

## A PRIMALARY STUDY OF THE BIOLOGICAL CONTROL OF FASCIOLIASIS

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### ABSTRACT

The present study demonstrated that the infection of *Lymnaea auricularia* with an oligochaete worm gave a good protection against the penetration of *Fasciola gigantica* miracidiae to the snails. Experimentally, it was found that the Oligochaete ingested cercariae, Which shed from other snails and believed that it could play a significant role in the control of fascioliasis.

### INTRODUCTION

Fascioliasis caused by *F. gigantica* is regarded as most important, constrain to productivity and health of cattle and buffaloes in Southeast Asia and other humid tropical regions of the world (Yadav *et al.*, 1999 and Anonymous, 2003). Many different strategies are used for controlling fascioliasis, which include: antihelminthic treatment (Tongson *et al.*, 1978), grazing management (Schillhorn van Veen, 1980); predator/ competitor snails (Nguma *et al.*, 1982); predator with fish (Gupta *et al.*, 1986) or ducks (Rai *et al.*, 1996) and breeding resistant livestock (Roberts *et al.*, 1997). However, their relevance to control of *F. gigantica* is limited by the scarcity of epidemiological information about *F. gigantica* on which application of such strategies is based (Spithill *et al.*, 1999; Anonymous, 2003).

In the present study, it was found that some of the *L. auricularia* snails obtained from the field were naturally infested with oligochaete worms, which actively attacked and swallowed the free cercariae, which were shed from other snails in petridish. Thus, the present study was carried out to

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evaluate the ability of utilization of these oligochaetes as a tool in biological control of fascioliasis.

## **MATERIALS AND METHODS**

### **Collection of the Oligochaetes**

The oligochaete worms were obtained from naturally infected *L. auricularia* collected from Garmat Ali river. Snails were then dissected and the oligochaete worms were freed and gathered by pipette, and used as soon as possible.

### **Infestation of *L. auricularia* with Oligochaete Worms**

A laboratory-reared snail *L. auricularia*, which has been free from infestation with oligochaete worms were used. One hundred snails were then individually exposed to five oligochaetes obtained in above item in 10 ml tap water for 1–2 hour.

### **Evaluation of the role of the oligochaetes as a biological control for fascioliasis**

Out of 100 snails which were infested in above item 30 snails were individually exposed to newly hatched *F. gigantica* and miracidia (Table 1). In other experiment, 10 *F. gigantica* and 10 monostome cercariae obtained from experimentally and naturally infected *L. auricularia* respectively were added to 12 petri dishes, each one contained two infested snails (Table 2). Control snails free of oligochaetes were exposed to miracidia or cercariae in the same manner. After three hours the shells of control and oligochaete infested snails exposed to the two species of cercariae as well as the inner walls of petri dishes were examined for the presence of metacercariae which encysted on external substrates. Snails exposed to miracidia were examined 15 days post infection for the presence of redia by crushing the snail under dissecting microscope.

## **RESULTS**

During the course of this study it was found that most of the snails collected from Karmat Ali river, Al-Asafia and Hassan creek were infested with oligochaetes (Fig 1). Each snail had at least 5–15 worms. The body of the oligochaete is white and divided into somites, which ventrally carry bundles of chaetae. The worms remain inside the snail shell and they occasionally extend the anterior part of their body outside the shell. Sometimes they creep over the shell or creep out and totally leave the snail in the water

seeking another snail. The worm extended their bodies considerably trying to catch and swallow the cercariae.

**Table 1- The influence of oligochaete worms on the percentage infection of snails exposed to five miracidiae of *F. gigantica***

Exp. No.	Snails with oligochaete worms		Control snails	
	No. exposed	No. infected	No. exposed	No. infected
1	10	0	10	8
2	10	1 (10%)	10	10
3	10	2 (20%)	10	8
Total	30	3 (10%)	30	26 (86.7)

**Table 2 The influence of oligochaete worms on the percentage of metacercarial formation of monostomes and *F. gigantica***

Exp. No.	Petri dishes with infested snails		Petri dishes with control snail	
	No. cercariae added	No. metacercariae formed	No. cercariae added	No. metacercariae formed
1	80	11	80	80
2	80	16	80	80
3	80	20	80	80
Total	240	47 (19.5%)	240	240 (100%)

In three experiments a total of 30 snails, each infested with five oligochaete worms were exposed individually to 10 *F. gigantica* miracidiae. Three of snails (10%) were found to be infected with *F. gigantica* redia in comparison with 86.7% in control groups (Table 1). There is about 76.7% reduction in the percentage of infection. In another experiments, the monostome and *F. gigantica* cercariae, which were placed with the oligochaetes infested snails, only 47 (19.5%) of the cercariae were encysted and formed metacercariae, while all the cercariae in the control snails were later found to encyst as metacercariae on the inner walls of the petri dishes and over the shell of the snails. The mean reduction percentage of encystation was 80.5%.

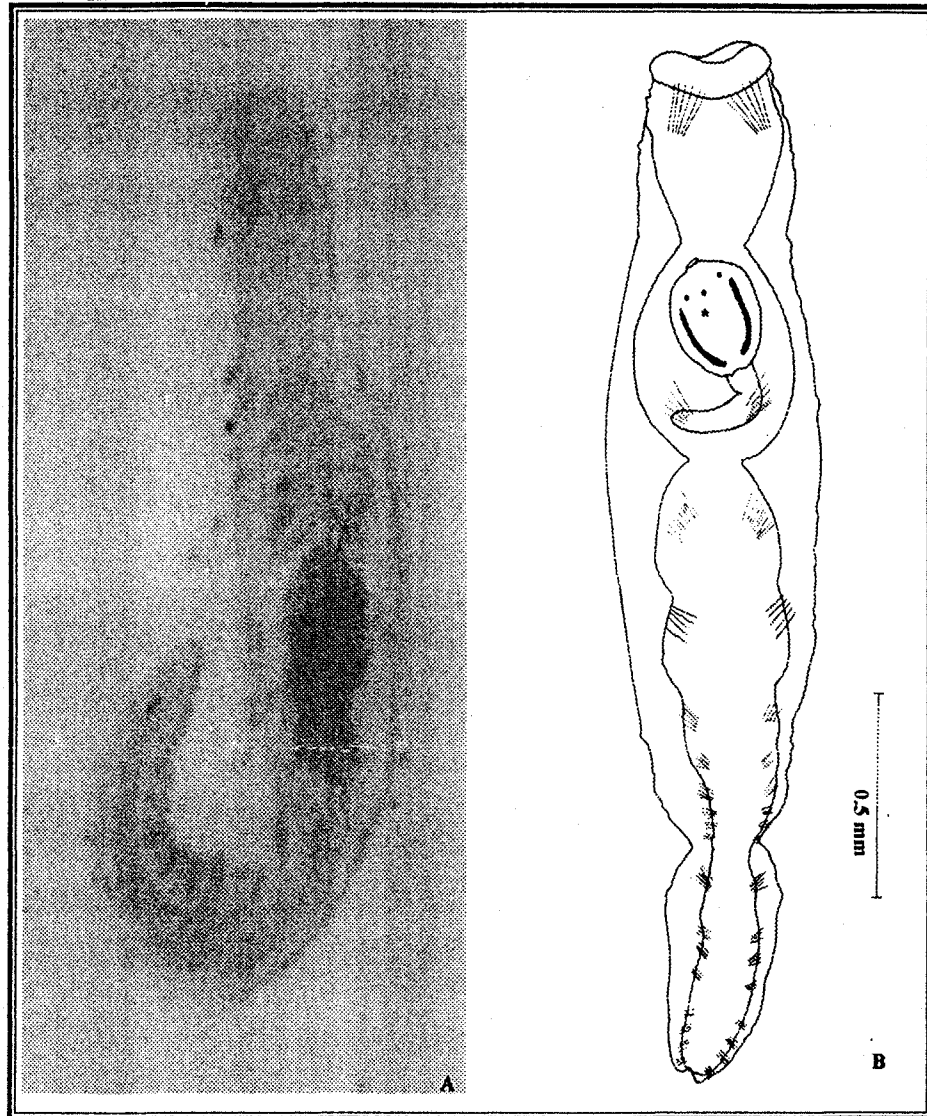


Fig. 1 . Oligochaete worm. A. Lateral view. B. Ventral view.  
\* Newly ingested cercaria.

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**DISCUSSION**

There was little information in the world literature concerning the epidemiology of infection with *F. gigantica* that could be used scientifically as appropriate recommendations for control of this parasite in cattle and buffaloes (Anonymous, 2003). Generally, the control of fascioliasis comprises one or more measures, which includes eradication of the snail intermediate hosts or adult worms in livestock by regular treatment using one of the known effective fasciolicides. Reduction of the chances of infection by animal husbandry management was suggested by Malek (1980).

Molluscicides have been used successfully and cost effectively in short-term control of fascioliasis (Reberts and Suhardono, 1996). Many molluscicides are toxic to humans and leave residual toxicity for non-targeted fauna (Haseeb and Fried, 1997). In irrigated rice fields application of molluscicides have gained little acceptance (Roberts and Suhardono, 1996). Reduction or eradication of fascioliasis in the mammalian host through chemotherapeutic treatment of infected animals whether it is only active on adult or immature or juvenile flukes (Malek, 1980).

The continued survival of liver flukes in the enzootic areas indicates that snails controlled by molluscicides or chemotherapeutic treatment of infected animals are not sufficient and they have not been widely adopted for control of fascioliasis (Graczyk and Fried, 1999). Protection against the invading of miracidiae or metacercariae formation may be considered as an alternative to biological control in human and live stock fascioliasis.

It is worthwhile to mention that further investigation is needed to emphasize the role of oligochaete worms in limiting the distribution of fascioliasis in Basrah.

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### دراسة أولية على السيطرة البايولوجية للإصابة بديدان حلزون الكبد

صبيح هليل المياح و عبد الحسين حبش عواد

قسم علوم الحياة - كلية التربية - جامعة البصرة - العراق

#### الخلاصة

أثبتت الدراسة الحالية أن إصابة قواقع *Lymnaea auricularia* بنوع من الديدان قليلة الأهلاب *Oligochaete* يعطيها حماية ضد إصابتها بمهديات *Fasciola gigantica*. كما لوحظ من خلال التجربة أن هذه الديدان تقوم بإقتناص وهضم المذنبات التي تنطلق من قواقع مصابة آخر، لذا فمن المتوقع أن لهذه الديدان دوراً مهماً في السيطرة الحياتية على الإصابة بديدان حلزون الكبد.