

GEOGRAPHICAL DISTRIBUTION OF THE SNAIL HOSTS OF SCHISTOSOMIASIS MANSONI IN NORTHEASTERN BRAZIL

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S U M M A R Y

A study was made of the geographical distribution of the intermediate hosts of *Schistosoma mansoni* in Northeastern Brazil.

Biomphalaria straminea was found over the whole territory. *B. glabrata* was limited to certain areas in the forest Region near the coast and in a few humid valleys in the State of "Rio Grande do Norte".

Northeastern Brazil comprises five States: Ceará, Rio Grande do Norte, Paraíba, Pernambuco and Alagoas. Over 15 million people live in this region, most of them near the coast. It is one of the most populated areas in Brazil.

The Northeastern is divided in three physiographical areas. The littoral area constitutes a narrow and sandy strip of land with beaches, dunes and mangrove swamps. Following that comes the tropical forest area in which the climate, as in the littoral, is hot and humid and the temperature varies very little during the year. However most of the Northeastern Region is dominated by an area of semi-arid climate the "caatinga", which is covered by a short and spiny vegetation of deciduous leaves. Limited areas with a special type of vegetation are called "cerrados", BARBOSA¹.

Schistosomiasis, in Northeastern Brazil, is essentially limited to littoral and forest areas in the States of Paraíba, Pernambuco and Alagoas. However, the schistosomiasis endemic realm overflows a little into the "caatinga" of those States. Schistosomiasis is also found in isolated foci in the States of Rio Grande do Norte and Ceará.

Collection of snails has never been done systematically in Northeastern Region. HOWEVER LUCENA³ presented a partial study on the geographical distribution of the snail intermediate hosts of schistosomiasis in Northeastern Brazil. In that study the snails were apparently classified by the shell characteristics only.

The current study was designed to learn in as much detail as possible the geographical distribution of the planorbid snails involved in transmission of schistosomiasis in Northeastern Brazil.

The collections of snails were made by trained field workers who covered the region (five States) utilizing jeeps during three consecutive years (September 1964 to August 1967).

Snails were packed in humid boxes and sent to the laboratory in Recife where they were put in tanks. Some of the specimens were later distended in water with menthol crystals and the animals pulled out of the shell after freezing, according to a method already described, BARBOSA et al.².

From collections that appeared by shell form to be homogeneous ten specimens were

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taken and studied anatomically. However any shell whose morphology suggest different aspect was also taken for anatomical study. In that way the classification of the snails was made first by conchiological characteristics and confirmed after dissection by anatomical features.

In the period of three years 372 snail collections were made. To these the Authors add 171 records from the malacological laboratory collection of the "Research Center Aggeu Magalhães" which dates from 1951.

The localities where snails have been collected are listed as follows. The names of the counties are written in italic types followed by the names of the localities where the snails were collected.

Biomphalaria glabrata (Say)

State of Ceará — Not found

State of Rio Grande do Norte — *Ceará Mirim*, several localities: *Pureza*, several localities: *Touros*, several localities:

State of Paraíba — *Alhandra*, in town; *João Pessoa*, *Varadouro* and *Graças*.

State of Pernambuco — *Cabo*, *Ponetinha*: *Correntes*, in town: *Garanhuns*, *Vista Alegre*: *Goiâna*, in town: *Olinda*, several localities: *Paulista*, several localities: *Recife*, several localities.

State of Alagoas: — *Anadia*, creek *Chi-queiro*: *Atalaia*, river *Paraíba*: *Capela*, in town: *Coruripe*, farm *Bonfim*: *Girau do Pon-ciano*, in town: *Junqueiro*, river *Piauí*: *Li-moeiro de Anadia*, in town: *Maceió*, several localities: *Maragogi*, engenho *Boa Vista* and in town: *Murici*, river *Mundaci*: *Palmeira dos Índios*, in town: *Penedo*, in town: *Pia-çabuçu*, *Paciência do Baixo* and town: *Que-brangulo*, in town: *São José da Lage*, in town: *São Miguel dos Campos*, in town: *Traipu*, sítio *Ôlho d'Água*: *União dos Palmares*, in town: *Viçosa*, several localities.

Biomphalaria straminea

State of Ceará — *Acaraú*, river *Aca-ráu*: *Acopiara*, farm *Turquia*: *Aiuaba*, dam *Riacho do Boi*: *Antonina do Norte*, in town:

Aquiraz, lake *Onça*: *Aracati*, *Itaiçaba* and sítio *Horta*: *Aracoiaba*, in town: *Araripe*, in town: *Arneiroz*, *Lagoa dos Veados*: *Assaré*, creek *Barriguda*: *Aurora*, in town: *Baixio*, *Cacimba do Gado*: *Barbalha*, in town: *Batutité*, in town: *Boa Viagem*, dam *Cap. Arno*: *Brejo Santo*, in town and sítio *Cabaceira*: *Camocim*, *Salina Parangaba*: *Campos Sales*, *Iguáçu* and *Barão*: *Canindé*, dam *Mateus* and *Croata*: *Cariré* dam *Novo* and *Taibaras*: *Carnaubal*, in town: *Cascavel*, dam *Corrego*: *Caucaia*, lake *Caripuan*: *Cedro*, in town: *Coreaú*, river *Escama de Peixe*: *Cratéus*, dam *Novo*: *Crato*, several localities: *Farias Brito*, river *Cariús* and in town: *Fortaleza*, several localities: *Frecheirinha*, in town: *General Sampaio*, in the dam: *Icó*, in town and *Lima Campos*: *Iguatu*, in town and *Quixeló*: *In-dependência*, in the dam Km²: *Ipaumirim*, in town: *Ipu*, in town: *Ipueiras*, farm *Belo Horizonte*: *Itaiçaba*, river *Jaguaribe*: *Ita-pagé*, creek *Pau Ferrado*: *Itapipoca*, lake *Carreira*: *Itapiuna*, *Junco* and in town: *Iguaretama*, creek *Sangue*: *Jaguaribe*, *Floresta*: *Jaguarana*, *Barra*: *Jardim*, *Sítio Gravatá* and in town: *Jati*, *Sítio Umburana*, farm *Abelha* and in town: *Juazeiro do Norte*, *Salgadinho* and in town: *Jucás*, in town: *Lavras da Mangabeira*, in town: *Limoeiro do Norte*, in town: *Maranguape*, in town: *Massapê*, dam *Ipaguaçu-mirim*: *Mauriti*, creek *Escondidinho*: *Milagres*, in town: *Missão Velha*, in town: *Mombaça*, farm *Boa Hora*: *Morada Nova*, *Curralinho* and river *Mauabóim*: *Morri-nhos*, river *Santana de Aracau*: *Nova Olinda*, *Caboré*: *Nova Russas*, farm *Pintadas*: *Orós*, in the dam: *Pacajus*, farm *Cumaré*: *Pacatuba*, in town: *Pacoti*, granja *Bonfim*: *Parambu*, farm *Açude Novo*: *Panaforte*, in town: *Pentecoste*, in town: *Pedra Branca*, farm *Piedade*: *Perei-ro*, in town: *Piquet Carneiro*, farm *Pitombeira*: *Porteiras*, in town: *Quixadá*, several localities: *Quixeramobim*, *Uruque*, *Campos* and *La-cerda*: *Queixeré*, *São Joaquim* and in town: *Redenção*, in town: *Reriutaba*, dam *Mata*: *Russas*, in town: *Saboeiro*, *Quixareu* and dam *Logradouro*: *Santa Quitéria*, dam *Caio*: *Santana do Acaraú*, river *Acaraú*: *Santana do Cariri*, in town: *São Benedito*, in town: *São Gonçalo do Amarante*, *Pegubaça*: *Senador Pompeu*, in town: *Sobral*: *Lagoa da Fa-zenda*, *Oiticica* and *Furguinhas*: *Solonópole*, *Milhã* and in town: *Tabuleiro do Norte*, in town: *Tamboril*, farm *Carnauba*: *Tauá*, farm

Cachoeira: *Umari*, Rio das Matas: *Urubure-tama*, in town: *Uruoca*, in town: *Várzea Ale-gre*, river Fortuna: *Viçosa do Ceará*, in town.

State of Rio Grande do Norte — *Acari*, in town: *Açu*, in town: *Água Nova*, in town: *Alexandria*, dam Prado: *Angicos*, in town: *Apodi*, dam Baixio: *Augusto Se-vero*, river Ipanema: *Caiçara do Rio do Ven-to*, in town: *Caicó*, in town: *Carajás*, dam Futuro: *Ceará-Mirim*, several localities: *Cêr-ro-Corá*, in town: *Currais Novos*, in town: *Florânia*, in town: *Goianinha*, in town: *Itaú*, in town: *João Câmara*, in town: *Jardim de Piranhas*, in town: *Jardim do Seridó*, in town: *Jucurutu*, in town: *Lagoa d'Anta*, in town: *Luís Gomes*, dam Cavalho Morto: *Macáiba*, dam Barragem, *Macau*, in town: *Martins*, creek Sermão: *Maxaranguape*, several localities: *Mossoró*, in town: *Natal*, several localities: *Nova Cruz*, dam Pau Barriga: *Parázinho*, in town: *Parelhas*, in town: *Patu*, Grotto: *Pau dos Ferros*, dam Alencar: *Pedro Avelino*, in town: *Portalegre*, creek Areia: *Pureza*, several localities: *Santa Cruz*, river Paraíso: *San-tana do Matos*, creek Bom Jesus: *Santo Antônio*, in town: *São Bento do Norte*, in town: *São José do Campestre*, in town: *São José de Mipibu* in town: *São Miguel*, in the dam: *São Paulo do Potengi*, in town: *São Tomé*, dam Pedra do Navio: *Serra Negra do Norte*, in town: *Sítio Nôvo*, in town: *Taípu*, creek Gameleira: *Tangará*, in town.

State of Paraíba — *Alagoa Grande*, in town: *Alagoa Nova*, in town: *Antenor Na-varro*, in town *Araçagi*, in town: *Araruna*, dam Caridade: *Bananeiras*, in town: *Barra de Santa Rosa*, in town: *Bonito de Santa Fé*, in town: *Boqueirão*, dam Tanque Raso: *Brejo do Cruz*, in town: *Cabeceiras*, dams Tijuca and Brado: *Cacimba de Dentro*, in town: *Caiçara*, in town: *Cajazeiras*, in town: *Cam-pina Grande*, in town: *Catolé da Rocha*, in town: *Conceição*, Serra Vermelha: *Coremas*, in town: *Cruz do Espírito Santo*, in town: *Esperança*, Sítio Pedro Batista: *Guarabira*, in town: *Ingá*, in town: *Itabaiana*, in town: *Itaporanga*, in town: *João Pessoa*, several localities: *Juazeirinho*, in town: *Mamanguape*, in town: *Mogeiro*, in town: *Monteiro*, in town: *Pa-tos*, in town: *Pedra Lavrada*, in town: *Piancó*, dam Castanheiro: *Picuí*, in town: *Pilar*, in tow: *Pilões*, in town: *Pirpirituba*, in town: *Pombal*, in town: *Princesa Isabel*, in town: *Rio*

Tinto, in town: *Santa Rita*, in town: *São João do Cariri*, in town: *São José de Pira-nhas*, Jatobá: *São Sebastião do Umbuzeiro*, in town: *Santa Luzia*, in town: *Sapé*, in town: *Solânea*, in town: *Soledade*, in town: *Souza*, lake Jaburu: *Taperoá*, dam Pomati: *Teixeira*, lake Tenente Serafim: *Umbuzeiro*, Somem-baia de Baixo.

State of Pernambuco — *Afogados da Ingazeira*, river Pajeú: *Afrânia*, Soledade: *Agrestina*, in town: *Água Preta*, several localities: *Águas Belas*, in town: *Aliança*, Macujé, in town Usina Aliança: *Altinho* in town: *Amaraji*, Batateira: *Araripina*, in DNOCS dam: *Arcoverde*, Sítio Barreiras: *Barreiros*, in town: *Belém de Maria*, in town: *Belém de São Francisco*, in town: *Belo Jardim*, in town: *Betânia*, farm São Gonçalo: *Bezerros*, in town: *Bodocó*, farm Casa Nova: *Bom Conselho*, Sítio Riacho Sêco: *Bom Jardim*, farm Independên-cia and Bizarra: *Brejo da Madre Deus*, river Brejo: *Buique*, Sítio São Luiz: *Cabo*, several localities: *Cabrobó*, in town: *Cachoeirinha*, in town: *Canhotinho*, in town: *Carnaíba*, river Pajeú: *Carpina*, in town and Lagoa do Carro: *Caruaru*, in town: *Catende*, in town: *Custódia*, in town: *Escada*, several localities: *Exu*, se-veral localities: *Fazenda Nova*, in town: *Flo-res*, creek Santa Gameleira: *Floresta*, dam Vila Central: *Gameleira*, in town: *Garanhuns*, in town: *Glória do Goitá*, several localities: *Coiana*, several localities: *Gravatá*, in town: *Ibimirim*, river Moxotó: *Inajá*, in town: *Ita-petim*, in the dam: *Itaquitinga*, in town: *Ja-boatão*, several localities: *João Alfredo*, in town: *Jurema*, in town: *Lageado*, in town: *Lagoa do Ouro*, in town: *Lagoa dos Gatos*, in town: *Limoeiro*, in town and Urucuba: *Ma-caparana*, in town: *Mirandiba*, farm Barrigu-da and in town: *Moreno*, several localities: *Nazaré da Mata*, in town: *Olinda*, several localities: *Orobó*, in town: *Ouricuri*, Alagoa do Alonço: *Palmares*, in town: *Parnamirim*, in town: *Passira*, several localities: *Paudalho*, São Severino dos Ramos and in town: *Pedra*, in town: *Pesqueira*, river Ipojuca: *Petrolânia*, Comissão Vale São Francisco: *Petrolina*, in the dam: *Recife*, several localities: *Ribeirão*, several localities: *Salgueiro*, in town: *Sanharó*, in town: *Santa Cruz do Capibaribe*, in town: *Santa Maria da Boa Vista*, in town: *São Bento do Una*, in town: *São Caetano*, river Ipojuca: *São José do Egito*, dam Pajéu:

São Joaquim do Monte, in town: *São Lourenço da Mata*, several localities: *Serra Talhada*, Varginha and in town: *Serrita*, dam Varginha: *Sertânia*, placas: *Surubim*, in town: *Tabira*, dam Espírito Santo: *Tacaratu*, farm Vaca Branca: *Taquaritinga do Norte*, Sítio Açuinho and Sítio Gravatá: *Timbauba*, several localities: *Toritama*, in town: *Tracunhaém*, several localities: *Trindade*, in the dam: *Triunfo*, in town: *Venturosa*, river Ipanema: *Verdejante*, farm Umani and in town:

Vertentes, in town: *Vicência*, several localities: *Vitória de Santo Antão*, several localities.

State of Alagoas — *Água Branca*, Sítio Furninha: *Anadia*, creek Chiqueiro: *Arapiraca*, in town: *Atalaia*, river Paraíba, Uzina Bautana, Bittencourt and in town: *Cacimbinhas*, in town: *Delmiro Gouveia*, Bom Sossego: *Flexeiras*, Uzina Bititinga: *Girau do Ponciano*, in town: *Igaci*, farm Cachoeira: *Igreja Nova*, creek Gotízera: *Junqueiro*,

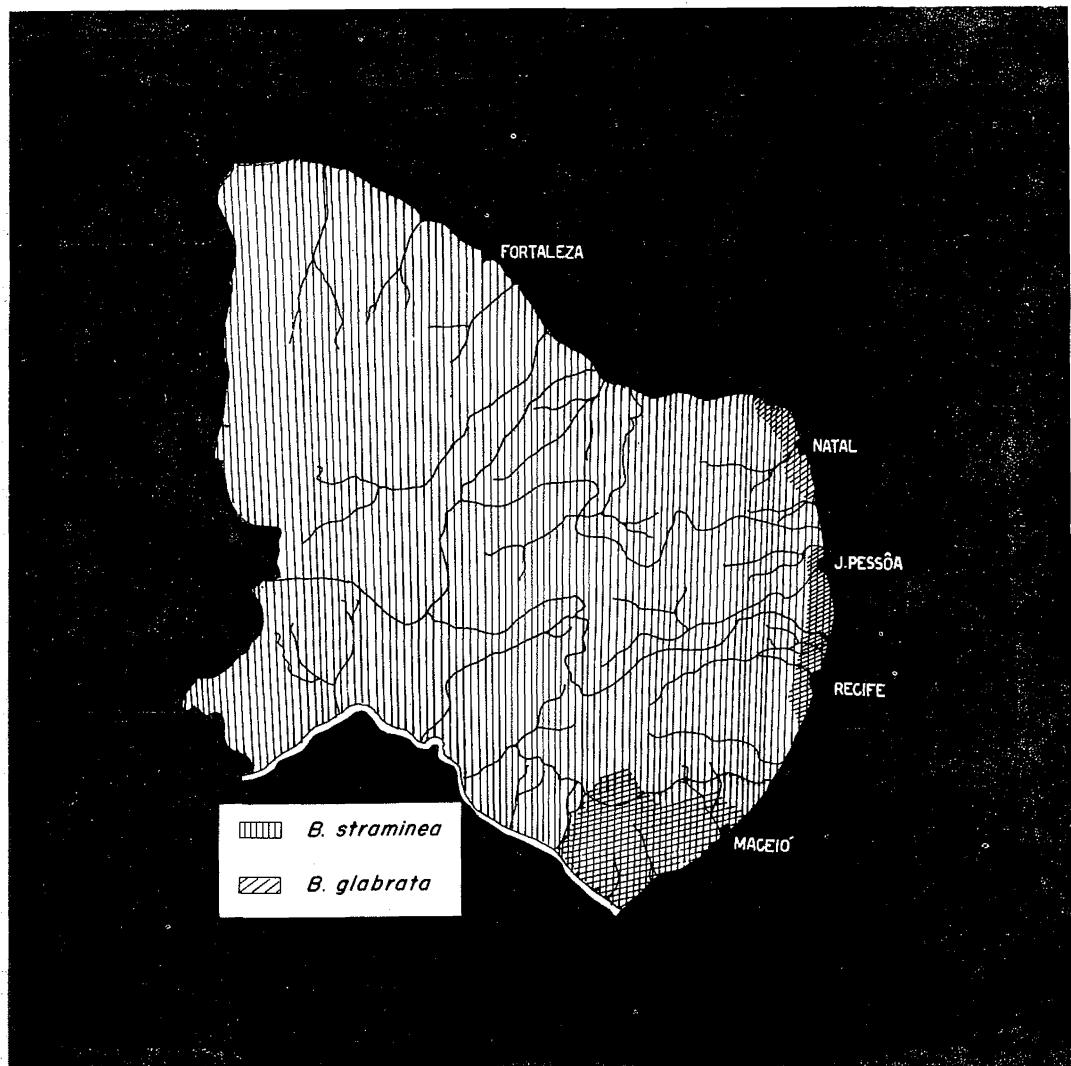


Fig. 1 — Geographical distribution of the snail hosts of Schistosomiasis mansoni in Northeastern Brazil

in town: *Limoeiro de Anadia*, in town: *Maciá*, in town: *Major Isidoro*, dam DNOCS: *Marimbondo*, in town: *Mata Grande*, creek *Cancela*: *Murici*, lake do *Engenho Velho*: *Olho d'Água das Flôres*, in town: *Olho d'Água do Casado*, creek *Bico do Gado*: *Palmeira dos Índios*, several localities: *Pão de Açúcar*, *Alagoa de Cima*: *Passo de Camaragibe*, engenho *Moderno*: *Penedo*, in town: *Pilar*, in town: *Piranhas*, lake *Mulata*, *Pôrto de Pedras*, Sítio *Salina*: *Pôrto Calvo*, in town: *Pôrto Real do Colégio*, lake *Cordeiro*: *Rio Largo*, in town: *Santana do Ipanema*, river *Ipojuca*: *São Brás*, *Olho d'Água*: *São José da Tapera*, in town: *São Luís do Quitunde*, in town: *São Miguel dos Campos*, in town: *Traipu*, in town: *União dos Palmares*, in town: *Viçosa*, *Anel* and in town.

The actual present distribution of the two species so far as it can be ascertained is better viewed in Fig. 1.

This extensive snail survey confirms the existence of only the two known intermediate hosts of schistosomiasis mansoni in the region; *Biomphalaria glabrata* (SAY) and *Biomphalaria straminea* (DUNKER).

However, the geographical distribution of the two species is different. While *B. straminea* is found in the whole Northeastern territory, *B. glabrata* is limited to certain areas in the forest area and in few humid valleys of the arid area in the State of Rio Grande do Norte.

In the State of Ceará *B. straminea* is the only snail vector.

RESUMO

Distribuição geográfica dos vectores da esquistosomose mansônica no Nordeste do Brasil

Utilizando dados de coleta, foi feito um estudo sobre a distribuição geográfica dos vectores de *Schistosoma mansoni* no Nordeste Oriental do Brasil.

Enquanto *Biomphalaria straminea* foi encontrada em toda a Região, *B. glabrata* está limitada a certas áreas da floresta tropical da encosta e a certos vales úmidos no Estado do Rio Grande do Norte. O único vector encontrado no Ceará foi *B. straminea*.

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