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SUSCEPTIBILITY OF *BIOMPHALARIA PEREGRINA* FROM BRAZIL AND ECUADOR TO TWO STRAINS OF *SCHISTOSOMA MANSONI*

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SUMMARY

Two populations of *Biomphalaria peregrina*, a planorbid snail widely distributed in South America, proved susceptible to infection with *Schistosoma mansoni*. A sample from Lapa, State of Paraná, Brazil, showed an infection rate of 45% after exposure of each snail to 20 miracidia of the BH strain. Nearly all infected specimens died during the incubation period with massive involvement of the internal organs, which was ascribed to the large number of infective miracidia. Two samples from Chillogallo, near Quito, Ecuador, were exposed to the BH and SJ strains (10 miracidia per snail) with resulting infection rates of 33% and 15%, respectively. Several characteristics, such as infection rate, incubation period, cercarial output and survival of infected snails, seem to indicate a higher degree of compatibility between the Chillogallo snails and the BH strain, as compared with the SJ strain.

INTRODUCTION

Biomphalaria peregrina is a planorbid species widely distributed in South America, east and west of the Andes, occurring at least over southern Brazil, Uruguay, Argentina, Chile and Ecuador (PARAENSE [2]).

In a previous experiment by PARAENSE & DESLANDES [3], the exposure of 150 specimens of *Australorbis inflexus* (a synonym of *B. peregrina*) from Pouso Alegre, Minas Gerais, to *Schistosoma mansoni* (10 miracidia per snail) was not followed by infection of any snail.

Additional experiments were later made with specimens descended from samples collected at Lapa, State of Paraná, Brazil, and Chillogallo, near Quito, Ecuador, the results of which are presented below.

MATERIAL AND METHODS

A total of 67 snails, belonging to the F_1 generation from wild specimens, and measuring 5 to 6 mm in shell diameter, were exposed to *S. mansoni* miracidia. Of those 67 snails, 20 belonged to the population from Lapa and 47 to that from Chillogallo. All the exposures were carried out in a period of four days, in June, 1965.

The 20 specimens from Lapa were exposed each to 20 miracidia of the BH strain. The 47 ones from Chillogallo were separated into two batches of 21 and 26 specimens, which were individually exposed to 10 miracidia of the BH and SJ strains, respectively.

Technical details concerning exposure and subsequent handling of the snails, and information about the origin of the parasite strains, are given elsewhere (see, for instance, CORRÊA & PARAENSE [1]).

RESULTS

Of the 20 snails from Lapa (Table I), 9 became infected and, of these, only 1 shed

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TABLE I

Results of exposure of 20 *Biomphalaria peregrina* from Lapa, Brazil, to the BH strain of *Schistosoma mansoni* (20 miracidia per snail)

Days after exposure	Exposed snails	Results (*)
14, 15	2	Negative
16, 21	2	PS in CM; SS migrating along PW
22	1	PS in CM
29, 30	2	SS in DG
32	1	Shed first cercariae (no. 1) (**)
33	1	PS in CM; SS in DG
36	1	PS in CM
38	1	SS in AG, DG, OT
60	9	Killed, negative
	20	Infection rate 45%

(*) AG albumen gland, CM cephalopodal mass, DG digestive gland, OT ovotestis, PS primary sporocysts, PW pulmonary wall, SS secondary sporocysts
(**) See Table III

cercariae on the 32nd and 33rd days after exposure, dying on the 34th day with massive infection of the internal organs. The other 8 infected specimens died during the incubation period.

The results concerning the snails from Chillogallo are shown in Table II. In the batch of 21 specimens exposed to the BH strain there were 7 infections, 5 of which with production of cercariae. In the batch of 26 specimens exposed to the SJ strain only 4 became infected, of which 3 produced cercariae.

The data relative to the cercariae-producing snails are shown in Table III.

DISCUSSION

So far there is no record of *B. peregrina* as an actual vector of *S. mansoni*. The above results show that at least some populations of this wide-spread species are preadapted to that role.

Owing to the negative attempts to infect the specimens from Pouso Alegre with 10 miracidia per snail (PARAENSE & DESLANDES [3]), twice as many miracidia were used in the experiment with the snails from Lapa,

TABLE II

Results of exposure of 47 *Biomphalaria peregrina* from Chillogallo, Ecuador, to the BH and SJ strains of *Schistosoma mansoni* (10 miracidia per snail)

Schistosome strain	Days after exposure	Exposed snails	Results (*)
BH	26	1	SS in DG
	35	1	Shed first cercariae (no. 2) (**)
	45	2	Shed first cercariae (nos. 3, 4) (**)
	50	1	Shed first cercariae (no. 5) (**)
	55	2	1 shed first cercariae (no. 6) (**); 1 negative
	59	1	SS in DG, OT
	70	13	Killed, negative
		21	Infection rate 33%
SJ	11-33	9	Negative
	33	1	SS in RR, DG, OT
	34	1	Negative
	35	2	Shed first cercariae (nos. 7, 8) (**)
	36	1	Shed first cercariae (no. 9) (**)
	70	12	Killed, negative
		26	Infection rate 15%

(*) DG digestive gland, OT ovotestis, RR renal ridge, SS secondary sporocysts
(**) See Table III

TABLE III

Shedding of cercariae and post-mortem findings in *Biomphalaria peregrina* infected with *Schistosoma mansoni*

Snail no. (*)	Period of cercarial output (days)	Total no. cercariae(**)	Mean daily no. cercariae	Post-mortem findings (***)
1	2	57	57	SS in AG, DG, OT
2	17	568	63	SS in PW, RR, DG, OT
3	30	405	25	SS in PW, RR, DG, OT
4	13	484	69	SS in PW, RR, DG, OT
5	2	26	26	SS in PW, RR, DG, OT
6	30	2,907	194	SS in PW, RR, AG, DG, OT
7	11	481	80	SS in CM, PW, RR, DG, OT
8	4	259	129	SS in CM, PW, DG, OT
9	9(****)	613	123	SS in PW, RR, DG, OT

(*) See Tables I and II

(**) Counts on alternate days

(***) AG albumen gland, CM cephalopodal mass, DG digestive gland, OT ovotestis, PW pulmonary wall, RR rectal ridge, SS secondary sporocysts

(****) No shedding from 10th to 21st (last) day

which were supposed to be insusceptible as well. Contrary to our expectation, however, there resulted so heavy infections that the susceptible snails died during the incubation period, with the only exception of a specimen that shed cercariae for two days and died on the 3rd day.

The development of the infections in the snails from Chillogallo, exposed to 10 miracidia, was somewhat dissimilar in the two groups. Although no generalization can be drawn from these results, owing to the small number of cercariae-producing snails, apparent differences have been observed in the following characteristics: infection rate — BH 33%, SJ 15%; mean incubation period — BH 46 days, SJ 35 days; mean number of cercariae shed by each group BH 878, SJ 451; mean survival, after exposure, of infected snails — BH 58 days, SJ 44 days; mean period of cercarial output — BH 18 days, SJ 8 days.

The above results show that *B. peregrina* from the studied populations of Lapa and Chillogallo are markedly susceptible to infection with the BH and SJ strains of *S. mansoni*. They also seem to indicate a higher degree of compatibility between the Chillogallo snails and the BH strain, as compared with the SJ strain. It is noteworthy that the snail no. 9 (from Chillogallo, infected with the SJ strain), which yielded an appreciable number of cercariae for 9 days, stopped shedding them for the 12 subsequent days and eventually died with abundant secondary sporocysts, including ripe ones, in the internal organs.

PARAENSE, W. L. & CORRÊA, L. R. — Susceptibility of *Biomphalaria peregrina* from Brazil and Ecuador to two strains of *Schistosoma mansoni*. *Rev. Inst. Med. trop. São Paulo* **15**:127-130, 1973.

RESUMO

Suscetibilidade da Biomphalaria peregrina *do Brasil e do Equador a duas cepas do* Schistosoma mansoni

Duas populações de *Biomphalaria peregrina*, planorbídeo amplamente distribuído na América do Sul, mostraram-se suscetíveis à infecção com *Schistosoma mansoni*.

Um lote de espécimes de Lapa, Estado do Paraná, Brasil, expostos individualmente a 20 miracídios da cepa BH, apresentou o índice de infecção de 45%. Quase todos os espécimes infetados morreram durante o período de incubação, com invasão maciça dos órgãos internos, fato este atribuído ao grande número de miracídios infetantes.

Dois lotes de Chillogallo, localidade próxima a Quito, Equador, foram expostos às cepas BH e SJ (10 miracídios por molusco), infetando-se nas proporções de 33% e 15%, respectivamente. Várias características, tais como índice de infecção, período de incubação, emissão de cercárias e sobrevivência dos moluscos infetados, parecem indicar um nível de maior compatibilidade entre os moluscos de Chillogallo e a cepa BH, em comparação com a cepa SJ.

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