

Two New Cercariae From *Melanopsis praemorsa* (L., 1758) (Thiaridae) Snails in Azraq Oasis, Jordan

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Introduction

Melanopsis praemorsa (L., 1758) is a conically elongated dark-brown to black prosobranch snail. It is widely prevalent in fresh-water bodies of the Mediterranean Region (Tchernov, 1971, 1975; Brown and Wright, 1980). In Azraq, *M. praemorsa* is very common on the edges of the oasis water bodies (Saliba, personal communication).

Several types of cercariae have been described from *M. praemorsa* snails. Ullman (1954) reported nine different types of cercariae from this snail collected from Yarkon River, Palestine, though he described only *Cercaria orospinosa*. Three other types were encountered in this snail from Megiddo springs in the Yezre'el Valley: two xiphidiocercariae and furcocercous cercaria (Lengy and Stark, 1971). Recently, seven new types of cercaria, named *Cercaria melanopsi* I through VII, have been described from the same snail collected from Yarmouk River, Jordan: two virgulate xiphidiocercariae, a microcotylous xiphidiocercaria, a brevifurcate lophocercous cercaria, a microcercous cercaria, and two pleurolophocercous cercariae (Ismail and Abdel-Hafez, 1983). In Azraq only two types of cercaria have been encountered in *M. praemorsa*, a tailless cercaria and a pleurolophocercous cercaria (Ismail *et al.*, 1983). The present study describes two new types of cercariae encountered in specimens of *M. praemorsa* collected from the water bodies

of Azraq. For description of the Azraq Oasis review Ismail *et al.* (1978).

Materials and Methods

A total of 2,718 *M. praemorsa* snails were collected from water bodies of Northern and Southern Azraq during the period from June to December 1983. Collection and examination of snails for cercariae and other developing stages were carried out as described by Saliba *et al.* (1978). Observations on the larval trematodes recovered were made on live unstained or vitally stained (0.5% neutral red or 0.5% brilliant cresyl blue) specimens fixed either in formalin-acetic acid-alcohol (FAA) solution or in 70% ethanol.

Measurements were taken on a minimum of 10 specimens of live and fixed larval trematodes. Drawings were made using a camera lucida or free-hand, from preparations examined under a light microscope. The behavior of cercariae was observed with the aid of a dissecting microscope.

Results

Two new types of cercariae were found in *M. praemorsa* snails: a gymnocephalous cercaria and a xiphidiocercaria. Since these cercariae have not been described before from this snail in the Middle East, they are named as *Cercaria melanopsi* VIII and *C. melanopsi* IX. Details of measurements of the various parts of both types of cercariae are presented in Table 1.

Cercaria melanopsi VIII: (Fig. 1)

This is a gymnocephalous cercaria that was found in 2 and 1 out of 2,019 and 699 *M.*

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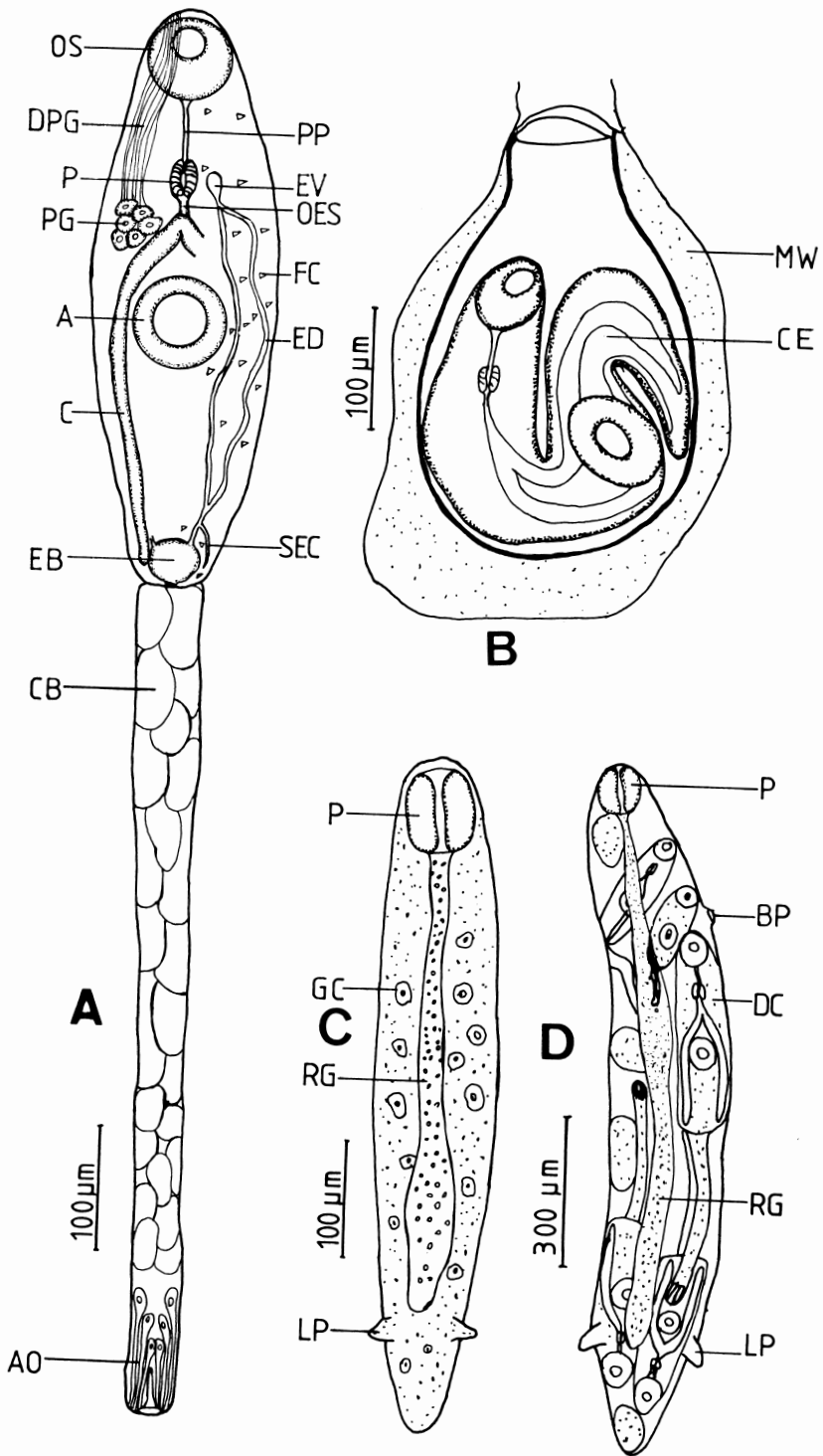


Fig. 1 *Cercaria melanopsi* VIII. A. Developed cercaria, B. Metacercaria, C. Small immature redia, D. Big mature redia. For abbreviation marks refer to Fig. 2.

Table 1 Measurements in microns of the various parts of *Cercaria melanopsi* VIII and *C. melanopsi* IX encountered in *Melanopsis praemorsa* snails collected from Azraq Oasis, Jordan

	<i>C. melanopsi</i> VIII	<i>C. melanopsi</i> IX
Body length*	425-750 450-650	100-138 75-120
Body width*	100-240 70-130	40-65 48-63
Tail length*	635-1050 625-800	58-93 43-85
Tail width*	30-43 33-43	8-15 15-17
Oral sucker†	70×85	40×30
Acetabulum† (diam.)	95-100	18-21
Pharynx†	42×30	10×12

* Measurements are given for live (upper values) and fixed (lower values) specimens

† Measurements are given for live specimens

praemorsa snails collected from water bodies of Northern and Southern Azraq, respectively. Its body is elongated and densely packed with cystogenous cells which obscure the internal structures of the cercaria. It is covered with a 7 µm thick tegument which provided with fine spines. The tail is slightly longer than the body. It is filled with "caudal bodies" except near its tip where an "adhesive organ" is located. By means of this organ, the cercaria attaches itself to the bottom of the dish or to the water surface. The "adhesive organ" is composed of three glands surrounding a suction cup at the tail tip. The outer pair of glands have the longest ducts while the inner glands have the shortest. The gland ducts run posteriorly to open at the tail tip.

The acetabulum is located near the middle of the body and is slightly larger than the oral sucker. The digestive system consists of a mouth that leads into a long prepharynx which passes through a muscular pharynx at about 50 µm from the posterior border of the oral sucker. The pharynx connects with an oesophagus which bifurcates into two intestinal caeca. Each caecum is 10-17 µm wide and extends to the posterior extremity of the body.

The excretory system is well developed.

The excretory bladder is globose measuring 30-50 µm in diameter. It receives two main excretory ducts. Each duct bifurcates into two excretory canals which run anteriorly to re-unite forming an excretory vesicle near the pharynx. Additional short excretory canal runs to the posterior extremity of the body. Caudal excretory canal was not detected. Flame cells are arranged symmetrically in the body, but are absent in the tail. The flame cell formula is $2[(2+2+2+2+2+2+3+2+1)+(2)]=40$.

The glandular system consists of two groups of penetration glands on both sides of the body between the acetabulum and the pharynx. It was possible to count 6 glands in each group. Ducts of glands run in two bundles that open at the anterior margin of the body.

Cercaria melanopsi VIII is a slow swimmer. As it emerges from the snail it swims in a whip-like manner toward the water surface. When it stops swimming it sinks down to the bottom of the dish or adheres to the water surface by means of its "adhesive organ". Cercariae usually encyst within one hour of their emergence from snails. The metacercaria is oval in shape measuring 280-360 µm long by 170-220 µm wide and is provided with a 5-7.5 µm thick cyst wall.

Cercariae develop within sausage-shaped rediae greatly varying in size and possessing an oval pharynx and a rhabdocoel gut. Two types of rediae were found; big and small. The big rediae measure 750-1425 µm long by 150-350 µm wide. They have a relatively small pharynx measuring 65-75 µm long by 52-62 µm wide, and a long rhabdocoel gut that runs to the posterior end of the redia. In addition, there are two lateral processes at about 200-300 µm from the posterior end, and a birth pore 40 µm wide and 400-500 µm from the anterior end. The small rediae are 410-570 µm long by 50-100 µm wide. They have a relatively large pharynx measuring 50-67 µm long by 38-62 µm wide, and a rhabdocoel gut that runs to the posterior end of the redia. Lateral processes are at about 65-100 µm from the anterior end. These rediae contain granular matter and germ cells only. However, big rediae contain 2-9 developed

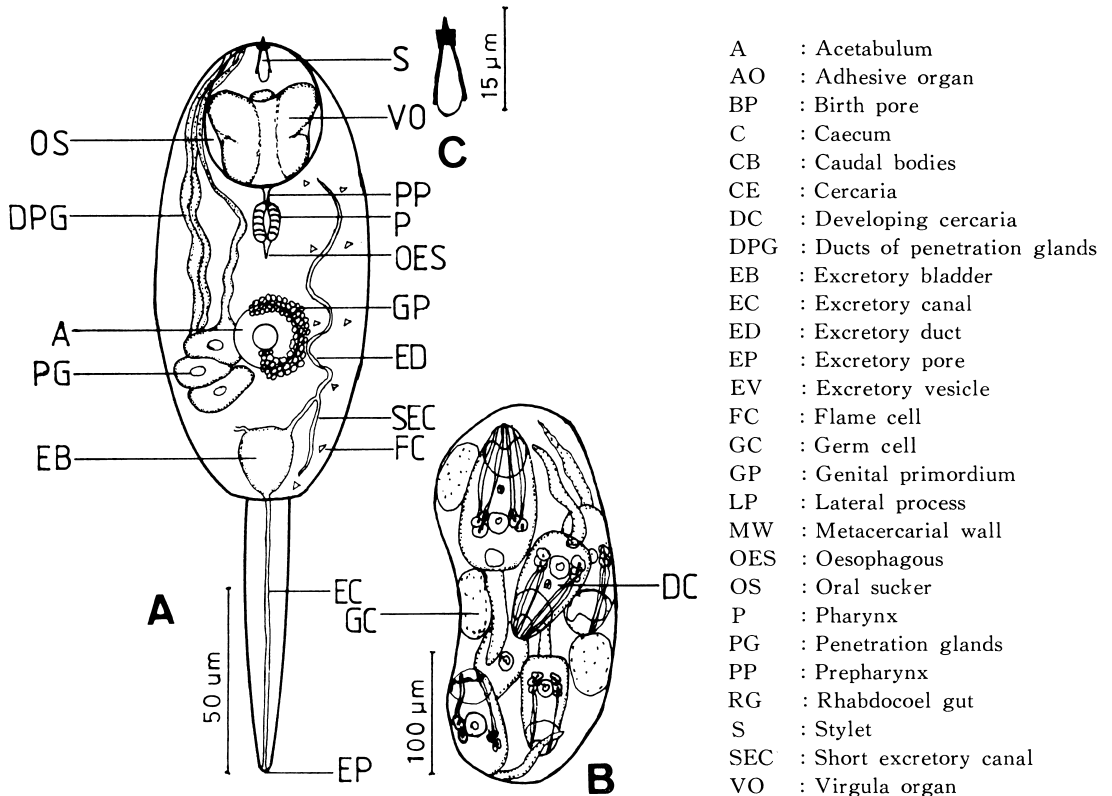


Fig. 2 *Cercaria melanopsi* IX. A. Developed cercaria, B. Sporocyst, C. Stylet.

cercariae, several developing cercariae, and germ cells.

Cercaria melanopsi IX: (Fig. 2)

This is a xiphidiocercaria which was found in 2 out of 699 *M. praemorsa* snails collected from water bodies of Northern Azraq. It is a relatively small cercaria. Its body is covered with a $1\ \mu\text{m}$ thick tegument which is provided with fine spines. Moreover, refractile granules were seen scattered on the body. The tail is highly contractile and is recessed into the posterior end of the body to a depth of $7\ \mu\text{m}$.

The oral sucker is oval in shape and is provided with a stylet (11 by $3\ \mu\text{m}$) and a virgula organ (23 by $26\ \mu\text{m}$). This organ is bilobed and is provided with an opening. The acetabulum is located at about $3/5$ of the body length from the anterior extremity and is smaller than the oral sucker.

The digestive system consists of a mouth

that leads into a short prepharynx which passes through a muscular pharynx at about $4\ \mu\text{m}$ from the posterior border of the oral sucker. The oesophagus is rudimentary and the caecum is absent.

The excretory system is composed of an excretory bladder which is globose in shape when full and measures $21\ \mu\text{m}$ in diameter. The bladder connects posteriorly to a caudal excretory canal that runs in the center of the tail to open at its tip. Anteriorly the bladder receives two main excretory ducts. Each duct bifurcates into two excretory canals at a little distance in front of the bladder; one runs anteriorly to about the level of the oral sucker while the other one runs posteriorly to the end of the body. Flame cells are arranged symmetrically in the body, but are absent in the tail. The flame cell formula is $2[(2+2+2+1)+(2)]=18$

There are three pairs of penetration glands

on both sides of the acetabulum. Gland ducts, on each side of the body, form two bundles. The outer bundle consists of two ducts, while the inner consists of one duct that curves inward at about the level of the pharynx. All ducts run anteriorly to open on both sides of the stylet. The genital primordium consists of a mass of cells below and around the acetabulum.

This cercaria is a moderate swimmer. It swims in the water column for a short period of time. As it stops swimming it sinks down slowly. On the bottom the cercaria crawls by the action of its body contractions to re-swim again. Many cercariae were seen hanging in the water particularly near the water surface. Cercariae show positive thigmotaxis, tending to concentrate along the rim of the dish. Although large number of cercariae usually emerge from the snail most of them die within 24 h without encystment.

Cercaria melanopsi IX develops within oval sporocysts greatly varying in size. They measure 150–440 by 100–170 μm and are packed with one to four developed cercariae, several developing cercariae, and germ cells.

Discussion

Melanopsis praemorsa apparently serves as the intermediate host for many digenetic trematodes that may exist in several vertebrate hosts in Jordan. Two new types of cercariae have been described in this study. Seven types of cercariae, named *Cercaria melanopsi* I through *C. melanopsi* VII, were found in this snail collected from Yarmouk River (Ismail and Abdel-Hafez, 1983) and two other types were from Azraq Oasis, Jordan (Ismail *et al.*, 1983). This is in addition to a furcocercous cercaria, named *Cercaria levantina* 5 by Lengy and Stark (1971), which has been encountered in this snail from Yarmouk River (Ismail and Abdel-Hafez, 1983). Thus, there are at least 12 different types of cercariae that this snail could carry in Jordan.

The cercariae recovered from *M. praemorsa* snails in this study belong to two different groups. *Cercaria melanopsi* VIII is a leptocercous distome cercaria, in which the tail

is straight, slender, and narrower than the body. The absence of a stylet related this cercaria to Luhe's (1909) group of gymnocephalous cercariae. Another gymnocephalous cercaria has been encountered in *Melanoides tuberculata* snail in Azraq (Ismail and Saliba, in Press). *C. melanopsi* VIII differs from the latter in several aspects: it is longer, it possesses penetration glands, it has three pairs of adhesive glands in the tail tip instead of two, and 20 pairs of flame cells instead of 16. *C. melanopsi* VIII closely resembles *Cercaria* sp. II Kerala from *Melanoides tuberculata* in Kerala, India (Mohandas, 1979). However, the latter has 18 pairs of flame cells and 8 pairs of penetration glands. Based on the life cycle studies of certain species of *Philophthalmus* (Rao and Rao, 1981; Murty, 1966; Alicata, 1982; Ching, 1961), it is possible that *C. melanopsi* VIII will develop into adults belonging to the family Philophthalmidae. Cercariae of these species are different from *C. melanopsi* VIII in number of flame cells, number of penetration glands, and in number of adhesive glands in the tail tip.

The presence of well developed stylet in *C. melanopsi* IX identifies it as a xiphidiocercaria. Its virgula indicates that it belongs to "Cercaria Virgulae" subgroup (Luhe, 1909). Two other virgulate xiphidiocercariae, named *melanopsi* II and *C. melanopsi* III, have been found in *M. praemorsa* snails collected from Yarmouk River (Ismail and Abdel-Hafez, 1983). However, the virgula organs, the arrangement of penetration glands, and the stylets of these cercariae are different. In addition, *C. melanopsi* III has 15 pairs of flame cells vs 9 pairs in *C. melanopsi* IX.

Xiphidiocercariae may not conform to any particular group to relate them to specific families (Nasir, 1972). Several families have xiphidiocercariae as their larval stages, for example, Plagiorchiidae and Lecithodendriidae (Ginetsinskaya, 1968). Madi (1976) reported the occurrence of two species of each of the above families. The relationship between these trematodes and *C. melanopsi* IX is still undetermined.

Summary

Two new type of cercariae are described from the freshwater snail *Melanopsis praemorsa* (L., 1758) collected from two sites in Azraq Oasis, Jordan, in 1983; a gymnocephalous cercaria and a virgulate xiphidio-cercaria. These cercariae are named *Cercaria melanopsi* VIII and *C. melanopsi* IX, respectively. Details are presented on the morphology and behavior of the cercariae as well as on their development within the snail.

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ヨルダンのアスラックオアシスから得られたカワニナ (*Melanopsis praemorsa*)
に寄生する二種のセルカリアについて

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1983年にヨルダンのアスラックオアシスの2カ所から2,718ケのカワニナを採集して、セルカリアの2新種を検出した。その一つは裸頭セルカリアに属するもので *Cer-*

caria melanopsi VIII とし、他の一つは剣尾セルカリアに属するもので *C. melanopsi* IX として、それらの形態や習性について報告したものである。