A LONGIFURCATE DISTOME CERCARIA FROM BULINUS TRUNCATUS SNAILS IN THE JORDAN VALLEY, JORDAN

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SUMMARY: Bulinus truncatus snails collected from water bodies of the South Shuna region, north of the Dead Sea, were found infected with a pharyngeal longifurcate distome cercaria. This new form of cercaria is named Cercaria bulini I. It has three pairs of penetration glands, 12 pairs of flame cells, and lacks the intestinal ceca. This cercaria is an active swimmer and develops within an elongated sporocyst. Other details on the morphology, behavior, and development of C. bulini I are presented.

INTRODUCTION

In addition to their important role in the transmission of schistosomiasis, Bulinus snails act as intermediate host for other larval trematodes. Archibald and Marshall (1) described three nonfurcocercous cercariae from B. contortus in the Sudan. In Egypt, B. truncatus and B. forskali were found to harbor eight forms of cercariae including those of Schistosoma haematobium (2). Three of these cercariae were Echinoparyphium recurvatum, Paramphistomum cervi and Lepoderma ramalianum. The others were two holostomes of Apharyngostrigea ibis, a longifurcous cercaria, one lophocercous, and an ocellate cercaria. Later, Rysavy et al. (3) recovered three types of cercariae from B. truncatus at Warak El-Arab, Egypt; a strigeid cercaria, a Paramphisotomatidae cercaria, and a xiphidiocercaria. Another strigeid cercaria was also found in B. truncatus collected from the Golan Heights (4). Similarly, Bulinus truncatus snails in Asir
Province, Saudi Arabia, were found infected with a lophocercous distome cercaria named *Cercaria asiri* V (5).

Prior to 1975 when the snail, *Bulinus truncatus*, was located for the first time in Jordan (6), the country had been believed to be free from this snail (7,8). Subsequent surveys encountered *Bulinus truncatus* at several sites in Jordan (9). These snails were found highly susceptible to experimental infection with *S. haematobium* (10,11). However, no natural cercarial infection was found in these snails, except for a brevifurcate ocellate cercaria which was encountered once in *B. truncatus* snails collected from the Jordan Valley in 1981 (Saliba, personal communication). The present paper reports on the occurrence and description of a pharyngeal longifurcate distome cercaria from *B. truncatus* in Jordan.

**MATERIALS AND METHODS**

A total of 300 *B. truncatus* snails were collected from various water bodies at the South Shuna region north to the Dead Sea during October 1995. Collected snails were isolated individually in small vials containing clean water, placed under illumination, and few hours later examined for cercariae. Infected snails were then crushed, dissected, and examined for developing larval stages. Cercariae and other developing larval stages were studied live, unstained or stained with vital stains.

Larval morphometrics were taken from at least 10 live and 10 FAA (formalin-acetic acid-alcohol)-fixed specimens. Camera lucida drawings from fixed specimens were completed free hand from observation on live specimens using a compound microscope. The behavior of cercariae was observed under a dissecting microscope.

**RESULTS**

Of the 300 snails examined, four were found infected with a pharyngeal longifurcate distome cercaria. Since the description of this cercaria was different from all other related forms of cercariae, it is named *Cercaria bulini* I.
General Description

_Cercaria bulini_ I is a relatively large cercaria (Fig. 1A, Table I). Its body is smooth, except for the fine spines at the ventral and the oral suckers, the latter being modified into a protrusible organ. Stronger spines are present at the outer edge of this organ. There are also two sensory setae near the posterior end of the body. The tail is over twice the body length and is highly contractile and beset with setate papillae. It has also five and seven pairs of longer sensory setae at the anterior and posterior ends of the tail stem, respectively. Two additional pairs were observed at the tail rami. The oral sucker is oval and measures 38 by 24 μm. The ventral sucker is round and measures 15 μm in diameter. It is located at about 54-68 μm from the posterior extremity of the body. The digestive system consists of a mouth, prepharynx, pharynx, and a short oesophagus that does not bifurcate. The excretory system consists of a small 8 by 8 μm bladder. It empties into the caudal excretory duct which, in turn, opens at the end of the tail stem. The bladder also receives two ascendingducts which bifurcate into anterior and posterior collecting tubules at about the middle of the body. The posterior tubules

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<th>Table I. Measurements (in microns) of 10 live (upper) and 10 fixed (lower) specimens of <em>Cercaria bulini</em> I isolated from <em>Bulinus truncatus</em> snails collected from Jordan</th>
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*One standard deviation.
run back into the tail stem. Twelve pairs of flame cells are arranged symmetrically in the body and the tail. The flame cell formula is $2[(1+1+1)+(1+1+2+1+2)+(2)]=24$. The glandular system consists of six penetration glands arranged circumacetabularly; four paracetabular and two postacetabular. Each gland is finely granulated and opens into a duct. Two pairs of these ducts open at the anterior end of the protrusible organ and one pair opens laterally.

The genital primordium is made of a dense cluster of cells between the excretory bladder and the postacetabular penetration glands.
Behavior

Shedding of *C. bulini* I by the snail is strongly affected by light. Cercariae were seen within half-hour of illumination, remained active for 24 hr, and all died within 48 hr. *Cercaria bulini* I is an active swimmer. It swims briefly and as it stops it sinks to the bottom, head down, assuming a C-shape. It swims back into the water column either autonomously or if stimulated by water disturbance.

Development

*Cercaria bulini* I develops directly within elongated sausage-shaped sporocysts, which were found embedded in the snail's hepatopancreas. Sporocysts measure 540-1935 by 43-129 μm (Fig. 1B) and up to 18 cercariae were observed within each sporocyst.

DISCUSSION

The presence of a pharynx and anteriorly directed piercing spines, the absence of eyespots and rami finefolds, and the tail rami being longer than half of the tail stem relate *Cercaria bulini* I to longifurcate cercariae of group 2 of Cort (12). Sewell (12) divided this group into three subgroups: 'Pahila', 'Emarginata' and 'Dursa'. The absence of intestinal ceca may relate *C. bulini* I to the 'Pahila' subgroup. However, *C. bulini* I differs from 'Cercariae Indicae I', the representative of 'Pahila' subgroup (12), in having spinulated tail, different number of flame cells, and in the structure of the digestive system. In describing a similar pharyngeal longifurcate distome cercaria from *Bulinus truncatus*, Lengy and Wolf (4) suggested assigning such cercariae to a new fourth subgroup named 'Strigeid'.

*Cercaria bulini* I differs from *Cercaria Levantina* 8 of Lengy and Wolff (4) in having more flame cells in the body, the caudal excretory duct does not bifurcate and opens at the end of the tail stem, and in being slightly larger. Two additional pharyngeal longifurcate strigeid cercariae were also described from *B. truncatus* in Egypt (2,3). *Cercaria bulini* I differs from the two described cercariae in being different in size, in having more flame cells, and in the location of the acetabulum and the excretory pores.

Strigeid trematodes are intestinal parasites of birds and mammals with metacercariae developing in fishes (13). It is our belief that the adult form of the
described cercaria is a parasite of birds that are either indigenous to, or migrating through, the area.

REFERENCES