis.*—Thelastomatinae: Oral opening small and sub-triangular, surrounded by three well developed lips; the dorsal lip bears four papillae on its external surface and the ventro-lateral lips bear two papillae each. Amphids are present, opening externally near

the dorsal part of the ventro-lateral lips. Cuticle striated only anterior to the nerve ring. Buccal cavity long, partly covered by the oesophagus. Oesophagus very long, occupying more than 25 per-cent of the body length, consisting of an anterior corpus, an isthmus and a posterior valvular bulb. Excretory pore anterior to base of oesophagus. Intestine dilated anteriorly to form a big cardia. Tail short and rounded,



TEXT-FIG. 4.—*Mirzaiella asiatica*, gen. et sp. nov.

a. Adult female, entire, lateral view. b. Female, head, en face view. c. Female, oesophageal region. d. Female, tail, lateral view. e. Egg.

bearing a caudal appendage which is distinctly set off from the body. Vulva two-third of the body length from the anterior end. Vagina

long and muscular, directed anteriorly. Ovaries two; uteri divergent. Eggs oval, with a conspicuous polar cap.

*Type species.*—*Mirzaiella asiatica*, sp. nov.

*Specific description.*—*Mirzaiella*: *Male* unknown.

*Female*: (Text-fig. 4 *a-e*).—2.2 mm. long by 360  $\mu$  wide. Cuticle transversely striated only anterior to the nerve ring. Anterior annules 11  $\mu$  wide and posterior ones up to 15  $\mu$  wide. Mouth small and sub-triangular, surrounded by three well developed lips; the dorsal lip bears four papillae on its external surface and the ventro-lateral lips bear two papillae each. Amphids open externally towards the dorsal part of the ventro-lateral lips. Buccal cavity 75  $\mu$  long by 11  $\mu$  wide. Oesophagus 620  $\mu$  long, consisting of a corpus 510  $\mu$  long by 40  $\mu$  in maximum width, an isthmus 22  $\mu$  long by 22  $\mu$  wide and a posterior valvular bulb 85  $\mu$  long by 108  $\mu$  wide. Nerve ring 270  $\mu$  from the anterior end of body. Excretory pore anterior to base of oesophagus, 550  $\mu$  from the anterior end of body. Intestine dilated anteriorly to form a big cardia. Anus 215  $\mu$  from the posterior end of body. Tail short and rounded, bearing a caudal appendage 130  $\mu$  long, the latter being longer in younger females. Vulva 1.55 mm. from the anterior end of body. Vagina long and muscular, directed anteriorly, Ovaries two; uteri divergent. Eggs oval, 70  $\mu$  long by 45  $\mu$  wide, with a conspicuous polar cap.

*Host.*—*Gryllotalpa*, sp.

*Location.*—Intestine (rectum).

*Type locality.*—Aligarh (Northern India).

*Type specimen.*—(Reg. No. W3459/1) is deposited in the Zoological Survey of India (*Ind. Mus.*), Calcutta.

### Genus **Periplaneticola** Basir, 1940.

*Generic diagnosis.*—*Thelastomatinae*: *Male* unknown.

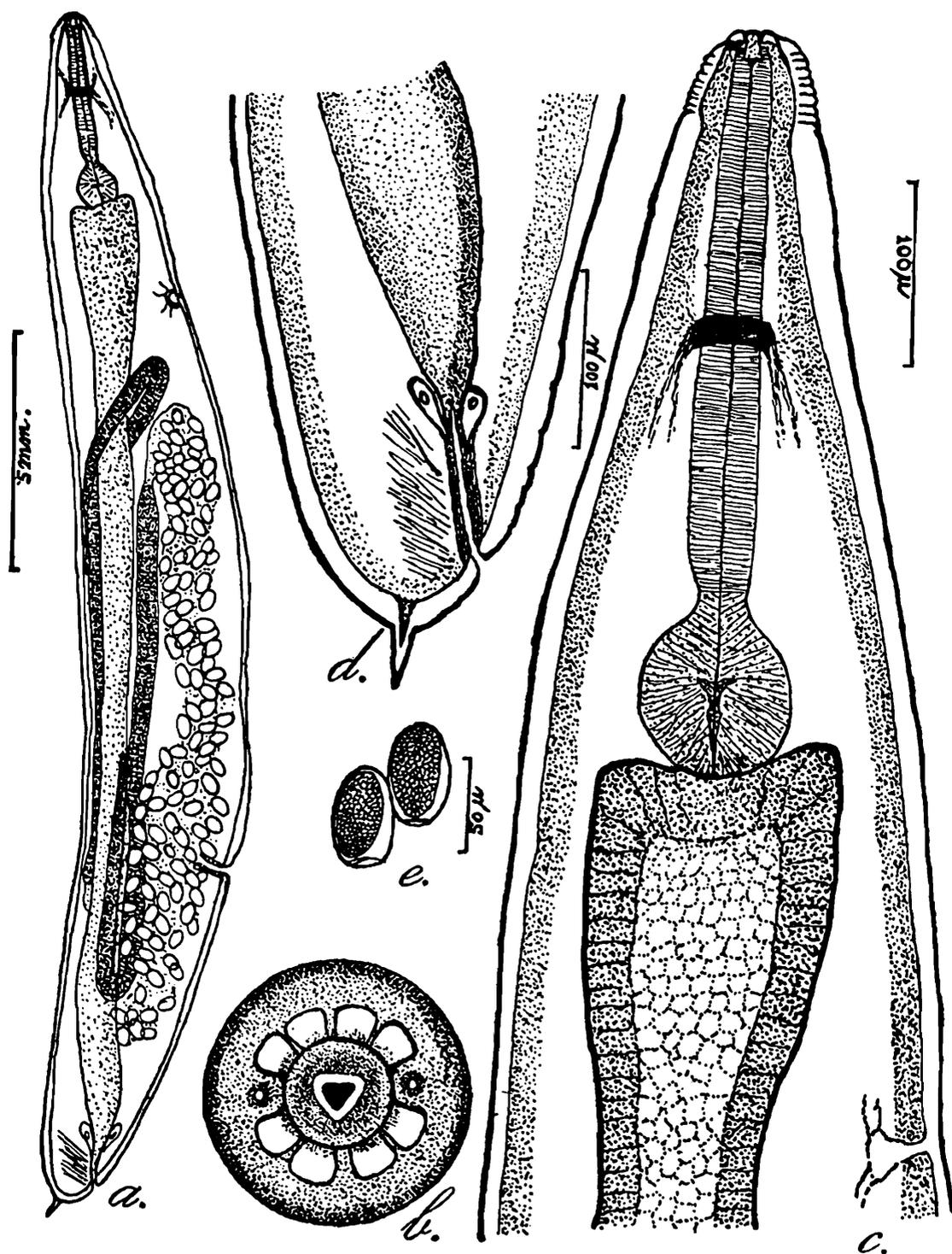
*Female* with mouth opening sub-triangular, surrounded by a circumoral elevation and eight labiopapillae. Amphids appear as small circular openings. Oesophagus consisting of an anterior corpus followed by a distinct isthmus and a posterior valvular bulb. Nerve ring about two-third of the length of corpus from its anterior end. Tail of female very characteristic; short and blunt, with a very small caudal appendage distinctly set off from the body. Vulva two-third or more of the body length from the anterior end. Ovaries two; uteri divergent. Eggs oval, with a conspicuous polar cap.

### **Periplaneticola periplaneticola**, sp. nov.

*Specific description.*—*Periplaneticola*: *Male* unknown.

*Female*: (Text-fig. 5 *a-e*).—2.6 mm. long by 350  $\mu$  in maximum width. Cuticle striated only in the cervical region; in all only nine annules present. First annule 15  $\mu$  wide, remaining annules 8.5  $\mu$  wide each. Lateral alae, present. Oral opening sub-triangular, surrounded by a circumoral elevation and eight labiopapillae. Amphids appear as small circular openings. Buccal cavity cylindrical, partly enveloped by the oesophagus, 18  $\mu$  deep by 10  $\mu$  wide. Oesophagus 400  $\mu$  long, consisting of a

corpus 295  $\mu$  long by 35  $\mu$  wide, an isthmus 15  $\mu$  long by 28  $\mu$  wide and a posterior valvular bulb, 90  $\mu$  long by 85  $\mu$  wide. Nerve ring 140  $\mu$ .



TEXT-FIG. 5.—*Periplaneticola periplaneticola*, sp. nov.

a. Adult female, entire, lateral view. b. Female, head, en face view. c. Female, anterior region. d. Female, tail, lateral view. e. Egg.

from the anterior end of body. Excretory pore much behind the base of oesophagus, 610  $\mu$  from the anterior end of body. Intestine enlarged anteriorly to form a slight cardia. Anus 90  $\mu$  from the posterior end of body. Tail short and blunt with a very small pointed caudal appendage, 35  $\mu$  long, distinctly set off from the body. Vulva 1.85 mm. from the anterior end of body, 71 per cent of the body length from the anterior end. Ovaries two; uteri divergent. Eggs oval, 55  $\mu$  long by 35  $\mu$  wide, with a conspicuous polar cap.

*Periplaneticola* was described as a new genus by the writer in the paper cited and one species *Periplaneticola mirzaia*, was described from the intestine of *Periplaneta americana*. Since that description was based on a single non-gravid female, it could not be complete. No eggs were seen and the form of oral opening and head papillae could not be described. The present specimens were obtained from *Gryllo-talpa* and resemble *Periplaneticola mirzaia* to a great extent; but there are certain characters which do not allow the two to be put together under the same species. The absence of alae, the extent of cuticular striations on the body, and the position of vulva in *Periplaneticola mirzaia*, are characters sufficient enough to separate the two as distinct species.

*Host.*—*Gryllo-talpa* sp.

*Location.*—Intestine (rectum).

*Type locality.*—Aligarh (Northern India).

*Type specimen.*—(Reg. No. W3460/1) is deposited in the Zoological Survey of India (*Ind. Mus.*), Calcutta.

*Key to the species of the genus Periplaneticola.*

1. Lateral alae absent. Cuticle striated throughout the whole length of the body. Vulva 66 per cent of the body length from the anterior end .. .. *P. mirzaia*.
2. Lateral alae present. Cuticle striated only in the cephalic region. Vulva 71 per cent of the body length from the anterior end .. *P. periplaneticola*.

*Key to the genera of the sub-family Thelastomatinae.*

1. Corpus of oesophagus terminated posteriorly by a pronounced swelling at least in female 2  
Corpus of oesophagus not terminated by a pronounced swelling .. 6
2. Anterior and posterior parts of corpus not distinctly set off .. *Aorurus*.  
Anterior and posterior parts of corpus distinctly set off .. .. 3
3. Corpus terminated by a subcylindrical swelling *Leidynema*.  
Corpus terminated by an ovoid or subspherical swelling .. .. 4
4. Corpus terminated by a subspherical swelling .. *Leidynemella*.  
Corpus terminated by an ovoid swelling .. 5
5. Tail of female filiform .. .. *Hammerschmidtella*.  
Tail of female conical .. .. *Galebiella*.
6. Eggs encapsulated or covered with spiral threads (often in two's or three's) 7  
Eggs not covered as above .. 8
7. Eggs covered by spiral threads .. *Pseudonymus*.  
Eggs encapsulated, not covered by spiral threads *Binema*.
8. Corpus of oesophagus of female very short 9  
Corpus of oesophagus of female not very short 11
9. Vulva near middle of body .. .. *Talpicola*.  
Vulva much posterior to middle of body .. 10
10. Tail of female conical .. .. *Blatticola*.  
Tail of female attenuated .. .. *Blattelicola*.

11. Corpus distinctly enlarged in form of a sub-spherical swelling at base of buccal cavity ..	<i>Blattophila</i> .
Corpus subcylindrical, without any form of enlargement	12
12. Tail conical or nearly conical in both sexes ..	13
Tail filiform, attenuated then delicately filiform, or very sharply set off in both sexes	14
13. Head of female with dorsodorsal and ventro-ventral simple papillae and laterodorsal and lateroventral labiopapillae .. .. .	<i>Sevirianoia</i> .
Head of female with all eight cephalic papillae in form of labiopapillae	<i>Cephalobellus</i> .
14. Female with one ovary	<i>Galebia</i> .
Female with two ovaries	15
15. Oral opening surrounded by three lips	16
Oral opening not surrounded by three lips	17
16. Tail of female filiform or very delicately attenuated .. .. .	<i>Fontonema</i> .
Tail of female short and round bearing a caudal appendage .. .. .	<i>Mirzaiella</i> .
17. Tail of male extremely short, degenerate ..	<i>Eurycoma</i> .
Tail of male delicately attenuated or filiform ..	<i>Thelastoma</i> .
18. Vulva anterior to middle of body ..	<i>Suifunema</i> .
Vulva much posterior to middle of body ..	19
19. Uteri divergent .. .. .	20
Uteri parallel .. .. .	<i>Gryllophila</i> .
20. Tail conical ..	<i>Gryllocola</i> .
Tail short and blunt with a very small caudal appendage attached to it ..	<i>Periplaneticola</i> .

## SUMMARY.

Four new genera and one new species of nematodes have been described from the intestine of *Gryllotalpa* (Gryllidae). All of these are Oxyurid worms belonging to the subfamily Thelastomatinae. The key to the genera at present included in the subfamily Thelastomatinae is given above.

## LITERATURE CITED.

- Basir, M. A., 1940.—Nematodes parasitic in Indian cockroaches. *Proc. Ind. Acad. Sci.* XII, pp. 8-16.
- Basir, M. A., 1941.—Two new nematodes from an aquatic beetle. *Proc. Ind. Acad. Sci.* XIII, pp. 163-167
- Basir, M. A., 1941.—A new species of the nematode genus *Blattophila* Cobb, 1920, from a cockroach. *Current Science* X, pp. 443-445.
- Baylis, M. A. and Daubney, R., 1926.—A synopsis of the families and genera of Nematoda. *Brit. Mus. (Nat. Hist.)*, pp. 1-277
- Chitwood, B. G., 1932.—A synopsis of nematodes parasitic in insects of the Family Blattidae. *Zeit. Parasitenk.*, V, pp. 14-50.
- Chitwood, B. G. and Chitwood, M. B., 1934.—Nematodes parasitic in Philippine cockroaches. *Philip. Journ. Sci.* LII, pp. 381-393.

- Christie, J. R., 1931.—Some nemtic parasites (Oxyuridae) of Coleopterous larvae. *Jour. Agr. Res.* XLII, pp. 463-482.
- Hammerschmidt, K. E., 1846-47.—Beschreibung einigen Oxyuris-Arten. *Naturwiss, Abhand. Wien* I, pp. 279-288.
- Travassos, L., 1929.—Contribucao preliminar a systematica dos nematodes dos arthropodos *Int. Oswaldo Cruz. Suppl.* V, pp. 15-25.
- Walton, A. C., 1927.—A revision of the nematodes of the Leidy collections. *Proc. Acad Nat. Sci., Philadelphia* LXXIX, pp. 49-163.