

***Leiperocotyle meghalayensis* sp. nov. (Trematoda: Paramphistomidae: Orthocoeliinae) a New Parasite of Cattle (*Bos indicus* Linnaeus) in India**

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With 12 Figures

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**Abstract**

*Leiperocotyle meghalayensis* sp. nov. occurring in the rumen of *Bos indicus* L. in Meghalaya (India) is described. The new species is distinguished from all the other members of the genus by the structure of the pharynx and the streptocoelium type of acetabulum.

**Introduction**

Exploration of some slaughter houses in Meghalaya (India) revealed the presence of a hitherto undescribed species of paramphistomes from the rumen of *Bos indicus*. The observations, made both from sagittal (ss) and cross sections and whole mounts (wm), revealed some difference with the existing species of the genus *Leiperocotyle* Eduardo, 1980. This form is described herein as a new species.

**Materials and Techniques**

A total of 16 specimens of the new species were collected from the rumen of 2 slaughtered cattle, *Bos indicus* L. at Shillong in Meghalaya, India. Six specimens were processed for whole mount preparation. Three series of sagittal and 2 series of cross sections were prepared and stained in haematoxylin and eosin. Ink drawings were made to scale with the aid of a camera lucida.

For SEM studies, 5 specimens were fixed in 10% cold neutral buffered formalin and dehydrated through a graded series of acetone to pure acetone, and finally treated with Tetramethylsilane (TMS) and metal coated as described earlier (ROY and TANDON 1989). These specimens were observed under a Jeol JSM-35 CF electron microscope using accelerating voltages of 10–15 Kv.

The observations are based on the above number of preparations. Measurements are taken from 6 whole mounts and 3 series of sagittal sections (ss).

**Results**

**Measurements and description**

*Leiperocotyle meghalayensis* sp. nov. (Figs. 1–12)

Body elongated and straight, 4.29–7.32 mm long, 1.94–2.53 mm in greatest width (wm), ratio of body width to body length 1 : 2.3 to 1 : 2.84.

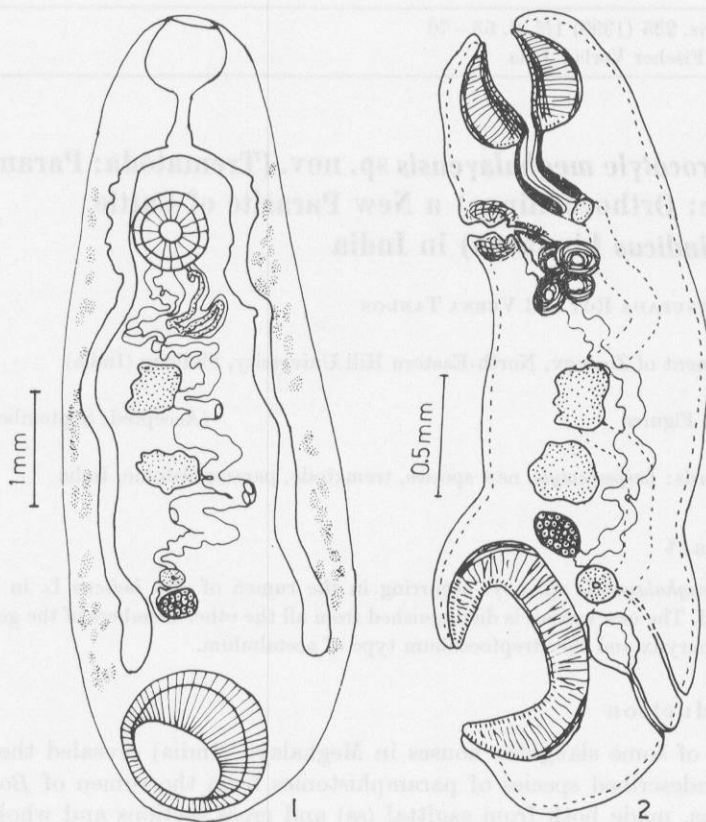


Fig. 1 and 2. *Leiperocotyle meghalayensis* sp. nov. (Fig. 1–5 diagrammatic representation through camera lucida drawings).

1. Whole mount, 2. Whole worm, sagittal view

Acetabulum subterminal, 0.99–1.35 mm (wm) in external diameter, ratio to body length 1: 4.54 to 1: 6.25; of streptocoelium type as defined by NÄSMARK (1937), i.e., dorsal and ventral exterior circular muscle units not delimited from the acetabulum tissue by an oblique muscle band; number of circular muscle units in each series: DE, 12–18; DI, 22–30; VE, 11–16; VI, 21–30; dome 4–8 (Fig. 3).

Pharynx 0.49–0.72 mm (wm) long, 0.63–0.76 mm (wm) in greatest diameter, ratio to length of body 1: 8.80 to 1: 10.87, to diameter of acetabulum 1: 1.62 to 1: 2; of calciphoron type as defined by DINNIK (1964) in median sagittal section; internal surface lined by small papillae. Oesophagus 0.36–0.45 mm long, ratio to body length 1: 12.78 to 1: 16.19; musculature of its wall gradually thickened posteriad to form an oesophageal bulb (Fig. 4). Caeca more or less straight, extend up to anterior level of acetabulum and terminate ventrally.

Testes tandem, intercaecal; anterior testis 0.27–0.67 mm long, 0.31–0.76 mm (wm) in width; posterior testis 0.27–0.81 mm long, 0.31–0.67 mm (wm) in width. Pars prostatica moderately developed, pars muscosa coiled and well developed, vesicula seminalis thin walled.

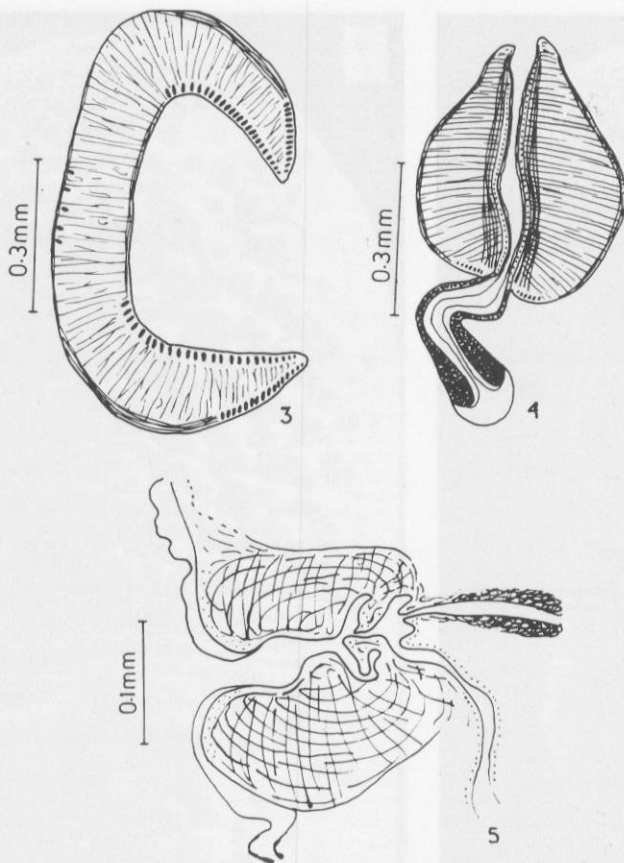


Fig. 3-5. *Leiperocotyle meghalayensis* sp. nov.

3. Acetabulum, median sagittal section. 4. Pharynx and oesophageal bulb, median sagittal section. 5. Terminal genitalium, median sagittal section

Ovary 0.18–0.22 mm by 0.18–0.31 mm (wm), post-testicular; Mehlis' gland close to ovary; Laurer's canal not crossing excretory vesicle or duct, somewhat parallel to excretory canal, opens on dorsal surface about 0.14–0.39 mm (ss) anterior to excretory pore. Uterus follows median course with few loose coils through its course. Eggs 0.113–0.144 mm by 0.067–0.081 mm. Vitellaria consist of few loose or small clusters of vitelline glands in lateral fields, extending from little behind oesophageal bifurcation to anterior level of acetabulum.

Excretory vesicle dorsal to acetabulum, opens on dorsal surface, posterior to opening of Laurer's canal.

Genital pore ventral at level of oesophageal bifurcation or little below it; genital atrium surrounded by a distinct muscular sucker (Fig. 5), of cotylophoron type as defined by NÄSMARK (1937) due to complete delimitation of muscular sucker from surrounding body tissues by a membrane, 0.40–0.72 mm (wm) in diameter; ratio to length of pharynx 1 : 0.93 to 1 : 1.33, to diameter of acetabulum 1 : 1.62 to 1 : 2.56.

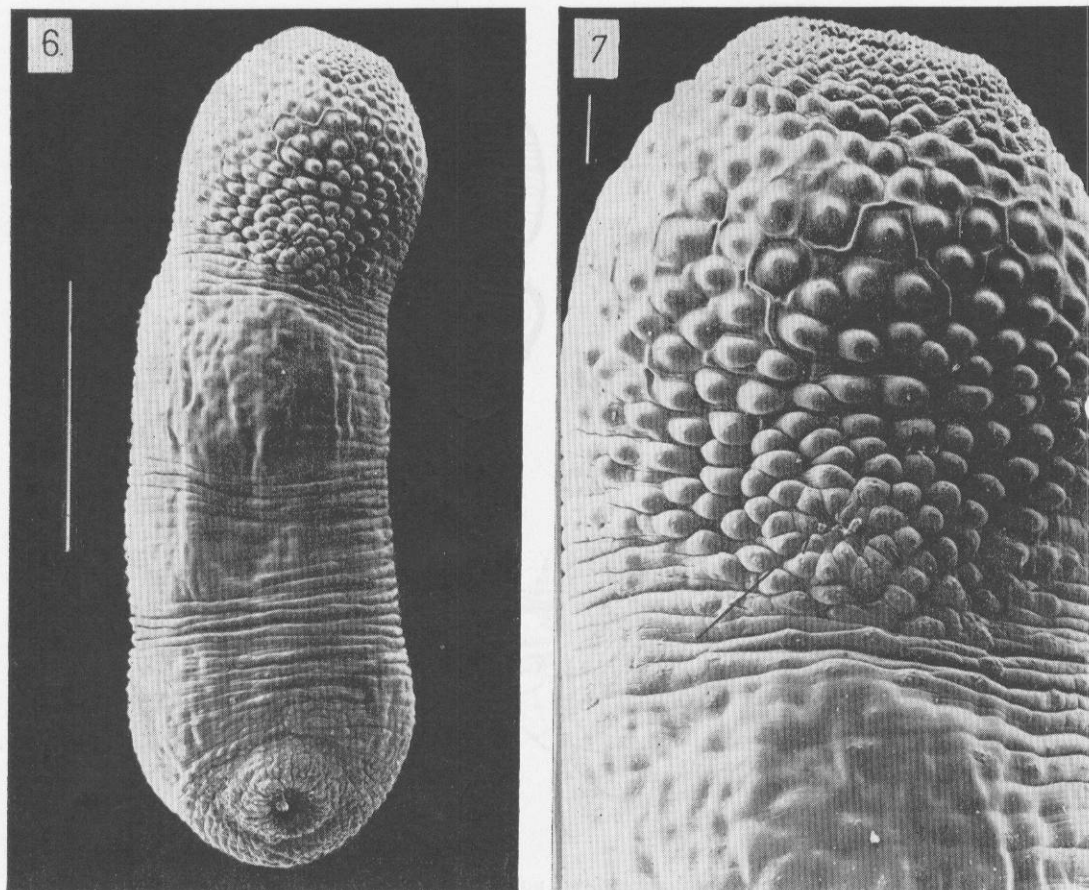


Fig. 6 and 7. *Leiperocotyle meghalayensis* sp. nov. (Fig. 6—12 scanning electron micrographs).

6. Whole worm, ventral view (scale bar, 1 mm). 7. Anterior end magnified, showing tegumental papillae around oral aperture and genital opening (arrow) (scale bar, 100  $\mu$ m)

Scanning electron microscopic observations of the body surface (Figs. 6—12) revealed the presence of three types of tegumental papillae. Those around the oral aperture and also in the vicinity of genital pore are not smooth and have cilia-like structures on their apical end. Papillae in the acetabular region are dome-shaped, smooth-surfaced elevations, usually found in small clusters of 2—6 papillae each. The tegument lining the aperture of the acetabulum also has smooth but randomly scattered papillae with finely beaded surface.

#### Discussion

EDUARDO (1980) created the genus *Leiperocotyle* in the subfamily Orthocoeliinae (Paramphistomidae) to accommodate *Cotylophoron okapi* Leiper, 1935 and *C. congolense* Baer, 1936. The genus was separated from the genus *Cotylophoron* by the characters, viz. the Laurer's canal not crossing the excretory vesicle or duct. Two species of the

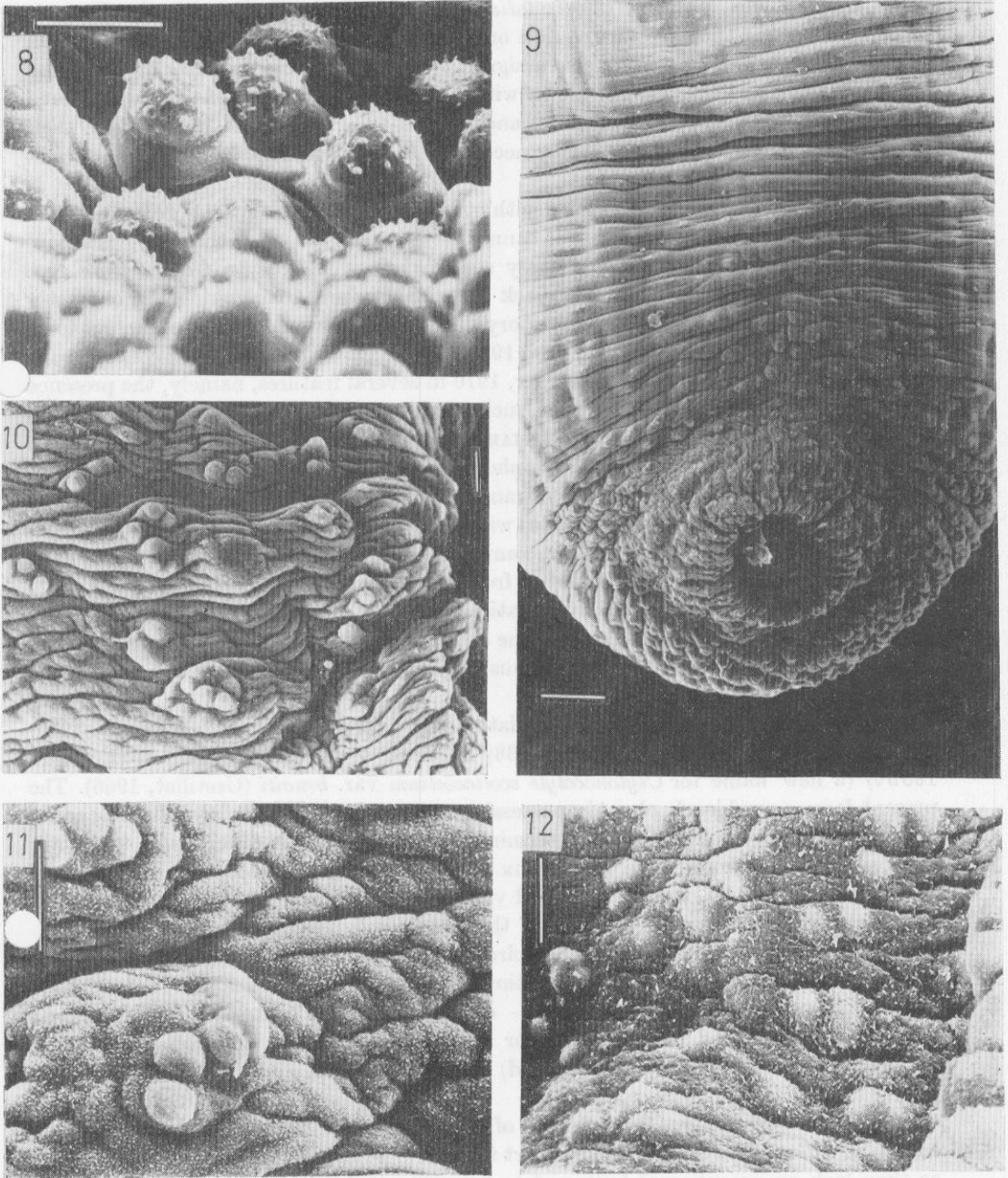


Fig. 8—12. *Leiperocotyle meghalayensis* sp. nov.

8. A closer view of tegumental papillae around oral aperture. Apical spine-like structures are conspicuous (scale bar, 10  $\mu$ m). 9. Enlarged view of acetabular region (scale bar, 100  $\mu$ m). 10. Clustered arrangement of papillae in acetabular region (scale bar, 10  $\mu$ m). 11. Same in a magnified view (scale bar, 10  $\mu$ m). 12. Papillae of tegument lining the acetabular aperture (scale bar, 10  $\mu$ m)

genus *Cotylophoron*, namely, *C. orientalis* and *C. elongatum*, both with the Laurer's canal not crossing the excretory vesicle or duct as described by HARSHEY (1934) from goats and sheep in India, were also assigned tentatively to *Leiperocotyle* by EDUARDO (1980). However, these species along with *C. ovatum* Harshey, 1934 are considered species inquirenda (BHATTACHARYULU and PANDE 1969, EDUARDO 1985a) since their descriptions lack histological details, necessary for generic allocation among paramphistomes.

A comparison of the present form with other paramphistome species described from bovine hosts in India revealed that it cannot be identified as one of these. The relationship of Laurer's canal to the excretory system brings it close to *Orthocoelium* spp. (EDUARDO 1985b), which, however, lack a genital sucker. Overlooking the character of Laurer's canal not crossing the excretory duct or vesicle would place the present form in the genus *Cotylophoron* (see EDUARDO 1985a). It resembles *Cotylophoron cotylophorum* (Fischöeder, 1901) Stiles and Goldberger, 1910 in several features, namely, the presence of an oesophageal bulb and a genital sucker, pharynx calicophoron type and genital atrium cotylophoron type (*sensu* NÄSMARK 1937). However, the points of deviation include the acetabulum which is cotylophoron type (*sensu* NÄSMARK 1937) and the intestinal caeca which have several bends and terminate dorsally in *C. cotylophorum*. The material pertaining to the latter species was also collected by the present authors from cattle (*Bos indicus*) in Shillong. An examination of the same also revealed that the specimens described herein are different from *C. cotylophorum*.

In view of the fore-going, the combination of characters like the presence of a genital sucker and Laurer's canal not crossing the excretory vesicle or duct in the present form leaves no choice but to keep it in the genus *Leiperocotyle*, so far represented only in the African continent.

The genus includes three species to date namely, *Leiperocotyle okapi* (Leiper, 1935) Eduardo, 1980, *L. congolense* (Baer, 1936) Eduardo, 1980, and *L. gretillati* (Eduardo 1985c) (a new name for *Ceylonocotyle scoliocoelium* var. *benoiti* (Gretillat, 1966)). The present form resembles *L. okapi* in possessing an oesophageal bulb, laterally extending vitellaria and cotylophoron type of terminal genitalium, but it differs from the latter in having a calicophoron type of pharynx (*sensu* DINNIK 1964), streptocoelium type of acetabulum (*sensu* NÄSMARK 1937), and vitellaria in the form of a few loose or small clusters of vitelline glands; in *L. okapi* the pharynx is paramphistomum type (*sensu* NÄSMARK 1937 — the units of interior circular muscle layer relatively well developed, radial muscle layer occupying a proportionally broad area) and the acetabulum cotylophoron type (*sensu* NÄSMARK 1937 — dorsal and ventral exterior circular muscle units clearly separated from the interior acetabulum tissue by an obliquely running and longitudinally branched muscle band) and the vitellaria are in large and dense clusters.

The present form shares the character of terminal genitalium (i.e., cotylophoron type) with *L. gretillati*. However, it stands apart from *L. gretillati* as well as from *L. congolense* as they lack an oesophageal bulb and have cotylophoron type of acetabulum (*sensu* NÄSMARK 1937), further in *L. congolense* the terminal genitalium is of schistocotyle type (*sensu* SEY and GRABER 1979).

The authors believe that these differences are sufficient to establish the present species as distinct and valid for which the name *L. meghalayensis* is proposed after the origin of the materials.

### Specific diagnosis

Laurer's canal not crossing excretory vesicle or duct, oesophageal bulb present, terminal genitalium cotylophoron type, acetabulum streptocoelium type (*sensu* NÄSMARK 1937), ciliated papillae present around oral aperture and genital pore opening, and non ciliated clustered papillae present around rim of acetabulum.

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### Deposition of specimens

Holotype (No. IV/ERS, 298) and one series of ss (No. IV/ERS, 299) in the Zoological Survey of India, Eastern Regional Station, Shillong; paratypes and 2 series of ss in Helminthological collection of Department of Zoology, NEHU, Shillong (NEHU/Z-TM/2).

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