

**Strongylides in Achatina (Lissachatina) fulica (Mollusca, Achatinidae) in  
Havana, Cuba**

Strongylides in Achatina (*Lissachatina*) fulica (*Mollusca, Achatinidae*) in  
Havana, Cuba

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**ABSTRACT**

*Achatina* (*Lissachatina*) *fulica* was introduced in Cuba in 2014 for african religious purposes and nowadays, mainly by human activity, it is widespread all over the country and, where besides a general nuisance for people it is a pest and also a public health concern, since it is one of the natural intermediate host of *Angiostrongylus cantonensis*, ethiological agent of the meningoencephalitis. As in Havana is experiencing the explosive phase of the invasion, LABCEL has been receiving samples of these molluscs for

identification and search for *Angiostrongylus cantonensis* larvae. While examining samples of *A. fulica* different larvae were obtained, as strongylides found in the interior of the pallial cavity of *A. fulica*. This is the first report in San Miguel del Padrón and Regla municipalities of the development of larvae in *A. Fulica* evidencing the health importance of this mollusc in the potential transmission of eosinophilic meningoencephalitis. Since the spread of *A. fulica* is pointed out in the literature as one of the main causative spread of the meningoencephalitis caused by *A. cantonensis* the authors emphasize the need of sanitary vigilance of snails and rats from vulnerable areas for *A. cantonensis* introduction as the port side areas like these municipalities.

**Keywords:** strongylides; *Angiostrongylus cantonensis*; *Achatina fulica*; Invasive molluscs; Havana; Regla; San Miguel del Padrón.

## **RESUMEN**

*Achatina (Lissachatina) fulica* se introdujo en Cuba en 2014 con fines religiosos africanos y hoy en día, principalmente por actividad humana, está muy extendida en todo el país y, además de una molestia general para las personas, es una plaga y también un problema de salud pública, ya que es uno de los huéspedes intermedios naturales de *Angiostrongylus cantonensis*, agente etiológico de la meningoencefalitis. Como en La Habana está experimentando la fase explosiva de la invasión, LABCEL ha estado recibiendo muestras de estos moluscos para su identificación y búsqueda de larvas de *Angiostrongylus cantonensis*. Mientras se examinaban muestras de *A. fulica*, se obtuvieron diferentes larvas, como strongylides encontrados en el interior de la cavidad paliar de *A. fulica*. Este es el primer informe en los municipios de San Miguel del Padrón y Regla sobre el desarrollo de larvas en *A. Fulica* evidenciando La importancia para la salud de este molusco en la transmisión potencial de la meningoencefalitis eosinofílica. Dado que la propagación de *A. fulica* se señala en la literatura como una de las principales causas de la meningoencefalitis causada por *A. cantonensis*, los autores enfatizan la necesidad de vigilancia sanitaria de caracoles y ratas de áreas vulnerables para la introducción de *A. cantonensis* como zonas de babor como estos municipios.

**Palabras clave:** strongylydes; *Angiostrongylus cantonensis*; *Achatina fulica*; Moluscos invasores; La Habana; Regla; San Miguel del Padrón.

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## **Introduction**

The Giant African snail, *Achatina fulica* Bowdich, 1822 has been introduced throughout the tropics and subtropics and has been considered the most important snail pest in the world. In Cuba it has been introduced in 2014 for African religious purposes.<sup>(1)</sup> Nowadays, mainly by human activity, *A. fulica* is widespread all over the country, where it is a pest in ornamental gardens, vegetable gardens, and small-scale agriculture.<sup>(2)</sup>

*Achatina fulica* is also a public health concern since it is intermediate host of the *Metastrongyloidea* nematode *Angiostrongylus cantonensis* (Chen, 1935), which causes eosinophilic meningoencephalitis in humans, notable cases having been reported in Cuba since 1981.<sup>(3,4)</sup>

*Angiostrongylus cantonensis* normally resides in rat lungs where it lays eggs in pulmonary arteries. Larvae subsequently hatch and migrate via the trachea and gastrointestinal tract into rat feces. First stage larvae are consumed by snails and slugs, then develop eventually into infectious third stage larvae, often in extremely high numbers. Rats and humans become infected by eating infected snails or contaminated uncooked vegetables. In man, many larvae migrate to the brain where they cause abscesses, brain swelling, and hemorrhage.<sup>(5)</sup>

Additionally, worms can travel to the spinal cord where they also eventually die and degenerates. Since Havana is currently experiencing the explosive phase of the invasion with big specimens of *A. fulica* occurring in dense populations in urban areas, LABCEL (Laboratorio Central de Líquido Cefalorraquídeo) has been examining samples of *A. fulica* sent by the medical students Map of Havana showing the municipalities with samples of

*Achatina fulica* examined for *Metastrongylidae* larvae in order to determine the health risks for human population and for other implications. While examining those samples nematode larvae were obtained and morphological and morphometric analyses were performed. This is the first report of the development of *A. cantonensis* infective larvae from several localities in Havana, found in the interior of the pallial cavity of *A. fulica* evidencing the human importance of this mollusc in the potential transmission of *A. cantonensis*.

## Methods

The technique of Lobato-Paraense modified under the laboratory conditions was used for the examination of 20 specimens of *A. fulica* received in Laboratorio Central de Líquido Cefalorraquídeo (LABCEL) in August 2019. It were examined from Regla and San Miguel municipalities ([Fig. 1](#))



1 and 2: zones from Regla municipality  
3: zone from San Miguel del Padrón municipality.

**Fig. 1.** Geographical localization of snails collection.

### **The cephalopodal mass of *A. fulica* specimens were individually extracted**

The viscera and the pallial organs of the molluscs were placed in Petri dishes with saline solution (NaCl 0,9 %). Some parts of the pallial membrane was cotted and placed on microscope slides and was observed in *Carl Zeiss* light microscopy as well as the sediment collected from the bottom of the assay tubes, were examined under microscope for

helminth larvae. For light microscopy collected larvae were washed twice and examined under an *Carl Zeiss* light microscope. The morphometric analyses were made under a Zeiss Standard microscope with the aid of a phone camera. Larvae movements were recorded in an mp4 format using a mobile camera. Representative specimens of strongylides larvae were collected in the digital helminthological collection of LABCEL.

## **Results**

From 20 specimens of *A. fulica* examined, 10 belongs for each municipality. Five were infected with strongylides from Regla Municipality (50 %), and 3 (30 %) with strongylides from San Miguel Municipality. In [figure 2](#) appears an strongylide encapsulated in the palliar membrane of *L. fulica* snail.



**Fig. 2.** L3 Encapsulated strongylides in pallial membrane of *L. fulica*.

The morphological parameters of the third larval stages ( L3) are shown in [Fig. 3](#). The form and structure of strongylides of *A. cantonensis* larvae were compared to those obtained by *Martini L* in 2016 from Ecuador. <sup>(5)</sup> Characteristics movements of *A. cantonensis* larvae can be observed in the following [video](#).

**Third stage (L3) larva. Notice its characteristic movements**

In adult's snails, that was differentiated by its higher size and for its less intensive color of their shells was the ones with more positive larvae recovery. It is due because *L. fulica* was collected from open air garbage deposits where the rats and their feces have more chance to infect snails.

### **Discussion**

The recent introduction of *A. fulica* in Cuba must be regarded with caution by health authorities. The human activities in addition to its high reproductive capacity and lack of natural pathogens have led to rapid dispersal even among distant regions including the Cuban eastern provinces. The present study registered the strongylides of *A. cantonensis* in this mollusc indicating also its potential as health damage for humans.

*A. fulica* can also become intermediate hosts of parasites of wild animals becoming a risk for the wild fauna biodiversity. In addition, the large numbers of this mollusc in areas of variable human population densities, i.e., faraway and urban populations, increase the changes of emergent zoonoses.

Considering all those aspects, we emphasize the need for further investigations of the potential intermediate host capacity of this mollusc for Cuban endemic parasite like *A. cantonensis* of human interest besides the sanitary vigilance of snails and rats from vulnerable areas for *A. cantonensis* introduction as the port and airport side areas.

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### **Conflict of interests**

There is no conflict of interest in relation to the research presented.