

HUMAN DISEASE IN RIBEIRA VALLEY, BRAZIL CAUSED BY CARAPARU, A GROUP C ARBOVIRUS — REPORT OF A CASE

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SUMMARY

The clinical and laboratory data of a disease in a resident of Ribeira Valley, São Paulo State, southeastern Brazil, caused by an agent close or identical to Caraparu, a Group C arbovirus, was described.

Although there is evidence of an intensive circulation of several arboviruses in the area, no diagnosis of human disease by these agents has been made, except the encephalitis cases caused by Rocio virus during an epidemic in 1975-1977.

An antigenic difference between Caraparu strains isolated in São Paulo and in Pará States and a close antigenic relationship between Caraparu strain from São Paulo and Bruconha virus were suggested by the serological tests.

KEY WORDS: Arbovirus Caraparu — human disease.

INTRODUCTION

In 1975 an epidemic of encephalitis caused by a newly recognized flavivirus, ROCIO^{25,15} suddenly struck on southeastern Brazil, in an area that includes the region of Ribeira Valley. Since then a number of studies have been carried out there in an involved in their persistence^{2,3,4,7,8,9,11,12,13,14,15,16,17,19,20,21}.

Results of the studies indicated the presence of many arboviruses known to be pathogenic for men. Among virus isolations from mosquitoes, sentinel mice and hamsters, birds, bats and humans, 13 arboviruses were identified, of which three were known human pathogens: eastern equine encephalitis, Rocio and Caraparu viruses^{16,2,3,4}. Serological surveys have also suggested the probable circulation in man of Mucambo and SP AN 50783 (Venezuelan equine encephalitis complex), Ilheus and St Louis encephalitis viruses^{11,12,13,14}.

However, only cases of encephalitis has an arbovirus etiology been suspected and in many patients this has not been confirmed.

We present here a case of febrile illness in a man that was living in the Ribeira Valley. The serologic diagnosis indicates that the etiologic agent, a virus close to or identical to Caraparu virus, caused human disease in this area.

MATERIAL AND METHODS

Characteristics of the area

The Ribeira Valley (24° — 25° 16'S, 46° 50' — 49° 20'W) is located in the south of São Paulo State, southeastern Brazil (figure 1). About 58% of the area is still covered extensively by forests and has a highly humid tropical climate²².

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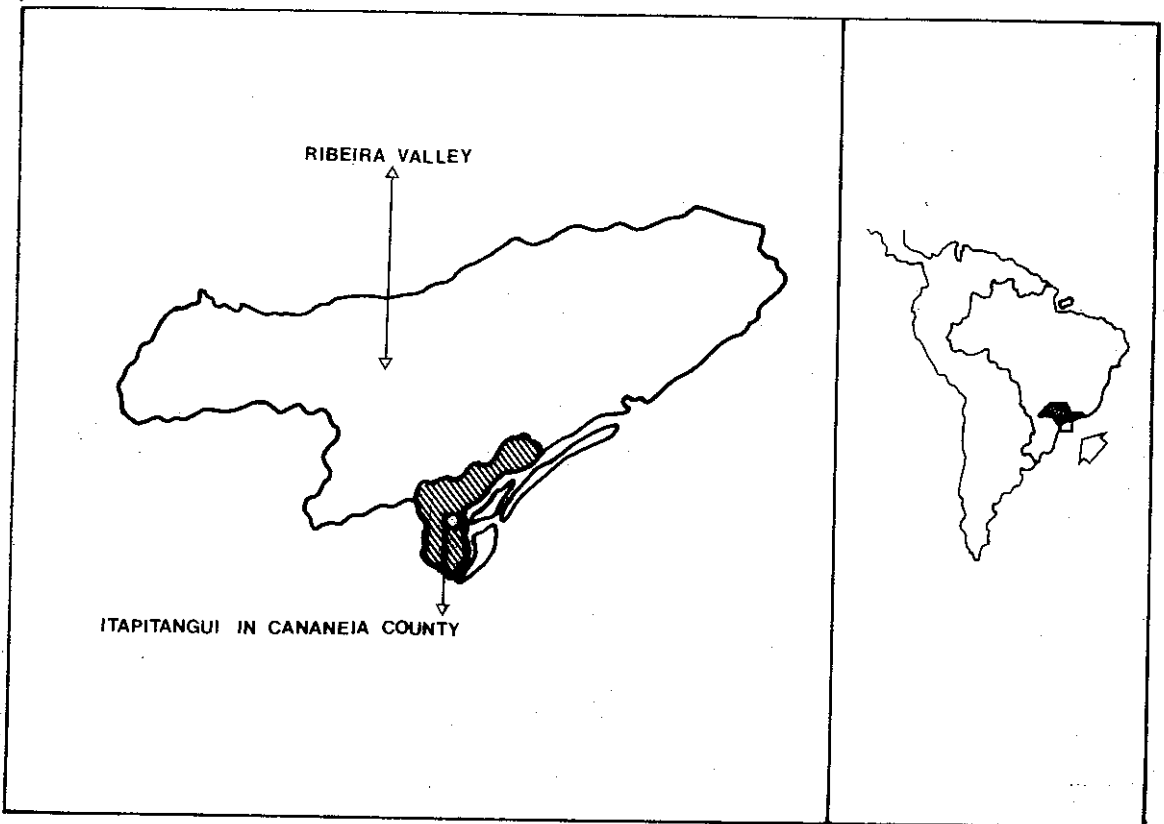


Fig. 1 — Geographic position of the Ribeira Valley and the Cananeia Country.

The local population, 243,290 inhabitants in 1980¹⁰, work mostly in agriculture, fishing and lumbering and has the lowest income of São Paulo State²².

Case report

A 28-year-old man developed high fever (38.5°–39°C) chills, severe headache, myalgia and prostration. Within 48 hours, during which he was treated with bed rest and aspirin, the symptoms disappeared completely. Since the patient was a biologist who had lived in the last nine months in a town of the Ribeira Valley and was working with an entomological team conducting studies in the forested area, the diagnosis of an arbovirus infection was suspected. During the two weeks before the onset of the disease he had been working in a small farm in Itapitangui, Cananeia, a coastal district (figure 1). From Monday afternoon until Wednesday, a team of six men usually carried out catching of mosquitoes using hu-

man bait. None of the other workers became sick.

Serum samples were collected from the patient on the second and 15th days after the first symptoms and tested by hemagglutination-inhibition (HI), according to technique described by SHOPE²³, and by complement fixation (CF), according to methods reported by CASALS²⁴, against the antigens of eastern equine encephalitis (SP An 14723), western equine encephalitis (Tr 25717) Mucambo (SP An 15600) SP an 50783 (new variant of subtype I of VEE complex) Rocio (SP H 34675) Ilheus (Be H 7445) St Louis encephalitis (Be An 11916) dengue-2 (Tr 1751), yellow fever (Asibi and 17D) and Caraparu (SP An 26550, isolated in São Paulo State and the prototype strain, Be An 3994, isolated in Pará State).

After a serological conversion to Caraparu virus was observed, other members of Group C, known to occur in Brazil (Apeu-Be An 848,

Itaqui-Be H 1779, Marituba — Be An 15, Murutucu — Be An 974, Nepuyo — TRVL 18462, Oriboca — Be An 17 and Bruconha, a newly recognized Group C virus isolated in Ribeira Valley from *Culex (Melanoconion) sp.* mosquitoes^{2,4} were tested by HI, CF and neutralization (N) tests. The last one was performed using suckling mice, according to a technique described by CASALS⁵.

A serum collected eight months after the illness was also tested for antibody to antigens of Group C. The neutralization test to Bruconha virus was performed only on this serum. The acute serum sample was not available when we have received this virus from the laboratory of Division of Vector-Borne Viral Diseases, C.D.C., U.S.A.

Isolation of the virus was not attempted

since the acute serum samples was not preserved at -70°C after collection.

RESULTS

A serological conversion to Caraparu (SP An 26550) and Bruconha viruses was apparent from the results of HI test presented on table 1. N test have confirmed the serological conversion to Caraparu (SP An 26550, Be An 3994) and Apeú (Be An 848) viruses, with highest titers to SP An 26550 (table 3). The serum sample collected 8 months after the disease has presented a long neutralization index of 4.8 to Bruconha virus.

CF antibodies, in low titers, were present on the acute and convalescent sera with highest titer to Bruconha virus. (Table 2).

T A B L E I
Results of hemagglutination — inhibition (HI) teste with paired human sera and group C prototype strains

Serum	Antigen (4u)								
	Bruconha 77V14814	Caraparu SP An 26550	Caraparu Be An 3994	Itaqui An 12797	Marituba An 15	Apeú An 848	Oriboca An 17	Murutucú An 974	Nepuyo An 10709
Bruconha	640*	640	640	160	160	320	80	160	320
Caraparu									
SP An 26550	640	640	640	80	80	160	40	80	160
Caraparu									
Be An 3944	320	320	1.280						
Itaqui	<20			160					
Marituba	80				320				
Apeú	40					160			
Oriboca	<20						160		
Murutucú	80							160	
Nepuyo	40								320
S1	<10	<10	<10	<10	<10	<10	<10	<10	<10
S2	40	40	20	<10	<10	20	<10	<10	<10
S3	40	40	<20						
Control	<20	<20	<20	<20	<20	<20	<20	<20	<20

Blank indicates not tested

* Titer of HI antibody

S1 — Serum of patient collected on 12/16/83

S2 — Serum of patient collected on 12/29/83

S3 — Serum of patient collected on 8/9/84

DISCUSSION

The serological results indicated a recent infection caused by Caraparu virus or a virus closely related.

Our current knowledge about natural cycles of Group C bunyavirus isolated in neotropical region, particularly in northern Brazil¹, points out that they circulate among rodents, marsupials and eventually humans, transmitted by

mosquitoes of genus *Culex* specially *Culex (Melanoconion)*. Ribeira Valley presents a rich fauna of these small vertebrates and mosquitoes. *Cx. (Melanoconion)* was one of predominant species in longitudinal studies carried out both in extra and intradomiciliary environment in localities where encephalitis cases have occurred^{7,8}.

Thus, the occurrence of disease caused by Group C virus in a man with high exposition

T A B L E II

Results of fixation complement (FC) tests with paired human sera and Bruconha and Caraparu (SP AN 26550) antigens

Serum	Antigens	
	Bruconha	Caraparu (SP An 30256)
S1	8/32*	8/8
S2	16/32	8/8
S3	<8/32	<8/8
Bruconha	32/256	
Caraparu (SP An 26550)		8/64

* serum titer/antigen titer

S1 serum sample collected on 12-16-83

S2 serum sample collected on 12-29-83

S3 serum sample collected on 8-9-84

T A B L E III

Results of neutralization test with paired human sera and Caraparu and Apeu viruses

Serum	Virus		
	Caraparu SP An 26550	Be An 3994	Apeu (Be An 848)
S1	≅ 1,8*	≅ 0,3	≅ 0,8
S3	≅ 5,8	3,9	3,0
Caraparu SP An 26550	≅ 6,8	4,5	3,9
Caraparu Be An 3994	3,8	≅ 4,0	5,3
Apeu (Be An 848)	3,9	4,5	6,1

* Log neutralization index

S1 serum sample collected on 12-16-83

S3 serum sample collected on 8-9-84

to wild anthropophilic mosquitoes was not surprising. In prior serological survey on 83 healthy road workers that were living in the region close to the forest, 12 out of them presented Caraparu IH antibodies¹². Even in healthy women and children that always lived in small towns of the region, N antibodies to Caraparu were detected, suggesting eventual urban transmission of this virus^{13,14}. But, until now, this diagnosis has not been made by the local physicians, either due to the absence of laboratory facilities for a rapid diagnosis or because the arbovirus etiology was remembered only in severe diseases with central nervous system disturbances.

The clinical symptoms observed in the patient were similar to those mentioned in cases where the Caraparu virus was isolated from blood during the viremic phase¹⁸.

Serologic results with patient sera are consistent with the antigenic behavior of Caraparu virus which is closely related to Apeu virus in HI and N tests^{6,24}.

The results also suggested a close antigenic relationship between Caraparu, Strain isolated in São Paulo, and Bruconha virus. When the latter was identified as a newly Group C virus, the Caraparu prototype (Be An 3994) was used, among other Group C prototype strains, for its characterization⁴. But the HI and N tests processed on sera of the patient (Tables 1 and 3) showed an antigenic difference between Caraparu strains from Belém and São Paulo. A more detailed study about the antigenic relationships between SP An 26550 and Bruconha viruses seems called for. Serologic studies of human population are also warranted for Bruconha virus because the possible role of this virus as an human pathogen.

RESUMO

Caso de moléstia humana causada por arbovírus do Grupo C, Caraparu, na região do Vale do Ribeira, São Paulo, Brasil.

Relatam-se os dados clínicos e laboratoriais de um caso de moléstia humana causada por vírus idêntico ou antígenicamente muito relacionado ao arbovírus do Grupo C Caraparu, em um morador da região do Vale do Ribeira, Estado de São Paulo, sudeste do Brasil. O fato apresenta interesse médico sanitário pois embora existam evidências da presença de inúmeros arbovírus na área, os únicos casos comprovados de doença por esses agentes foram os de encefalite pelo vírus Rocio durante a epidemia ocorrida em 1975-1977. Os resultados dos testes sorológicos sugerem diferença antigênica entre as cepas de vírus Caraparu isoladas nos Estados de São Paulo e Pará e proximidade antigênica entre a cepa de Caraparu de São Paulo e o vírus Bruconha.

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