# Effect of some Physico-Chemical Parameters on Abundance of Trematode Snails in Fayoum Governorate, Egypt

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## Introduction

Freshwater molluscs often act as intermediate host for different species and thus are of significant importance for human and animal health. Due to globalization and anthropogenic impact many introductions of non endemic species can be observed. There is a need for more scientific investigation (1). Different infections are widespread and often prevalent in areas where the snail intermediate hosts breed in water bodies contaminated by feces or urine of infected humans and animals. Several factors are considered to affect the ecology of snails and other intermediate hosts of diseases, hence their focal and seasonal distributions. These include physical factors such as water current, temperature, turbidity, water transparency and distribution of suspended solids, chemical factors such as ion concentration and dissolved gases in water as well as biological factors such as availability of food, competition and predator-prey interactions (2). Besides, aquatic macrophytes have been shown to play a vital role in the distribution of snails in different parts of Africa (3). Aim of the present study was to collect data on distribution and abundance of gastropods and their trematodes in irrigation channels in Fayoum governorate in relation with environmental factors to explain parasite prevalence, especially for diseases of human and veterinary relevance.

**Fig 1:** *P. collumella* on water hyacinth

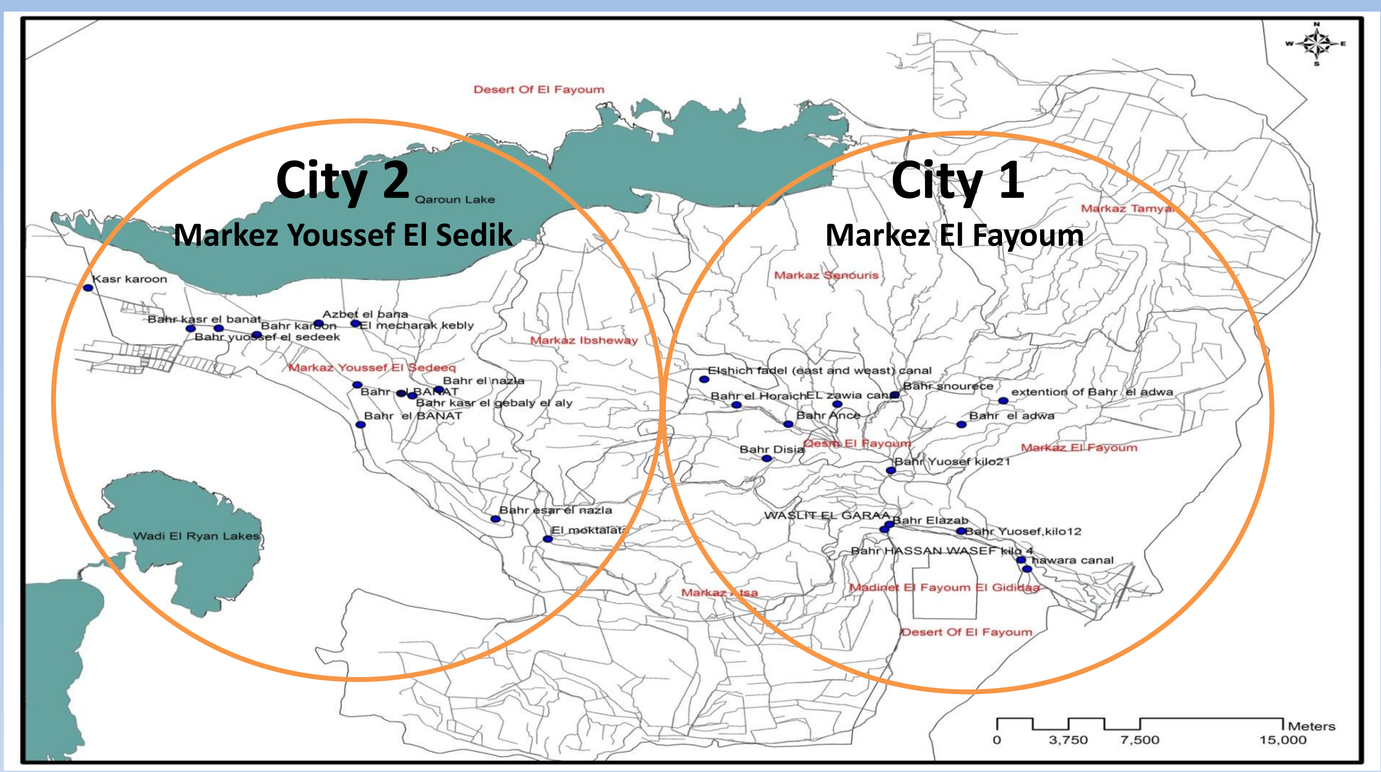


**Fig 2:** Map showing drainage channels and sampling sites

## Methods

Snails were collected by using dip nets from August to September 2013 at 28 sites in the vincinity of Markez El Fayoum and Markez Youssef El Sedik, Fayoum governorate (fig. 2). Ecological factors like water temperature, pH, conductivity, total solids and turbidity measured by field devices. Occuring species of water plants were recorded. Collected snails were preserved in 99% ethanol for further examination in the laboratory. Snails were identified morphologically according to the key of Brown (4). DNA was extracted from each snail by the Jet Quick® tissue DNA Miniprep Kit. PCR tests were performed for each snail using different universal and specific DNA primers to detect possible infections and for molecular identification of the snails. PCR products were separated by standard agarose gel electrophoresis and visualized by an UV transilluminator. Purified PCR products were sent for sequencing (GATC Biotech, Köln, Germany). Identity of sequences with entries in the GenBank was checked by BLAST search.

## Results

**Snail diversity**

A total of 11 snail species belonging to 7 families were collected. The total of the collected snails was 1518, 493 specimens were recorded at city1 (Markaz El Fayoum) and 1025 at city 2 (Markaz Youssef El sedik) (Fig. 3).

**Prevalence of trematode infections**

According to detection by PCR (Fig. 5) and sequencing, 20 of 176 tested snails (35.2%), were infected with trematodes in city 1, and 13 out of 124 (16.12%), were infected in city 2. (Fig. 4). In detail, *Pseudosuccinia collumella* was infected with a notocotyloid trematode, a *Philophthalmus* sp. was detected in *Cleopatra bulimoides* and *Bellamya unicola*, *Theodoxus niloticus was infected* with *Catatropis indicus,* and *Biomphalaria alexandrina* with *Schistosoma mansoni* and a *Apharyngostrigea* sp.

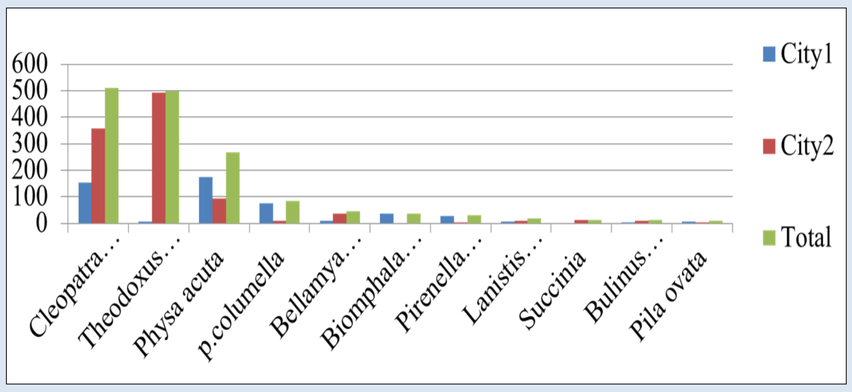


**Fig. 3**: Number of snail species collected from Markez El Fayoum (city 1) and Markez Youssef El Sedik (city 2)

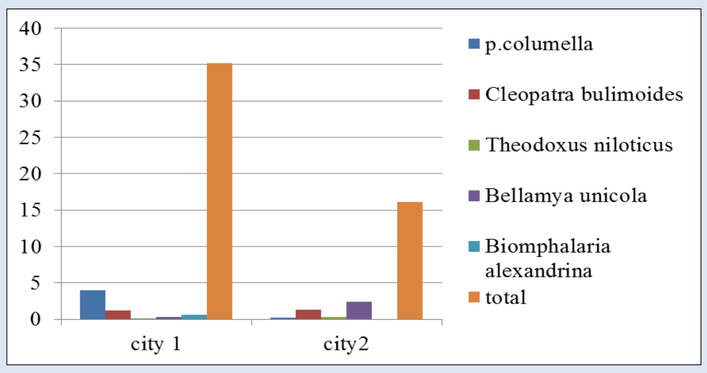


**Fig. 4:** Prevalence of trematode infection in snails from Markez El Fayoum (city 1) and Markez Youssef El Sedik (city 2)

**Physico-chemical properties of water at the sampling sites**

No marked differences were observed between the two cities. Only for conductivity and total salts, Markez Youssef El sedik had higher value in these two parameters than Markez El Fayoum (Fig 4). The high value of the conductivity in city 2 may be the cause of the presence of high number of snails in this city.

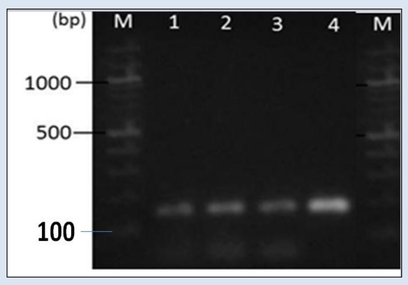


**Fig. 5:** Example of PCR result

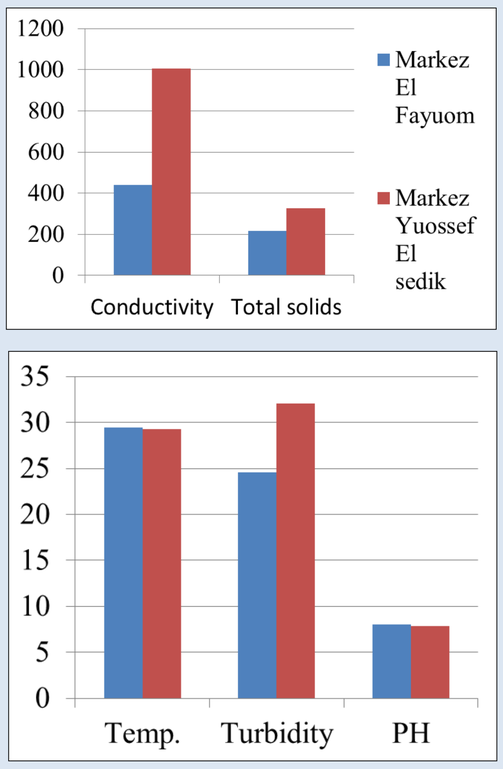


**Fig 6:** Results of physico-chemical parameters recorded in water at theinvestigated site.

## Conclusions and outlook

Results of the present study show a high diversity of different snail species in the irrigation channels of two areas in and around the cities Markez El Fayoum and Markez Youssef El Sedik. We found infections of some of the most abundant snail species with different trematodes, in one case also with relevance to human infections (*S. mansoni*). In contrast to previous studies (5), the liver fluke *Fasciola gigantica* was not detected in the snails investigated. This might be explained by the low number of *P. columella* (host for *F. gigantica*) present at the sites. The high conductivity can be a reason for the higher prevalence of snails in city 2. No correlation to other parameters could be verified. Further sampling in other periods of the year are necessary to complete the results.

## References

(1) Abd El-Malek, E. (1958): Factors conditioning the habitat of Bilharziasis intermediate hosts of the family Planorbidae. Bull. Org. mond. Santé. Bull. Wld. Hlth. Org., 18: 785-818.
(2) Barbosa, F. S. & Barbosa, C. S. (1994): The bioecology of snail vector for Schistosomiasis in Brazil. Cad. Saùde Pùbl., Rio de Janeiro, 10 (2): 200-209. in Britain. J. Anim. Ecol., 5: 116-186.
(3) Ofoezie, I. E. (1999): Distribution of freshwater snails in the man-made Oyan Reservoir, Ogun State, Nigeria. Hydrobiologia, 416: 181-191.
(4) Brown, D. S. (1994),2nd edition. Taylor and Francis CRC Press. London, U.K: Fresh water snails of africa and their medical importance.
(5) Grabner D, Mohamed FAAM, Nachev M, Méabed EMH, Sabry AHA, Sures B (2014) Invasion Biology Meets Parasitology: A Case Study of Parasite Spill-Back with Egyptian *Fasciola gigantica* in the Invasive Snail *Pseudosuccinea columella*. Plos ONE, in press.

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