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# *NECTOMYS SQUAMIPES* (RODENTIA: CRICETIDAE) AS AN EXPERIMENTAL MODEL FOR SCHISTOSOMIASIS MANSONI

VALÉRIA AGUIAR MELLO DE SOUZA; ROSÂNGELA RODRIGUES E SILVA; ARNALDO MALDONADO JR.; JOSÉ ROBERTO MACHADO E SILVA* & LUIS REY

Departamento de Biologia, Instituto Oswaldo Cruz, Av. Brasil, 4365, 21045-900 Rio de Janeiro, RJ, Brasil
*Departamento de Patologia e Laboratórios, Universidade do Estado do Rio de Janeiro,
Rua Teodoro da Silva, 48 – 5º, 20560-001 Rio de Janeiro, RJ, Brasil

*Twenty specimens of* Nectomys squamipes *born in captivity, were infected with 500 cercariae by the transcutaneous route. Coprologic examinations were carried out from the 5th to 23rd week after infection. On the 7th, 8th, 12th, 16th, and 23rd weeks the animals were sacrificed and perfused. The oogram was performed in segments of the small intestine (proximal, medial and distal portions) and the large intestine.*

*The average pre-patent period was of 42 days. The average number of eggs varied from 350 on the 6th week, to 800 on the 13th.*

*From the 14th week on, the average number of eggs eliminated was lower than 50 per gram of feces. The recovery of worms kept steady on the 7th, 8th and 12th week (16.85%; 15.45% and 11.95%), decreasing to 7.70% on the 16th week and 8.45% on the 23rd week.*

*The proportion of male/female worms was about the same on the first two weeks, but from the 12th week on, the proportion was: 1,4/1 on the 12th week; 2,5/1 on the 16th week and 1,8/1 on the 23rd week.*

*These observations suggest that* N. squamipes *may be used as an experimental model for schistosomiasis mansoni, to which it develops resistance mechanism, useful for immunity studies..*

Key words: *Nectomys squamipes* – *Schistosoma mansoni* – wild rodents – experimental model

The employment of experimental models has contributed to the better understanding of factors involved on the pathogenesis of schistosomiasis mansoni.

Mice, hamsters, albino rats and rabbits are among the most used laboratory animals (Stirewalt et al., 1951; Warren & Peters, 1967). However, the use of these animals as experimental models for schistosomiasis is not always satisfactory, since under certain aspects they don't reflect the situations occuring in nature (Silva, 1984).

Wild rodents presenting natural infection by *Schistosoma mansoni*, in some regions, have been remembered as candidates to develop experimental models less artificial than the used at present (Bastos et al., 1984; Campos et al., 1984). Among these, *Nectomys squamipes* must be pointed out as rodent of semi-aquatic habits in endemic areas where it takes part in schistosomiasis transmission (Carvalho, 1982; Rodrigues-Silva, 1989). It is highly susceptible to experimental infection (Rodrigues-Silva, 1989) developing lesions similar to those observed in the mouse and eliminating viable eggs in stools.

Under captivity conditions, it does not need much space, reproduces easily and is easy to care and handle (D'Andrea et al., 1991).

The *Nectomys* has about the same weight of an albine rat, is not agressive when bred in the laboratory (D'Andrea et al., 1991), being

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however highly susceptible to schistosomotic infection.

This work aims to study some aspects of *S. mansoni* biology in this rodent host, in order to evaluate its usefulness as an experimental model for laboratory investigations on schistosomiasis.

## MATERIALS AND METHODS

*Methodology for the study of infection* – Twenty specimens of *N. squamipes* of both sexes, born in captivity, were used, each weighing around 166 and 384 g. Each animal received 500 cercariae from BH strain of *S. mansoni,* by the transcutaneous route, dipping their footpads into a cercarial suspension.

Coprologic examinations by the Kato modified technique (Katz et al., 1972) were carried out every two days, from the 5th to the 23rd weeks after infection.

On the 7th, 8th, 12th, 16th and 23rd weeks batches of animals were sacrificed with sulphuric ether and perfused (Smithers & Terry, 1965).

The intestine was divided into four segments: proximal portion of the small intestine (next to the stomach), medial portion, distal portion and large intestine, where samples of 2,0 cm length were taken for oogram performance.

*Statystical analysis* – The data obtained in the oogram were submitted to statystical treatment by the Kruskal-Wallis method values of $p \leq 0,05$ were considered significantly different (Siegel, 1975).

## RESULTS

The average prepatent period was of 42 days. The average number of eliminated eggs varied from 350 on the 6th week, to 800 eggs on the 13th week. From the 14th week on, the average number of eliminated eggs decreased (Fig. 1).

The recovery of adult male and female worms was kept steady on the 7th, 8th and 12th week. From there on there was a considerable decreased on the 16th and 23rd weeks, mainly concerning female worms.

Consequently the proportion of males to females which was about the same on the two former weeks, modified on the 12th week for 1,4/1; on the 16th week for 2,1/1 and on the 23rd week for 1,8/1.

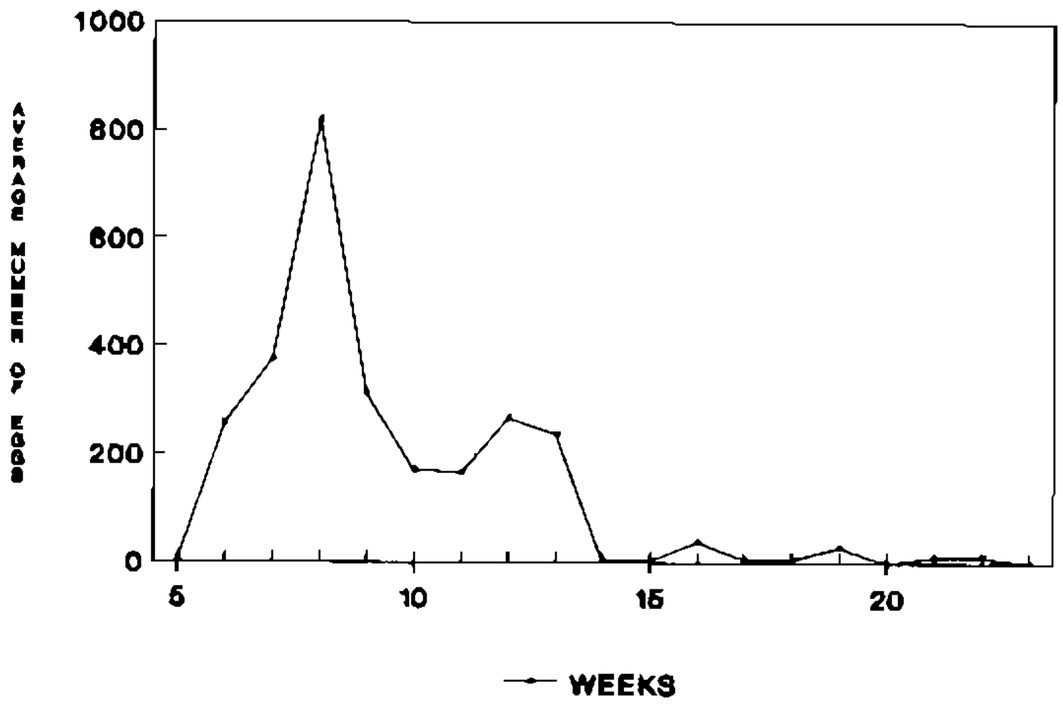


Fig. 1: experimental infection of *Nectomys squamipes* by *Schistosoma mansoni* (BH strain). Average number of eggs (Kato-Katz method) according to infection period (weeks).

TABLE

Experimental infection of *Nectomys aquamipes* by *Schistosoma mansoni.* Quatification of the number of eggs (oogram) in percentage on the proximal, medial and distal portions of small intestine, as well as large intestine, according to period of infection

| Week | Intestine | | | |
|---|---|---|---|---|
| | Small | | | Large |
| | Proximal | Medial | Distal | |
| 7 | 11,48 | 11,13 | 13,33 | 22,60 |
| 8 | 25,89 | 21,12 | 18,29 | 25,90 |
| 12 | 9,12 | 15,65 | 24,68 | 18,10 |
| 16 | 22,31 | 33,31 | 32,68 | 25,83 |
| 23 | 31,14 | 18,57 | 11,00 | 7,54 |

Through the oogram we have seen a slightly greater concentration of eggs on the medial and distal portions of the small intestine and on the large intestine (Table). However, significant differences have not been found statystically, among the total number of eggs counted on the different intestinal segments.

Each of the segments throughout the period also did not present significant differences concerning egg counting, up to the last week of observation (23rd week).

## DISCUSSION

For an animal to be considered suitable for experimentation on schistosomiasis, it must

have some of the following characteristics: (1) size, anatomic structure and handling should ease laboratory work; (2) eliminate mature eggs in stools, since the pre-patent period and development of the worms must be known and the same as those usually found in susceptible hosts (Brener, 1959); (3) the infection must be lengthy and worms must have relatively long life (Warren, 1964).

*Nectomys squamipes* is a medium-sized rodent which reproduces efficiently in the laboratory (D'Andrea et al., 1991), developing schistosomal infection (pre-patent period, longevity of worms, eggs distribution on intestinal segments) in a similar way as observed in classical models (Stirewalt et al., 1951) with the advantage of being one of this parasite's natural host.

The shortest recovery of adult worms (Fig. 2) was the only difference observed between the data obtained and those quoted for other susceptible hosts (Warren & Peters, 1967; Campos et al., 1984).

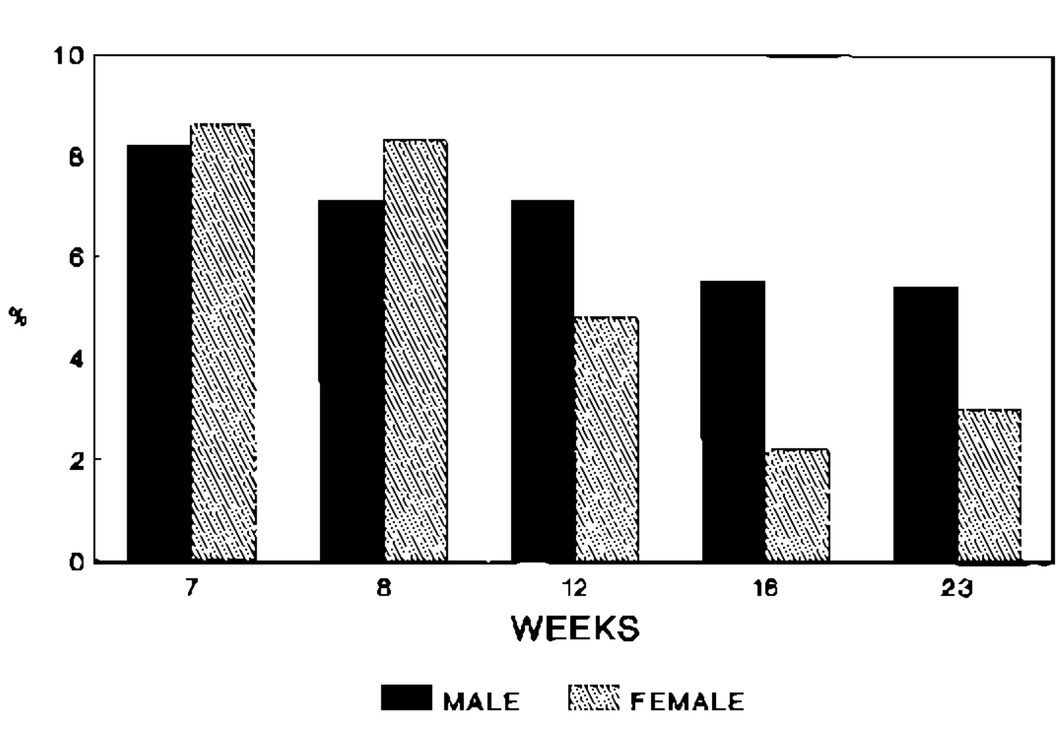


Fig. 2: experimental infection of *Nectomys squamipes* by *Schistosoma mansoni* (BH strain). Percentage of worm recovery according to period of infection (weeks).

As in rats (Phillips et al., 1975), it is likely that larval forms may be destroyed more intensively on the skin and/or lungs than mice or hamsters.

However, the worm population which is beyond the initial barriers, keeps steady for long periods (12 weeks), with later decrease among the female worms (Maldonado Jr. et al., 1989).

It is then concluded that *N. squamipes* may be indicated as an alternative experimental model for schistosomiasis.

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