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ORIGINAL ARTICLE

Record of gut associated nemathelminth in the giant African snail *Achatina fulica* (Bowdich) from Bangalore, India

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Abstract Prevalence of nematodes in *Achatina fulica* (Bowdich) sample collected from two different sites within Bangalore University Jnana Bharathi Campus viz., Dhanavanthari vana and Botany Department garden was 84 and 100 % respectively. However, the identity of the nemathelminth could not be established to the species level as it did not respond to the clearing agent and its genital organs were not located which is key character for taxonomic identification. Also, no Cercariae were recorded in the samples, perhaps the snail sample was non endemic for parasitic population. Helminthological prospection with regard to the giant African snail from the region has not been performed till date. The present work is a preliminary study in that direction intended to determine the nemathelminth fauna associated with *A. fulica* populations in Bangalore region laying emphasis on further studies to be undertaken in this regard.

Keywords *Achatina fulica* · Nemathelminth · Cercariae

Introduction

Malacofauna act as hosts for several nematodes of both medical and veterinary importance (Chitwood 1930; Cheng and Alicata 1965; Malek 1974, Farahnak et al. 2006). Incidence of Rhabditids nematodes in particular is reported by various workers viz., Chandler and Reed (1961) found *Rhabditis dolichula* in the feces of *Helix pomatia*, while Grewal et al. (2003) reported 61 known nematode species that utilize molluscs as intermediate hosts, 49 belonging to the superfamily Metastrongyloidea; 47 known nematode species use molluscs as definitive hosts, 33 of which belong to the order Rhabditida. Subsequent reference of a non-parasitic *Rhabditis* sp., in the alimentary canal of *Achatina fulica*, *Hemiplecta distincta* and *Parmarion* sp. was reported by Viyada (2005). Reports on nematodes associated with the giant African snail, *A. fulica* (Bowdich) (Achatinidae: Gastropoda) (Fig. 1) in the Indian context are minimal (Raut and Ghose 1984). Hence, the present study was undertaken as part of a broader approach dealing with the eco-biology of the invasive snail in Bangalore region.

Materials and methods

Study area

Bangalore region (12° 8′N, 77° 37′E) is at an altitude of 920 m above the sea level with tropical savanna climate. The region is favorable for different horticultural and ornamental crops of economic importance. After a through survey undertaken, numerous localities were identified to be prone to the incidence *A. fulica.* As indicated by literature review an attempt was made to identify the nemathelminth fauna associated with the snails in the region. For this purpose snail populations were collected from two different localities viz., Bangalore University Jnana Bharathi Campus and the Indian Institute of Science (IISC) Campus, both with dense prevalence of *A. fulica*. In both areas other endemic snails' viz., Crytozona *bistralis* and *Macrochlamys indica* were observed co-occurring with *A. fulica*. The samples collected along with native soil were

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Fig. 1 The giant African snail, *Achatina fulica* (Bowdich)

transported to the laboratory and maintained in glass terrarium and further parasitological examination studies were duly undertaken.

Study design

Experiment 1

Samples collected from Botany Department garden and the Dhanavanthari vana medicinal plant nursery of Bangalore University campus were studied to detect the prevalence of gut associated nematodes and the percent prevalence of the nematode after confirming their presence was calculated using the formula,

$$\text{Percent prevalence} = \text{snails with nematodes divided by total snails} \times 100.$$

Detection and identification of endobiont nematodes The snail alimentary tract was dissected and its contents were squeezed and washed with distilled water thrice. The visible specimens were isolated (via: sieve) and washed with PBS three times. They were kept in Lacto phenol as clearing agent for further identification. Then the specimens were examined under dissection microscope at 5× objective of simple microscope. The nematodes obtained after collection were stored in vials containing 70 % alcohol for further taxonomic evaluation.

Experiment 2

In the second experiment intended to examine gut associated parasitic helminthes the snails collected from Botany Department garden and the IISC Campus were dissected as per requirement to identify the following standard protocols (Placid 2006).

Detection of parasitic helminthes The snails were put in glass beakers containing tap water and placed against light for an hour in the early hours of the day. The water in the beaker was centrifuged at the rate of 1,500 rpm for 3 min. The supernatant was carefully siphoned off and the sediment was centrifuged and suspended homogeneously in 10 ml of distilled water and 3–4 ml of samples was then pipette from the suspension and examined with 10× objective compound microscope, to look for cercariae.

Results and discussion

In the present study prevalence of an unidentified nematode (Fig. 2) was observed in the snail samples were collected in the selected areas. The percent prevalence of nematodes in the samples collected from Dhanavanthari vana and Botany Department garden was 84 and 100 % respectively (Figs. 3, 4). The observations are comparable to Raut and Ghose (1984) reporting a morphologically similar non parasitic Rhabditid nematode from the gut of 35 % individuals of *A. fulica* and *Macrochlamys indica* in West Bengal and incidence of *Rhabditis* sp. in 47.5 % of *A. fulica* population in Brazil as recorded by Oliveira et al. (2010). However, the identified nemathelminth could not be established to the species level as it did not respond to the clearing agent and its genital organs were not located which is key identification. Similar situations were encountered by Berto and Bogea (2007) and Franco-Acuna et al. (2009) in not being able to establish the taxonomic identity of the nematodes collected from *A. fulica* in their study areas.

Hence this study confirms that, species identification and their association with the snail need to be examined. In the second experiment no cercariae were recorded, perhaps the snail sample was non endemic for parasitic population. Helminthological prospection with regard to the giant African snail from the region has not been performed till date. The present work is a preliminary study to determine the nemathelminth fauna associated with *A. fulica*

Fig. 2 Endonemathelminth (×10) detected in the gut of *A. fulica*

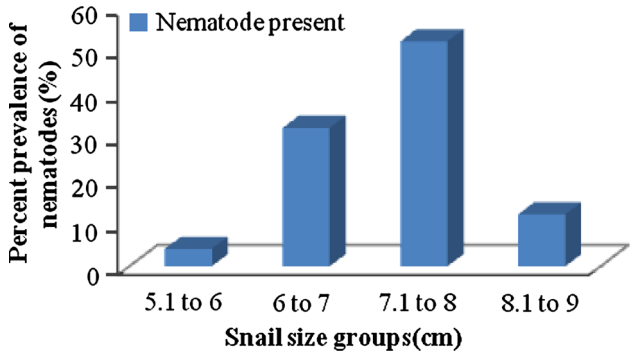

Fig. 3 Percent prevalence of nematodes among the snail sample from Bangalore University, Botany Department garden (Note: 100 % of the sample harboured the nematodes)

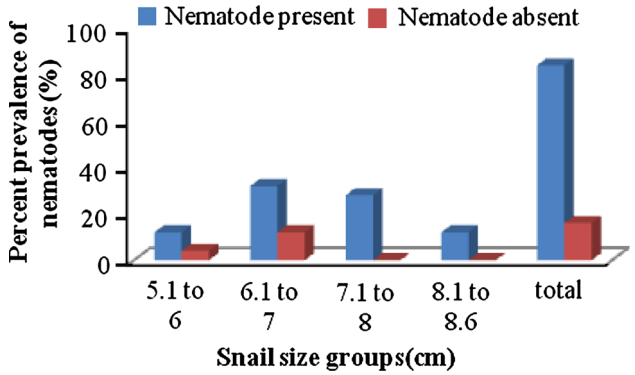

Fig. 4 Percent prevalence of nematodes among the snail sample from Bangalore University, Dhanavanthari vana, Forest Department Nursery

populations in Bangalore region and further study in this regard needs to be undertaken.

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