

RESEARCH NOTE

Occurrence of *Biomphalaria tenagophila* and Disappearance of *Biomphalaria straminea* in Paracambi, RJ, Brazil

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Key words: *Biomphalaria tenagophila* - *Biomphalaria straminea* - schistosomiasis - competitive exclusion

The transmission of *Schistosoma mansoni* in different localities at the municipality of Paracambi, State of Rio de Janeiro, Brazil, appeared to implicate *Biomphalaria straminea* as the only intermediate host since the 70s, according to the records of the Fundação Nacional de Saúde (FNS). In March 1975, WL Paraense (1986 in *Modernos conhecimentos sobre esquistossomose mansônica*, Biblioteca da Academia Mineira de Medicina, 12 pp.) identified *B. straminea* in Paracambi, and the specimens were deposited in the Malacologic Collection of the Oswaldo Cruz Institute. However, following a more recent epidemiological study of schistosomiasis in Sabugo (MS Soares et al. 1995 *Mem Inst Oswaldo Cruz* 90: 451-458) initiated in January 1990, the exclusive presence of *B. tenagophila*, infected with *S. mansoni*, was reported. Consequently, the present study was undertaken to ascertain the distribution of potential snail hosts in the municipality.

The study, started in 1990, paid special attention to sites where *B. straminea* had been previously reported by the FNS and also to sites where cases of schistosomiasis had been reported. The snail breeding sites studied were located in: Centro, Sabugo, Vila Nova, Cascata, Boqueirão, Bairro da Fábrica, Quilombo, BNH, Jardim Nova Era, Lages, Guarajuba, and Cabral, and in the rural locations of Saudoso, São José, and Mutirão.

All the aquatic habitats in which the snail hosts might be present (rivers, streams, sewage ditches, domestic and collective water reservoirs, wells, dams and lakes) were examined at the studied locations. The number, size and localization of the collection sites were determined on the basis of habitats characteristics (size, depth, current, etc.) as well as the personnel available. The collections were made from monthly to 6-months intervals depending on the availability of resources (personnel, transportation, etc.) and of the presumed epidemiological importance of each habitat. The snails were collected using forceps, basins or sieves, depending on the type of breeding site.

In the laboratory, the snails were placed in vessels containing water and a mineral substrate (clay + CaCO₃), with photoperiod of 12hr light/12hr dark, and left there for 60 days, receiving fresh lettuce as food. During this period of time, tests of cercaria emission were performed by exposing the animals to artificial light at 5-day intervals to determine possible natural infection with *S. mansoni*. After this step, the snails were sacrificed, fixed in Railliet-Henry fluid modified for freshwater animals and dissected. Identification was based on taxonomic shell and internal morphology traits, with emphasis on the male and female reproductive systems (WL Paraense 1975 *Arq Mus Nac RJ* 55: 105-128).

All the planorbids collected in Paracambi from January 1990 to December 1995 were from the species *B. tenagophila* and were recorded in 10 of the 15 neighborhoods surveyed. *S. mansoni* positive snails were detected at Sabugo along Sabuguinho river, which feeds four domestic water reservoirs. A total of 2,120 snails were collected of which 5 were infected with *S. mansoni*. Infected snails were also found in another tributary of the same river system at a location situated 1.5 km from the junction with the main river. The catchment here was densely populated and the river was heavily polluted with domestic sewage from a large number of temporary dwellings. Of the 172 snails collected at this site, 3 were infected. Although schistosomiasis was prevalent and *B. tenagophila* was abundant in this area, no *S. mansoni*-positive snails were detected.

In Paracambi *B. tenagophila* occurs in varied habitats with lotic or lentic ecosystems. These include unpolluted clear or turbid streams or rivers, sewage ditches, rivers receiving untreated sewage, marshes, flood areas, irrigation canals for vegetable gardens, wells, two large dams that supply two textile industries, and domestic and public water reservoirs.

The occurrence of snails in the study area was found to be intimately related to human activity,

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Received 9 May 1996

Accepted 25 October 1996

with the breeding sites being most frequently formed as a consequence of environmental changes such as supply canals, water reservoirs for consumption and leisure, wells, and sewage ditches. The snails were also found in the head-waters of two streams in Nova Era and Mutirão, similar to those described as primitive habitats (JR Freitas 1976 *Ci Cultura* 28: 212-217).

Dams are particularly important in Paracambi as reservoirs for the maintenance of planorbid colonies due to their location in the hydrographic network upstream of other breeding sites.

One species may appear in or disappear from a given habitat due to changes in a number of biotic or abiotic factors, such as climate, predation, competition and anthropogenic perturbations (JD Thomas 1995 *Mem Inst Oswaldo Cruz* 90: 195-204).

It has been often claimed that molluscs acting as intermediate hosts of *S. mansoni* are excluded from certain habitats as a result of competition by other molluscs. Thus, WL Paraense (1970 In AS Cunha, *Esquistossomose mansoni*, Sarvier & Univ. São Paulo, São Paulo) claimed that *B. tenagophila*, an autochthonous species in Manguinhos, RJ, Brazil, was excluded by *B. glabrata*, which was accidentally introduced in 1917. This author did not report any example of coexistence of *B. straminea* and *B. tenagophila* and suggested that competitive exclusion should be considered as one of the factors possibly influencing the distribution of these species. FS Barbosa et al. (1981 *Mem Inst Oswaldo Cruz* 78: 361-363) showed competitive displacement of *B. glabrata* by *B. straminea* in two municipalities in the State of Pernambuco, Brazil. In studies conducted in Belo Horizonte and Lagoa

Santa, State of Minas Gerais, JR Freitas and MBL Santos (1995 *Mem Inst Oswaldo Cruz* 90: 261-269) observed interactions between two or more molluscan species in contrasting habitats, and interpreted the results as showing competitive exclusion in some locations and coexistence of the same two species in others for many years.

Several investigators claim that *B. straminea* has a competitive advantage over *B. glabrata*. Thus, EH Michelson and L Dubois (1979 *Rev Inst Med Trop São Paulo* 21: 246-253) postulated that interspecific crowding reduces the fecundity of *B. glabrata* and benefits that of *B. straminea*, FS Barbosa et al. (1984 *Mem Inst Oswaldo Cruz* 79: 163-167) attributed the competitive superiority of *B. straminea* under seminatural conditions over *B. glabrata* to its greater capacity for dispersal and vagility.

Although no reports are available about the replacement of *B. straminea* by *B. tenagophila*, it is possible that such a process had occurred in Paracambi. However caution is needed in attributing the disappearance of a molluscan species to interspecies competition by another. Other factors that must be considered include changes in water chemistry, predation and parasitism. It is possible that one species may be less resistant to toxins, including pesticides, as well as microparasites. Therefore, the hypothesis which is advanced in this paper must be confirmed by laboratory and field experiments.

Acknowledgments: to Drs WL Paraense and to LR Correa for confirming the taxonomic identification and for a critical reading of the text.