RESEARCH REPORT

Cercarial fauna of Malabar, Kerala- I

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ABSTRACT

Two new species of echinostomecercariae, *Cercaria malabari*I n.sp. found in pilid snails, *Pilavirens* and *Cercaria malabari* II*n. sp*. In *Bellamyadissimilis*, collected from different freshwater bodies of Malabar, Kerala are described. Descriptions of metacercariae are also given.

Keywords: *Cercaria malabari* I n.sp.,*Cercaria malabari* II n.sp., Echinostomecercaría.

INTRODUCTION

The pilid snails, *Pilavirens* and viviparid snails, *Bellmya dissimilis* were collected from different water bodies, such as paddy fields, ponds, rivulets in Malabar region of Kerala were screened for cercarial study. Two species of echinostome cercariae having 37 collar spines were noticed from each snail species. Detailed studies proved that these cercariae were differ from all the known echinostome cercariae and reported here are *Cercaria malabari* I n.sp. and *Cercaria malabari* II n.sp. respectively after the region of collection of snails.

MATERIALS AND METHOD

Snails were collected from paddy fields, ponds and rivulets of Malabar region of Kerala, and infected snails were isolated and kept for cercarial study. The cercariae emerging from infected snails were studied on their morphology and behaviour. Internal structures were observed using supravital stains, Neutral red and Nile blue sulphate with the aid of Leitz Diaplan Phase-contrast microscope. Permanent preparations were prepared after staining them in Alum Carmine, following the procedure outlined by Cantwell (1981). Measurements were taken from 10% formalin fixed larvae. Measurements are given in micrometers (µm) with mean values in parentheses. Sketches are drawn with the aid of Camera Lucida(prismtype).

RESULT AND DISCUSSION

1. *Cercaria malabari* I n.sp.

Cercariae were found emerging from pilidsnails in moderate during the morning hours. They showed photopositivity and accumulated in large numbers on the brighter side of the container. They exhibited typical wobble-like motion with constant flexion and extension of tail. The cercariae performed leech-like movements on a glass slide with a thin film of water or at the bottom of the container. They remained alive for about 12 h in well-water.

Description (Fig. 1a, b): Body elongate or oval, spinose, with 8 pairs of sensory hairs at anterior half, measured 355-490 (412) x 132-290 (212). Collar distinct, 74-119 (87) wide with 37 spines, 8.5-10.5 (9.8) in length. Spines arrangement characteristic: five corner spines on each ventral lappet, 3 oral and 2 aboral; 6 laterals on each side in single row; 15 dorsals, 8 oral and 7 aboral. Oral sucker roughly oval, measured 44-71 (56) x 41-65 (54). Acetabulum post-equatorial, protrusible, 65-89 (75) in diameter. Tail cylindrical, aspinose, set in a concavity at the posterior end of body, measured 327-550 (42) x 66-93 (70), with 2 dorsal, 2 ventral, 2 ventro-lateral and one ventral finfolds. At anterior half, 12-14 sensory hairs present. Tip of tail finger-like, capable of independent contraction and expansion.

Mouth subterminal, Prepharynx 18-25 (22) long, with a small glandular prepharyngealbody. Pharynx muscular, 31-43 (36) x 17-22 (19) in size. Oesophagus solid, 142-176 (161) long, consisting of 9-10 cells. Intestinal caeca solid, 231-249 (235) long; each caecum composed of 10 cells and an additional cell at the point of bifurcation. Penetration glands 4 pairs, lobate, along oesophagus; gland ducts open on dorsal lip of oral sucker in 2 pairs. Paraoesophageal gland-cells 16-18 in number, with duct outlets around oral sucker and pharynx. Cystogenous glands numerous, densely distributed throughout body, and filled with rod-shaped contents. Genital primordia consist of two masses of cells, one at the pre-acetabular region, the other between acetabulum and base of tail and connected by a string of cells passing dorsal to acetabulum. Excretory system stenostomate; excretory bladder bipartite, at posterior end of body; main collecting ducts distended between collar and acetabulum, each containing 60-90 excretory granules. Caudal excretory duct extends to anterior fifth of tail, and then bifurcates into two lateral branches. Flame cell formula: 2[(3+3+3) + (3+3+3)] = 36.

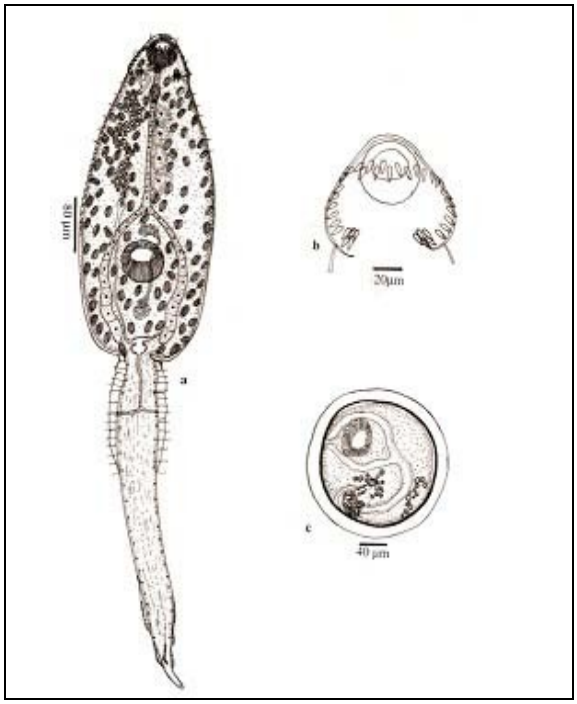

Fig. 1: Cercari malbari I n. sp.
a. Cercari **b.** Collar with spines
c. encysted metacercaria

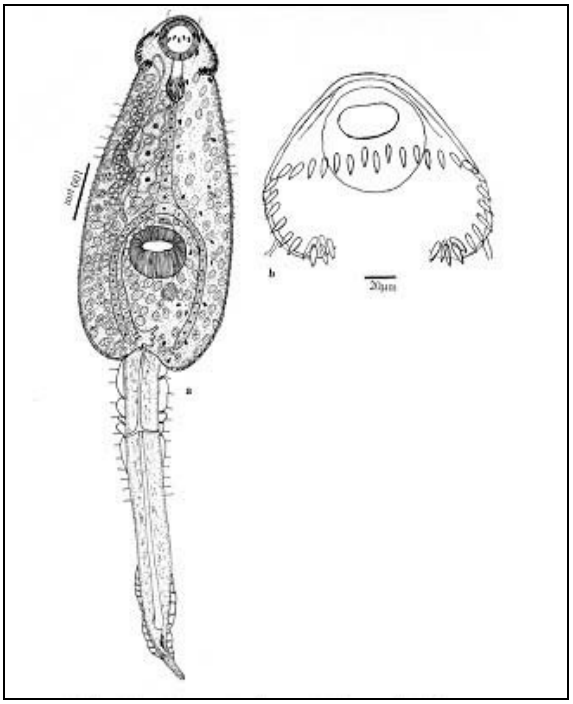

Fig. 2: Cercari malbari II n. sp.
a. Cercari **b.** Collar with spines

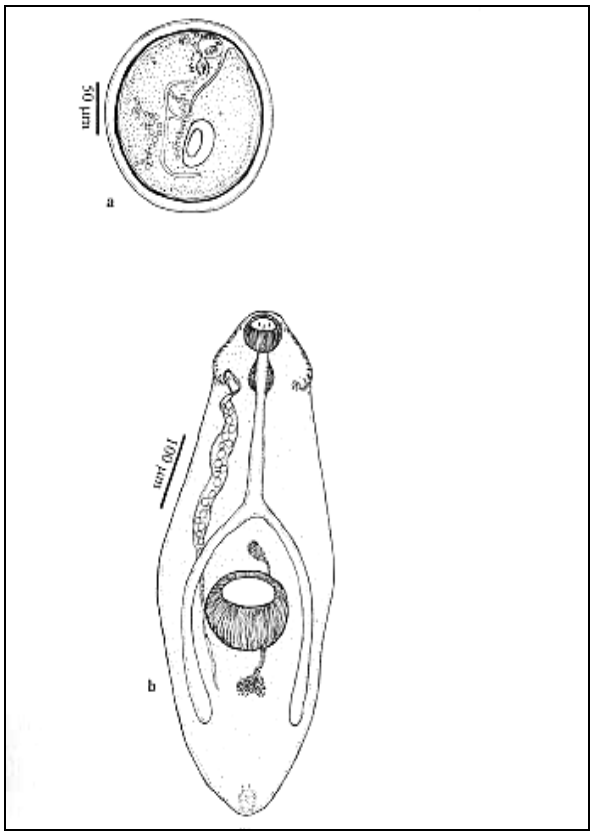

Fig. 2: Cercari malbari II n. sp.
a. encysted metacercaria
b. excysted metacercaria

Metacercaria (Fig 1c): The cercariae encysted in the auricle of *Bellamyadissimilis* and hepatopancreas of *Indoplanor bisexustus* and *Lymnaealuteola.* Occasionally, a few metacercariae were found in the kidney and hepatopancreas of the host snail, *P. virens*. They also encysted on gill arches of tadpoles and fishes. Under experimental conditions, metacercariae were obtained from these hosts. Cyst spherical, 192-204 (198) in diameter. Cyst wall three-layered, 13-15 thick; outer, thin, transparent layer, 0.7-2 thick; inner, translucent layer, 3-4 thick and middle, transparent layer 7-9 thick. The cysts recovered from gill arches of fishes and tadpoles were without the outer layer. Inside the cyst the larva remained curled up. Oral sucker, acetabulum, collar and collar spines, pharynx, oesophagus and caeca visible through cyst wall.

First intermediate host : *Pilavirens*
Locality : Cherukunnu, Payyanur, Pinarayi in Kannur district
Period of collection : 2012-2014
Prevalence : 131 out of 2230 (5.87) snails were examined

Remarks: The present cercaria has a tail identical with that of the cercariae of the genus *Echinostoma*, as described by Fried et.al (1998). The number and arrangement of collar spines can be taken as one of the important distinguishing characters of echinostomecercariae and the present form has 37 collar spines arranged in unique pattern described by Mohandas (1973),Kanev (1994) and Kanev et. al (1995), is compared with other 37 spinned echinostomecercariae, cercariae of *E. echinatum, E. trivolvis, E. cinetorchis, E. rodriguesi and Cercaria unnaoensis*III Pandey and Lal1982, *C. andhraensis* Ganapathi and Rao 1969.

The present cercaria differs from that of cercaria of *E. echinatum* in body spination, number of penetration glands, paraoesophageal gland-cells, cells in the oesophagus and caecum and flame cells and in having a different snail host.
The difference in number of paraoesophageal gland-cells and cells in the oesophagus and caecum make the cercaria of *E. trivolvis* distinct from the present cercaria. Further, the hosts utilized by the cercariae of the two species are different.

The cercariae of *E. cinetorchis*differs from the present cercaria in the arrangement of collar spines, the number of penetration glands, oesophageal and caecal cells, in the nature of cystogenous material and in morphometry. Moreover, the cercaria of *E. cinetorchis* develops in *Hippeutiscantori* whereas that of the present form in *Pilavirens*. In the cercaria of *E. caproni* there are 8 penetration glands, 18 pairs of flame cells, 7 cells each in oesophagus and caecum and in the cercaria of *E. rodriguesi*, the oesophagus and caecum consists of 7 cells, penetration glands are 6 in number and there are 21 pairs of flame cells.

The present cercaria is compared with other 37 spinned echinostome cercariae, the adults of which are not known. Among these, the present form has a tail identical with that of *Cercaria unnaoensis* III Pandey and Lal, 1982. But it stands distinct from the others in one or more of the following characters: distribution of body spines, number of oesophageal and caecal cells, nature of cystogenous material, number and position of penetration glands, number of flame cells, number and disposition of setae, presence or absence of paraoesophageal gland-cells. Again it differs in the snail hosts utilized.

The present cercaria needs comparison with *Cercaria andhraensis,* the only species of echinostome cercaria known from a *Pila*species in India till date. Ganapati and Rao (1969) reported it from *P. globosa* in Waltair. However the presence of 33 collar spines and absence of tail fin folds make it distinctly different from the present form which has 37 collar spines and 7 finfolds on tail. Besides, there are differences in several other characters and in morphometry.

In view of these reasons which differentiate the present echinostome cercariae from the closely related forms, this cercaria is considered new to science and is reported here as *Cercaria malabari* I n.sp after the name of region of collection.

2. *Cercaria malabari*II n.sp.

Cercariae were released by snails throughout day-time. They were found swimming actively for about 6 hours, then sank to the bottom and died several hours later. Cercariae were negatively phototactic, and performed leech-like movements at the bottom of the container.

Description (Fig 2a, b): Body elongate, spinose, measured 431-601 (527) x 227-331 (283), with 8 pairs of sensory hairs in anterior half. Body spines 3-4.5 long in pre-acetabular region and 1.8 to 2.7 in post-acetabular region. Collar distinct, 119-146 (132) wide, armed with 37 spines, 11-13 (12.1) long. Spine arrangement characteristic: five corner spines on each ventral lappet, 3 oral and 2 aboral; 6 laterals on each side in single row; 15 dorsals, 8 oral and 7 aboral. Oral sucker round to oval, measured 62-69 (65) x 69-73 (71). Acetabulum post-equatorial, protrusible, 73-84 (79) in diameter. Tail cylindrical, aspinose, ending in a finger-like projection, capable of independent movement; 354-420 (382) long, 73-85 (82) wide, with 7 finfolds, 2 dorsal, 2 ventral, 2 ventro-lateral and a small ventral just anterior to the finger-like projection. Ten pairs of sensory hairs at anterior half of tail.

Mouth subterminal, Prepharynx 23-35 (28) long; pharynx ovoid, muscular, 31-39 (34) x 39-42 (41) in size. Oesophagus solid, 193-220 (199) long, consisting of 10 cells filled with coarse granular contents. Intestinal caeca solid, 163-293 (236) long, extending to posterior end of body, each caecum with 14 cells and an additional cell at bifurcation.

Penetration glands 3 pairs, located along oesophagus; each gland lobate, with round nucleus and finely granular contents. Paraoesophageal gland-cells at pharyngeal region with 12-14 outlets opening at oral sucker and 6 at pharyngeal zone. Cystogenous glands abundant, distributed throughout body, below the level of prepharynx; filled with round or oval contents.

Genital primordia consist of two cell masses, one anterior to and the other posterior to acetabulum, both connected by a string of cells passing dorsally to acetabulum. The excretory system stenostomate; excretory bladder bipartite, at posterior end of body; main collecting ducts distended between pharyngeal region and acetabulum, each containing 30-60 excretory granules. The caudal excretory duct extents one fourth of tail-length before bifurcating into two lateral branches. Flame cell formula: 2[(3+3+3)+(3+3+3)] = 36.

Metacercaria (Figs. 3a, b): The cercariae encysted in the same snail host which liberated them or in other snails of the locality. Cysts were recovered from the pericardial cavity, kidney and muscles of *Bellamyadissimilis, Lymnaealuteola, Pilavirens, Indoplanorbisexustus* and*Thiaratuberculata*and tadpoles of *Bufobufo*. Metacercarial cysts spherical, 185-191(188) in diameter. Cyst wall double-layered with an outer, transparent, delicate, easily detachable layer of 5-6 thickness and an inner, translucent layer of 2-3 thickness. Inside the cyst the larva remained curled up. Metacercariae exposed to digestive juice of chicks excysted in 3-4 hours. Excystedmetacercariae measured 551-648 (592) x 216-326 (285).

First intermediate host : *Bellamyadissimilis*
Locality : Thalassery and Thazhechovva in Kannur District
Period of collection : 2012-2014
Prevalence : 353 out of 3827 (9.22%) snails examined were infected.

Remarks : The present form of cercaria also has 37 spinned collar and 7 tail finfolds Hence it can be compared with cercariae of genus *Echinostoma* with 37 collar spines, *Echinostomaechinatum, E. trivolvis, E. cinetorchis, E. caproni, E. redriguesi*, and *Cercariaspinosa* Pandey and Singh 1984 and *Cercaria malabari* I n.sp..

The cercaria of *E. echinatum*differs from that of the present form in the number of paraoesophageal gland-cells, penetration glands, flame cells and oesophageal and caecal cells. Cercariae of *E. trivolvis* differ in body spination, number of paraoesophageal gland-cells and caecal cells. Differences observed with cercariae of *E. cinetorchis*in the number of penetration glands, number and arrangement of finfolds, number and distribution of paraoesophageal gland-cells, and in morphometry. The cercaria of *E. caproni* is distinct in the number of penetration glands, body setae, nature of cystogeneous material and number of oesophageal and caecal cells. Besides, the cercaria of *E. rodriguesi* different from the present cercaria in flame cell formula, number of oesophageal and caecal cells and in morphometry.

The present cercaria needs comparison with other cercariae, the adults of which are not known. It differs from *Cercariaspinosa* infecting *Bellamyabengalensis*from Uttar Pradesh in the number and arrangement of tail finfolds on tail and first intermediate host and internal organisation. The present cercaria differs from *Cercaria malabari* I n. sp. in first intermediate host morphometry and morphological features. Therefore, the cercariae under discussion considered new and the name *Cercaria malabari* IIn.sp.

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