Freshwater Snails and Schistosomiasis Mansoni in the State of Rio de Janeiro, Brazil: III - Baixadas Mesoregion

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In this paper, the third of a series dealing with the survey of freshwater gastropods of the state of Rio de Janeiro, the results of collections carried out in the Mesoregion Baixadas from 2000 to 2002 are presented. Twenty-two species, belonging to seven families, were found. As to the snail intermediate hosts of Schistosoma mansoni, *the most frequent species was* Biomphalaria tenagophila *besides some new findings of* Biomphalaria straminea. *No specimens were found harboring larval forms of* S. mansoni *although different kinds of cercariae had been observed.*

Key words: schistosomiasis mansoni - freshwater snails - cercariae - Rio de Janeiro - Brazil

Aiming to elaborate a chart of planorbids of the state of Rio de Janeiro, collections have been done by the authors since 1997. During the last two years, from March 2000 to May 2002, collecting was done in the following municipalities of the Baixadas Mesoregion: Casimiro de Abreu, Rio das Ostras and Silva Jardim (Microregion Bacia de São João); Araruama, Armação dos Búzios, Arraial do Cabo, Cabo Frio, Iguaba Grande, São Pedro da Aldeia and Saquarema (Microregion Lagos). This Mesoregion has nowadays 14 Units of Nature Conservation including Biological Reserves and Areas of Environmental Protection. Once seven out of the ten municipalities are located at the littoral, there are plenty of brackish waterbodies.

The freshwater snail species listed include specimens collected by the authors as well as those in the Collection of the Department of Malacology of Instituto Oswaldo Cruz. The distribution of the snail species of medical and veterinary importance, various kinds of cercariae and the number of schistosomiasis cases reported to this region during the last seven years are also presented.

MATERIALS AND METHODS

We have adopted the Brazilian Institute of Geography and Statistics (IBGE 1995) procedures in dividing the state of Rio de Janeiro into six Mesoregions and the Center of Information and Data of Rio de Janeiro (CIDE 2001) for the new municipalities.

The molluscs were collected from different suitable snail habitats from all 24 districts of the ten municipalities. Since at least three different habitats were investigated in each of the districts, an average of 79 samples was obtained. Live snails were exposed to artificial light at five-day intervals to determine possible infection with trematode larvae. Cercariae were fixed in 70% ethanol, stained with chlorhydric carmine, mounted in Canada balsam and subsequently identified according to Schell (1970).

The ten largest specimens of each mollusc sample were preserved in Railliet-Henry's fluid after relaxation in a 0.05% nembutal solution. Two were dissected under a stereomicroscope for identification purpose.

Samples of taxonomic importance were deposited at the Malacological and Helminthological Collections of Instituto Oswaldo Cruz.

The cases of schistosomiasis reported from 1996 to the first trimester of 2002 were obtained from the National Health Foundation (Funasa).

RESULTS

Table I shows the localities where the 22 molluscan species were found: *Antillorbis nordestensis* (Lucena, 1954); *Biomphalaria schrammi* (Crosse, 1864); *Biomphalaria straminea* (Dunker, 1848); *Biomphalaria tenagophila* (d'Orbigny, 1835); *Burnupia* sp.; *Drepanotrema anatinum* (d'Orbigny, 1835); *Drepanotrema cimex* (Moricand, 1839); *Drepanotrema lucidum* (Pfeiffer, 1839); *Ferrissia* sp.; *Gundlachia ticaga* (Marcus & Marcus, 1962); *Heleobia australis australis* (d'Orbigny, 1835); *Heleobia bertoniana* (Pilsbry, 1911); *Heleobia parchappei* (d'Orbigny, 1835); *Heleobia* sp.; *Idiopyrgus souleyetianus* Pilsbry, 1911; *Lymnaea columella* Say, 1817; *Melanoides tuberculatus* (Müller, 1774); *Physa cubensis* Pfeiffer, 1839; *Physa marmorata* Guilding, 1828; *Pomacea* sp.; *Pomacea canaliculata* (Lamarck, 1822) and *Pomacea sordida* (Swainson, 1823).

The highest species richness occurred in Araruama (14 species), Rio das Ostras (13), and Silva Jardim (13). On the other hand, in Armação dos Búzios and Arraial do Cabo only three and two species were found, respectively.

Specimens of *B. tenagophila* and *P. marmorata* were found in all municipalities except Arraial do Cabo, where only hydrobiid specimens were collected.

Although many different kinds of cercariae had been observed (Table II), no specimens were found infected with *Schistosoma mansoni* Sambon, 1907 or *Fasciola hepatica* (Linné). Xiphidiocercariae were the most fre-

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TABLE I

List of species and localities where they were found in the Baixadas Mesoregion of the state of Rio de Janeiro

		Ampullariidae		Hydrobiidae			Thiaridae	Planorbidae						Physidae		Lymnaeidae	Ancylidae		
		Pomacea canaliculata	*Pomacea sordida*	*Pomacea* sp.	*Heleobia australis australis*	*Heleobia bertoniana*	*Heleobia parchappei*	*Heleobia* sp.	*Idiopyrgus soleyetianus*	*Melanoides tuberculatus*	*Antillorbis nordestensis*	*Biomphalaria schrammi*	*Biomphalaria straminea*	*Biomphalaria tenagophila*	*Drepanotrema anatinum*	*Drepanotrema cimex*	*Drepanotrema lucidum*	*Physa cubensis*	*Physa marmorata*	*Lymnaea columella*	*Burnupia* sp.	*Ferrissia* sp.	*Gundlachia ticaga*
Microregion Bacia de São João	Casimiro de Abreu																						
	Barra de São João		+											+		+			+	+			
	Casimiro de Abreu										+		+					+	+	+			+
	Prof. Souza		+												+								
	Rio Dourado		+												+								
	Rio das Ostras																						
	Rio das Ostras		•+		+						+	•+		•+	+	+	+		+	+			+
	Silva Jardim																						
	Correntezas		+									+		+	+	+	+		+				+
	Gaviões														+		+						+
	Quartéis		+								+		+		+		+		+				+
	Silva Jardim	+	+								+		+	+	+		+		+	+			+
Microregion Lagos	Araruama																						
	Araruama			+							+	+		+		+			+				
	Morro Grande	+	+									+		+			+		+				
	Praia Seca						+							+									
	São Vicente de Paula		+						+		+	+		+	+	+	+		+				
	Armação dos Búzios																						
	Armação dos Búzios													+		+			+				
	Arraial do Cabo																						
	Arraial do Cabo						+																
	Figueira						+		+														
	Monte Alto						+																
	Cabo Frio																						
	Cabo Frio										+			•+		•							
	Tamoios	+	+			+	+							+	+	+			+	+			
	Iguaba Grande																						
	Iguaba Grande								+				+	+		+			+				
	São Pedro da Aldeia																						
	São Pedro da Aldeia							+			+			+		+	+		+				
	Saquarema																						
	Bacaxá		+							+	+			+		+	+		+				
	Sampaio Correia										+			+		+			+	+			
	Saquarema		•									•+		•+		+•			+				

•: samples of the Collection of the Department of Malacology of Instituto Oswaldo Cruz.

TABLE II

List of types of cercariae and localities where they were found in the Baixadas Mesoregion of the state of Rio de Janeiro

Municipality	Trematode		Mollusc host		
	Larval stages	Possible family	Species	Infected	Total
Araruama	Echinostome cercaria	Echinostomatidae	*B. tenagophila*	16	196
	Echinostome cercaria	Echinostomatidae	*P. marmorata*	2	36
	Ornatae cercaria	Haplometridae or Macroderoididae	*A. nordestensis*	1	11
	Ornatae cercaria	Haplometridae or Macroderoididae	*P. marmorata*	1	36
	Xiphidiocercariae	-	*B. tenagophila*	31	114
	Xiphidiocercariae	-	*L. columella*	1	3
	Strigid cercaria	Strigeidae or Diplostomatidae	*D. cimex*	2	37
Arraial do Cabo	Pleurolophocercus cercaria	Opistorchiidae or Cryptogonimidae	*H. parchappei*	2	45
Iguaba Grande	Xiphidiocercariae	-	*B. tenagophila*	24	1111
	Pleurolophocercus cercaria	Opistorchiidae or Cryptogonimidae	*I. souleyetianus*	3	34
Rio das Ostras	Ornatae cercaria	Haplometridae or Macroderoididae	*L. columella*	5	17
	Ornatae cercaria	Haplometridae or Macroderoididae	*P. marmorata*	3	73
	Xiphidiocercariae	-	*B. tenagophila*	3	51
Saquarema	Xiphidiocercariae	-	*B. tenagophila*	3	130
	sporocyst	-	*B. tenagophila*	2	130
	rediae	-	*B. tenagophila*	1	130
São Pedro da	Echinostome cercaria	Echinostomatidae	*B. tenagophila*	2	7
Aldeia	Echinostome cercaria	Echinostomatidae	*D. cimex*	3	14
Silva Jardim	Xiphidiocercariae	-	*B. tenagophila*	1	1

quent type of trematode larvae.The major diversity of cercariae was found in Araruama, in the following species: *A. nordestensis, B. tenagophila, D. cimex*, *L. columella* and *P. marmorata*.

As in Mesoregion Baixadas no transmission sites for schistosomiasis had been reported, no specific parasitological surveys have been performed by Funasa. From 1996 to the first trimester of 2002 six cases of schistosomiasis were detected: Rio das Ostras (one in 2000; four in 2001) and São Pedro da Aldeia (one in 2001).

DISCUSSION

The present study extended the geographical distribution of *B. tenagophila* and *B. straminea*, natural vectors of schistosomiasis in Brazil. *Biomphalaria straminea* was previously recorded in 18 municipalities in the state of Rio de Janeiro (Paraense 1986, Thiengo et al. 1998, 2001, 2002) and the records for Casimiro de Abreu, Iguaba Grande and Silva Jardim are new. The distribution of those species as well as of *L. columella*, vector of fascioliasis, is shown in the Figure.

In relation to the non-vector planorbid species, *D. cimex* was the most common, followed by *A. nordestensis*. In the previously studied Mesoregions, e.g., Metropolitana (Thiengo et al. 2001) and Centro Fluminense (Thiengo et al. 2002) *D. anatinum* was the most frequent. The distribution of *A. nordestensis*, previously known in 18 municipalities in the state (Thiengo et al. 1998, 2001, 2002, Santos et al. 1999) is now extended to include Araruama, Cabo Frio, Casimiro de Abreu, Rio das Ostras, São Pedro da Aldeia, Saquarema and Silva Jardim.

Of the remaining pulmonate species, *P. marmorata* was found most frequently (9 districts), followed by *L. columella* (6 districts). In contrast to the wide distribution observed in the two other Mesoregions, *P. cubensis* was found only in Casimiro de Abreu.

The Afro-Asian thiarid *M. tuberculatus* was found only in Saquarema. On the contrary, it has a wide range in the Metropolitan perhaps owing to the major influence of anthropic action that has been taking place at that Mesoregion during the last years. The greatest number of hydrobiid species in that Mesoregion is probably due to favorable environmental conditions such as the occurrence of many brackish waterbodies, where most species were collected.

Concerning the ampullariids, *P. sordida* was the most frequent species. *Pomacea* sp. collected from Araruama is the same found in some municipalities of the Centro Fluminense Mesoregion. Further morphological studies are being undertaken on samples from both regions, to permit identification to species level.

Ferrissia, the most complex and probably the most widespread genus of Ancylidae, is now represented in Brazil only by *Ferrissia gentilis* Lanzer, 1991 from the South of the country. *Ferrissia* sp., collected in Casimiro de Abreu and Silva Jardim, is quite different from *F. gentilis* by morphological and conchological characters. The commonest ancylid species in the surveyed region is *G. ticaga*, also observed in the Metropolitan and Centro Fluminense Mesoregions.

Similarly to the above-mentioned Mesoregions, the xiphidiocercariae were the most frequently kind found in

Map showing the distribution of the species of medical and veterinary importance. (●) *Biomphalaria straminea*; (■) *Biomphalaria tenagophila;* (★) *Lymnaea columella*

the molluscs. The trematode larval type, Pleurolophocercus cercaria, previously found only in *M. tuberculatus* in Brazil (Boaventura et al. 2002), was also found in the hydrobiids *H. parchappei* and *I. souleyetianus.*

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