
OCURRENCE OF NEMATODE LARVAE IN

Achatina fulica BOWDICH, 1822

(GASTROPODA: ACHATINIDAE) SNAILS

IN VARGEM PEQUENA, RIO DE JANEIRO, BRAZIL

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ABSTRACT

This paper reports the occurrence of nematode larvae in the giant African snail *Achatina fulica* in Rio de Janeiro City, Brazil. A total of 78 snails was collected in four out of 22 localities in Vargem Pequena neighborhood between August and December of 2005. In one of the localities (Novo Horizonte residential complex), two forms of nematode larvae were found, which were unsheathed and displayed oxyuroid esophagus. The large and stout form is a third-stage larva with a striated cuticle and a short undulating tail. The small and slender form exhibited esophago-intestinal and intestinal valves. The prevalence of larval nematodes in *A. fulica* snails in Vargem Pequena neighborhood was 4.8%. Additional studies are strongly recommended to identify the nematode species found and to determine whether this snail species constitutes a public health concern.

KEY WORDS: *Achatina fulica*. Nematoda. Vargem Pequena. Rio de Janeiro City. Brazil.

The giant African snail *Achatina fulica*, originally from East-Northeast Africa, has been reported in many countries. Due to its high herbivorous potential, this mollusk species has been frequently detected in agricultural areas (13). Its parasitological importance is also significant considering that this snail can serve as intermediate host to the nematodes *Angiostrongylus cantonensis* and *Angiostrongylus costaricensis*, which are responsible for human meningoencephalic and abdominal angiostrongyliasis, respectively (10). In Brazil, *A. fulica* was introduced for commercial purposes (15). Today, it is distributed throughout the national territory (6). From a parasitological standpoint, Carvalho *et al.* verified experimentally that the invading snail population may host *A. costaricensis* (7). Recently, it was claimed in the press that *A. fulica* snails would not transmit diseases

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to humans in Brazil (3). The present study first reports the occurrence of nematode larvae in *A. fulica* snails collected in Vargem Pequena, a rural neighborhood located in the metropolitan region of Rio de Janeiro City, Brazil.

Study area and selection of localities

Vargem Pequena was selected as the study area. It is a rural neighborhood located in the West zone of Rio de Janeiro City characterized by the presence of family agriculture and many ornamental plant gardens. Twenty-two localities were selected with the aid of area maps according to their economical importance in the community. The geographic coordinates of each locality were obtained with the Global Position System (GPS).

Snail collection

The snails were sampled between August and December of 2005. They were collected with the aid of forceps and gloves, identified by locality, and then transferred to the laboratory in plastic vials.

In the laboratory, the snail shell lengths were measured and marked with nail polisher for individual control. The snails were maintained in plastic vials and fed fresh lettuce *ad libitum* every 2 days, when the recording and removal of dead specimens were performed.

Snails collected in each locality were identified to distinguish between the present species and the native mollusks. The snails were submerged in water and kept in the refrigerator for up to 36h. After this period, they were transferred to a modified Railliet-Henry solution (14). Taxonomic identification followed descriptions available in the literature (Salgado, personal communication).

Snail examinations

After acclimation to the laboratory conditions, the examinations were carried out to identify the occurrence of nematode larvae in the snails collected (12). For this purpose, the snails were eviscerated and sectioned (16). Tissue fragments were then incubated in a 0.7% hydrochloric acid solution for 8h (8). The preparation was placed in Baermann funnels for at least 15h and subsequently investigated with a stereoscopic microscope. The larvae were recovered for morphological studies. They were fixed in Railliet-Henry solution (14) at 50°C and kept in Eppendorf vials. Larval morphology was studied based on descriptions available in the literature (2, 12). Prevalence, defined as the number of snails presenting one or more individuals of the taxonomic group (Nematoda) divided by the number of snails examined (5), was estimated. This index was calculated for each locality as well as for the study area.

A total of 22 localities was investigated in Vargem Pequena neighborhood (Figure 1). Localities 12 ($22^{\circ} 59' 26,4''$, $43^{\circ} 26' 22,2''$), 13 ($22^{\circ} 59' 27,8''$, $43^{\circ} 26' 31,1''$), 14 ($22^{\circ} 59' 20,5''$, $43^{\circ} 27' 24,2''$), and 22 ($22^{\circ} 59' 12,2''$, $43^{\circ} 27' 61,0''$) were infested with *A. fulica*. Seventy-eight snails, with shell lengths varying from 4 to 12 cm, were collected.

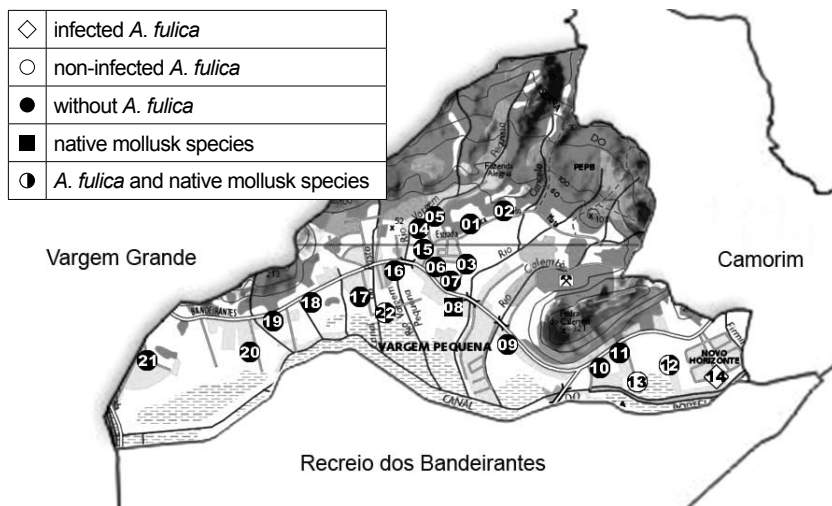


Figure 1. Map of Vargem Pequena neighborhood located in Rio de Janeiro City, RJ, Brazil, showing the selected localities for collection of *Achatina fulica* snails. The numbers in the map indicate the 22 localities.

Sixty-two *A. fulica* snails were examined for the presence of nematode larvae. Four nematode larvae were recovered from three snails in locality 14. The prevalence of larval nematodes estimated for locality 14 and Vargem Pequena neighborhood was 7.0 and 4.8%, respectively (Table 1). Two forms of nematode larvae were recovered. They were unshathed and displayed oxyuroid esophagus (Figure 2 and 3). The large and stout form is a third-stage larva with a striated cuticle and a short undulating tail (Figure 2). The small and slender form exhibited esophago-intestinal and intestinal valves (Figure 3).

The present study first reports the occurrence of nematode larvae in *A. fulica* snails in the West zone of Rio de Janeiro City. It shows a low but significant prevalence in Vargem Pequena neighborhood. The larvae were found in snails collected in locality 14, which exhibits an estimated prevalence of larval nematodes of 7.0%. This locality is characterized as a residential complex for a low income community of approximately 1,937 families, in Vargem Pequena neighborhood. Most of them were inhabitants of Cidade de Deus and Rio das Pedras neighborhoods who were dislodged during a severe flooding that took place in Rio de Janeiro City in 1996.

Table 1. *Achatina fulica* snails collected in Vargem Pequena neighborhood, Rio de Janeiro City, RJ, Brazil. Number of collected, tested, and infected snails found in each locality are presented. Prevalences estimated for each locality are also shown.

Locality	Snails (number)			Prevalence
	Collected	Tested	Infected	
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	5	4	0	0
13	15	14	0	0
14	55	42	3	7
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	0	0	0	0
19	0	0	0	0
20	0	0	0	0
21	0	0	0	0
22	3	2	0	0
TOTAL	78	62	3	4.8

There is a great population of children in this community, mostly due to the presence of a public elementary school. Thus, the present results are even more significant considering that children can be in close contact with snails. In addition, snails were mostly observed in the agricultural parts of the residential complex. Thus, plant farmers as well as consumers have been instructed on how to handle and discard *A. fulica* snails properly (4).

The taxonomical identification of the nematodes found remains unknown considering that only larvae were recovered. The lack of a sheath as well as the occurrence of an oxyuroid esophagus clearly indicates that both forms belong to class Rhabditea (1). Additional studies are strongly recommended to identify the nematode species found.

The present results encourage further studies aiming to a better assessment of the role of *A. fulica* as an intermediate host of native parasitic nematodes. Such studies would provide relevant information on the potential risks of *A. fulica* transmitting diseases for the local community.



B

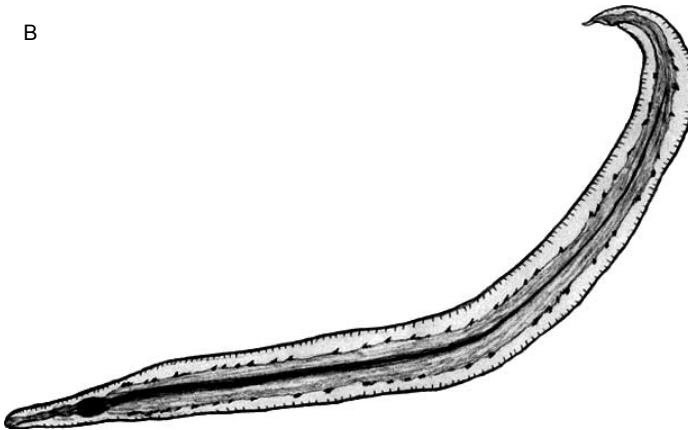


Figure 2. Nematode larva recovered from *Achatina fulica* snail collected in locality 14 in Vargem Pequena neighborhood, Rio de Janeiro City, Brazil. A. Unsheathed third-stage larva, with oxyuroid esophagus (S), striated cuticle (C), and undulating tail (U) (scale=50µm). B. Line drawing of unsheathed third-stage larva.



Figure 3. Nematode larva recovered from *Achatina fulica* snail collected in locality 14 in Vargem Pequena neighborhood, Rio de Janeiro City, Brazil. A. Unsheathed larva, with oxyuroid esophagus (S), esophago-intestinal valve (EIV), and intestinal valve (IV) (scale=50µm). B. Line drawing of unsheathed larva.

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RESUMO

Ocorrência de larvas de nematódeos em caramujos *Achatina fulica* Bowdich, 1822 (Gastropoda: Achatinidae) em Vargem Pequena, Rio de Janeiro, Brasil

Este artigo relata a ocorrência de larvas de nematódeos no caramujo gigante africano *Achatina fulica* na cidade do Rio de Janeiro, RJ, Brasil. Entre agosto e dezembro de 2005, foram coletados 78 caramujos em 4 de 22 localidades do bairro de Vargem Pequena. Em uma dessas localidades (Conjunto Habitacional Novo Horizonte), foram identificadas duas formas larvais de nematódeos sem bainha e com esôfago oxiuriforme. A forma grande e robusta era uma larva de terceiro estágio, com cutícula estriada e cauda curta e ondulada. A forma pequena e delgada exibia as valvas esôfago-intestinal e intestinal. A prevalência de larvas de nematódeos nos

caramujos *Achatina fulica*, no bairro de Vargem Pequena, foi de 4,8%. Recomenda-se a realização de estudos adicionais que possibilitem identificar a espécie de nematódeo encontrada e avaliar se ela representa risco para a saúde pública.

DESCRITORES: *Achatina fulica*. Nematoda. Vargem Pequena. Rio de Janeiro.

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