

THE CROWDING EFFECT IN *SCHISTOSOMA MANSONI* INFECTION OF HAMSTERS: INFLUENCE ON WORM SIZE

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SUMMARY

Studies were carried out to evaluate the influence of the magnitude of worm population (crowding) on the worm size in schistosomiasis mansoni. It was found that female size decrease significantly ($p < 0.05$) in relation to an increase in worm population.

INTRODUCTION

A crowding effect resulting in a decrease of egg production was demonstrated by MCCOY⁷ and KRUPP⁶ in infections with *Ancylostoma caninum* and by HILL³ and PESSÔA & PASCALE¹⁰ in infection with *Necator americanus*. A similar phenomenon was noted by READ¹¹ in infections with *Hymenolepis diminuta*.

Recent work by GUIMARÃES et al.² in cattle infected with nematodes of the genera *Cooperia*, *Trichostrongylus*, *Haemonchus*, and *Oesophagostomum* suggested that the size of worm burden affects the rate of oviposition of these parasites. Crowding effect in human helminthiasis has been discussed by PESSÔA & MARTINS⁹.

Several papers have been published on egg laying in *Schistosoma mansoni*, but a few Authors tried to correlate worm burden with worm size and egg output. The crowding phenomenon as related to egg-laying was tentatively studied by KLOETZEL⁵ in 4 groups of mice experimentally infected with different numbers of cercariae. However, the statistical analysis of his data did not

shown any effect due to crowding. On the other hand, the data presented by KOURA⁴ are suggestive that crowding affects oviposition of *S. mansoni*. In recent work BRUCKNER & SCHILLER¹ working with two strains of *S. mansoni* showed in both strains that an increase in worm density results in a decrease of weight only in relation of male worms.

In the present paper it was demonstrated that an increase in worm burden produce a decrease of the female size. This finding may well be considered as an expression of the "crowding effect".

MATERIAL AND METHODS

Cercariae of *S. mansoni* (L.E. strain) were obtained from *Biomphalaria glabrata* (B.H. strain) reared and infected in the laboratory. Three groups of 10 adult hamsters were infected intraperitoneally with 40, 80, and 160 cercariae. Fifty days after infection the animals were sacrificed and their liver and mesenteric veins perfused to collect the worms according to PELLEGRINO

This work was supported, in part, by the "Conselho Nacional de Pesquisas", "Fundação de Amparo à Pesquisa Parasitológica", and World Health Organization, Geneva, Switzerland.

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Contribution number 77 from the Schistosomiasis Research Unit.

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& SIQUEIRA⁸. The worms were collected in Bouin's fixative and the size of each individual schistosome was measured. For the statistical analysis the test of Spearman (SNEDECOR¹²) was used.

RESULTS AND COMMENTS

The average size of the female schistosome was significantly smaller when the worm burden was high (Fig. 1). Twenty-four hamsters with the worm population ranging from 10 to 101 worms per animal were used. The Spearman Test was statistically significant at the level of $p < 0.05$ ($r = 0.462$) showing that an increase in worm density result in a decrease in worm female size. It is interesting to note that a high worm burden did not affect the average size of the male schistosomes in the same population (the relation male/female was 1.37).

The result obtained was in sharp contrast to those obtained by BRUCKNER & SCHILLER¹ that found the crowding affecting only the males (evaluation by weight of the worms) in 2 out of 4 strains of *S. mansoni*. This discrepancy could be explained by a possible difference of strains and the vertebrate host

used: mice by BRUCKNER & SCHILLER¹ and hamsters in the present study.

RESUMO

O efeito de densidade populacional em hamsters experimentalmente infectados com Schistosoma mansoni: influência no comprimento dos vermes

Estudos foram realizados com hamsters experimentalmente infectados com *S. mansoni* no sentido de avaliar a densidade populacional dos parasitos influenciando no tamanho (comprimento) alcançado pelos vermes. Verificou-se que o comprimento das fêmeas diminui de maneira estatisticamente significativo ($p < 0,05$) em função do aumento da população de vermes.

ACKNOWLEDGEMENT

The Authors would like to express their gratitude to Prof. Miguel Alphonsus de Guimaraens Chquiloff for his kind collaboration in the statistical analysis of the data obtained in this study, as well as to Prof. Fausto Gonçalves de Araújo and Prof. J. Pellegrino for their valuable suggestions.

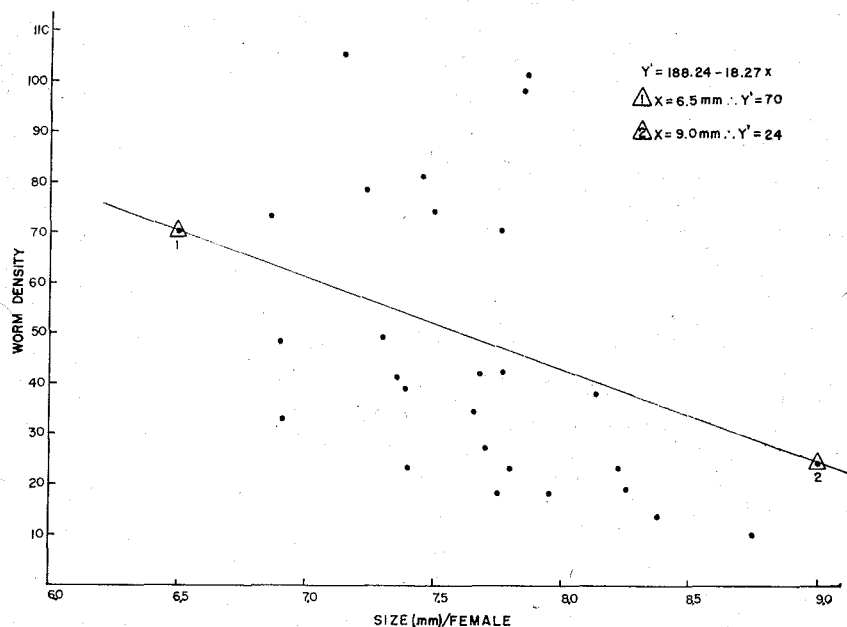


Fig. 1 — Relation between worm density and female size

COELHO, P. M. Z.; SOUZA, R. C. A.; BREDT, A. & SOUZA-NETO, J. A. — The crowding effect in *Schistosoma mansoni* infection of hamsters: Influence on worm size. *Rev. Inst. Med. trop. São Paulo* 18:440-442, 1976.

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Recebido para publicação em 18/8/1975.