# Schistosomiasis Mansoni in the Region of the Triângulo Mineiro, State of Minas Gerais, Brazil

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*In order to reevaluate the possible presence of schistosomiasis mansoni in the Triângulo Mineiro, one of the areas of the State of Minas Gerais where this parasite is not commonly found, malacological survey and fecal examinations were undertaken in the region between October 1990 and June 1992. A sample of 7,032 1st grade school children from 29 counties had their feces examined using the Kato-Katz method. Amongst the children examined, two from Planura and one from each countie of Capinópolis, Conceição das Alagoas, Uberaba, Uberlândia, Prata and Gurinhatã were positive for* Schistosoma mansoni. *None of the children were identified as being autoctonous cases. In the malacological survey, 5,406 planorbid snails were examined. The specimens were identified morphologically and examined for* S. mansoni *by squashing between glass plates. The species were identified as* Biomphalaria tenagophila *in three counties, as* B. straminea *in ten and* B. intermedia *in 16. No snails were found in eight other counties studies. The snails were found to be negative for* S. mansoni. *The presence of intermediate hosts for* S. mansoni, *associated with parasitized individuals emphasizes the necessity of epidemiological surveillance for schistosomiasis in the region of Triângulo in the State of Minas Gerais.*

Key words: *Schistosoma mansoni - Biomphalaria tenagophila - Biomphalaria straminea - Biomphalaria intermedia* - Triângulo Mineiro - Brazil

Schistosomiasis mansoni is an endemic disease in the State of Minas Gerais in the regions of Médio São Francisco, Itacambira, Alto Jequitinhonha, Metalúrgica, Oeste and Alto São Francisco. The highest prevalence levels are found in Zona da Mata , Mucuri and the Rio Doce (Pellon & Teixeira 1950, Katz et al. 1978, Lambertucci et al. 1987, Carvalho et al. 1987). In the areas of Urucuia, Alto Paranaíba (except for Araxá where some foci of the disease are found), Triângulo, and Sul an insignificant prevalence exists. Nevertheless, as in other regions of Brazil, schistosomiasis is spreading in the State of Minas Gerais to areas that were until recently considered to be free of the disease (Katz & Carvalho 1983, Carvalho et al. 1985, 1987, 1988, 1989).

These observations led us to reevaluate the current status of schistosomiasis mansoni in the region of the Triângulo Mineiro, one of the areas free of schistosomiasis mansoni, by means of a malacological survey in the water sources and parasitological examinations of the feces of school children.

## MATERIALS AND METHODS

The region of the Triângulo Mineiro is situated in the west of the State of Minas Gerais and borders the states of Goiás, Mato Grosso do Sul and São Paulo. These studies were undertaken in the period between October 1990 and June 1992 in 29 of the 30 counties of the region.

*Snail survey* - The survey was undertaken in water sources neighboring the schools and other areas identified as being frequently used by the children. The snails collected were transported to the laboratory where they were measured, classified and examined microscopically, following squashing between two glass plates, for the presence of cercariae or sporocysts of *Schistosoma mansoni*.

*Parasitological diagnosis* - diagnosis was undertaken using the Kato-Katz method (Katz et al. 1972). Two slides were examined from each fecal sample taken from 1st grade school children (7 to 14 years old), within the county school network, a total of 29 counties were included in these studies. The sample size required to estimate the

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prevalence in the area was based on estimated parameters of 2% prevalence, precision of 0.5 and a confidence limit of 95%.

## RESULTS

*Snail survey* - A total of 5,406 planorbid snails were collected from 21 counties and they were all found to be negative for *S. mansoni* cercariae and/or sporocysts. The snails were identified as *B. tenagophila* (3 counties), *B. straminea* (10 counties) and *B. intermedia* (16 counties) (Fig). No snails were found in eight counties.

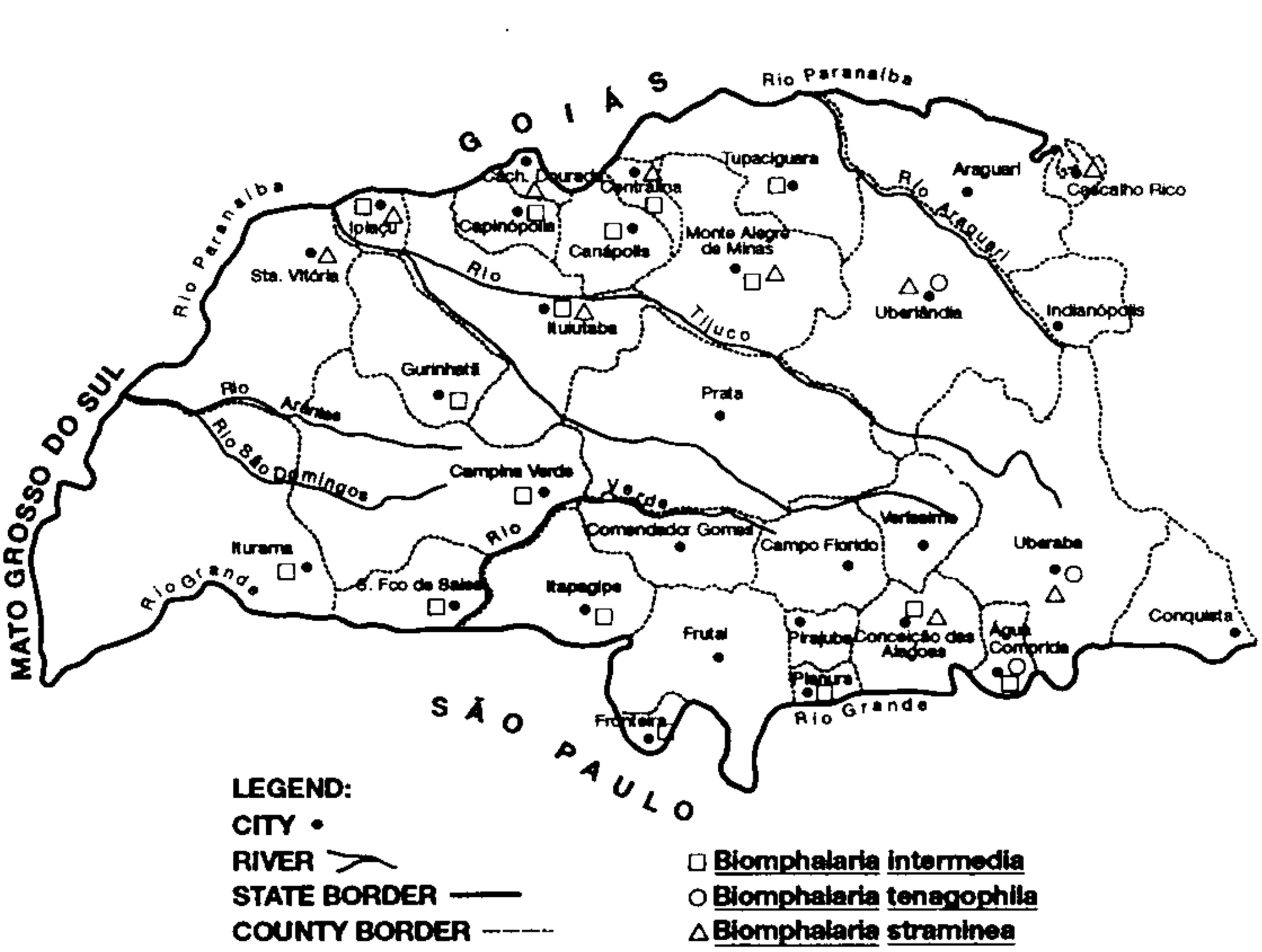
*Parasitolological diagnosis* - Of the 7,032 school children examined, eight (0.1%) were positive for *S. mansoni*, one child from each of the following counties: Uberaba, Capinópolis, Conceição das Alagoas, Gurinhatã, Prata, Uberlândia and two from Planura. Following epidemiological investigation, none of the children were identified as being autoctonous cases, all of them had been in areas when schistosomiasis transmission is occuring. All the children with schistosomiasis were treated.

## DISCUSSION

The region of the Triângulo Mineiro is one of the areas of the State of Minas Gerais in which there is intense and continuous economic development with a significant migration of labor originating from various regions of the country. Such migration has been an important factor in introducing schistosomiasis mansoni into three counties in the state (Itajubá, Paracatu e Passos) which are situated in areas until recently considered to be free of the disease (Katz & Carvalho 1983, Carvalho et al. 1987, 1988, 1989).

The data obtained in the present study indicate that the region of Triângulo continues to be free from schistosomiasis mansoni and that the prevalence of 0.1% found results from infections acquired in other regions. It is important to note that the prevalence of schistosomiasis has not altered in the region in the last 43 years since Pellon and Teixeira (1950) and Katz et al. (1978) observed a prevalence of 0.07%.

Of the three species of snail captured, *B. straminea* and *B. tenagophila* have an epidemiological importance in the transmission of schistosomiasis in a number of regions of Brazil. In this context, *B. straminea* has an important role in the transmission of the disease almost exclusively in the Northeast of the country where it is considered to be more important than *B. glabrata*




Distribution of planorbids in the region of the Triângulo in the State of Minas Gerais (October/90 - June/92).

(Lucena 1950). The finding of *B. straminea* in ten counties of the Triângulo enlarges its known distribution to areas on the border of the states of Minas Gerais and Goiás. Machado et al. (1992) described, for the first time, this species in the county of Uberlândia in Minas Gerais, however it has been found naturally infected only once on the borders of the counties of Lagoa Santa and Pedro Leopoldo (Dias Pinto et al. 1984) in a different region of the state. It was also found to be responsible for the focus of schistosomiasis in the county of Paracatu (Carvalho et al., 1988). The species *B. tenagophila* is responsible for a number of isolated foci of the disease in the states of Espírito Santo, Minas Gerais, Rio de Janeiro and Santa Catarina, and has an important role in the transmission of schistosomiasis mansoni in Vale do Paraíba (SP). This species was probably introduced into three counties of the studied region: Uberlândia, Água Comprida and Uberaba. *B. tenagophila* was found for the first time in the latter county in 1990 by SUCAM (Superitendência Nacional de Saúde Pública, now Fundação Nacional de Saúde). The same may have occurred with the *B. straminea* captured in the south of the Triângulo in the counties of Conceição das Alagoas and Uberaba.

*B. intermedia* was described by Paraense and Deslandes (1962) in 11 counties in the State of São Paulo. In addition to this state, where it has a wide distribution (Teles 1988, Vaz et al. 1983, 1985, 1986, 1987, 1992), this species is also found in two counties in the State of Mato Grosso do Sul (Paraense 1985). There still are, no reports of this species being naturally or experimentally infected with *S. mansoni*. The finding of this snail in 16 localities within the Triângulo Mineiro extends the North limit of its distribution to Centralina (18° 36' S, 49° 11' W), State of Minas Gerais.

The Triângulo region is considered, at present, an area free of schistosomiasis transmission. Nevertheless, the occurrence of two species of planorbid snails that are intermediate hosts for *S.mansoni* (*B.tenagophila* and *B.straminea*), together with the presence of individuals eliminating eggs and constant migration to this area emphasizes the importance of maintaining an epidemiological surveillance for schistosomiasis in this region of the State of Minas Gerais.

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## REFERENCES

Carvalho OS, Massara CL, Rocha RS, Katz N. 1989. Esquistossomose mansoni no sudoeste do Estado de Minas Gerais (Brasil). *Rev Saúde Públ S Paulo 23*: 341-344.

Carvalho OS, Rocha RS, Massara CL, Katz N 1987. Expansão da esquistossomose mansoni em Minas Gerais. *Mem Inst Oswaldo Cruz 82* suppl. IV: 295-298.

Carvalho OS, Rocha RS, Massara CL, Katz N 1988. Primeiros casos autóctones de esquistossomose mansoni em região do noroeste do Estado de Minas Gerais (Brasil). *Rev Saúde Públ S Paulo 22:* 237-239.

Carvalho OS, Souza CP, Katz N 1985. Primeiro encontro de *Biomphalaria tenagophila* (D'Orbigny, 1835) naturalmente infectada, com *Schistosoma mansoni*, em Itajubá, sul do Estado de Minas Gerais, Brasil. *Rev Saúde Públ S Paulo 19*: 88-91.

Dias Pinto AMS, Bizzoto Pinto CM, Ferreira HLM; Assis LFS, Rolla ME, Junqueira MV 1984. Presença de *Biomphalaria straminea* naturalmente infectada pelo *Schistosoma mansoni* na represa Samambaia, divisa dos Municípios de Lagoa Santa e Pedro Leopoldo, MG. *Ciência e Cultura 36* (supl.): 893.

Katz N, Carvalho OS 1983. Introdução recente da esquistossomose mansoni no sul do Estado de Minas Gerais, Brasil. *Mem Inst Oswaldo Cruz 78*: 281-284.

Katz N, Chaves A, Pellegrino J 1972. A simple device for quantitative stool thick-smear technique schistosomiasis mansoni. *Rev Inst Med Trop São Paulo 14*: 397-400.

Katz N, Motta E, Oliveira VB, Carvalho EF 1978. Prevalência da esquistossomose em escolares no Estado de Minas Gerais. p.102. In Resumos do XIV Congresso da Sociedade Brasileira de Medicina Tropical, João Pessoa.

Lambertucci JR, Rocha RS, Carvalho OS, Katz N 1987. A esquistossomose mansoni em Minas Gerais. *Rev Soc Bras Med Trop 20*: 47-52.

Lucena DT 1950. Epidemiologia da schistosomose mansoni. *An Soc Med Pernambuco 2*: 11-27.

Machado MI, Coletto FA, Costa MB 1992. *Biomphalaria straminea*: transmissor potencial de esquistossomose mansônica em Uberlândia, região do Triângulo, Minas Gerais.p.54 In, Resumos do XXVIII Congresso da Sociedade Brasileira de Medicina Tropical, Belém.

Paraense WL 1985. *Biomphalaria intermedia* in Mato Grosso do Sul, Brazil, and Missiones, Argentina (Pulmonata: Planorbidae). *Mem Inst Oswaldo Cruz 80*: 247-250.

Paraense WL, Deslandes N 1962. *Australorbis intermedius sp.* n. from Brazil. *Rev Brasil Biol 22*: 343-350.

Pellon AB, Teixeira I 1950. *Distribuição geográfica da esquistossomose mansônica no Brasil.* Divisão de Organização Sanitária, Rio de Janeiro. pp 108.

Teles, HMS 1988. Aspectos ecológicos de *Biomphalaria* Preston, 1910 (Basomatophora, Planorbidae) no Estado de São Paulo, Brasil. I. Sintopia. *Ciência e Cultura 40*: 374-379.

Vaz JF, Elmor MRD, Gonçalves LMC 1992. Levantamento planorbídico do Estado de São Paulo:

8ª Região Administrativa (Grande Área de São José do Rio Preto). *Rev Inst Med Trop São Paulo 34* :527-534.

Vaz JF, Elmor MRD, Gonçalves MC, Ishata GK 1983. Resultados do levantamento planorbídico da área de Presidente Prudente - Estado de São Paulo. *Rev Inst Med Trop São Paulo 25:* 120-126.

Vaz JF, Mantegazza E, Teles, HMS, Leite SPS, Morais LVC 1987. Levantamento planorbídico do Estado de São Paulo (Brasil): 4ª Região Administrativa. *Rev Saúde Públ S Paulo 21:* 371-379.

Vaz JF, Teles HMS, Takaku L 1985. Levantamento planorbídico do Estado de São Paulo: 7ª Região Administrativa. *Ciência e Cultura 37*: 2057-2062.

Vaz JF, Teles HMS, Leite SPS, Corrêa MA, Fabbro ALD, Rosa WS 1986. Levantamento planorbídico do Estado de São Paulo: Sexta Região Administrativa. *Rev Saúde públ S Paulo 20*: 352-361.