

*Short Communication***Morphological identification of *Calicophoron* sp. (Digenea: Paramphistomidae) in the rumen of infected goat**

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E-mail : [zsiddiki@gmail.com](mailto:zsiddiki@gmail.com)**ABSTRACT**

This study was undertaken to identify *Calicophoron* sp. on the basis of its morphology and morphometry to differentiate it from other paramphistomes affecting ruminants in Bangladesh. Adult rumen flukes were recovered from the rumen of naturally infected goat slaughtered in local abattoirs of Chattogram, Bangladesh. Some adult flukes were flattened and stained for morphometry. The permanent slides were used to record the length and width of various internal organs including oral and ventral sucker, anterior and posterior testes, ovary, esophagus, acetabulum, pharynx etc. Microscopic features of the parasite used in identification are morphology and histology of the anterior sucker, pharynx, esophagus, genital atrium, posterior sucker (*acetabulum*) and testes to the *Calicophoron* sp. The study is possibly the first report of *Calicophoron* sp. in goats in Bangladesh. Further histological and molecular analyses can highlight its taxonomic position with a view to their reliable differentiation from other rumen flukes of small ruminants.

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**1. INTRODUCTION**

Paramphistomes play a vital role in ruminant diseases worldwide. These include those commonly associated with diseases in goat where most predominant species is known to be *Paramphistomum* sp. (Dorny *et al.*, 2011). Along with *Paramphistomum* sp, *Ceylonocotyle dicranocoelium*, *Bothriophoron bothriophoron*, *Calicophoron calicophorum* and *Calicophoron microbothrioides* are trematodes of the family Paramphistomidae and are parasitic in the alimentary canal of many ruminants (Horak, 1971). Mature parasites of many

species are mainly found in the reticulum and rumen where they rarely produce any clinical symptoms but immature paramphistomes are found pathogenic (Fuertes *et al.*, 2015). Immature migrating amphistomes of certain species have been reported to cause serious disease and even deaths of their hosts by burying themselves into the submucosa of the duodenum and feeding on the epithelial cells of the Brunner's gland which results in anorexia, polydipsia, profuse foetid diarrhoea, drop in plasma protein concentration and anemia (Buttler *et al.*, 1962; Rolfe, 1994).

The aim of this study was to determine the identity, prevalence, frequency of *Calicophoron calicophorum* in from a goat rumen collected from a local abattoir in Chattogram, Bangladesh. Until now limited information is available on the helminth fauna of small ruminants in Bangladesh. We have attempted to use classical approach to reliably identify the worm with a view to facilitate future research regarding the incidence and prevalence, their epidemiology and possible pathogenic importance in small ruminants in Bangladesh.

## 2. MATERIALS AND METHODS

Specimens (n=20) were obtained from the inner wall of the rumen and reticulum from cattle slaughtered at the abattoirs in Chattogram Metropolitan area. The condition of the rumen and reticulum were assessed for damage caused by the parasites. The parasites were hand-picked into plastic containers containing normal saline (Dube *et al.*, 2013) and were washed in the same solution. Some specimens were teased to obtain eggs; some were flattened dorsoventrally between two slides to facilitate exploring diagnostic features like distribution of vitelline glands, positioning of testes, oesophagus, branching of caeca and uterus. Some specimens were fixed and preserved in formal saline or 70% ethanol (Ferrerias *et al.*, 2014) for histological characterization while several permanent slides (n=9) were prepared using conventional approach. Photographs were taken using a camera mounted on a microscope while morphometry were done with calibrated microscope. Statistical analyses was performed using Microsoft Excel.

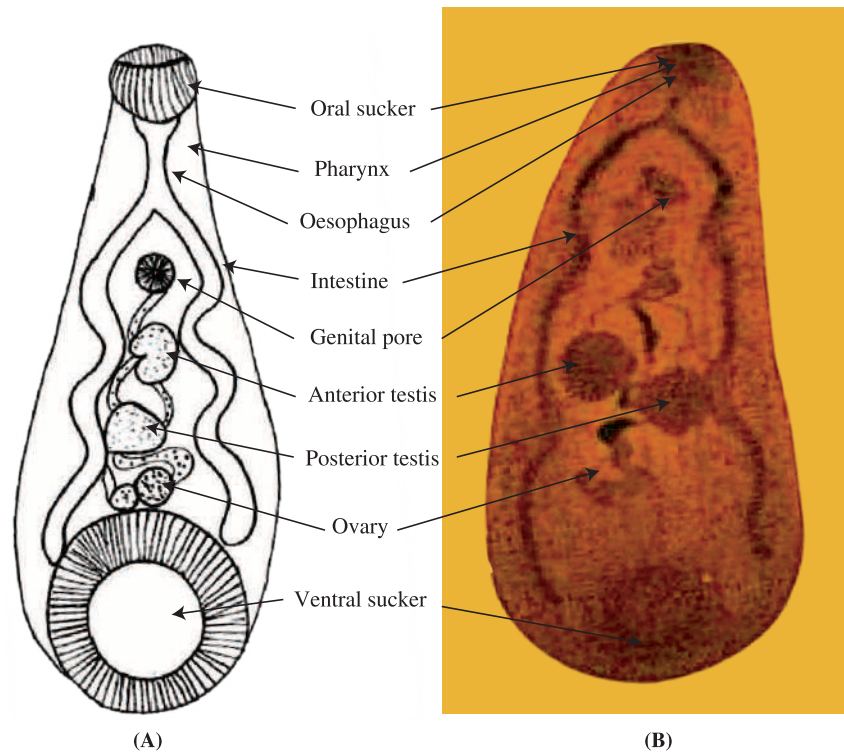
## 3. RESULTS AND DISCUSSIONS

The sample specimens was carefully examined for morphological characteristics and based on previous reports. A number of salient features were recorded. The examination revealed that the fresh pink colored trematode specimen has the following known characteristics (Table 1) including conical shaped body, integument has wrinkles and genital pore is visible especially when the genital atrium is everted (Fig. 1, 2). It lies about one fifth of the body length from the oral end. The acetabulum and pharynx was of the

**Table 1:** Morphometric data from 20 flukes collected during this study.

Characteristics	Mean±SD (mm)
Body length	8.18±0.05
Body breadth	2.51±0.16
Acetabulum diameter	1.62±0.10
Ratio of acetabulum diameter to body length	1:1.56
Pharynx length	0.94±0.07
Ratio of pharynx length to body length	1:2.70
Oesophagus length	0.64±0.09
Anterior testis length	0.56±0.11
Anterior testis breadth	0.49±0.12
Posterior testis length	0.47±0.11
Posterior testis breadth	0.47±0.04
Genital atrium diameter	0.30±0.10

*Calicophoron* type. The oesophagus is shorter than the pharynx and is made of two layers and outer circular layer and an inner longitudinal layer. The caeca makes six bend and after the last bend which is on the dorsal side, the caeca turns towards the ventral direction (Gordon *et al.*, 2013). The excretory bladder opens through the excretory pore three tenths of the body length from the posterior end. Two testes are situated diagonally in the mid-third of the body and are deeply lobed. The ovary and Mehli's gland lie adjacent to each other between the posterior testis and the acetabulum. Clusters of vitelline glands extend from the pharynx to acetabulum on the lateral margins of the body. The genital atrium is of *Calicophoron* type. The pars prostatica is long and large, opening to exterior through the ductus ejaculatorius. Dorsally the pars prostatica leads to a pars muscosa which leads into the vesicular seminalis with many loops. The vesicular seminalis branches into two *vas differentia* which lead to the posterior and anterior testis. The uterus is wavy extending from the ovary along the midline to the metraterm.

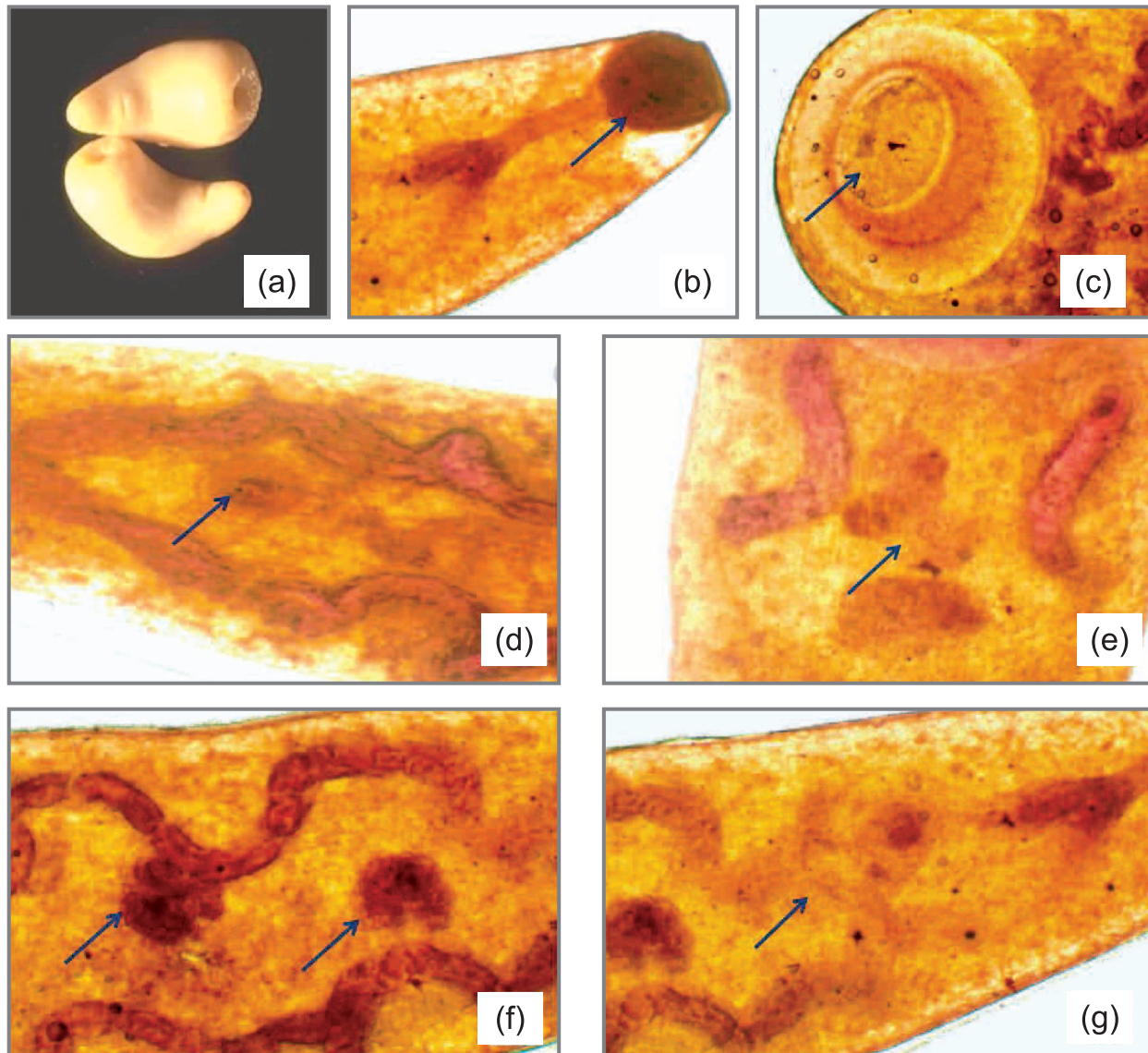


**Figure 1.** (A) Schematic presentation of various internal organs and suckers of *Calicophoron sp.* (B) The picture of the worm from the website of North-East India Helminth Parasite information database (Adapted from <http://nepiac.nehu.ac.in/helminth/specie/14.html>) No scale bar is mentioned intentionally.

Based on the different characteristics as observed during microscopy and morphometry, the sample was identified as *Calicophoron calicophorum*. Other supporting evidence was the histology of the acetabulum,

pharynx and genital atrium which correspond with the previous descriptions and illustrations of this worm as reported earlier (Edgar, 1938; Harding, 1950; Roberts, 1939; Gee, 1958; McFadden, 1968).

**Table 1:** Measurement of flattened specimen of *Calicophoron sp.* recovered from goat in Chattogram



**Fig. 2:** Collected specimen (a) and whole mounted parasite stained with H and E showing visceral organs: (b) Anterior sucker with cecal bifurcation and caeca, ventral sucker or acetabulum (c), genital pore (d), ovary (e), anterior and posterior testes (f) and Uterus (g). All photos were captured at 4X objective with a photomicroscope.

#### 4. CONCLUSION

Morphological study of all parasites revealed presence of *Calicophoron spp* mainly in adult stage in the rumen of goat and possibly this is the first case reported in Bangladesh. Identification of *Calicophoron spp* will provide us a new direction to the specific diagnosis of Paramphistomes and provides a solid foundation for studying the reproductive biology of Paramphistomes and how to control them by interrupting their life cycle.

#### 5. ACKNOWLEDGEMENTS

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#### 6. REFERENCES

Buttler, R. W. and Yeoman, G.H. 1962. Acute intestinal paramphistomiasis in Zebu cattle in

- Tanganyika. Veterinary Record, 74: 227 - 231.
- Dube, N.E. Onyedineke and Aisien, M.S.O. 2013. Ceylonocotyle, Bothriophoron and *Calicophoron* species parasitic in some Nigerian cattle, Advances in Bioresearch,4:38-43
- Dorny, P., Stoliaroff, V., Charlier, J., Meas, S., Sorn, S., Chea, B., Holl, D., Van Aken, D., Vercruyssen, J. 2011. Infections with gastrointestinal nematodes, *Fasciola* and *Paramphistomum* in cattle in Cambodia and their association with morbidity parameters. Veterinary Parasitology, 175: 293-299.
- Edgar, G. E. 1938. Paramphistomiasis of young cattle. Australian Veterinary Journal; 14: 27-3
- Ferreras, M.C., Gonzalez-Lanza, C., Perez, V., Fuentes, M., Benavides J., Mezo, M., 2014, *Calicophoron daubneyi* (Paramphistomidae) in slaughtered cattle in Castilla Leon (Spain), Veterinary Parasitology. 199:268-271
- Fuertest, M., Perez, V., Benavides, J., González-Lanza, MC., Mezo, M., González-Warleta, M., Giráldez, FJ., Fernández, M., Manga-González, MY., Ferreras, MC. 2015. Pathological changes in cattle naturally infected by *Calicophoron daubneyi* adult flukes. Vet Parasitol, 209(3-4):188-96
- Gee, R. W. 1958. Disease problems of dairy cattle in irrigation areas. Australian Veterinary Journal, 34: 352-357
- Gordon, D.K., Roberts, L.C., Lean, N., Zadoks, R.N., Sargison, N.D., Skuce, P.J. 2013. Identification of the rumen fluke, *Calicophoron daubneyi*, in GB livestock: possible implications for liver fluke diagnosis, Veterinary Parasitology, 195:65-71.
- Harding, G. W. B. 1950. Mortality in adult cattle due to paramphistomes. Yearbook of Inspectors of Stock, N.S.W. pp. 87-89.
- Horak, I.G. 1971. Paramphistomiasis of domestic ruminants. Advances in Parasitology. Academic press London, England, New York U.S.A, 9:33-70
- Mcfadden, G. M. 1968. Amphistomosis in cattle. Victorian Veterinary Proceedings, pp. 69-70
- Robert, F. H. S. 1939. The Gastrointestinal Helminths of Cattle in Queensland: Their distribution and pathogenic importance. Proceedings of the Royal Society of Queensland, 50: 46-54.
- Rolfe, P.F., Boray, J. C. and Collins, G.H. 1994. Pathology of infection with *Paramphistomum ichikawai* in sheep. International Journal for Parasitology, 24 (7): 995-1004.