

**Two New Cercariae of the Freshwater Snail
Ancylus fluviatilis (Müller, 1774) (Ancylidae)
from Asir Province, Saudi Arabia**

NAIM S. ISMAIL*, ABDUL KARIM NASHER*, AND ABDUL KARIM AL-MADANI†

(Received for publication; February 22, 1988)

Abstract

Two new types of cercariae are described from the freshwater pulmonate *Ancylus fluviatilis* (Müller, 1774) collected from Asir Province, Saudi Arabia: an ornate xiphidiocercaria belonging to the Prima group, and an apharyngeal brevifurcate lophocercous monostome cercaria. These 2 cercariae are given the names *Cercaria asiri* I and *Cercaria asiri* II, respectively. *Cercaria asiri* I is characterized by having 5 pairs of penetration glands, intestinal caeca reaching beyond the acetabulum, a finfold near the end of the tail, and 36 flame cells. It develops in an elongated sporocyst. *Cercaria asiri* II has 8 pairs of penetration glands, a reduced body finfold, and 6 flame cells. It develops in an elongated sporocyst.

Key words: *Ancylus*; Ancylid molluscs; Saudi Arabia; Xiphidiocercariae; Furcocercariae.

Introduction

Several types of cercariae have been described from the ancylid snails. Smith (1967) gave a historical review of cercariae infecting these snails in different countries, and reported 15 types of cercariae parasitizing the ancylids *Ferrissia fragilis* and *Laevapex fuscus*, in southeastern Michigan, U.S.A. However, he did not give details or illustrations of these cercariae. Smith (1968) reported that *F. fragilis* and *L. fuscus* act as the first intermediate hosts for *Lissorchis mutabile*. Later, Duncan and DeGiusti (1976) described 3 new types of the lissorchid cercariae, *Cercariaeum* type I, *Cercariaeum* type II, and *Cercariaeum* type III, from *Ferrissia revularis* in southeastern Michigan, U.S.A. In a more recent report, Nasir (1979) described *Cercaria ghaziaporzanae* of the pharyngeal longifurcate distome group from the ancylid *Gundlachia* sp. in Langua de Los Patos, Venezuela.

In Saudi Arabia, the ancylid *Ancylus fluviatilis* has been reported from streams in the mid and southwestern regions, particularly in Khamis Mushayt-Abha area (Brown and Wright, 1980). The snail lives closely attached to stones or vegetation in permanent and perennial streams. Like other ancylid snails, *A. fluviatilis* may act as an intermediate host for certain digenetic trematodes. The present study describes 2 types of cercariae encountered in specimens of *A. fluviatilis* collected from Asir Province, Southwestern Saudi Arabia.

Materials and Methods

Snails were collected from permanent streams in Al-Sudah area and perennial streams in Sarat Abeedah, Southwestern Saudi Arabia, during the period of September, 1986 to January, 1987. Individual snails were placed in separate small glass dishes containing filtered stream water, and examined in the following morning. All snails, whether or not had shed cercariae, were then crushed and dissected and examined for developing larval stages. Cercariae were studied live, unstained, or irrigated with intravital stains. The excretory system was seen

*King Saud University, Abha Branch, College of Education, Department of Biology, Abha, Saudi Arabia.

†King Saud University, Abha Branch, College of Medicine, Department of Microbiology and Clinical Parasitology, Abha, Saudi Arabia.

best after placing freshly emerged cercariae in a mixture of equal parts of 0.1% neutral red and 0.09% saline solution for a period of half an hour. Unstained specimens were killed and fixed in hot 70% ethanol.

Camera lucida drawings from fixed material were completed free hand from observations on live specimens using a compound microscope. Measurements were made on a minimum of 10 live and 10 fixed specimens, and are presented in microns as ranges followed by means in parentheses. Fixed specimens are deposited in the helminthology collection of the Biology Department, College of Education, King Saud University, Abha Branch, Saudi Arabia.

Results

Two new types of cercariae were found in *Ancylus fluviatilis* snails: a xiphidiocercaria and a brevifurcate lophocercous cercaria which are named *Cercaria asiri* I and *Cercaria asiri* II, respectively.

Cercaria asiri I (Fig. 1):

This is a relatively large xiphidiocercaria. Measurements of live and fixed cercariae, respectively, are: body length 118 – 200 (152) and 138 – 225 (164); body width 45 – 113 (71) and 50 – 140 (98); tail length 75 – 125 (95) and 88 – 163 (129); tail width 25 – 43 (32) and 23 – 40 (32). The body is covered with a smooth 2 μm thick tegument, equipped with 11 long sensory setae on each side. The tail is highly contractile, and is recessed into the posterior end of the body to a depth of 20 μm . It is provided with an 8 μm wide finfold at its extremity. The oral sucker is oval in shape and measures 52 \times 60 μm . It is provided with a 25 \times 5 μm stylet, but lacks the virgula organ. The spherical acetabulum, which is 36 μm in diameter, is located near the middle of the body. The digestive system consists of a mouth that leads into a short prepharynx. The muscular pharynx is oval, and connects the oesophagus. The latter bifurcates halfway between the

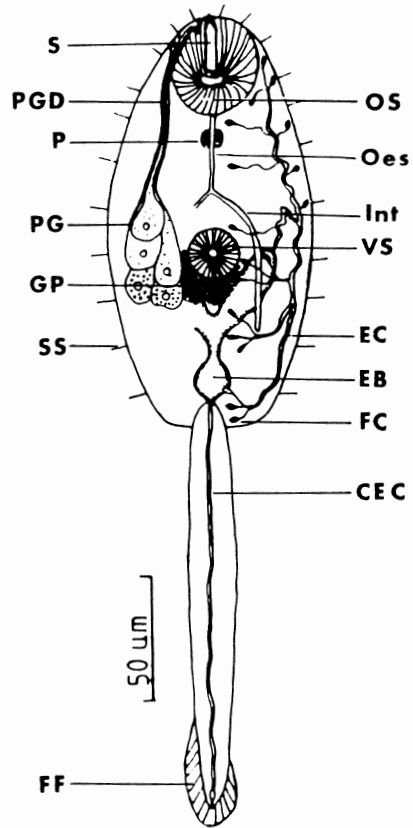


Fig. 1 *Cercaria asiri* I. Penetration glands shown on one side and flame cells and intestinal caeca on the other side.

ABBREVIATIONS

BDC	: Body dorsal crest
CEC	: Caudal excretory canal
EB	: Excretory bladder
EC	: Excretory canal
EP	: Excretory pore
FC	: Flame cell
FF	: Fin fold
GP	: Genital primordium
Int	: Intestine
Oes	: Oesophagus
OS	: Oral sucker
P	: Pharynx
PG	: Penetration glands
PGD	: Penetration gland ducts
PO	: Penetration organ
S	: Stylet
SS	: Sensory seta
VS	: Acetabulum

pharynx and the acetabulum into 2 intestinal caeca, which diverge outwards and terminate behind the acetabulum. The excretory bladder has a round base and 2 long cornua which diverge outwards reaching the acetabulum. Each cornu gives rise to an ascending duct which coils in front of the acetabulum before dividing into anterior and posterior collecting tubules. The caudal excretory duct opens at the tip of the tail. Flame cells are arranged symmetrically in the body, and are absent in the tail. The flame cell formula is $2 [(3 + 2 + 2 + 2) + (3 + 3 + 3)] = 36$. The glandular system consists of 5 pairs of penetration glands located at both sides of the acetabulum. The upper 3 pairs are finely granulated, while the lower 2 have coarse granules. The glands empty their contents into ducts that open at both sides of the stylet. The genital primordium consists of a mass of cells abutting the posterior margin of the acetabulum. The cercariae develop within elongated sporocysts measuring $308 - 564 \times 103 - 154 \mu\text{m}$. The sporocyst wall is thin and usually takes the shape of its internal contents of the developing cercariae. Each sporocyst contains 1 - 2 developed cercariae, 1 - 2 developing ones, and germ cells.

Cercaria asiri II
(Fig. 2):

This is a relatively small cercaria. Measurements of live and fixed cercariae, respectively, are: body length 75 - 125 (91) and 93 - 108 (101); body width 35 - 58 (47) and 23 - 40 (33); tail stem length 125 - 225 (182) and 195 - 220 (204); tail stem width 20 - 30 (26) and 20 - 32 (26); tail furca length 63 - 88 (74) and 48 - 63 (54); tail furca width 10 - 18 (13) and 10 - 16 (14). The highly contractile body of the cercaria has a conspicuous dorsal transparent crest. The tegument is smooth, except for 3 rows of fine spines around the anterior region of the snout-like penetration organ. Moreover, there are 2 pairs of longer spines at the tip of the penetration organ. The tail is 2 ~ 3 times the body length, and has 10 long hair-like setae on each side. There are

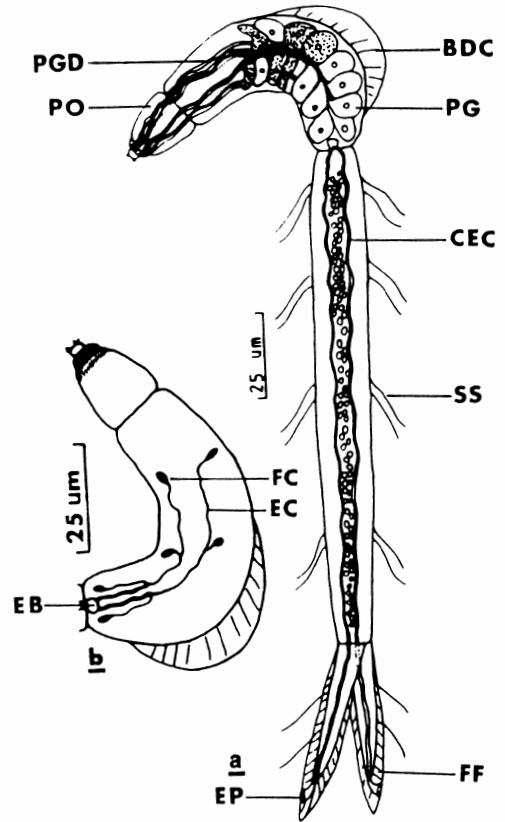


Fig. 2 *Cercaria asiri* II. a. Entire specimen; details of penetration glands and tail. b. Body; details of excretory system and spines on the penetration organ.

numerous small spherical caudal bodies grouped along the central axis of the tail stem. Each of the 2 tail furcae is provided with a finfold extending along both sides. There are 8 pairs of penetration glands filling the posterior half of the body. The first, third, and fourth pairs contain coarse granules; the second is agranulated, while the last 4 pairs contain fine granules. The glands empty their contents into 2 bundles of ducts that pass forward to open at the apex of the penetration organ. The relatively small, round excretory bladder is connected posteriorly to 2 caudal excretory ducts which run along the central axis of the tail stem. They then diverge into the tail furcae, and each one opens in a flask-like pocket which terminates into an excretory pore at the tip of the tail furca. The

flame cells are arranged symmetrically in the body and are absent in the tail. The flame cell formula is $2 [(2) + (1)] = 6$. *Cercaria asiri* II develops within elongated sporocysts which are embedded in the hepatopancreas of the mollusc host. The sporocyst wall is very thin, that it was difficult to remove it intact and take necessary measurements.

Discussion

This is the first report of a natural infection of *Ancylus fluviatilis* snails with larval trematodes. Cercariae recovered from this snail belong to 2 different cercarial groups. *Cercaria asiri* I is an ornate xiphidiocercaria of Prima group. In this group, Sewell (1922) included those medium-sized cercariae in which the acetabulum is smaller than the oral sucker; the tail is shorter than the body and has a finfold of which the ventral portion extends farther forward; the intestinal caeca reaching beyond the acetabulum; there are 4 or 5 pairs of penetration glands; the excretory bladder is oval and has cornua; and the cercariae develop in oval or sac-shaped sporocysts. Members of this group include *Cercaria indicae* XXIV and XXVIII (Sewell, 1922), *C. longistyla* (McCoy, 1929), *C. elimensis* (Porter, 1938), *C. kingi* (Brooks, 1943), and *C. leyteensis* no. 43 (Ito and Blas, 1978). *Cercaria asiri* I differs from *C. indicae* XXIV and XXVIII, and *C. leyteensis* in having more penetration glands. It differs from *C. kingi*, *C. longistyla* and *C. elimensis* in being significantly smaller in size, and in having more flame cells.

Several types of xiphidiocercariae have been described from the ancylid snails. These include *C. trapezoidea* (Porter, 1938), *C. burnupiae* (Faust, 1926), and 4 different types of sporocysts (Smith, 1967). None of these belong to Prima group.

Cercaria asiri II is an apharyngeal brevifurcate monostome lophocercous cercaria. The only other described brevifurcate lophocercous cercariae from the ancylid snails include *C. sewelli* from *Burnupia capensis* and *B. trapezoi-*

dea (Faust, 1926) and *C. capensis* from *B. capensis* and *C. ferrissia* from *Ferrissia burnupi* (Porter 1938). *Cercaria capensis* has all penetration glands in the anterior half of the body, whereas in *C. asiri* II the glands are in the posterior half and are more numerous. The body finfold or crest covers two thirds of the body in *C. asiri* II, whereas it covers the entire length of the body in *C. ferrissia*. Moreover, the latter has only one pair of penetration glands, while there are 8 pairs in *C. asiri* II. *C. sewelli* differs from *C. asiri* II in having 2 pairs of eye-spots, and only 2 pairs of penetration glands.

Cercaria asiri II closely resembles *C. lophosoma* of the snail *Notopala hanleyi* in Australia (Johnston and Beckwith, 1947), and *C. kentensis* of the snail *Lymnaea perger* in Britain (Khan, 1961). The absence in *C. lophosoma* of the conical spines at the tip of the penetration gland, and the presence of a single caudal excretory duct differentiate it from *C. asiri* II. *Cercaria kentensis* differs from *C. asiri* II in having only 4 pairs of penetration glands. Moreover these types of cercariae develop in a widely different snail hosts.

Acknowledgements

We would like to thank Dr. Mohammad Mubarak, College of Education, Chemistry Department, King Saud University, Abha Branch, for obtaining some of the references from U.S.A.

References

- 1) Brooks, F. G. (1943): Larval trematodes of Northwest Iowa. I. Nine new xiphidiocercariae. *J. Parasitol.* 29, 330–339.
- 2) Brown, D. S. and Wright, C. A. (1980): Molluscs of Saudi Arabia: freshwater molluscs. *Fauna of Saudi Arabia*. 2, 341–358.
- 3) Duncan, B. and DeGiusti, D. L. (1976): Three new lissorchiid cercariae of the Mutabile group from *Laevapex fuscus* (Adams, 1814) and *Ferrissia rivularis* (Say, 1917). *Proc. Helminthol. Soc. Wash.* 43, 1–19.
- 4) Faust, E. C. (1926): Further observations on South African larval trematodes. *Parasitology* 18, 101–127.
- 5) Ito, J. and Blas, B. L. (1978): Studies on freshwater cercariae in Leyte Island, Philippines. 6.

- Cercariae from Lymnaeidae and Bulinidae. Jpn. J. Exp. Med. 48, 1-16.
- 6) Johnston, T. H. and Beckwith, A. C. (1947): Larval trematodes from Australian freshwater molluscs. Part XII. Trans. Roy. Soc. South Australia 71, 324-333.
 - 7) Khan, D. (1961): Studies on larval trematodes infecting freshwater snails in London (U.K.) and some adjoining areas. Xiphidiocercariae. Z. Parasitenkd. 21, 71-87.
 - 8) McCoy, O. R. (1929): Notes on cercariae from Missouri. J. Parasitol. 15, 199-208.
 - 9) Nasir, P. (1979): Freshwater larval trematodes, *Cercaria ghaziaporzanae* n. sp. of the pharyngeal longifurcate distome group, parasitic in ancyliid molluscs. Int. J. Parasitol. 9, 293-295.
 - 10) Porter, A. (1938): The larval trematodes found in certain South African Molluscs. Publ. South African Instit. Med. Res. 8, 1-492.
 - 11) Sewell, R. B. S. (1922): Cercariae Indicae. Ind. J. Med. Res. Suppl. 10, 370 pp.
 - 12) Smith, J. (1967): Ancyliid snails as intermediate hosts of *Megalodiscus temperatus* and other digenetic trematodes. J. Parasitol. 53, 287-291.
 - 13) Smith, J. (1968): Ancyliid snails as first intermediate hosts of *Lissorchis mutabile* comb. n. (Trematoda: Lissorchiidae). J. Parasitol. 54, 283-285.