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Immature Larval Stages of *Echinostoma* sp. Sought in *Indoplanorbis exustus* in the Fresh Water Stream in Al-Hasa, Saudi Arabia

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Abstract: The aim of the present study was to make a preliminary survey of the snail species and identify them for serving as the intermediate hosts for digenetic trematodes. Examination of four different fresh water streams in Al-Hasa, Eastern region, Saudi Arabia, revealed one of the species of fresh water snail that was identified as *Indoplanorbis exustus*. Examination of 50 snails of *I. exustus* showed natural infection with immature larval stages of *Echinostoma* sp. The infection rate was 20%. It was evident that *I. exustus* serves as the first intermediate molluscan host for the *Echinostoma* sp. in Saudi Arabia.

Key words: *Echinostoma*, trematode, snail, *Indoplanorbis*, larval stages

INTRODUCTION

Several members of the genus *Echinostoma* and related genera occasionally infect humans as well as other mammals throughout the world and echinostomiasis in humans has been attributed to about 16 different species^[1]. The number and arrangement of the collar spines found typically around the head region of the adult as well as the larval stages, form the basis of the different species of echinostomes^[2].

The complex life cycles of echinostomes are all linked to fresh water habitats. A mammalian or avian definitive host, one or two molluscan hosts, and one or two fresh water stages of this trematode, are usually required to complete the life cycle. Several studies are available on the experimental and epidemiological life cycle of these echinostomes^[2,3-7].

Malacological surveys are useful to trace the dynamics of molluscan populations of an area and the prevalence and intensity of infection by larval trematodes^[8,9]. The present study was based on the survey of fresh water streams in Al-Hasa, Eastern region, Saudi Arabia, identifying one of the fresh water snail as *Indoplanorbis exustus*. Different immature larval stages of *Echinostoma* species were identified from these molluscan intermediate host. *Indoplanorbis exustus* reportedly serves as the intermediate host of many digenetic trematodes like paramphistomes^[10], schistosomes^[11], including echinostomes^[12]. The present study may lead to further detailed and long term epidemiological study in this region to trace the dynamics of molluscan

populations and the prevalence and intensity of infection by larval trematodes.

MATERIALS AND METHODS

Malacological samplings were made at random during the month of January in the year 2004, from four different sites of fresh water natural streams located in Al-Hasa, Eastern region of Saudi Arabia. The method of samplings was essentially the same as mentioned in the manual of WHO^[13]. Briefly, the samples were collected from littoral and the mid water stream by a standard dip net technique. Ten net dips were taken from each site. The recovered materials in the nets were carefully examined for snails. The snails were picked up with a blunt forceps. Sometimes a hand magnifying lens was also used. The snails were collected in labeled jars filled with water of the same water stream sites. The jars were covered with a perforated lid and transported to the research laboratory. The snails were identified with the help of the key by Brown and Wright^[14]. The snails were then individually examined to trace the prevalence and intensity of infection by larval trematodes. The snails were examined either by crushing or by natural shedding^[9]. The shedding immature stages of cercariae were examined fresh. Immature larval stages were recovered from the tissue of the crushed snails. All immature stages including the cercariae, were preserved in 70% ethanol for pre-servance and further studies.

The identified snail species and the immature larval stages of the trematode were photographed under natural and unstained conditions using a Phase Contrast Nikon

Microscope (model Eclipse E600, Japan) fitted with a digital camera (Nikon DXM1200F, Japan) using a PC programme NCT-1 version 2.62.

RESULTS

The snail species collected from the survey sites were identified as *Lymnea* sp., *Physa* sp., *Melanooides* sp. and *Indoplanorbis* sp. However, only one species, *Indoplanorbis exustus* (Fig. 5), was used for the present study. The other identified snail species will be discussed in a separate study elsewhere. In all 50 snails of *I. exustus* were examined and the natural infection rate with immature larval stages of trematode was found to be 20%. The immature larval stages, viz. redia, cercaria and encysted metacercaria (Fig. 1-4, respectively), reported in this study resembled the features of *Echinostoma* sp. Chances



Fig. 1: Redia of *Echinostoma* sp., showing one cercaria outside the rediae (arrow) and another cercaria inside the redia (arrow head). Mag. 10 X 10x

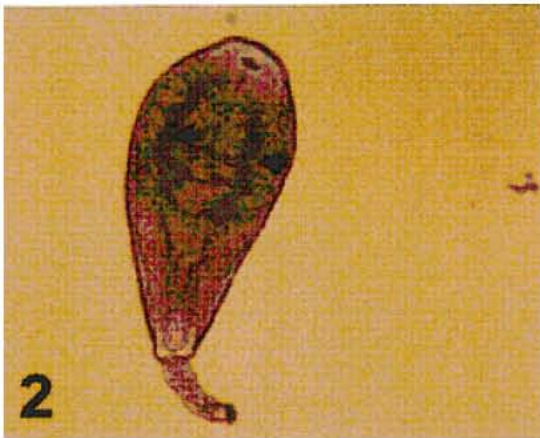


Fig. 2: Free cercaria of *Echinostoma* sp. Note the germ cells (arrows). Mag. 10 X 10x

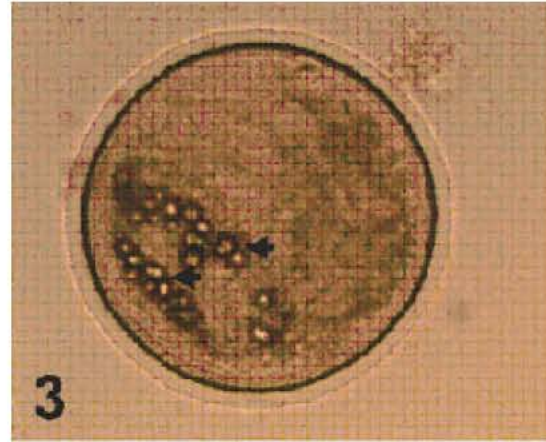


Fig. 3: Encysted metacercaria of *Echinostoma* sp. showing the germ cells (arrows). Mag. 10 X 20x

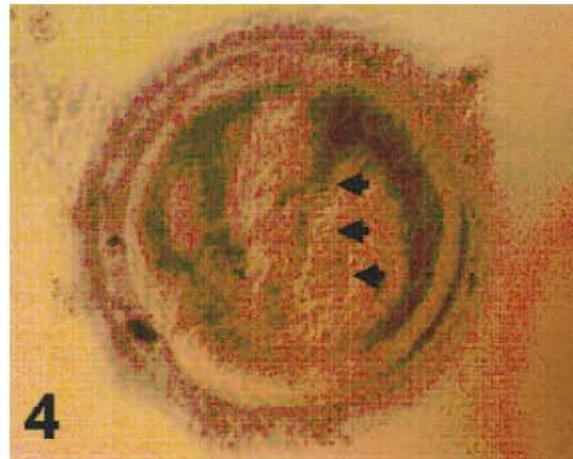


Fig. 4: Encysted metacercaria of *Echinostoma* sp. showing collar of spines (arrows) in the larva. Mag. 10 X 20x

of multiple infection was ruled out since all encysted metacercaria examined herein contained collar of spines (Fig. 4) which is a unique identifying character of *Echinostoma* sp.

DISCUSSION

In the present study the snail species, *Indoplanorbis exustus*, was identified from all the four different fresh water streams of Al-Hasa region. *Indoplanorbis exustus* prefers fairly shallow water area. Twenty percent of the collected and surveyed snails shedded cercaria of *Echinostoma* sp. Although shedding method is less sensitive than crushing in diagnosis of naturally infected snails, crushing of snails is rapid, simple and useful in detection of immature stages in dying snails or for the

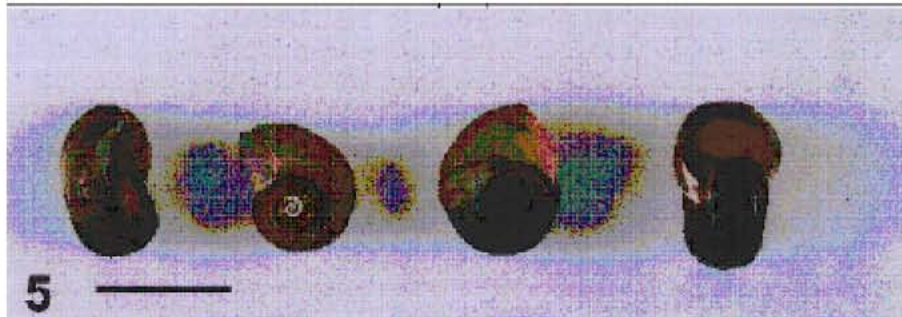


Fig. 5: Shells of the snail *Indoplanorbis exustus* showing all surfaces of the species. Mag. Bar = 1 cm

non-shedding ones^[15]. Thus, by crushing method, other larval stages like redia (possessing cercaria within), cercaria and metacercaria of *Echinostoma* sp. were also identified from the snail *I. exustus*.

Indoplanorbis exustus has been reported as the first intermediate host of other digenetic trematodes also, like paramphistomes^[10], schistosomes^[11] besides echinostomes^[2]. The present study also indicates that *I. exustus* serves as the first intermediate host of *Echinostoma* sp. under natural condition in the Al-Hasa region of Saudi Arabia and this is the first report of its kind from this region. It is warranted to mention here that *Echinostoma* sp. are important trematode parasites of human health significance, that requires anthelmintic treatment in human infections. Recently, a survey in Cambodia has revealed a high positive rate (4.8%) for *Echinostoma* sp. among children^[16]. Further, it is hoped that the present study might be helpful in establishing the experimental life cycle of *Echinostoma* sp. in *I. exustus*, in Saudi Arabia, under laboratory conditions, for the use in biological research.

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