

## CHAGAS' DISEASE IN THE BRAZILIAN AMAZON

### I - A SHORT REVIEW

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#### SUMMARY

At least eighteen species of triatominae have been found in the Brazilian Amazon, nine of them naturally infected with *Trypanosoma cruzi* or "cruzi-like" trypanosomes and associated with numerous wild reservoirs.

Despite the small number of human cases of Chagas' disease described to date in the Brazilian Amazon the risk that the disease will become endemic in this area is increasing for the following reasons: a) uncontrolled deforestation and colonization altering the ecological balance between reservoir hosts and wild vectors; b) the adaptation of reservoir hosts of *T. cruzi* and wild vectors to peripheral and intradomiciliary areas, as the sole feeding alternative; c) migration of infected human population from endemic areas, accompanied by domestic reservoir hosts (dogs and cats) or accidentally carrying in their baggage vectors already adapted to the domestic habitat. In short, risks that Chagas' disease will become endemic to the Amazon appear to be linked to the transposition of the wild cycle to the domestic cycle in that area or to transfer of the domestic cycle from endemic areas to the Amazon.

**KEYWORDS:** Chagas' disease; Brazilian Amazon

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Two of the major problems facing the Amazon - human migration from other areas and uncontrolled deforestation - also constitute the greatest risk for the establishment of endemic Chagas' disease in this part of the country.

For some time now, it has been known that there are *Trypanosoma cruzi* reservoir hosts among wild animals as well as insect vectors of the parasite in the Brazilian Amazon. However, reports of human cases of the disease have been sporadic, probably occurring randomly as a result of ingestion of contaminated food or accidental

contact with infected triatominae. These are the most likely routes of infection, since triatominae, with the exception of *Triatoma rubrofasciata*, have not yet adapted to human habitats in the area, and *T. rubrofasciata* does not have anthropophilic habits.

At least eighteen species of triatominae have been found in the Brazilian Amazon <sup>1,5,8,26,27,28</sup> (Table 1)

With regard to the *T. rubrovaria*, characteristic of the southern part of our country, there are

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doubts as to its occasional finding in the Amazon while *Rhodnius prolixus* has been reported found only once there.

The triatomine population in Maranhão has not been well defined. A number of wild and domestic species, although not infesting houses have been described there, apparently in a transition phase from one cycle to another. It should be recalled that Maranhão is a transition zone between the Northeast and the Amazon.

Although at least nine species of wild triatomine from the Brazilian Amazon have been found hosting *Trypanosoma* similar to *T.cruzi* 1,2,8,17,25,27,28,29, there is still no definitive evidence that any of these species, infected or not, have become domiciliary (Table 1). Adult triatomine have only been found occasionally in or around residences in the Amazon, having been attracted by the light, or physically brought in with firewood or construction materials, such as palm leaves gathered to use as roofing.

Since 1924, when Chagas confirmed as *Trypanosoma cruzi* the trypanosomes found in 1922 by Aben-Athar in squirrel monkeys (*Saimiri sciureus*) in the state of Pará, several species of wild mammals, including marsupials, chiroptera, rodents, edentata and primates native to the Amazon have been described by various authors as carriers of *Trypanosoma cruzi*, parasites similar to *T.cruzi* or parasites of the "cruzi type" 6,11-16,21,25,29.

Chagas confirmation 9 that *T.cruzi* existed in wild reservoir hosts in the Amazon, where there were no human cases of the disease, was extremely important as proof of his own hypothesis that the disease he had discovered had in primitive times been and enzoonosis found only in wild animals, which subsequently became adapted to domestic animals and man. Verification of this fact is very important in determining the risks of Chagas'disease becoming endemic in human population in this area.

Since SHAW, et al. 32 described the first four autochthonous cases of Chagas'disease in Belém do Pará, only 38 human cases of the disease have been described in the Brazilian Amazon (Table 2):

TABLE 1

SPECIES OF TRIATOMINAE FOUND IN THE BRAZILIAN AMAZON

<i>Belminus herreri</i>	<i>Rhodnius nasutus</i>
<i>Cavernicola lenti</i>	<i>Rhodnius neglectus</i> (*)
<i>Cavernicola pilosa</i>	<i>Rhodnius paraensis</i> (*)
<i>Eratyrus mucronatus</i> (*)	<i>Rhodnius pictipes</i> (*)
<i>Microtriatoma trinidadensis</i> (*)	<i>Rhodnius prolixus</i>
<i>Panstrongylus geniculatus</i> (*)	<i>Rhodnius robustus</i> (*)
<i>Panstrongylus lignarius</i> (*)	<i>Triatoma maculata</i>
<i>Panstrongylus rufotuberculatus</i> (*)	<i>Triatoma rubrofasciata</i>
<i>Rhodnius brethesi</i>	<i>Triatoma rubrovaria</i>

(\*) Found infected with *Trypanosoma cruzi* or "cruzi-like"

21 in Pará, 9 in Amapá, 4 in Maranhão, 3 in Amazonas and 1 in Acre, all sporadically found with characteristics of acute Chagas'disease 4,10,18,23-25,30,31,33-39.

It is possible that other cases have been observed in the Amazon, and not published. FER-RARONI et al. 20 described six cases with positive serology for Chagas'infection in farmers from the municipality of Barcelos, in the State of Amazonas.

Despite small number of human cases of Chagas'disease described to date in the Brazilian Amazon the risk that the disease will become endemic in this area is increasing for the following reasons: a) uncontrolled deforestation and colonization altering the ecological balance between reservoir hosts and wild vectors; b) the adaptation of reservoir hosts of *T.cruzi* and wild vectors to peripheral and intradomiciliary areas, as the sole feeding alternative; c) migration of infected human population from endemic areas, accompanied by domestic reservoir hosts (dogs and cats) or accidentally carrying in their baggage vectors already adapted to the domestic habitat. In short, risks that Chagas'disease will become endemic to the Amazon appear to be linked to the transposition of the wild cycle to the domestic cycle in that area or to transfer of the domestic cycle in endemic areas to the Amazon.

TABLE 2

HUMAN CASES OF CHAGAS'DISEASE DESCRIBED IN THE BRAZILIAN AMAZON

YEAR	LOCALITY	AUTHORS	Nº OF CASES
1969	Belém (Pará)	Shaw, Lainson & Frahia	4
1974	Macapá (Amapá)	Lacerda Jr. et al.	1
1979	Belém e Abactuba (Pará)	Lainson et al.	3
1979	Ilha do Mosqueiro (Pará)	Silveira et al.	1
1980	São Paulo de Olivença (Amazonas)	França et al.	1
1981	Santo Antonio de Tauá (Pará)	Dorea	1
1982	Alto Solimões (Amazonas)	Souza Lima et al.	1
1985	Barcelos (Amazonas)	Souza Lima et al.	1
1985	São Félix do Xingú (Pará)	Rodrigues et al.	1
1985	São Luiz e Bacurituba (Maranhão)	Silva et al.	4
1988	Macapá (Amapá)	Rodrigues et al.	8
1988	Plácido de Castro (Acre)	Barata et al.	1
1989	Barcarena (Pará)	Valente et al.	1
1989	Cachoeira do Arari and Km 92 of Transamazônica (Pará)	Souza et al.	4
1992	Vila de Icoaraci (Pará)	Crescente et al.	4
1992	Belém (Pará)	Valente et al.	2

Uncontrolled deforestation and colonization in the Amazon are currently amongst the great concerns of (thinking) citizens in our country, and give rise to great international speculation regarding the possibility of exponential increase in these activities <sup>19</sup>. Several studies on the matter have been carried out recently and will not be discussed here due to lack of space. With wide-ranging deforestation, wild animals will perforce be driven into other areas, with a tendency for triatominae to become adapted to alternative food sources in peri and intra-domiciliary areas. BARRETO <sup>7</sup>, in his study of *T.cruzi* reservoir hosts and vectors, gives a painstaking analysis of the consequences of modifying natural foci. FORATTINI <sup>22</sup> and ARAGÃO <sup>3</sup> have carried out detailed studies of the origin of and preadaptation to domiciliary activity in triatominae in Brazil, thus confirming our assertion.

Finally, uncontrolled migratory movements from the south, southeast, northeast and west-central areas towards the Amazon, on the increase during recent years, have been responsible for maintaining and exacerbating various endemic parasitic diseases in Brazil, such as malaria. In the case of Chagas'disease, although its adaptation mechanisms are slower, it poses one the most serious threats of transposition of an endemic disease into the Amazon; the effects of this will become evident during the next century unless the following precautions are taken: a) reduction and control of deforestation particularly on the periphery of population centres; b) constant surveillance of domestic adaptation of wild triatominae and transposition of triatominae and domestic reservoir hosts from endemic areas to the Amazon; c) formulation of a global policy for the settlement and colonization of the Amazon, which

would simultaneously preserve the ecology of the area, while promoting its socioeconomic development.

## RESUMO

### Doença de Chagas na Amazônia Brasileira. I. Revisão

Pelo menos dezoito espécies de triatomíneos foram encontradas na Amazônia brasileira, nove das quais infectadas com *Trypanosoma cruzi* ou semelhante ("cruzi-like"), associadas com numerosos reservatórios silvestres.

A despeito do pequeno número de casos humanos da doença de Chagas descritos até agora na Amazônia brasileira, o risco que essa doença se torne endêmica é cada vez maior, pelas seguintes razões: a) desmatamentos e colonização descontrolados, alterando o balanço entre reservatórios e vetores; b) adaptação de reservatórios e vetores silvestres com *T.cruzi* ao peridomicílio, como única alternativa alimentar; c) migração de populações humanas infectadas com *T.cruzi* acompanhadas de reservatórios domésticos (cães e gatos) ou de vetores de suas regiões de origem na bagagem, já adaptados ao domicílio. Em resumo, o risco de que a doença de Chagas se torne endêmica na Amazônia brasileira está ligado à transposição do ciclo silvestre para o doméstico na própria área ou do ciclo doméstico já estabelecido em áreas endêmicas para a Amazônia.

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## REFERENCES

1. ALMEIDA, F.B. - Triatomíneos da Amazônia. Encontro de três espécies naturalmente infectadas por *Trypanosoma* semelhante ao *cruzi*, no Estado do Amazonas (Hemiptera, Reduviidae). *Acta amaz. (Manaus)*, 1:89-93, 1971.
2. ALMEIDA, F.B. & MACHADO, P.A. - Sobre a infecção de *Panstrongylus geniculatus* pelo *Trypanosoma cruzi* em Manaus, Amazonas, Brasil. *Acta amaz. (Manaus)*, 1:71-75, 1971.
3. ARAGÃO, M.B. - Domiciliação de triatomíneos ou pré-adaptação à antropofilia e a ornitofilia(?). *Rev. Saúde publ. (S.Paulo)*, 17:51-57, 1983.
4. BARATA, J.M.S.; ROCHA, R.M.; RODRIGUES, V.L.C.C. & FERRAZ, Fº, A.N. - Primeiro caso autóctone de tripanosomíase americana do Estado do Acre, Brasil, e sua correlação com as cepas isoladas do caso humano e de triatomíneos silvestres da área. *Rev. Saúde publ. (S.Paulo)*, 22:401-410, 1988.
5. BARRET, T.V. & GUERREIRO, J.C.H. - Os triatomíneos (Hemiptera, Reduviidae) em relação à doença de Chagas na Amazônia. In: VAL, A.L.; FIGLIUOLO, R. & FELDBERG, E. Bases científicas para estratégia de preservação e desenvolvimento da Amazônia: fatos e perspectivas. Manaus, Instituto Nacional de Pesquisas da Amazônia, 1991. p.119-130.
6. BARRETTO, M.P. - Reservatórios do *Trypanosoma cruzi* nas Américas. *Rev.bras. Malar*, 16:527, 1964.
7. BARRETTO, M.P. - Estudo sobre reservatórios e vetores do *Trypanosoma cruzi*. XXII. Modificações de focos naturais de tripanosomíase americana e suas consequências. *Rev.Soc.bras.Med.trop.*, 1:167-173, 1967.
8. BRAZIL, R.P.; SILVA, A.F.; ALBARELLI, A. & VALLE, J.F. - Distribuição e infecção de triatomíneos por *Trypanosoma cruzi* na Ilha de São Luiz, Maranhão. *Rev.Soc.bras.Med.trop.*, 18: 257-260, 1985.
9. CHAGAS, C. - Infection naturelle des singes du Pará (*Crysotrix sciureus*) par *Trypanosoma cruzi*. *C.R.Soc.Biol.(Paris)*, 90:873, 1924.
10. CRESCENTE, J. A.; VALENTE, S. A. S.; VALENTE, V. C. & ARAUJO, J. A. - Ocorrência de 4 casos agudos de doença de Chagas na Vila Icoaraci - PA. *Rev. Soc. bras. Med. trop.*, 25 (suppl.): 29 (res. 062), 1992.
11. DEANE, L. M. - *Trypanosoma* de mamíferos da região Amazônica. I. Alguns flagelados encontrados no sangue de mamíferos silvestres do Estado do Pará. *Rev. Inst. Med. trop. S. Paulo*, 3: 15-28, 1961.
12. DEANE, L. M. - Animal reservoirs of *Trypanosoma cruzi* in Brazil. *Rev bras. Malar.*, 16: 27-48, 1964a.
13. DEANE, L. M. - Tripanosomídeos de mamíferos da região Amazônica. III. Hemoscopia e xenodiagnóstico de animais silvestres nos arredores de Belém, Pará. *Rev. Inst. Med. trop. S. Paulo*, 6: 225-232, 1964b.

14. DEANE, L. M. - Tripanosomídeos de mamíferos da região Amazônica. IV. Hemoscopia e xenodiagnóstico de animais silvestres da estrada Belém-Brasília. *Rev. Inst. Med. trop. S. Paulo*, 9: 143-148, 1967.
15. DEANE, L. M. & DAMASCENO, R. - Tripanosomídeos de mamíferos da região Amazônica. II. Tripanosomas de macacos da zona de Salgado, Estado do Pará. *Rev. Inst. Med. trop. S. Paulo*, 3: 61-70, 1961.
16. DEANE, L. M. & JANSEN, G. - Encontro do *Schizotrypanum cruzi* (Chagas, 1909) em marsupiais da espécie *Marmosa cinerea* Desmarest. *Brasil-méd.*, 53: 265-266, 1939.
17. DEANE, M. P. & DAMASCENO, R. - Encontro de *Panstrongylus lignarius* naturalmente infectado por tripanosoma do tipo cruzi e algumas notas sobre a sua biologia. *Rev. Serv. Saúde públ. (Rio de J.)* 2: 809-814, 1949.
18. DOREA, R. C. - Doença de Chagas na Amazônia: aspectos epidemiológicos regionais e considerações a propósito de um caso pediátrico. *Hiléia méd. (Belém)*, 3: 81-109, 1981.
19. FEARNSTIDE, M. P. - Desmatamento na Amazônia brasileira: com que intensidade vêm ocorrendo (?). *Acta amaz. (Manaus)*, 12: 579-590, 1982.
20. FERRARONI, J. J.; MELO, J. A. N. & CAMARGO, M. E. - Moléstia de Chagas na Amazônia. Ocorrência de seis casos sus- peitos, autóctones, sorologicamente positivos. *Acta amaz. (Manaus)*, 7: 438-440, 1977.
21. FERREIRA, L. C. & DEANE, L. M. - Novo depositário silvestre do *Schizotrypanum cruzi* (Chagas, 1909): a Irãra, *Toyra barbara*. *Brasil - méd.*, 52: 1159-1161, 1938.
22. FORATTINI, O. P. - Biogeografia, origem e distribuição da domiciliação de triatomíneos no Brasil. *Rev. Saúde públ. (S. Paulo)*, 14: 265-299, 1980.
23. FRANÇA, M. S.; FRADE, J. M.; KONASUGAWA, K. & ALMEIDA, F. B. - Doença de Chagas: primeiro caso autóctone na Amazônia Ocidental, Amazonas, Brasil. *Acta amaz. (Manaus)*, 10: 759-762, 1980.
24. LACERDA Jr., K. G.; FARIA, J. I. M.; MATTE, J. R. et al. - Doença de Chagas. Registro do primeiro diagnóstico feito no homem no Território Federal do Amapá. In: *CONGRESSO DA SOCIEDADE BRASILEIRA DE MEDICINA TROPICAL*, 10, Curitiba. 1974. Programa e sumários. (res. 32).
25. LAINSON, R.; SHAW, J. J.; FRAHIA, H.; MILES, M. A. & DRAPER, C. C. - Chagas' disease in the Amazon Basin. I. *Trypanosoma cruzi* in silvatic animals, triatomine bugs and man in the State of Pará, north Brazil. *Trans. roy Soc. trop. Med. Hyg.*, 73: 193-204, 1979.
26. LENT, H. & WYGODZINSKY, P. - Revision of the triatominaes (Hemiptera, Reduviidae) and their significance as vectors of Chagas' disease. *Bull. Amer. Museum Nat. History*, 163 (art. 3), 1979.
27. MILES, M. A.; SOUZA, A. A. & POVOA, M. - Chagas' disease in the Amazon Basin. III. Ecotopes of ten triatomine bug species (Hemiptera, Reduviidae) from the vicinity of Belém, Pará State, Brazil. *J. med. Ent.*, 18: 266-278, 1981.
28. MILES, M. A.; ARIAS, J. R. & SOUZA, A. A. - Chagas' disease in the Amazon Basin. V. Periurban palms as habitats of *Rhodnius robustus* and *Rhodnius pictipes*, triatominae vectors of Chagas' disease. *Mem. Inst. Oswaldo Cruz*, 78: 391-398, 1983.
29. RODRIGUES, B. A. & MELLO, G. B. - Contribuição ao estudo da tripanosomiase americana. *Mem Inst. Oswaldo Cruz*, 37: 77-90, 1942.
30. RODRIGUES, I. R. C.; SOUZA, A. A. & VALENTE, S. A. S. - Novo caso autóctone de doença de Chagas no Estado do Pará. In: *CONGRESSO DA SOCIEDADE BRASILEIRA DE PARASITOLOGIA*, 9, Fortaleza, 1985. Resumos. p. 22.
31. RODRIGUES, I. R. C.; SOUZA, A. A.; TERCEROS, R. & VALENTE, S. - Doença de Chagas na Amazônia. I. Registro de oito casos autóctones em Macapá. *Rev. Soc. bras. Med. trop.*, 21: 193-197, 1988.
32. SHAW, J.; LAINSON, R. & FRAHIA, H. - Considerações sobre a epidemiologia dos primeiros casos autóctones de doença de Chagas registrados em Belém, Pará, Brasil. *Rev. Saúde públ. (S. Paulo)*, 3: 153-157, 1969.
33. SILVA, A. R.; MENDES, J. R. B.; MENDONÇA, M. L.; CUTRIM, R. N. & BRAZIL, R. P. - Primeiros casos agudos autóctones da doença de Chagas no Maranhão e inquérito soroepidemiológico da população. *Rev. Soc. bras. Med. trop.*, 18: 269-270, 1985.
34. SILVEIRA, P. T.; DIAS, M. G. V.; PARDAL, P. P.; LOBÃO, A. O. & MELO, G. B. - Novo caso autóctone de doença de Chagas registrado no Estado do Pará, Brasil. *Hiléia med. (Belém)*, 1: 61-62, 1979.
35. SOUZA LIMA, M. Z. M.; ARAUJO FILHO, N. A.; ALECRIM, M. G. C. et al. - Forma aguda da doença de Chagas no Amazonas (caso autóctone) In: *CONGRESSO DA SOCIEDADE BRASILEIRA DE MEDICINA TROPICAL*, 18, Ribeirão Preto, 1982. Resumos. p. A-3.

36. SOUZA LIMA, M. Z. M.; MIRANDA SANTOS, I. K. F.; SOUZA, A. A. A. et al. - Caso humano de infecção mista por *Trypanosoma cruzi* e organismos tipo *Trypanosoma rangeli* procedente de Barcelos, Rio Negro, Amazonas. In: *CONGRESSO DA SOCIEDADE BRASILEIRA DE MEDICINA TROPICAL*, 21., São Paulo, 1985. Resumos. p. 44.
37. SOUZA, A. A. A.; PARDAL, P. P. O.; VALENTE, S. A. A. et al. - Doença de Chagas no Estado do Pará: aspectos clínicos e laboratoriais de 4 novos casos autóctones. In: *CONGRESSO BRASILEIRO DE PARASITOLOGIA*, 11., 1989. Anais p.10.
38. VALENTE, S. A. A.; SOUZA, A. A. A.; MELO, P. R. R. et al. - Considerações epidemiológicas sobre um novo caso agudo de doença de Chagas observado no Estado do Pará. In: *CONGRESSO BRASILEIRO DE MEDICINA TROPICAL*, 25, Florianópolis, 1989. Resumos. p. 171. (res. 149),
39. VALENTE, S.; SOUZA, A. & VALENTE, V. - Doença de Chagas na Amazônia: situação atual e perspectivas. *Rev. Soc. bras. Med. trop.*, 25 (suppl.): 29(res. 063), 1992.

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