

## UNSUSCEPTIBILITY OF *BIOMPHALARIA OCCIDENTALIS* TO INFECTION WITH A STRAIN OF *SCHISTOSOMA MANSONI*

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*Susceptibility experiments with 1582 specimens of Biomphalaria occidentalis, 3–6 mm in shell diameter, from 10 localities of the states of Mato Grosso, Mato Grosso do Sul, Paraná and São Paulo, exposed individually to 5 miracidia of Schistosoma mansoni (SJ2 strain), gave negative results. B. tenagophila from Joinville (Santa Catarina) and Taubaté (São Paulo), used as controls, showed infection rates of 17.9% and 14.8%, respectively.*

*Experiments with other strains of S. mansoni are in progress. If the present results are confirmed, expansion of schistosomiasis toward far-western Brazil through the agency of B. occidentalis becomes less probable.*

*Biomphalaria occidentalis* is a newly described species of planorbid snail that has been found over a large area of western Brazil roughly between 8°S, in the Acre state, and 25°S, in the Paraná state (Paraense, 1981). It is indistinguishable from *B. tenagophila* (Orbigny, 1835) by the characteristics of the shell and of most organs of the genital system, so that a number of records of the last-mentioned species in the states of Mato Grosso, Mato Grosso do Sul, western São Paulo and western Paraná, as well as in eastern Paraguay, really refer to *B. occidentalis*.

The geographical distribution of this planorbid species having been outlined (Paraense, 1981, Fig. 14), the practical question of its possible role as vector of schistosomiasis immediately arises.

The experiments described in this paper are intended to test the susceptibility of *B. occidentalis* to a strain of *S. mansoni* isolated from specimens of *B. tenagophila* collected at São José dos Campos, state of São Paulo, in April 1980. Although originated from the same breeding place where a former strain — referred to as SJC strain by Paraense &

Corrêa (1963), or SJ strain in subsequent papers – had been isolated in 1962, the present one shows some differences in comparison with the preceding one, and therefore is named SJ2.

## MATERIAL AND METHODS

F<sub>1</sub> laboratory-reared snails, descended from specimens collected at 10 localities in the range of *B. occidentalis*, were individually exposed each to 5 miracidia of the SJ2 schistosome strain, maintained by passages through Swiss albino mice and *B. tenagophila* from São José dos Campos (SJ2 snail strain). Exposure to miracidia and subsequent dealing with the snails followed the procedure described in preceding papers (e.g., Paraense & Corrêa, 1978). The exposed snails were observed at least 4 times daily. If any specimen happened to die, it was dissected and examined for developing stages of the schistosome. In this way not a single dead snail was left undissected. The specimens that survived for 60 days were dissected and examined. The experiments were carried out under controlled temperature at 26°–28°C.

Specimens of *B. tenagophila* from two localities were used as controls.

## RESULTS

As shown in Table I, all specimens of *B. occidentalis* proved unsusceptible to infection with the SJ2 strain of *S. mansoni*. On the other hand, *B. tenagophila* from Joinville and Taubaté showed infection rates of 17.9% and 14.8%, respectively.

TABLE I

Susceptibility experiments with *Biomphalaria occidentalis*, 3-6 mm in shell diameter, exposed to infection with *Schistosoma mansoni* from São José dos Campos (SJ2 strain), 5 miracidia per snail. Abbreviations of Brazilian states: MS = Mato Grosso do Sul; MT = Mato Grosso; PR = Paraná; SC = Santa Catarina; SP = São Paulo

Origin of snails	Nº exposed	Dead specimens* (Days after exposure)	Specimens shedding cercariae (Days after exposure)	Survivors dissected on 60th day	% Infected
Aquidauana, MS	124	1(21)+1(40)+1(48)+1(54)+1(57)	0	119	0
Bela Vista, MS	168	1(28)+1(29)+1(33)+1(35)+1(36)+1(49)	0	162	0
Cáceres, MT	159	1(17)+1(23)+1(34)	0	156	0
Campo Grande, MS	137	1(28)+1(31)+1(45)+1(52)+1(57)	0	132	0
Cuiabá, MT	130	1(42)+1(48)+1(53)+1(59)	0	126	0
Dracena, SP	160	1(18)+1(38)+1(47)	0	157	0
Guaíra, PR	300	1(18)+2(29)+1(34)+1(41)+1(52)+2(54)	0	292	0
Miranda, MS	142	1(37)+1(44)	0	140	0
Pontes e Lacerda, MT	150	1(20)+1(30)+1(35)+1(41)+1(56)	0	145	0
Rio Brilhante, MS	112	1(18)+1(42)+1(51)	0	109	0
Controls:					
Joinville, SC					
<i>B. tenagophila</i>	117	1(35)+2(36)+1(43)+2(49)	15(28)+3(30)+2(35)+1(40)	90	17.9
Taubaté, SP					
<i>B. tenagophila</i>	108	1(20)+2(26)+1(32)+1(39)+2(42)+2(49)+1(52)+1(57)	9(28)+3(30)+4(35)	81	14.8

\* All negative.

## DISCUSSION

In a previous study involving samples of 20 *B. tenagophila* populations (Paraense & Corrêa, 1978), it was observed that 5 of them, from Cuiabá (Mato Grosso), Ubá (Minas Gerais), Uraí (Paraná), Hormiguero (Argentina) and Paysandú (Uruguay), were unsusceptible to infection with *S. mansoni*. Later on, realizing the existence of *B. occidentalis* in

western Brazil, we dissected all specimens from those 5 localities preserved in our collection, identifying exclusively *B. occidentalis* at Cuiabá and *B. tenagophila* at the other localities. As these dissected snails were the remainder of the samples that furnished F<sub>1</sub> specimens for the susceptibility experiments, it may be concluded that the experimental snails from Cuiabá were really *B. occidentalis*.

Another point to be discussed is the record, in the above-mentioned experiments (Paraense & Corrêa, 1978), of a single infected specimen among 120 from Guaíra. In our collection all biomphalarias of 6 samples collected at that locality between November 1972 and September 1976 were labeled "*Biomphalaria tenagophila*". Again in this case they are really *B. occidentalis*. We were highly interested in searching Guaíra for *B. straminea*, recorded there by Lucena (1956) but not found by other authors (Lôbo & Luz, 1954; Lima & Luz, 1960; Lima, 1965). In January 1980 we surveyed once more that locality, and finally found *B. straminea*, together with *B. occidentalis*, *Drepanotrema lucidum*, physids and ampullariids, in a brook draining a swampy area called "mina" (spring) by local people, near the SUCAM office. Therefore, the probability cannot be discarded that the single infected specimen mentioned above would have been some unnoticed hatchling *B. straminea* collected together with *B. occidentalis* and then mistook for a narrow-shelled F<sub>1</sub> of the latter.

Susceptibility experiments with other strains of *S. mansoni* are in progress. If the present results are confirmed, expansion of schistosomiasis toward far-western Brazil through the agency of *B. occidentalis* becomes less probable. The occurrence of allochthonous cases of schistosomiasis has been revealed by surveys conducted in the area by the Superintendency of Public Health Campaigns (SUCAM), Ministry of Health. To our knowledge, however, only two autochthonous cases have been recorded in the area (Baruffa & Bettin, 1977), in natives of Rio Negro, Mato Grosso do Sul. Even if the unsusceptibility of *B. occidentalis* is confirmed with regard to other *S. mansoni* strains, the role of other potential vectors present in the area (*B. straminea*, *B. peregrina* and *B. amazonica*) should be investigated.

## RESUMO

Experiências de suscetibilidade com 1582 espécimes de *Biomphalaria occidentalis*, medindo 3-6mm de diâmetro, de 10 localidades dos Estados de Mato Grosso, Mato Grosso do Sul, Paraná e São Paulo, expostos individualmente a cinco miracídios de *Schistosoma mansoni* (cepa SJ2), deram resultados negativos. Como controles foram usados exemplares de *B. tenagophila* de Joinville (Santa Catarina) e Taubaté (São Paulo), que apresentaram índices de infecção de 17.9% e 14.8%, respectivamente.

Estão em andamento experiências com outras cepas de *S. mansoni*. Se os resultados atuais forem confirmados, torna-se menos provável uma contribuição da *B. occidentalis* para a expansão da xistosomose em direção ao extremo oeste do Brasil.

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