

Studies on One New Species of Furcocercous Cercariae from the Freshwater Snail, *Lymnaea auriculaia*

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Abstract

Snails transmitted diseases are one of the major groups of helminths parasitic diseases which have been established by digenean larvae. The Snail is a host of cercariae (digenean larvae). This study was carried out on digenean larvae infecting freshwater snails, *Lymanaea auricularia* in a village, Ailum, district Shamli. The snails were collected to examine the cercarial infection of trematodes on monthly basis from only one sample site for the period of one year (April 2015 - March 2016). The hand-picking method was used for the collection of the snails. In this period 1732 snails were examined for digenean infection. Only one type of cercariae was recovered. The general prevalence of digeneans in snails was low, variations occurred between seasons. The density of snails was highest in August and September 2015 while the parasitic infection rate was highest in October 2015 (Table-1). There is one type of furcocercous cercaria was found in the snail. The purpose of the present study was to identify the cercariae released from *Lymanaea auricularia*, a freshwater snail, and evaluate their medical and veterinary importance.

Keywords

Digenean infection, snail, *Lymanaea auricularia*, cercariae, sporocyst.

Introduction

A study of a parasitic infection of freshwater snails in the water sources directly benefits the local residents and the country as a whole. Many of the skin diseases, i.e. human schistosomiasis, clonorchiasis, and fascioliasis are transmitted by the snails. Most of the snails act as an intermediate host to spread parasitic diseases in humans and animals. The digenean larvae (cercariae) after emerging from the snail tissue may find the suitable secondary intermediate host or definitive host by means of passive transmission (metacercaria) or active penetration respectively. Various studies have been done on the fauna of cercariae from different snail species. Snails are living in river banks, ponds, ditches, and agricultural canals. *Lymnea auricularia* is abundant in the highly oxygenated and marginal surface water of ponds and agriculture canals used for drinking, bathing, and washing by the people. Due to the presence of infected snails water bodies could be contaminated by the emerging cercariae and consequently, cercariae attack the local resident directly via the skin or are transferred to them by metacercariae ingestion. The aim of this research was to determine the transmitted cercariae by *Lymnea auricularia* (Lamarck) snail in the various water bodies of a Village, Ailum, District Shamli, and evaluate their medical and veterinary importance in this region (Malek, cheng,1974).

Material and Methods

We choose a rural site for this study because so many water bodies are over

there which are used by animals and local residents. Firstly, we collect the snails *Lymnea auricularia* from the ponds, ditches, and agricultural canals of Ailum, district Shamli from April 2015 to March 2016. Snail samples were collected by hand pick method and transferred to a large aquarium with a hydrilla plant in the laboratory. After that, we put the single snail in a separate beaker. Snails were exposed to the sunlight or artificial light for 2-8 hours to induce the shedding of cercariae. For the observation of emergence, behavior, swimming activity, and viability of naturally emerging cercariae, infected snails were kept in separate beakers containing tap water. For the study of the phototactic behavior of larva, black papered glass containers with small illuminated areas were used. The snails were kept under observation for 2 to 4 weeks and those not emitted cercariae were subsequently dissected to examine according to the methods reported by Mukharjee (1980).

A morphological description of a new species of Furcocercous cercaria procured from the freshwater snail *Lymnaea auricularia* is given here for the first time (Ukong, 2007). They were obtained during the parasitological investigation of thousand of snails (1732) collected from April 2015 to March 2016 from a sample site. 23 (1.32%) infected *Lymnaea* species (freshwater snail) were isolated and the cercariae of snails were obtained by emerging or crushing methods. Collected cercariae were observed as alive and in fixed form. Methylene blue and neutral red stains were used for the detailed study of penetration glands, gut, and genital

rudiments. For the excretory system, India ink, saline water of different concentrations, blood serum, and artificial light were used (Komiya, 1961). Unstained live cercariae were studied especially for their flame cell formulae. Then they were identified following the key as given by Erasmus (1972). Drawings were made with the help of camera lucida. Identification of cercariae species was made by using the systematic keys based on recognizable morphological characteristics, swimming behavior, length of the body, tail, furcae, and the distance between the two suckers. The cercariae were fixed in hot 70% alcohol and permanent preparation was made in Canada Balsam. After staining with aceto-alum carmine, dehydrate through ascending grades of alcohol and clearing in xylene.

Table 1:
Seasonal variations of digenean infection in *Lymnaea auricularia*

Month/Year	No. of snails collected	No. of infected snails	%age of infection
April 2015	100	01	1.0
May 2015	100	01	1.0
June 2015	100	01	1.0
July 2015	155	02	1.29
August 2015	310	04	1.29
September 2015	322	04	1.24
October 2015	265	08	3.01

November 2015	110	02	1.81
December 2015	70	Nil	-
January 2016	60	Nil	-
February 2016	60	Nil	-
March 2016	80	Nil	-
Total Incidence	1732	23	1.32

Results: Description of cercaria (Figure 1-3)

Sporocyst

The cercariae develop in large, elongated, and thin-walled sporocyst found infecting the digestive gland of the snail host. The size of sporocyst ranges from 620–680x80–90 µm. It contains numerous germ balls and a few developing cercariae. The cercariae are found actively moving inside the sporocyst. No birth pore, flame cell, and daughter sporocyst have been observed.

Emergence and Behavior

The cercariae emerged out in large numbers throughout the day, but maximum emergence was noticed in mid-day. They remain, most of the time, suspended in water with tail directed upward having stretched furcae. While swimming, they shoot up by the lashing movement of the tail vigorously in water and suddenly stop to have a long rest. During the rest period, they passively glide. At the bottom of the container or any other object, the cercariae perform creeping movements with the help of the anterior protrusible organ and ventral sucker. It lives for about 4-5 hours in tap water, loses the tail, and dies.

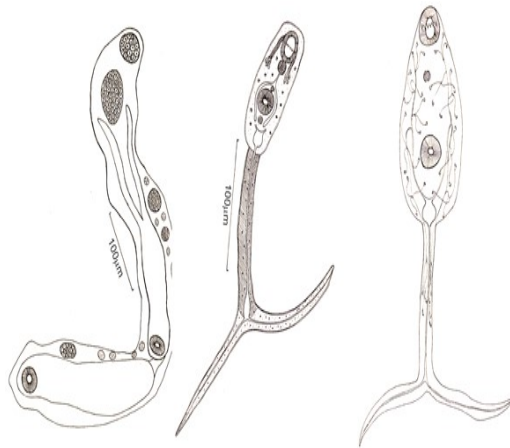


Figure 1. Sporocyst of *C. ailumi* n. sp. 2. *C. ailumi* n. sp., whole mount. 3. *C. ailumi* n. sp., excretory system.

Cercaria

The body of cercaria is small, aspinose, cylindrical with the bluntly rounded anterior and broad posterior end. It measures 200 – 230 μm in length and 38 – 40 μm in width. The tail stem is slightly longer than the body proper measuring 124 - 128 μm in length and 15 – 18 μm in width. The tail is long and smooth in outline and forked distally into two long furcal rami. The furcal rami are laterally flattened, broad, and more or less equal to the tail stem and measure 120-122 x 140 – 160 μm in size in fixed individuals. The circular longitudinal and oblique muscles are present in the tail. However, the muscles are absent in the furcal rami. Many small rounded caudal bodies are present in the tail parenchyma with the large nucleus. The fin fold is absent.

The protrusible organ is sub-terminal, pear-shaped, and located at the anterior region of the body measuring 24-27x20-23 μm in size. On the protrusible organ, a row of six spines is present transversely. The

ventral sucker is small, rounded, and situated behind the equatorial line of the body. It measures 18–22 x 18–20 μm in size.

The mouth leads into a small globular pharynx which measures 9–12 x 9–12 μm in size. The pharynx opens into an elongated esophagus measuring 9–13 μm in length. The esophagus bifurcates into two intestinal caeca, just anterior to the ventral sucker. The intestinal caeca extend up to the excretory bladder and terminate blindly. The penetration glands are five pairs located in the pharyngeal region. Each has a prominent nucleus and clear cytoplasm. Each gland opens outside by fine ducts. The entire body is filled with small cystogenous cells.

The genital primordium is represented by two unequal masses. The posterior one is rounded in shape and larger as compared to the anterior genital primordium measuring 6-7x6-8 μm in size. The anterior one is also rounded measuring 2-3x2-4 μm in size above the ventral sucker.

The excretory bladder is small and round to oval in shape. The main collecting canal on either side of the body arises from the excretory bladder, runs anteriorly upto the equatorial plane, and is divided into an anterior and a posterior collecting canal extends upto the anterior protrusible organ. From the anterior collecting canal, three secondary excretory canals arise each having three capillaries capped with flame cells. The posterior collecting canal extends into the tail and covers upto 1/3rd part and raises two secondary excretory canals in the body each having the flame cell. The

secondary excretory canal splits off in the tail, having three capillaries capped with flame cells. The third secondary excretory canal splits off in the tail, having three capillaries capped with flame cells. Thus the flame cell formula in the cercarial body is $2[(3+3+3) + (3+3) + (3)] = 36$. A fine well-marked caudal excretory canal extends from the excretory bladder posteriorly, to the tip of the tail stem and divides into two branches, each extending into rami. After reaching the tip, they open outside through a minute pore.

Discussion

The present cercaria belongs to the “pharyngeal brevifurca distome” group of cercaria. It resembles closely to *C. indica* XV Sewell, 1922; *C. pendulata* Baugh, 1954; *C. duplicata* premvati, 1955; *C. shikarii* Singh, 1962; *C. papillosoma* Khan, 1962; *C. bushiensis* Khan, 1962; *C. szidati* Anderson, 1944 and *C. kumaunensis* Singh and Malaki, 1963; *C. milleri* Pandey and Agrawal, 1977 in absence of caudal fin folds.

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However, it further differs from *C. indicae*, *C. pendulata*, *C. duptiplata*, *C. shikarii* and *C. papillosoma* in absence of spines on the anterior protrusible organs and in number of penetration glands.

Moreover, it differs from *C. bushiensis*, *C. szidati*, *C. kumaunensis* and *C. milleri* in having spines on the oral suckers and flame cells in tail. It is therefore, described as new species viz. *C. ailumi* n.sp., named after the locality collected.

Host: *Lymnaea auricularia*

Locality: Ailum, Shamli

No. of snails examined: 1732

No. of snails found infected: 23

Prevalence of infection: 1.32%

On account of the above mention features it is justified to establish a new species viz. *C. ailumi* n.sp.

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