INSTITUTO EVANDRO CHAGAS
MS-SECRETARIA DE VIGILÂNCIA EM SAÚDE

80 ANOS
DE CONTRIBUIÇÃO À CIÊNCIA E À SAÚDE

**OFICINA CONJUNTA UNASUR / CPLP DE ATUALIZAÇÃO CIENTÍFICA E TECNOLÓGICA**
**SOBRE FEBRE AMARELA E OUTRAS ARBOVIROSES EMERGENTES E REEMERGENTES**
**Outubro de 2017 - Rio de Janeiro**

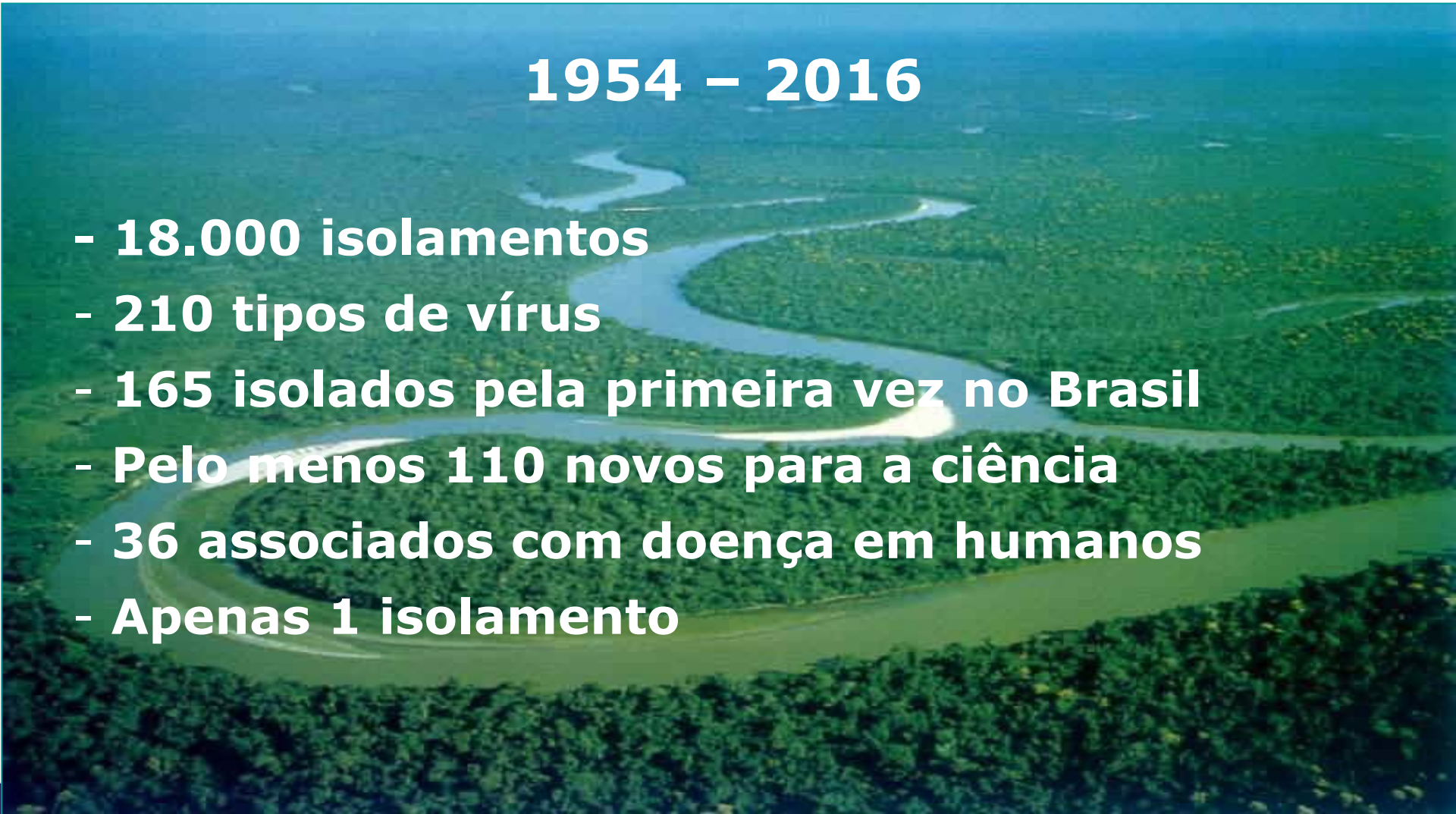
# SOROPREVALÊNCIA DAS ARBOVIROSES NO BRASIL


**Jannifer Oliveira Chiang**
**Pesquisadora em Saúde Pública**
**Seção de Arbovirologia e Febres Hemorrágicas**

SUS
SECRETARIA DE VIGILÂNCIA EM SAÚDE
MINISTÉRIO DA SAÚDE
BRASIL GOVERNO FEDERAL

# International Catalogue of Arboviruses, Including Certain Other Viruses of Vertebrates (Karabatsos, 1985)

n= 537/118 doença humana/ + 20 epidemia



**1954 – 2016**

- **18.000 isolamentos**
- **210 tipos de vírus**
- **165 isolados pela primeira vez no Brasil**
- **Pelo menos 110 novos para a ciência**
- **36 associados com doença em humanos**
- **Apenas 1 isolamento**

# ESTUDOS ECO-EPIDEMIOLÓGICOS NA AMAZÔNIA BRASILEIRA

*Belem-Brasilia*

*Santarem- Cuiaba*

*Carajás*

*Serra do Navio*

*Itaituba-Jacareacanga*

*Porto Trombetas*

*Transamazonia -1972*

# VIAGEM DE CAMPO

INSTITUTO EVANDRO CHAGAS
MS-SECRETARIA DE VIGILÂNCIA EM SAÚDE

## Captura de insetos hematófagos – solo

Fonte: IEC.

# VIAGEM DE CAMPO

## Captura de insetos hematófagos – Copa

Fonte: IEC.

# VIAGEM DE CAMPO

INSTITUTO EVANDRO CHAGAS
MS-SECRETARIA DE VIGILÂNCIA EM SAÚDE

## Captura de insetos hematófagos – Armadilha CDC

Fonte: IEC.

# VIAGEM DE CAMPO

INSTITUTO EVANDRO CHAGAS
MS-SECRETARIA DE VIGILÂNCIA EM SAÚDE

## Captura de aves silvestres – rede de neblina

Source: IEC.

# VIAGEM DE CAMPO

INSTITUTO EVANDRO CHAGAS
MS-SECRETARIA DE VIGILÂNCIA EM SAÚDE

## Captura de animais silvestres – armadilhas

Source: IEC.

# VIAGEM DE CAMPO

INSTITUTO EVANDRO CHAGAS
MS-SECRETARIA DE VIGILÂNCIA EM SAÚDE

## Humanos

Coleta de material na floresta de Uriboca (1954) para exame de febre amarela

Coleta de material na floresta de Uriboca (1954) exame de febre amarela

# LABORATÓRIO DE CAMPO

INSTITUTO EVANDRO CHAGAS
MS-SECRETARIA DE VIGILÂNCIA EM SAÚDE

# VIAGEM DE CAMPO

INSTITUTO EVANDRO CHAGAS
MS-SECRETARIA DE VIGILÂNCIA EM SAÚDE

## As dificuldades do trabalho de campo

Um dos aviões biplanos e monomotores, de asas de lona, do Correio Aéreo Nacional, para o piloto e um só passageiro, que quinzenalmente levava de Belém a Abaetetuba um a um dos membros da equipe que atuava com Evandro

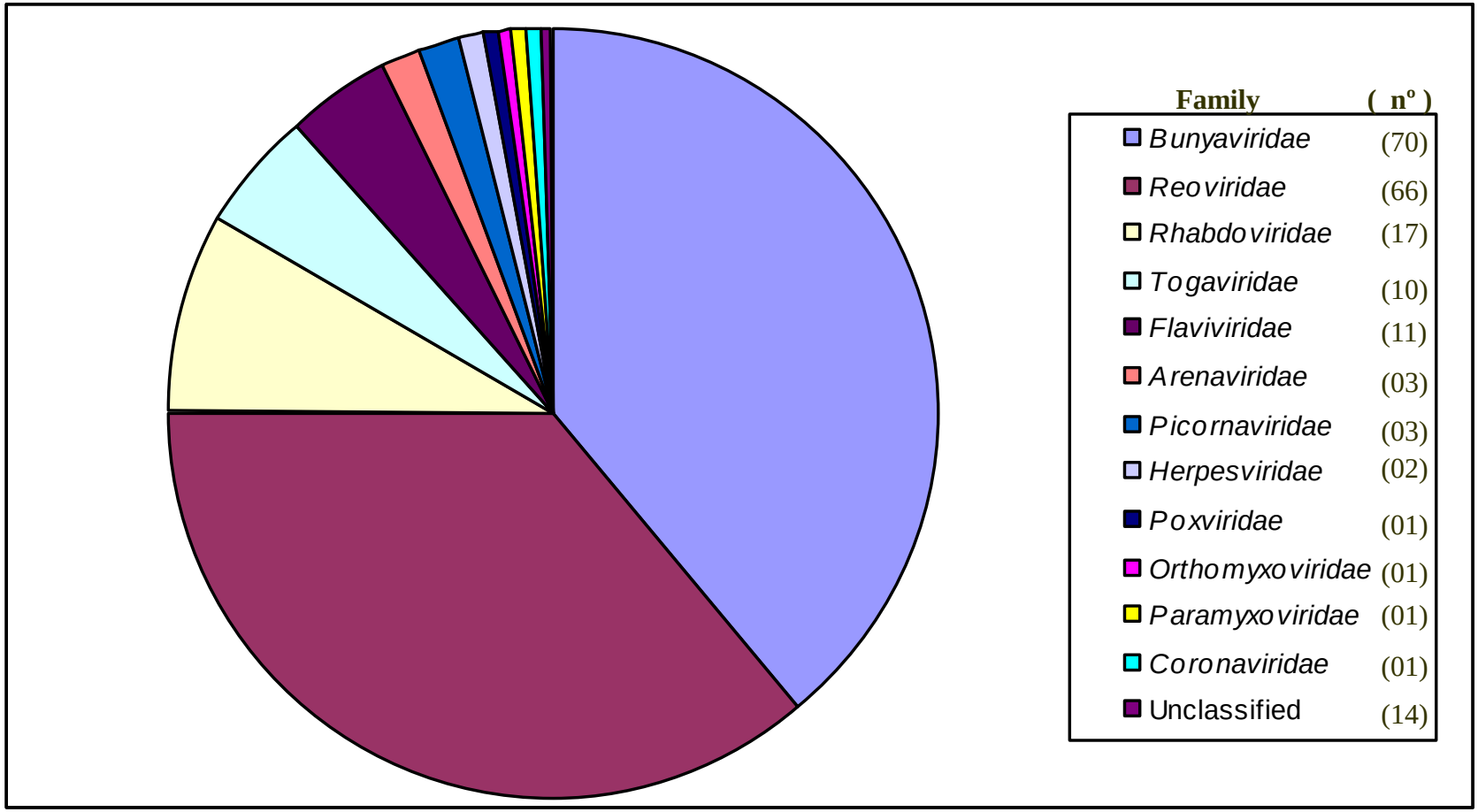
Chegada de pesquisadores ao interior em canoas: adversidades superadas para o avanço da ciência

# VIAGEM DE CAMPO

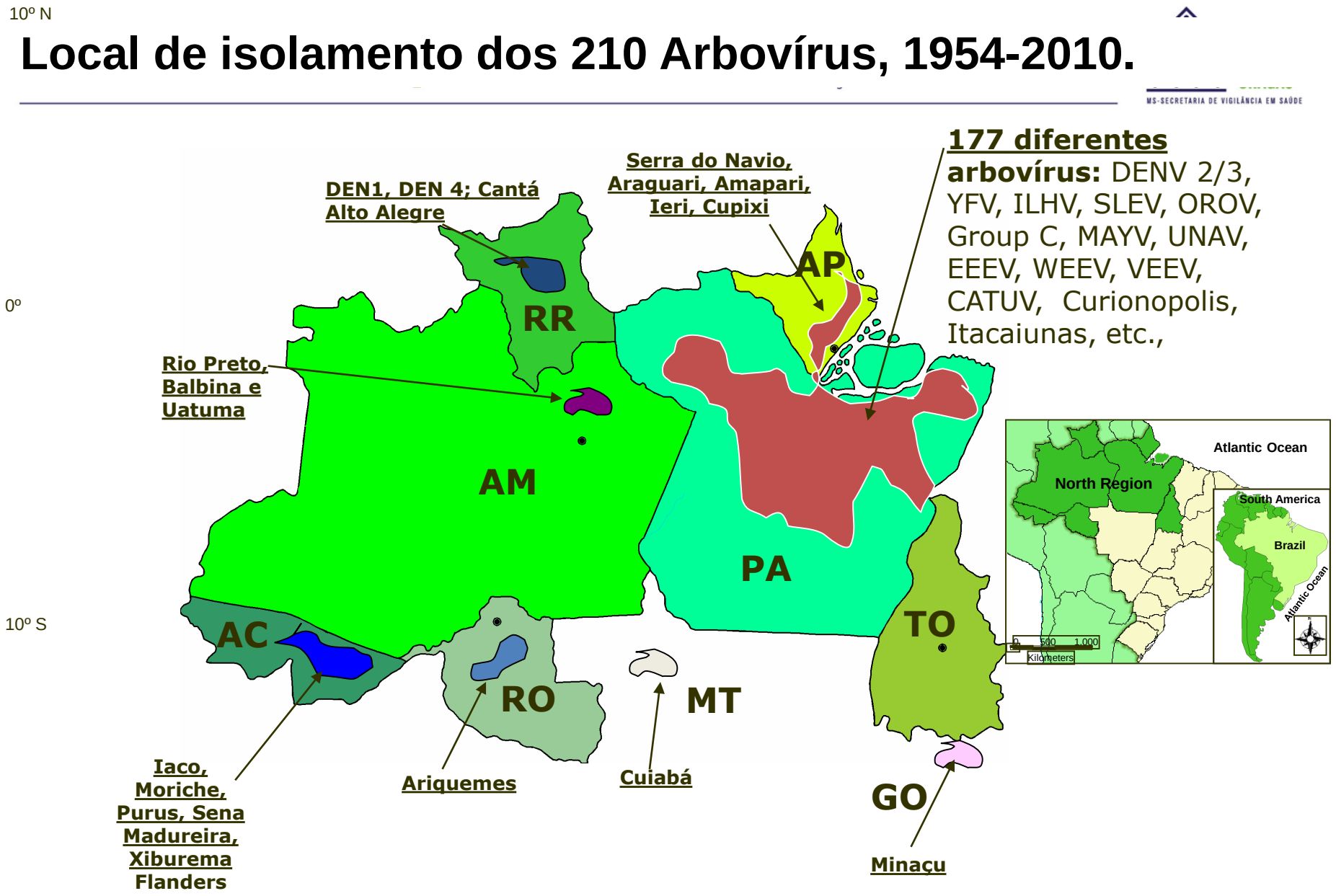
INSTITUTO EVANDRO CHAGAS
MS-SECRETARIA DE VIGILÂNCIA EM SAÚDE

## As dificuldades do trabalho de campo


# Distribuição dos 210 diferentes tipos de arbovírus e outros vírus isolados na Amazônia Brasileira por família viral



# Local de isolamento dos 210 Arbovírus, 1954-2010.

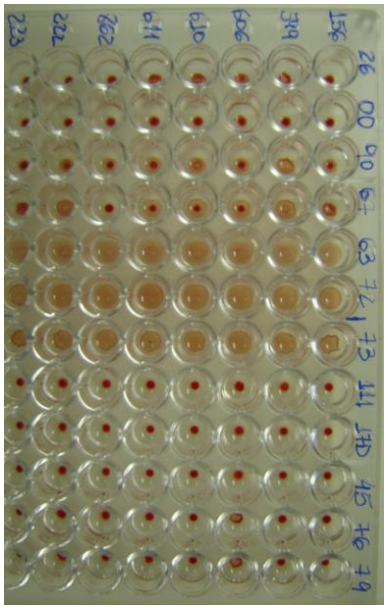


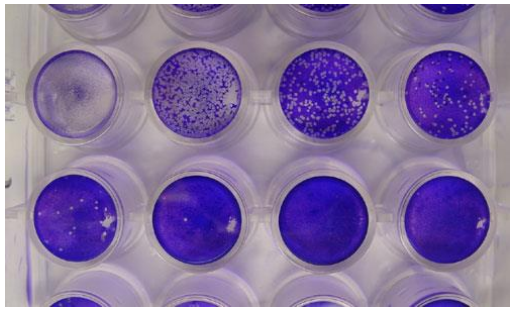

Vasconcelos et al., 2013

# Estudos Soroprevalência/soroepidemiológico

## TESTES SOROLÓGICOS

1. Inibição da hemaglutinação – IH
2. Neutralização viral – Camundongos e PRNT
3. Elisa





# QUADRO CLÍNICO

SINTOMÁTICAS

Assintomáticas

| Síndrome clínica | Genero/Grupo antigênico | Arbovírus |
|---|---|---|
| Febril | Alphavirus – A | MUCV, PIXV |
| | Flavivirus – B | BSQV, ILHV, DENV, CPCV |
| | Orthobunyavirus - C | CARV, APEUV, MTBV, MURV, ORIV, ITQV, NEPV |
| | Orthobunyavirus – Califórnia | GROV |
| | Orthobunyavirus - Anopheles A | TCMV |
| | Orthobunyavirus – Guamá | CATUV, GMAV |
| | Phlebovirus - Phlebotomus | ALEV, CDUV, MBIV, SNTV |
| | Orthobunyavirus- Simbu | OROV |
| | Bunyamwera | XINV |
| | Vesiculovirus – VSV | PIRYV*, JURV |
| Febril exantemática | Alphavirus – A | MAYV, CHIKV |
| | Flavivirus – B | DENV, ZIKV |
| | Orthobunyavirus - Simbu | OROV |
| Neurológica | A | EEEV, WEEV, VEEV subtipo IF *, CHIKV |
| | B | WNV, ROCV, SLEV, DENV, ZIKV |
| | Bunyamwera | TUCV |
| Hemorrágica | Flavivirus – B | DENV, YFV |

# TESTE DE IH – 36 ARBOVÍRUS

- Amostras: humanos e animais domésticos e silvestres

| | | |
|---|---|---|
| ***Alphavirus*** *(7)* | *Vírus encefalite equina Leste*<br>*Vírus encefalite equina Oeste*<br>*Vírus Mayaro*<br>*Vírus Chikungunya* | *Vírus mucambo*<br>*Vírua Aurá*<br>*Vírus Pixuna* |
| ***Flavivirus*** *(13)* | *Vírus febre amarela*<br>*Vírus dengue (4 sorotipos)*<br>*Vírus Zika*<br>*Vírus Ilhéus*<br>*Vírus encefalite Saint Louis* | *Vírus Rocio*<br>*Vírus Bussuquara*<br>*Vírus Cacipacoré*<br>*Vírus Naranjal-Like*<br>*Vírus West Nile* |
| ***Orthobunyavirus*** *(13)* | *Vírus Maguari*<br>*Vírus Tacaiuma*<br>*Vírus Caraparú*<br>*Vírus Oropouche*<br>*Vírus Catú*<br>*Vírus Utinga*<br>*Vírus Belém* | *Vírus Itaqui*<br>*Vírus Apeú*<br>*Vírus Murucutú*<br>*Vírus Oriboca*<br>*Vírus Guaroa*<br>*Vírus Marituba* |
| ***Phlebovirus*** *(3)* | *Vírus Icoarací*<br>*Vírus Bujaru* | *Vírus Urucuri* |

# Serological survey for arboviruses in Juruti, Pará State, Brazil


*Ana Cecilia Ribeiro Cruz* [1]
*Assis do Socorro Correa dos Prazeres* [1]
*Eliana Colares Gama* [1]
*Maxwell Furtado de Lima* [1]
*Raimunda do Socorro Silva Azevedo* [1]
*Lívia Medeiros Neves Casseb* [1]
*Joaquim Pinto Nunes Neto* [1]
*Lívia Carício Martins* [1]
*Jannifer Oliveira Chiang* [1]
*Sueli Guerreiro Rodrigues* [1]
*Pedro Fernando da Costa Vasconcelos* [1]

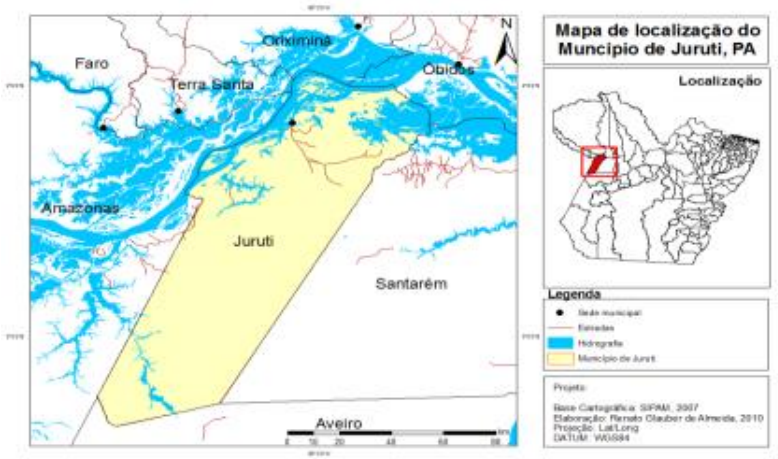




Tabela 1

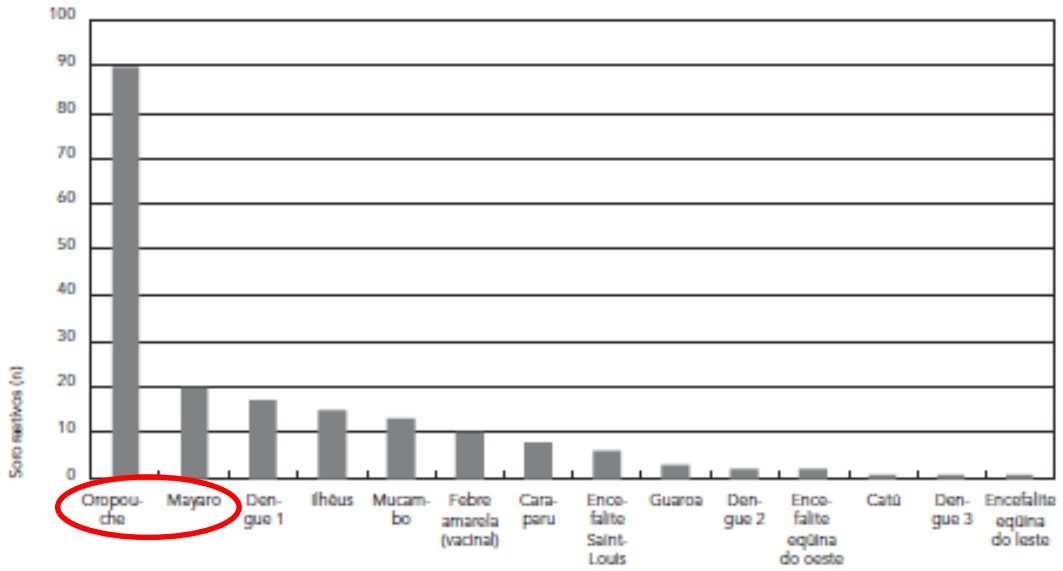
Prevalência de anticorpos totais para arbovírus em soros de humanos.

| Famílias virais | Positivos n | Positivos % | Total % |
|---|---|---|---|
| Togaviridae | 41 | 6,11 | 2,57 |
| Bunyaviridae | 116 | 17,29 | 7,26 |
| Flaviviridae | 379 | 56,48 | 23,73 |
| Reações mistas | 135 | 20,12 | 8,45 |
| Togaviridae + Bunyaviridae | 13 | 1,94 | 0,81 |
| Togaviridae + Flaviviridae | 41 | 6,11 | 2,56 |
| Togaviridae + Bunyaviridae + Flaviviridae | 13 | 1,94 | 0,81 |
| Flaviviridae + Bunyaviridae | 68 | 10,13 | 4,28 |
| Positivos | 671 | | 41,02 |
| Negativos | 926 | | 58,98 |
| **Total** | 1.597 | | |

**1.597 soros de humanos**
**Fevereiro de 2007 a abril de 2008**

Figura 2

Respostas monotípicas detectadas pela presença de anticorpos inibidores da hemaglutinação a partir de soros de humanos.



# Serological survey for arboviruses in Juruti, Pará State, Brazil



Tabela 2

Avaliação sorológica por captura de IgM (MAC ELISA) em soros de humanos.

| | Febre amarela | Dengue | Mayaro | Oropouche |
|---|---|---|---|---|
| Positivo | 0 | 20 | 5 | 23 |
| Negativo | 1.597 | 1.577 | 97 | 90 |
| Não testado | 0 | 0 | 1.495 | 1.484 |
| **Total** | 1.597 | 1.597 | 1.597 | 1.597 |

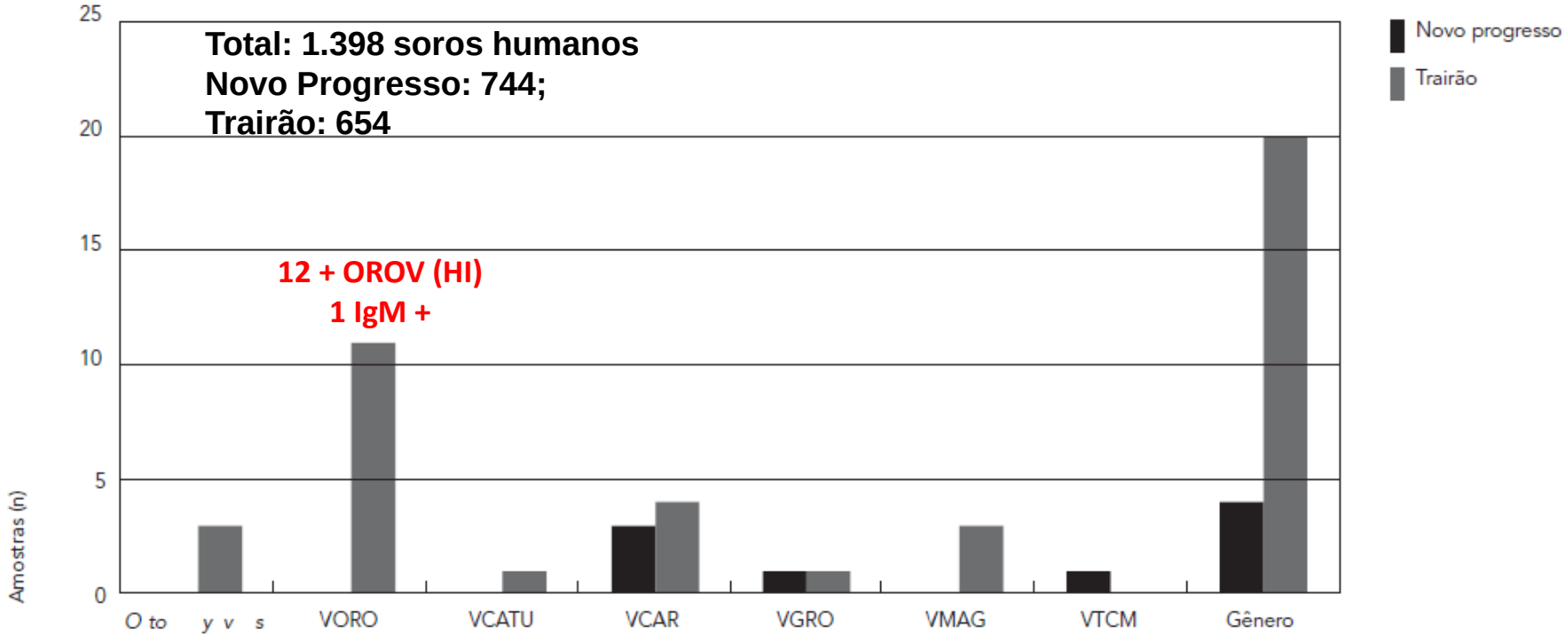
Tabela 3

Inquérito sorológico pela presença de anticorpos inibidores da hemaglutinação a partir de soros de animais silvestres.

| Animal | Espécie | Negativos | Positivos | Resultado da inibição da hemaglutinação |
|---|---|---|---|---|
| Aves | *Phlegopsis n. pareensis* | 71 | 1 | Vírus Ilhéus, Rocio e encefalite Saint Louis |
| | *Geotrygon montana* | 0 | 1 | Vírus da febre amarela, Ilhéus, encefalite Saint Louis e Rocio |
| | *Thamnophilus aethiops* | 0 | 1 | Vírus da febre amarela, Ilhéus, encefalite Saint Louis e Rocio |
| | *Conopophaga roberti* | 0 | 1 | Vírus da encefalite Saint Louis e Cacicaporé |
| | *Schiffornis tudinus* | 0 | 1 | Vírus da encefalite Saint Louis |
| | *Xiphorhynchus ocellatus* | 0 | 1 | Vírus da encefalite Saint Louis |
| | *Myrmothera companisona* | 0 | 1 | Vírus da encefalite Saint Louis |
| Roedor | *Proechimis guianensis* | 2 | 0 | Negativo |
| | *Proechimis longicaudatus* | 0 | 0 | Negativo |
| Marsupial | *Didelphis marsupialis* | 5 | 0 | Negativo |
| | *Metachyrus filander* | 0 | 0 | Negativo |
| | *Didelphis albiventris* | 0 | 0 | Negativo |
| **Total** | | 78 | 7 | |

# Ecoepidemiology of arboviruses in the influence area of Cuiabá-Santarém Highway (BR 163), Pará State, Brazil

*Marcio Roberto Teixeira Nunes* [1]
*Taciana Fernandes Souza Barbosa* [1]
*Lívia Medeiros Neves Casseb* [1]
*Joaquim Pinto Nunes Neto* [1]
*Nazaré de Oliveira Segura* [1]
*Hamilton Antônio de Oliveira Monteiro* [1]
*Eliana Vieira Pinto* [1]
*Samir Mansour Casseb* [1]
*Jannifer de Oliveira Chiang* [1]
*Lívia Caricio Martins* [1]
*Daniele Barbosa de Almeida Medeiros* [1]
*Pedro Fernando da Costa Vasconcelos* [1]



# Ecoepidemiology of arboviruses in the influence area of Cuiabá-Santarém Highway (BR 163), Pará State, Brazil

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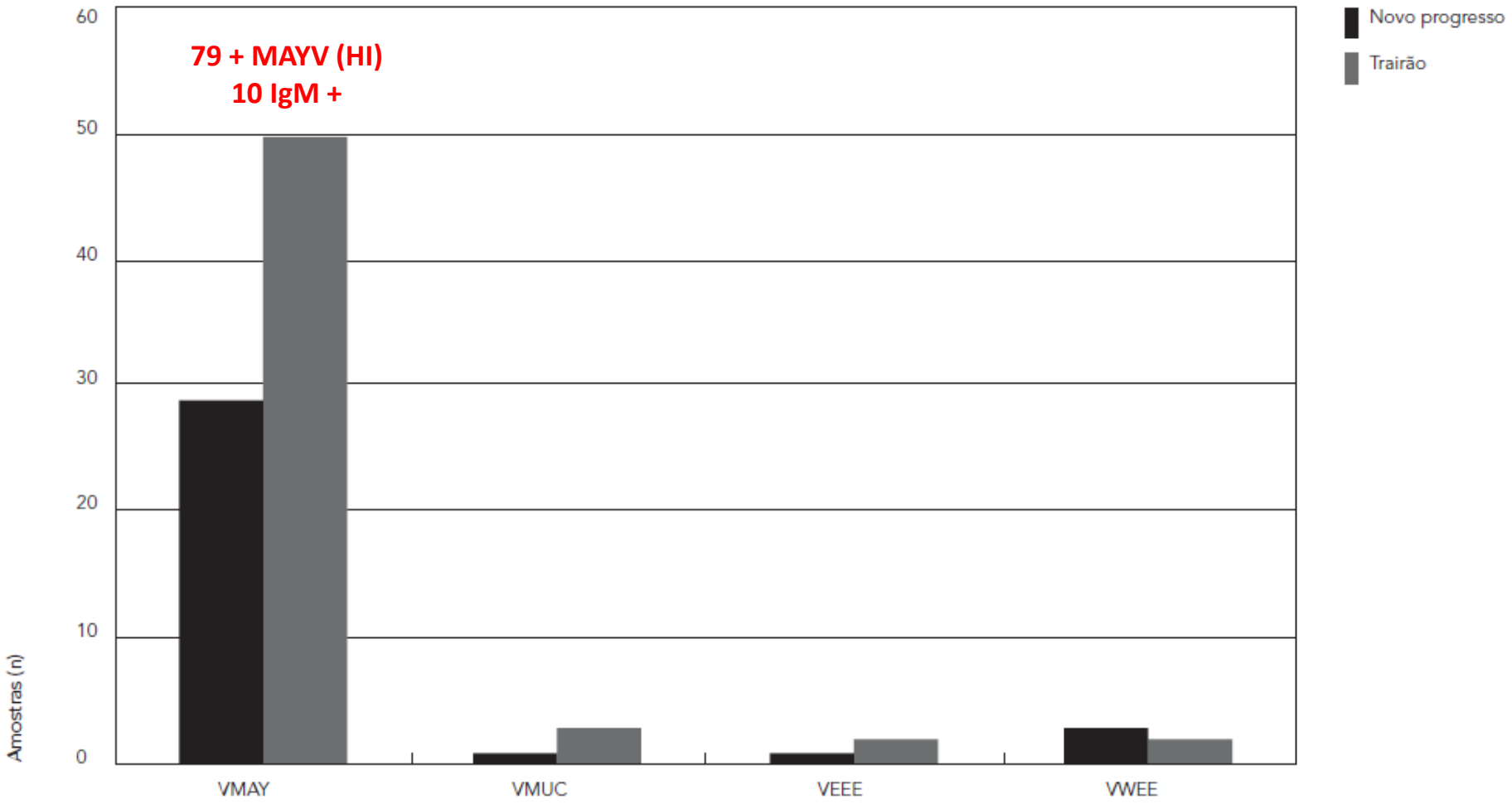

# Ecoepidemiology of arboviruses in the influence area of Cuiabá-Santarém Highway (BR 163), Pará State, Brazil

SERVIÇO DA SAÚDE PÚBLICA

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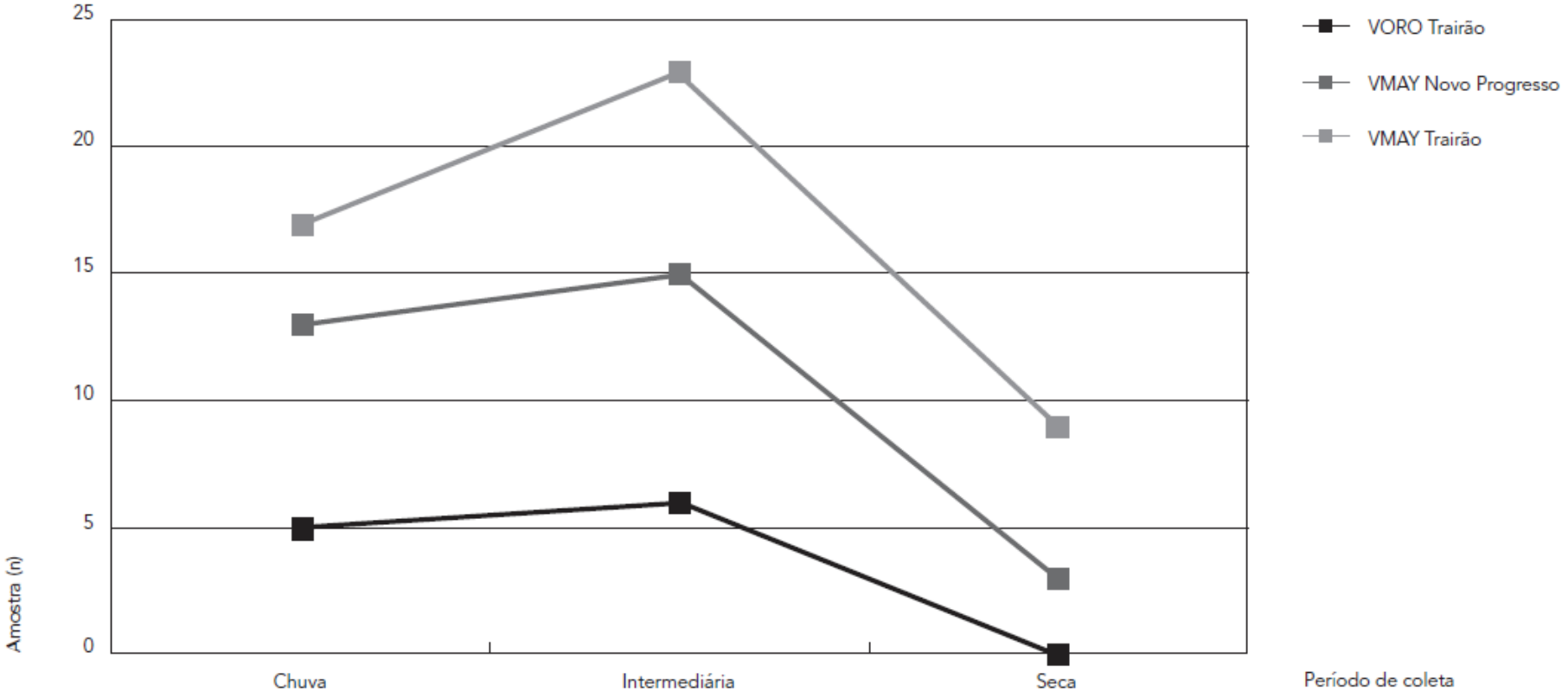
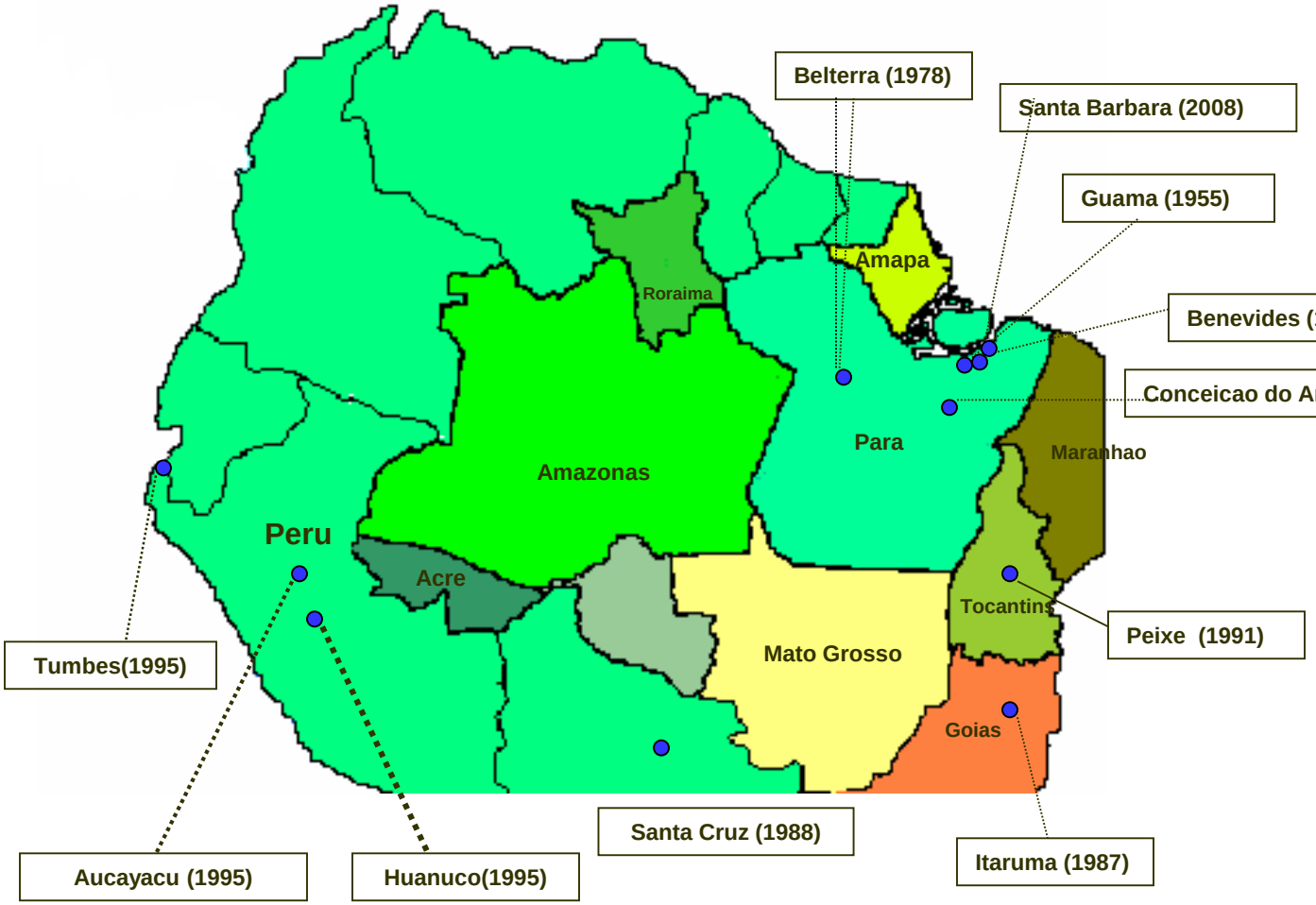


# VÍRUS MAYARO

- *Togaviridae – Alphavirus* – Grupo antigênico A*;*
- Relacionado ao vírus Chikungunya;
- Semelhante quadro clínico;
- Transmissão ciclo urbano: *Aedes aegipt*
- Diagnóstico laboratorial

# PRINCIPAIS EPIDEMIAS MAYV NA REGIÃO AMAZÔNICA

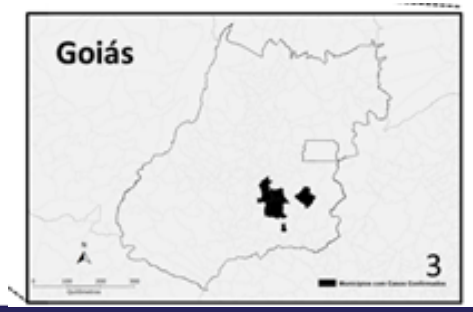
## 1955-2008




***Azevedo et al, 2009: Emeg Infet Dis***

**60 casos confirmados - 2015**

Professor Jamil: 12
Rio Quente: 11
Goiânia: 10
Bela Vista de Goiás: 7
Hidrolândia: 6
Piracanjuba: 6
Orizona: 4
Aparecida de Goiânia: 2
Caiapônia: 1
Caldazinha: 1



# Mayaro Fever Virus, Brazilian Amazon

Raimunda S.S. Azevedo, Eliana V.P. Silva, Valéria L. Carvalho, Sueli G. Rodrigues, Joaquim P. Nunes Neto, Hamilton A.O. Monteiro, Victor S. Peixoto, Jannifer O. Chiang, Márcio R.T. Nunes, and Pedro F.C. Vasconcelos

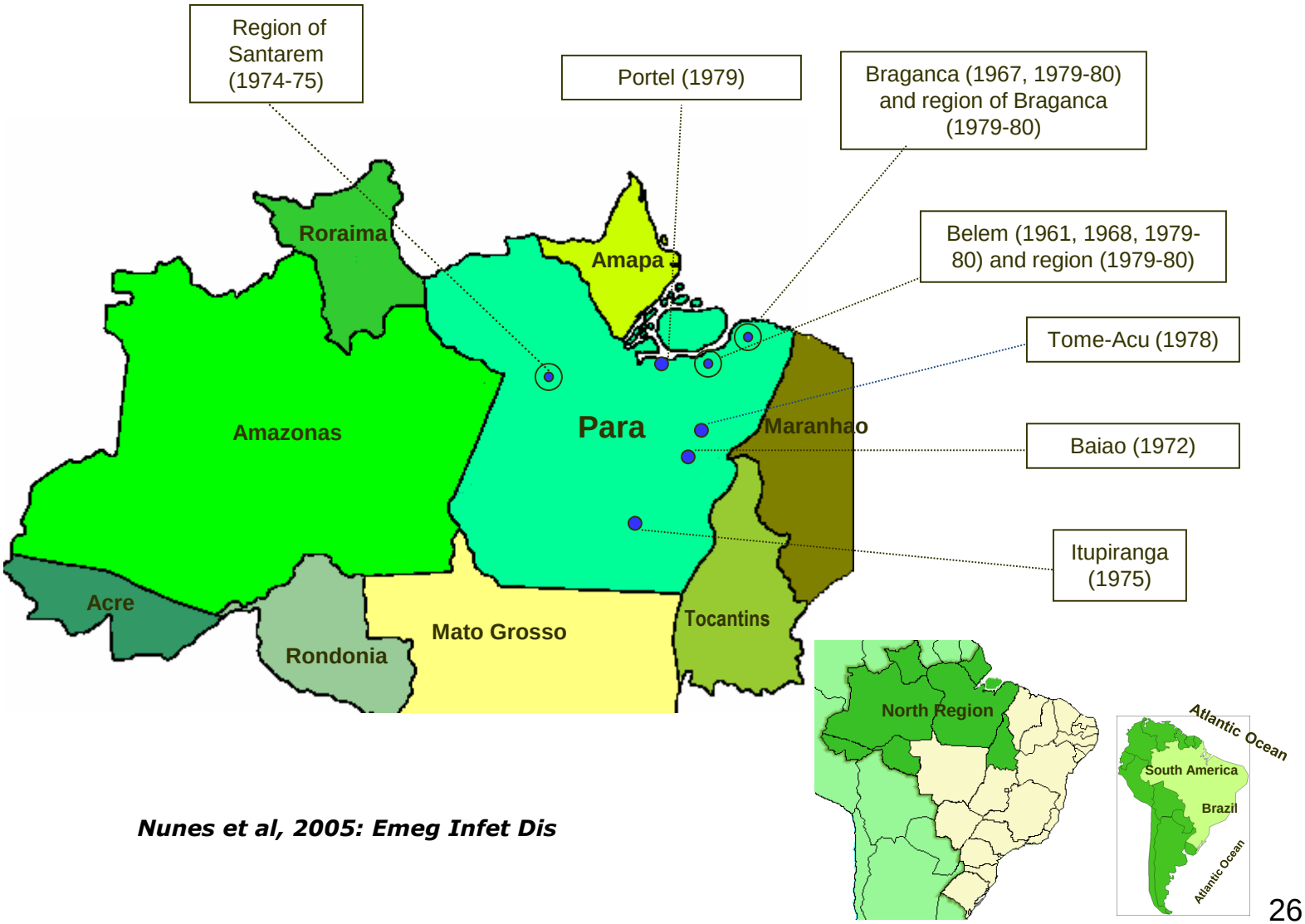
In February 2008, a Mayaro fever virus (MAYV) outbreak occurred in a settlement in Santa Barbara municipality, northern Brazil. Patients had rash, fever, and severe arthralgia lasting up to 7 days. Immunoglobulin M against MAYV was detected by ELISA in 36 persons; 3 MAYV isolates sequenced were characterized as genotype D.

Emerging Infectious Diseases • www.cdc.gov/eid • Vol. 15, No. 11, November 2009

**Assentamento Expedito Ribeiro, Santa Barbara**

# Febre do Oropouche: epidemias 1961 a 1980

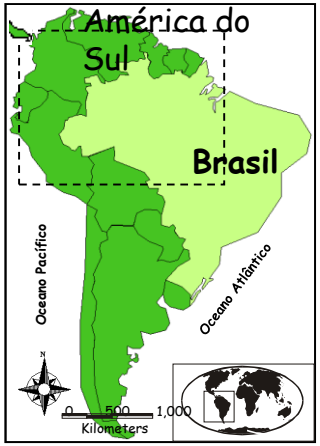


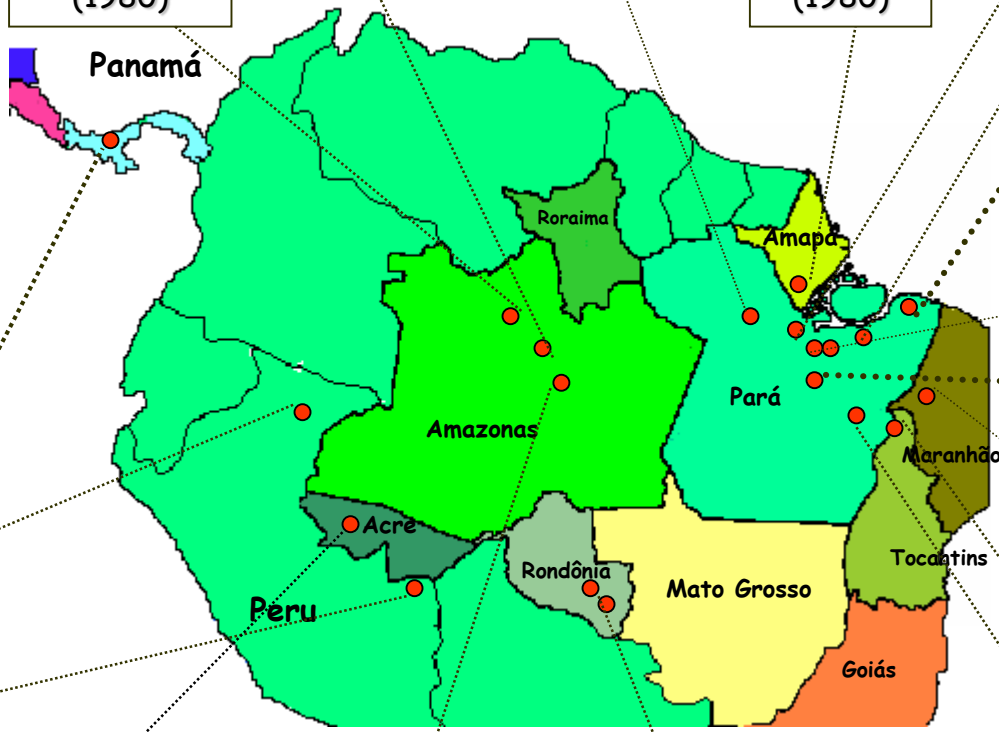



***Nunes et al, 2005: Emeg Infet Dis***

# Febre do Oropouche: epidemias 1980 e 2009






Barcelos (1980)

Novo Airão (1996)

Oriximiná (1996)

Mazagão (2009)

Mazagão (1980)

Porto de Moz (2004)

Santa Bárbara (2009)

Região Bragantina (2006)

Vitória do Xingu, Brasil Novo (1996)

Serra Pelada (1994)

Porto Franco (1988)

Tocantinópolis (1988)

Parauapebas (2003)

Ariquemes , Ouro Preto do Oeste (1991)

Manaus (1980-81)

Xapuri, 1996

Puerto Maldonado (1993)

Iquitos (1992-93-94-95-97-98)

Bejuco (1989)

# Reemergence of Oropouche Fever, Northern Brazil

Raimunda do Socorro da Silva Azevedo,*
Márcio Roberto Teixeira Nunes,*
Jannifer Oliveira Chiang,* Gilberta Bensabath,*
Helena Baldez Vasconcelos,* Ana Yecê das
Neves Pinto,* Lívia Carício Martins,*
Hamilton Antônio de Oliveira Monteiro,*
Sueli Guerreiro Rodrigues,*
and Pedro Fernando da Costa Vasconcelos*

Oropouche fever has reemerged in Parauapebas and Porto de Moz municipalities, Pará State, Brazil. Serologic analysis (immunoglobulin M–ELISA) and virus isolation confirmed *Oropouche virus* (OROV) in both municipalities. Nucleotide sequencing of 2 OROV isolates from each location indicated genotypes I (Parauapebas) and II (Porto de Moz) in Brazil.

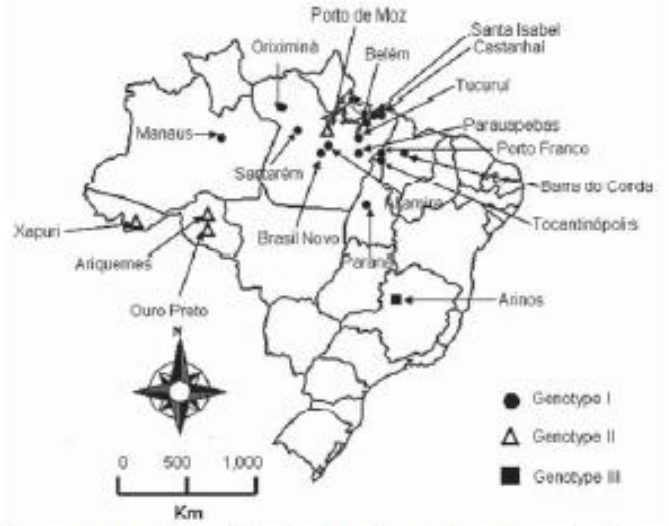



Figure 1. Map of Brazil showing locations where Oropouche fever outbreaks were identified up to 2003–2004.



# Oropouche Virus Isolation, Southeast Brazil

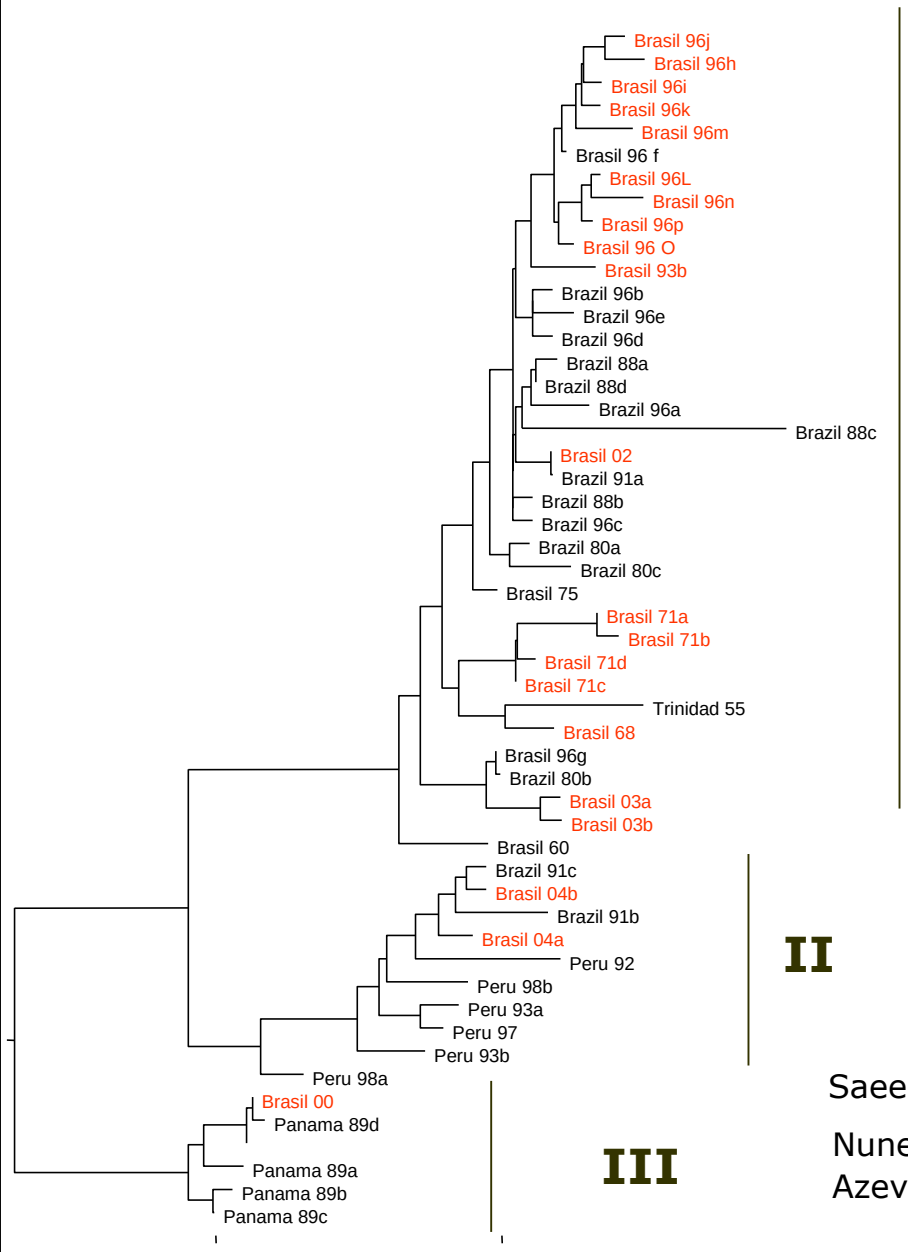
Márcio Roberto Teixeira Nunes,*
Lívia Carício Martins,*
Sueli Guerreiro Rodrigues,*
Jannifer Oliveira Chiang,*
Raimunda do Socorro da Silva Azevedo,*
Amelia P.A. Travassos da Rosa,†
and Pedro Fernando da Costa Vasconcelos*

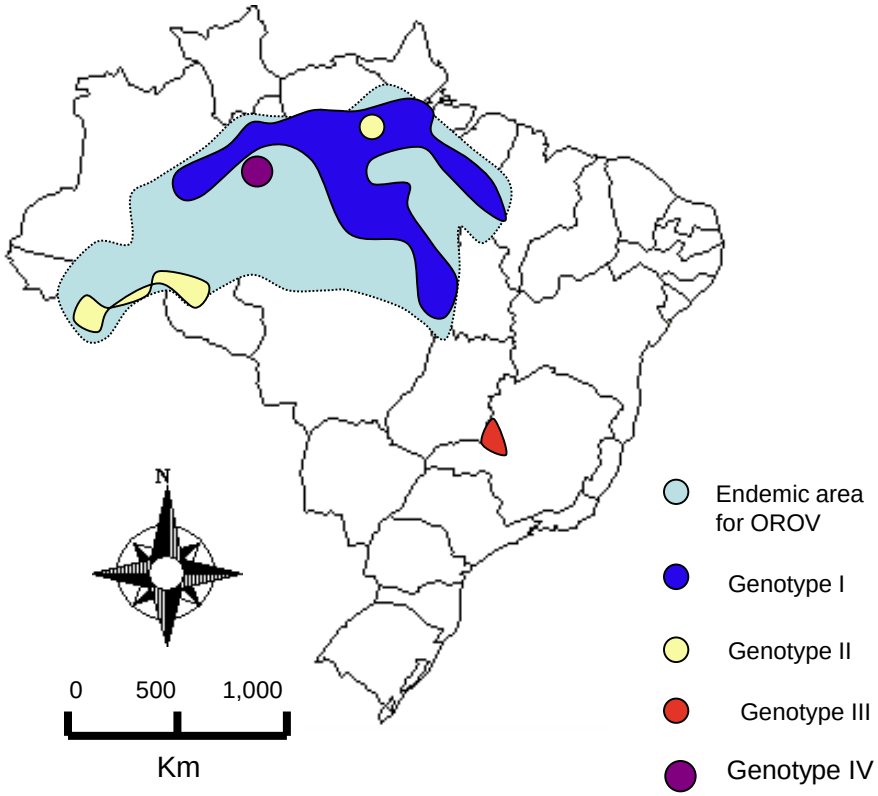
An Oropouche virus strain was isolated from a novel host (*Callithrix sp.*) in Arinos, Minas Gerais State, southeastern Brazil. The virus was identified by complement fixation test and confirmed by reverse transcription–polymerase chain reaction. Phylogenetic analysis identified this strain as a genotype III isolate previously recognized only in Panama.


Figure 2. Phylogeny of Oropouche virus (OROV) strains isolated from different sources and periods by using the neighbor-joining and maximum parsimony methods. Bootstrap values were assigned over each internal branch nodes, and highest values were indicated by continuous arrows showing the presence of at least 3 lineages or genotypes (I, II, and III) of OROV. Bootstrap values for the 3 representative genotype clades are placed over each respective branch node. The black arrow indicates the position of the strain BeAn 626090 (Brazil 00) in the tree. The Alno N gene nucleotide sequence was used as an outgroup to root the tree. The scale bar represents 5% nucleotide sequence divergence.


Figure 1. Map of the Arinos region, where the strain BeAN 626998 was isolated from a sylvatic monkey of the genus *Callithrix*.

# Phylogeny of Oropouche virus based on Nucleocapsid gene (693nt), 1955-2005




Saeed *et* al., J Gen Virol, 2000

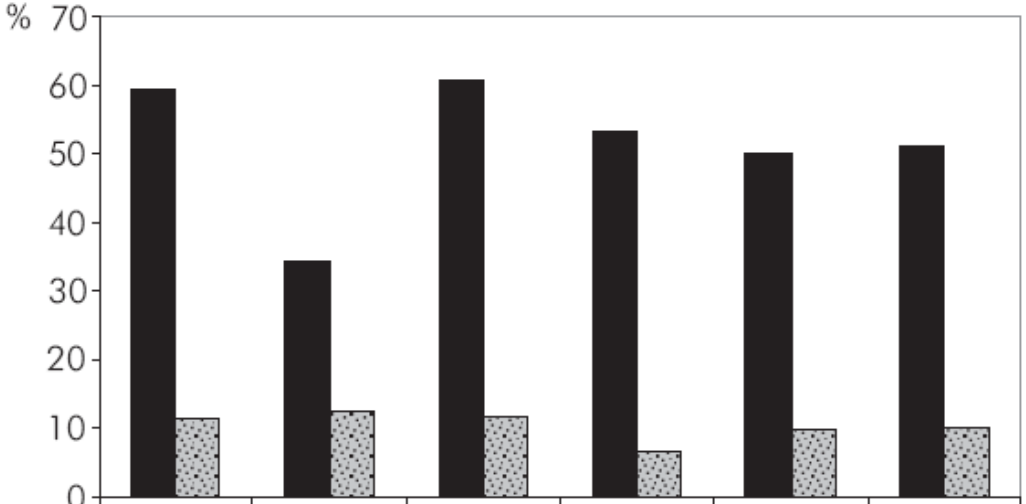
Nunes *et al* Emerg Infect Dis, 2005

Azevedo *et al* Emerg Infect Dis, 2007

# Epidemiology of Saint Louis encephalitis virus in the Brazilian Amazon region and in the State of Mato Grosso do Sul, Brazil: elevated prevalence of antibodies in horses

Epidemiologia do vírus da encefalite Saint Louis na Amazônia brasileira e no Estado do Mato Grosso do Sul, Brasil: elevada prevalência de anticorpos em equinos

Epidemiología del virus de la encefalitis de San Luis en la Amazonia brasileña y en el Estado de Mato Grosso do Sul (Brasil): alta prevalencia de anticuerpos en equinos




| | BRAGANÇA | SALVATERRA | MACAPÁ | RIO BRANCO | MARACAJU | TOTAL |
|---|---|---|---|---|---|---|
| ■ SLEV | 59.4 | 34.6 | 60.9 | 53.4 | 50.1 | 50.9 |
| ▨ CR | 11.5 | 12.5 | 11.7 | 6.6 | 9.9 | 10.1 |

CR – cross-reactivity; SLEV – Saint Louis encephalitis virus.

**Figure 3** – Percentage of equine serum samples presenting neutralizing antibodies (PRNT) against SLEV and cross-reactivity according to municipality

Casseb et al. Journal of Venomous Animals and Toxins including Tropical Diseases 2014, 20:9
http://www.jvat.org/content/20/1/9

Journal of Venomous Animals and Toxins including Tropical Diseases

ÚDE PÚBLICA

INSTITUTO EVANDRO CHAGAS
MS-SECRETARIA DE VIGILÂNCIA EM SAÚDE

SHORT REPORT Open Access

# Seroprevalence of flaviviruses antibodies in water buffaloes (*Bubalus bubalis*) in Brazilian Amazon

Alexandre R Casseb[1,5*], Andrea V Cruz[1], Iroleide S Jesus[1], Jannifer O Chiang[2], Lívia C Martins[2], Sandro P Silva[3], Daniele F Henriques[2], Livia MN Casseb[2] and Pedro Fernando C Vasconcelos[2,4]

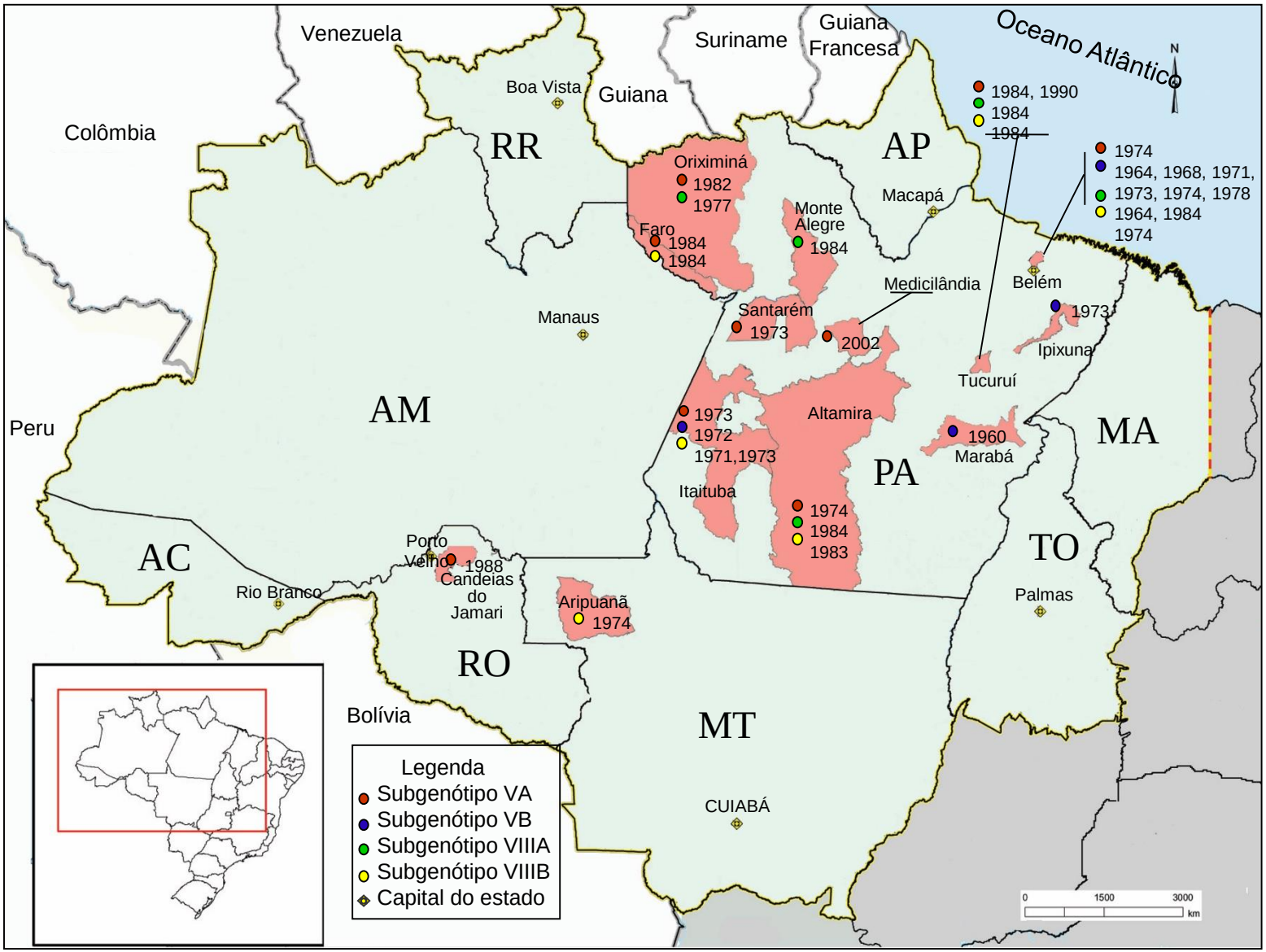
**Table 1 Prevalence of hemagglutination-inhibition antibodies against antigens of six flaviviruses in serum samples of water buffaloes from different regions of Pará state, Brazilian Amazon**

| | Water Buffaloes (n = 654) | | | | | |
|---|---|---|---|---|---|---|
| Virus | HR | %HR | MR | %MR | TR | %TR |
| SLEV | 65 | 9.94 | 82 | 12.54 | 147 | 22.48 |
| ILHV | 48 | 7.34 | 25 | 3.82 | 73 | 11.16 |
| YFV | 14 | 2.14 | 9 | 1.37 | 23 | 3.51 |
| ROCV | 11 | 1.68 | 2 | 0.30 | 13 | 1.99 |
| BSQV | 2 | 0.30 | 4 | 0.61 | 6 | 0.92 |
| CPCV | 8 | 1.22 | 0 | 0 | 8 | 1.22 |

HR: heterotypic reactions, MR: monotypic reactions, TR: total reactions, SLEV: Saint Louis encephalitis virus, ILHV: Ilheus virus, YFV: yellow fever virus, ROCV: Rocio virus, BSQV: Bussuquara virus, CPCV: Cacipacore virus.

# SLEV: Distribuição na Amazônia Brasileira






Rodrigues et al., 2010; J. Gen. Virol.

*Rev. Inst. Med. Trop. Sao Paulo*
*57(3):215-220, May-June, 2015*
*http://dx.doi.org/10.1590/S0036-46652015000300006*

# SAINT LOUIS ENCEPHALITIS VIRUS IN MATO GROSSO, CENTRAL-WESTERN BRAZIL

**Letícia Borges da Silva HEINEN(1), Nayara ZUCHI(1), Otacília Pereira SERRA(1), Belgath Fernandes CARDOSO(1), Breno Herman Ferreira GONDIM(2), Marcelo Adriano Mendes dos SANTOS(3), Francisco José Dutra SOUTO(1), Daphine Ariadne Jesus de PAULA(1), Valéria DUTRA(1) & Renata DEZENGRINI-SLHESSARENKO(1)**

## SUMMARY

The dengue virus (DENV), which is frequently involved in large epidemics, and the yellow fever virus (YFV), which is responsible for sporadic sylvatic outbreaks, are considered the most important flaviviruses circulating in Brazil. Because of that, laboratorial diagnosis of acute undifferentiated febrile illness during epidemic periods is frequently directed towards these viruses, which may eventually hinder the detection of other circulating flaviviruses, including the Saint Louis encephalitis virus (SLEV), which is widely dispersed across the Americas. The aim of this study was to conduct a molecular investigation of 11 flaviviruses using 604 serum samples obtained from patients during a large dengue fever outbreak in the state of Mato Grosso (MT) between 2011 and 2012. Simultaneously, 3,433 female *Culex* spp. collected with Nasci aspirators in the city of Cuiabá, MT, in 2013, and allocated to 409 pools containing 1-10 mosquitoes, were also tested by multiplex semi-nested reverse transcription PCR for the same flaviviruses. SLEV was detected in three patients co-infected with DENV-4 from the cities of Cuiabá and Várzea Grande. One of them was a triple co-infection with DENV-1. None of them mentioned recent travel or access to sylvatic/rural regions, indicating that transmission might have occurred within the metropolitan area. Regarding mosquito samples, one pool containing one *Culex quinquefasciatus* female was positive for SLEV, with a minimum infection rate (MIR) of 0.29 per 1000 specimens of this species. Phylogenetic analysis indicates both human and mosquito SLEV cluster, with isolates from genotype V-A obtained from animals in the Amazon region, in the state of Pará. This is the first report of SLEV molecular identification in MT.

*Mem Inst Oswaldo Cruz*, Rio de Janeiro, Vol. *105*(6): 829-833, September 2010 

# Serologic evidence of the recent circulation of *Saint Louis encephalitis virus* and high prevalence of equine encephalitis viruses in horses in the Nhecolândia sub-region in South Pantanal, Central-West Brazil

Alex Pauvolid-Corrêa[1]/+, Fernando Neto Tavares[1], Eliane Veiga da Costa[1], Fernanda Marcicano Burlandy[1], Michele Murta[1], Aiesca Oliveira Pellegrin[2], Márcia Furlan Nogueira[2], Edson Elias da Silva[1]

Major Article

Revista da Sociedade Brasileira de Medicina Tropical 47(3):280-286, May-Jun, 2014
http://dx.doi.org/10.1590/0037-8682-0083-2014

# Serological evidence for Saint Louis encephalitis virus in free-ranging New World monkeys and horses within the upper Paraná River basin region, Southern Brazil

*Walfrido Kühl Svoboda*[1], *Lívia Carício Martins*[2], *Luciano de Souza Malanski*[3], *Marcos Massaaki Shiozawa*[4], *Kledir Anderson Hofstaetter Spohr*[5], *Carmen Lúcia Scortecci Hilst*[6], *Lucas M. Aguiar*[7], *Gabriela Ludwig*[8], *Fernando de Camargo Passos*[9], *Lineu Roberto da Silva*[10], *Selwyn Arlington Headley*[11] *and Italmar Teodorico Navarro*[11]

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PLOS | NEGLECTED TROPICAL DISEASES

# Isolation of Saint Louis Encephalitis Virus from a Horse with Neurological Disease in Brazil

**Roberta Rosa[1], Erica Azevedo Costa[1], Rafael Elias Marques[2], Taismara Simas Oliveira[1,3], Ronaldo Furtini[3], Maria Rosa Quaresma Bomfim[4], Mauro Martins Teixeira[2], Tatiane Alves Paixão[5], Renato Lima Santos[1]***

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## Abstract

St. Louis encephalitis virus (SLEV) is a causative agent of encephalitis in humans in the Western hemisphere. SLEV is a positive-sense RNA virus that belongs to the *Flavivirus* genus, which includes West Nile encephalitis virus, Japanese encephalitis virus, Dengue virus and other medically important viruses. Recently, we isolated a SLEV strain from the brain of a horse with neurological signs in the countryside of Minas Gerais, Brazil. The SLEV isolation was confirmed by reverse-transcription RT-PCR and sequencing of the E protein gene. Virus identity was also confirmed by indirect immunofluorescence using commercial antibodies against SLEV. To characterize this newly isolated strain *in vivo*, serial passages in newborn mice were performed and led to hemorrhagic manifestations associated with recruitment of inflammatory cells into the central nervous system of newborns. In summary this is the first isolation of SLEV from a horse with neurological signs in Brazil.

# Infection with Saint Louis encephalitis virus in the city of Ribeirao Preto, Brazil: report of one case

Felipe Gonçalves Motta Maia, Juliana Helena Chávez, William Marciel de Souza, Marilia Farignoli Romeiro, Luiza Antunes de Castro-Jorge, Benedito Antônio Lopes da Fonseca, Luiz Tadeu Moraes Figueiredo *

*Virology Research Center, School of Medicine of Ribeirao Preto, University of Sao Paulo, Av. Bandeirantes, 3900, 14049-900, Ribeirao Preto, São Paulo, Brazil*

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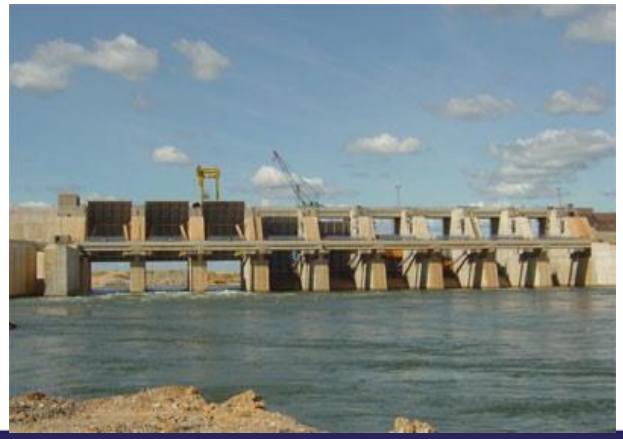
SUMMARY

Saint Louis encephalitis virus (SLEV) is a mosquito-borne flavivirus from the Americas. In this report we describe aspects of the laboratory diagnosis of a patient with an acute febrile illness induced by SLEV that was initially diagnosed as dengue by positive IgM-ELISA. Infection with this virus is probably not rare in Brazil, but cases remain undiagnosed. It is necessary to improve the surveillance system, including laboratories, for the diagnosis of SLEV in Brazil.

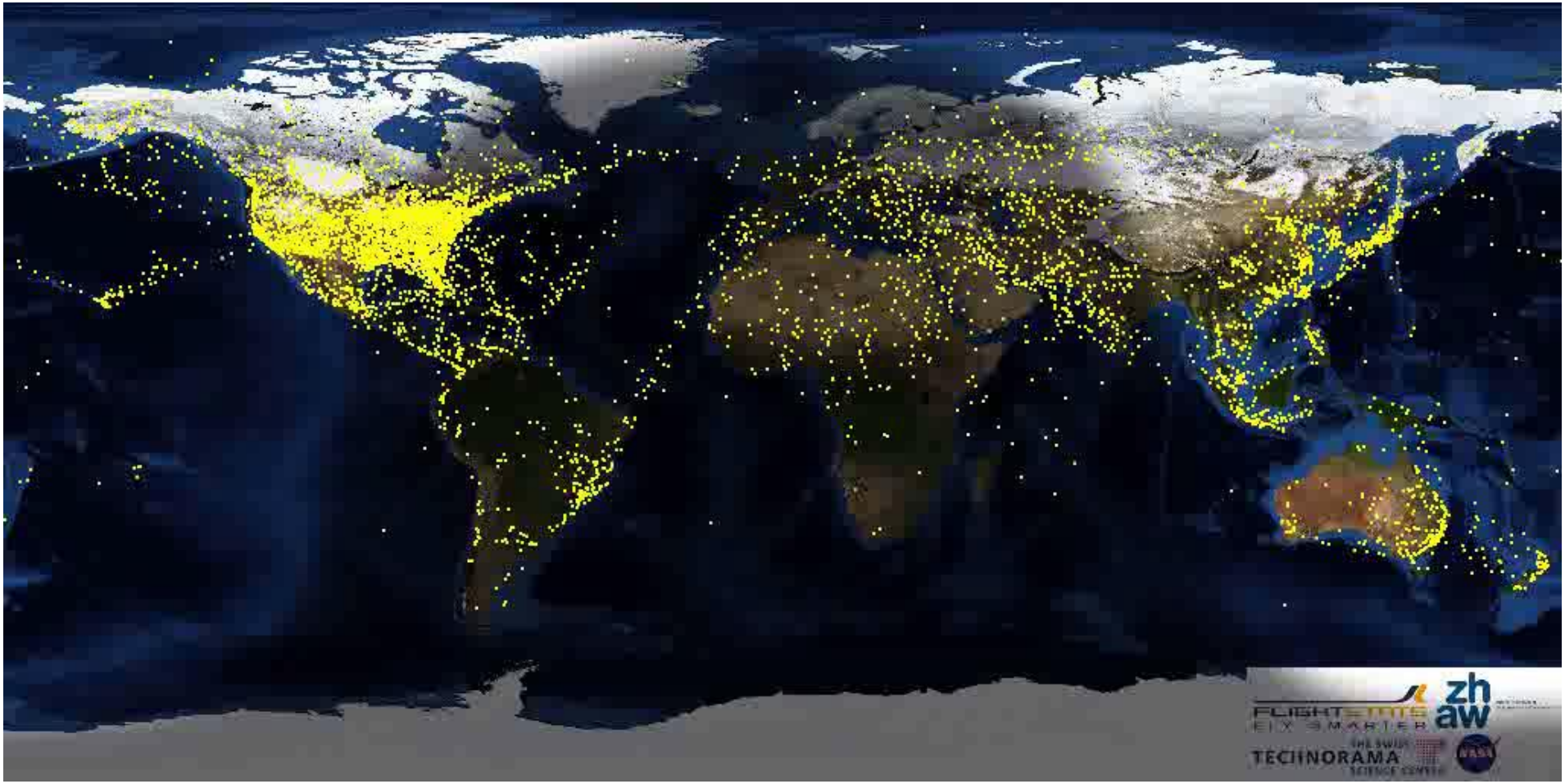
# FATORES ASSOCIADOS COM A RE/EMERGÊNCIA DE ARBOVÍRUS



- Crescimento da população;
- Urbanização sem planejamento;
- Derrubada de floresta;
- Construção de estradas na floresta;
- Construção de hidrelétricas;
- Uso do subsolo para extração de riquezas minerais.
- Transporte x dispersão dos arbovírus
- Mutações e rearranjos genéticos
- Turismo ecológico



# Global Airline Routes

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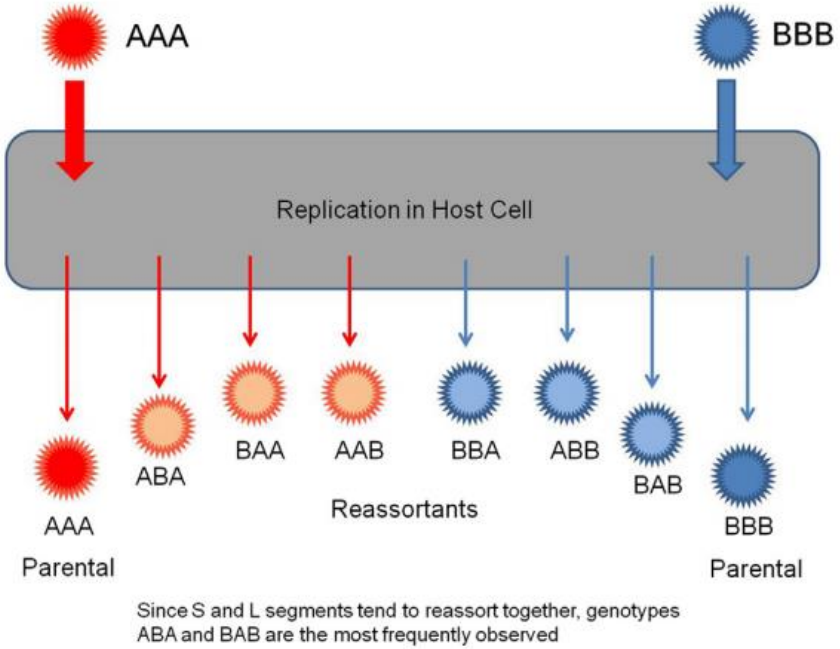
# REARRANJO GENÉTICO - *BUNYAVIRIDAE*




Ngari Virus Is a Bunyamwera Virus Reassortant That Can Be Associated with Large Outbreaks of Hemorrhagic Fever in Africa

Sonja R. Gerrard,[1,2] Li Li,[3] Alan D. Barrett,[3] and Stuart T. Nichol[1]*

## Schmallenberg Virus as Possible Ancestor of Shamonda Virus

**Katja V. Goller,[1] Dirk Höper,[1] Horst Schirrmeier, Thomas C. Mettenleiter, and Martin Beer**

Schmallenberg virus (SBV), an orthobunyavirus of the Simbu serogroup, recently emerged in Europe and has been suggested to be a Shamonda/Sathuperi virus reassortant. Results of full-genome and serologic investigations indicate that SBV belongs to the species *Sathuperi virus* and is a possible ancestor of the reassortant Shamonda virus.

## REVIEW ARTICLE
## 'Schmallenberg virus' – a novel orthobunyavirus emerging in Europe

M. BEER[1]*, F. J. CONRATHS[2] AND W. H. M. VAN DER POEL[3]

[1] *Institute of Diagnostic Virology, Friedrich-Loeffler-Institut, Greifswald-Insel Riems, Germany*
[2] *Institute of Epidemiology, Friedrich-Loeffler-Institut, Wusterhausen, Germany*
[3] *Central Veterinary Institute of Wageningen University and Research Centre, Lelystad, The Netherlands*

# MUTAÇÃO GENÉTICA

INSTITUTO EVANDRO CHAGAS
MS-SECRETARIA DE VIGILÂNCIA EM SAÚDE

## Two novel epistatic mutations (E1:K211E and E2:V264A) in structural proteins of Chikungunya virus enhance fitness in *Aedes aegypti*

Ankita Agarwal [a], Ajay Kumar Sharma [b], D. Sukumaran [b], Manmohan Parida [a], Paban Kumar Dash [a,*]

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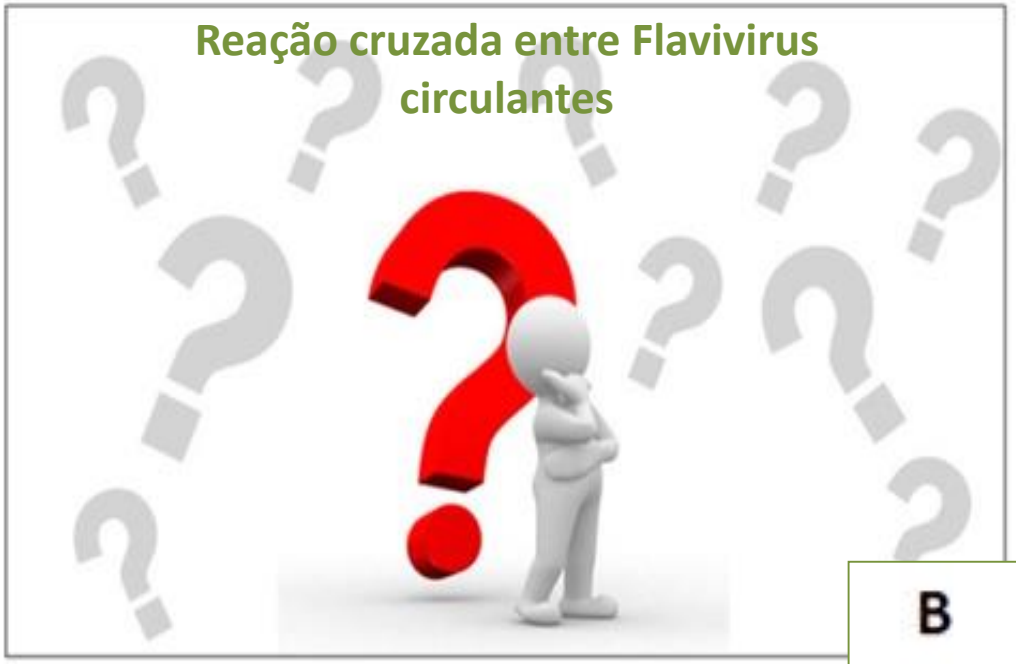
*Aedes*
Infection
Dissemination
Transmission

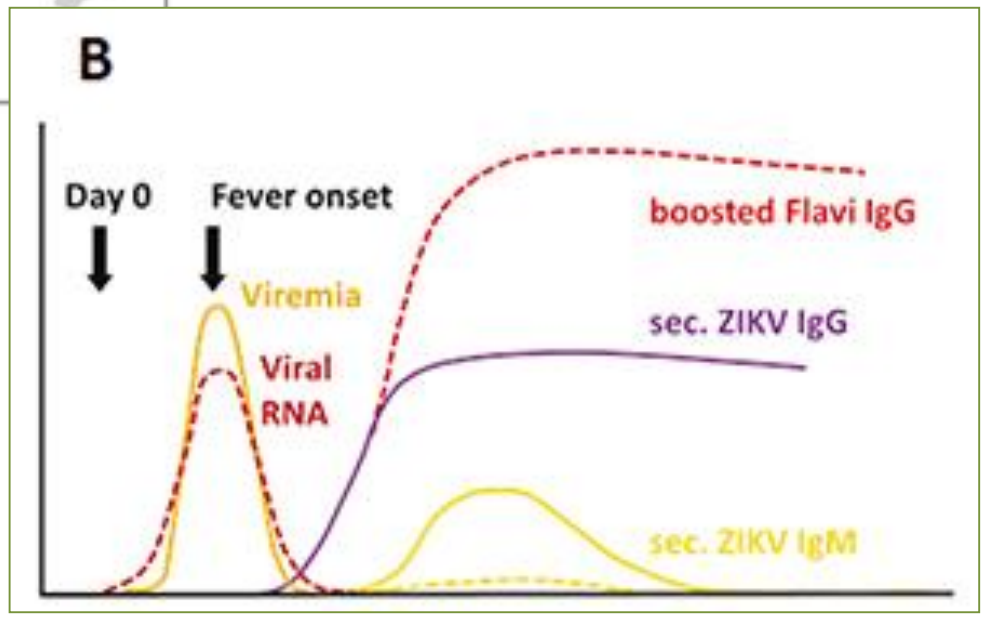
ABSTRACT

Expansion of CHIKV outbreaks with appearance of novel mutations are reported from many parts of the world. Two novel mutations *viz.* E1:K211E and E2:V264A in background of E1:226A are recently identified from *Aedes aegypti* dominated areas of India. In this study, the role of these mutations in modulation of infectivity, dissemination and transmission by two different *Aedes* species was studied. Mutations were sequentially constructed in CHIKV genome and female *Ae. aegypti* and *Aedes albopictus* mosquitoes were orally infected with eight different CHIKV mutants. Double mutant virus containing E1:K211E and E2:V264A mutations in background of E1:226A revealed remarkably higher fitness for *Ae. aegypti*, as indicated by significant increase in virus infectivity (13 fold), dissemination (15 fold) and transmission (62 fold) compared to parental E1:226A virus. These results indicate that adaptive mutations in CHIKV are leading to efficient CHIKV circulation in *Ae. aegypti* endemic areas, contributing and sustaining the major CHIKV outbreaks.

# DESAFIOS DO DIAGNÓSTICO LABORATORIAL





# Conclusões



- Conhecimento:
  - Importâncias dos estudos de soroprevalência e ecoepidemiológicos;
  - Estar atento para surtos/epidemias que estão ocorrendo em outros países – Dispersão;
- Diagnóstico diferencial para outros arbovírus;

Qual?

Quando?

Onde?

# SEÇÃO DE ARBOVIROLOGIA E FEBRES HEMORRAGICAS – INSTITUTO EVANDRO CHAGAS

- 3 Lab Sorologia
  - HI
  - Elisa
  - Hantavirus
- 2 lab isolamento viral
  - Cultura de células
  - Camundongos
- Lab Biologia molecular
- Lab Entomologia
- Lab Raiva
- Lab NB3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