Arboviroses

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Arboviroses

ARBOVÍRUS: *arthropode-borne viruses*

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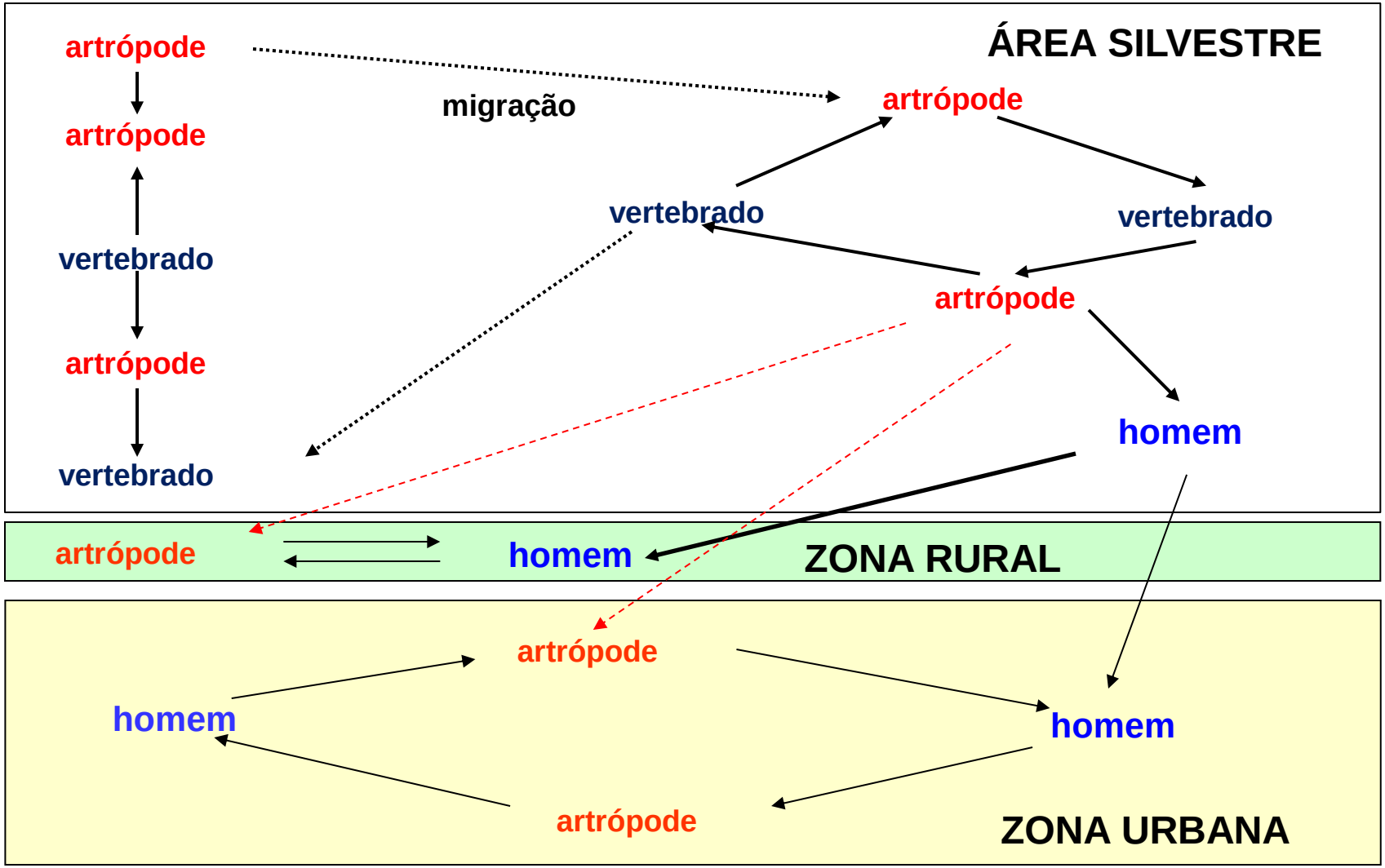
Ciclo de transmissão



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Família *Flaviviridae*

- Conhecida desde o início do século.
- Seu primeiro membro, o vírus da febre amarela (YF), foi reconhecido como um agente filtrável, em 1927.
- O nome tem origem na palavra latina *flavus* = amarelo.
- Possui quatro gêneros (60 espécies), com vírus que infectam humanos e animais:
  - Flavivírus
  - Pestivírus
  - Hepacivírus
  - Pegivírus

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O gênero *Flavivírus*

- **Pelo menos 73 sorotipos ≠, 40 já foram associados a doenças humanas.**
- **Os mais importantes são:**

Dengue 1
Dengue 2
Dengue 3
Dengue 4

→ Sorogrupo DEN
62 a 77% de identidade

Febre amarela → Sorotipo único

West Nile
Encefalite de Saint Louis
Encefalite Japonesa

→ Sorogrupo JE
72 a 93% de identidade

"Tick-borne" encefalite → Sorogrupo TBE
77 a 96% de identidade

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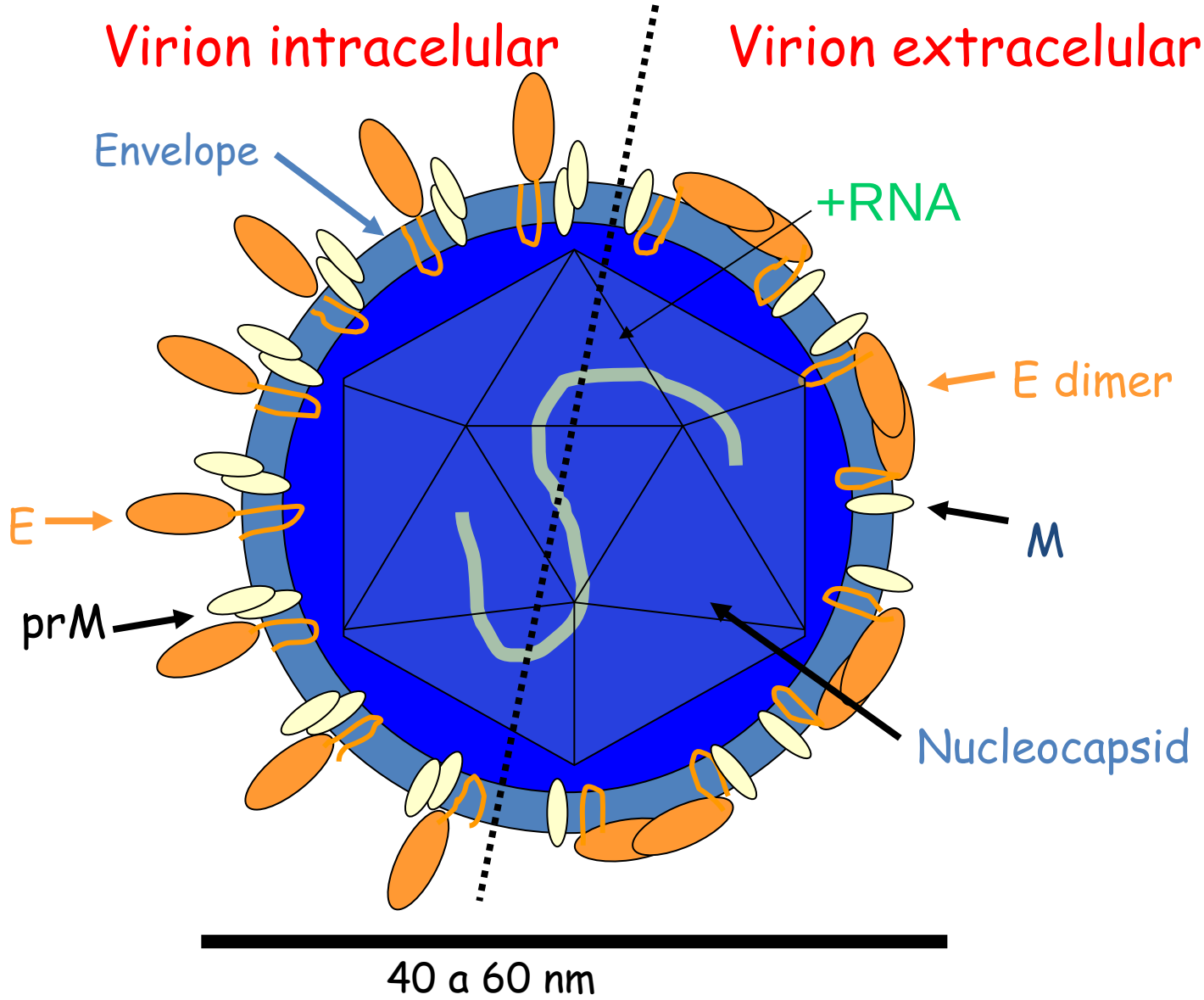
Flavivírus: Estrutura da partícula viral



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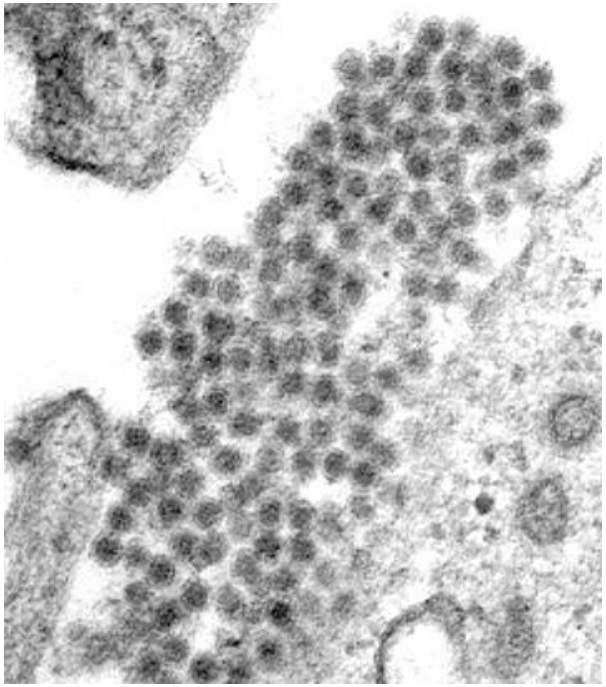
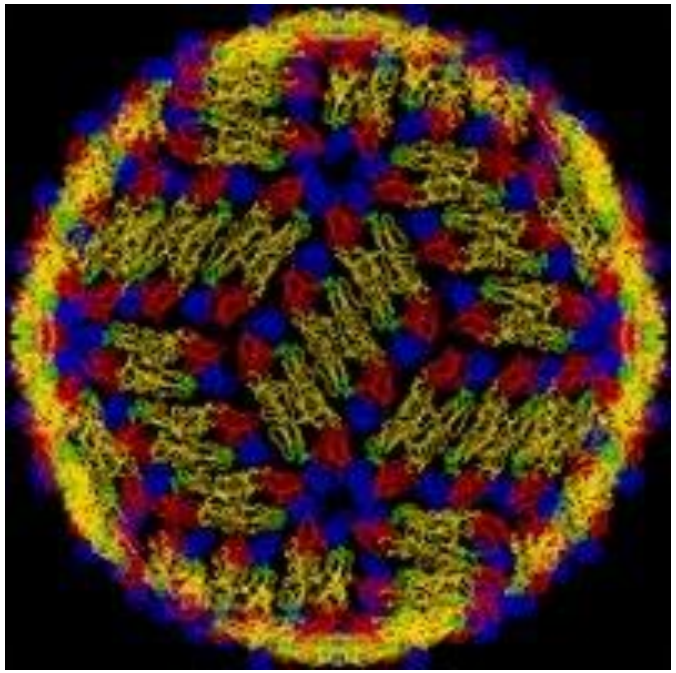
Flavivírus: Estrutura da partícula viral





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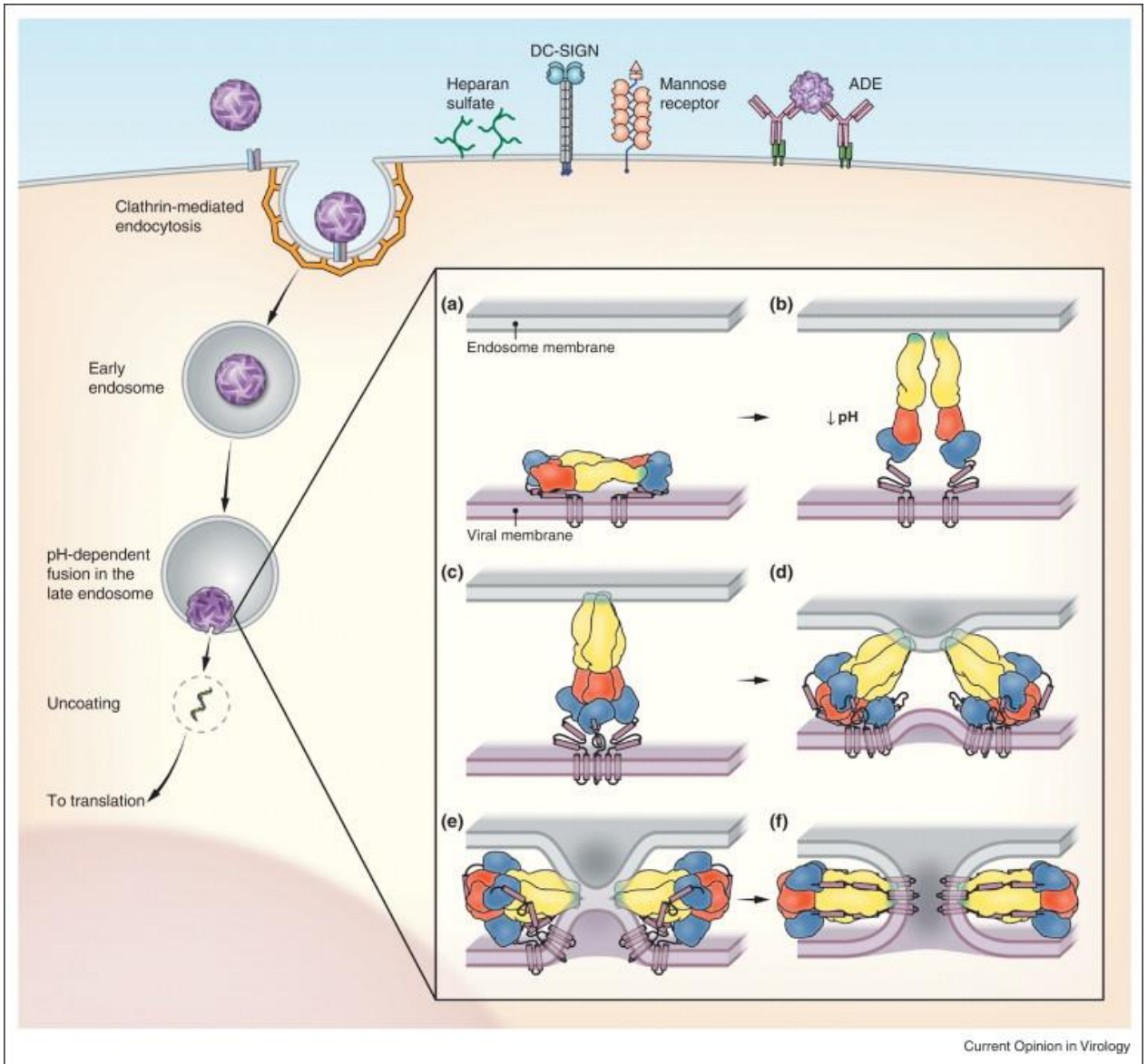
Flavivírus: Entrada da partícula viral



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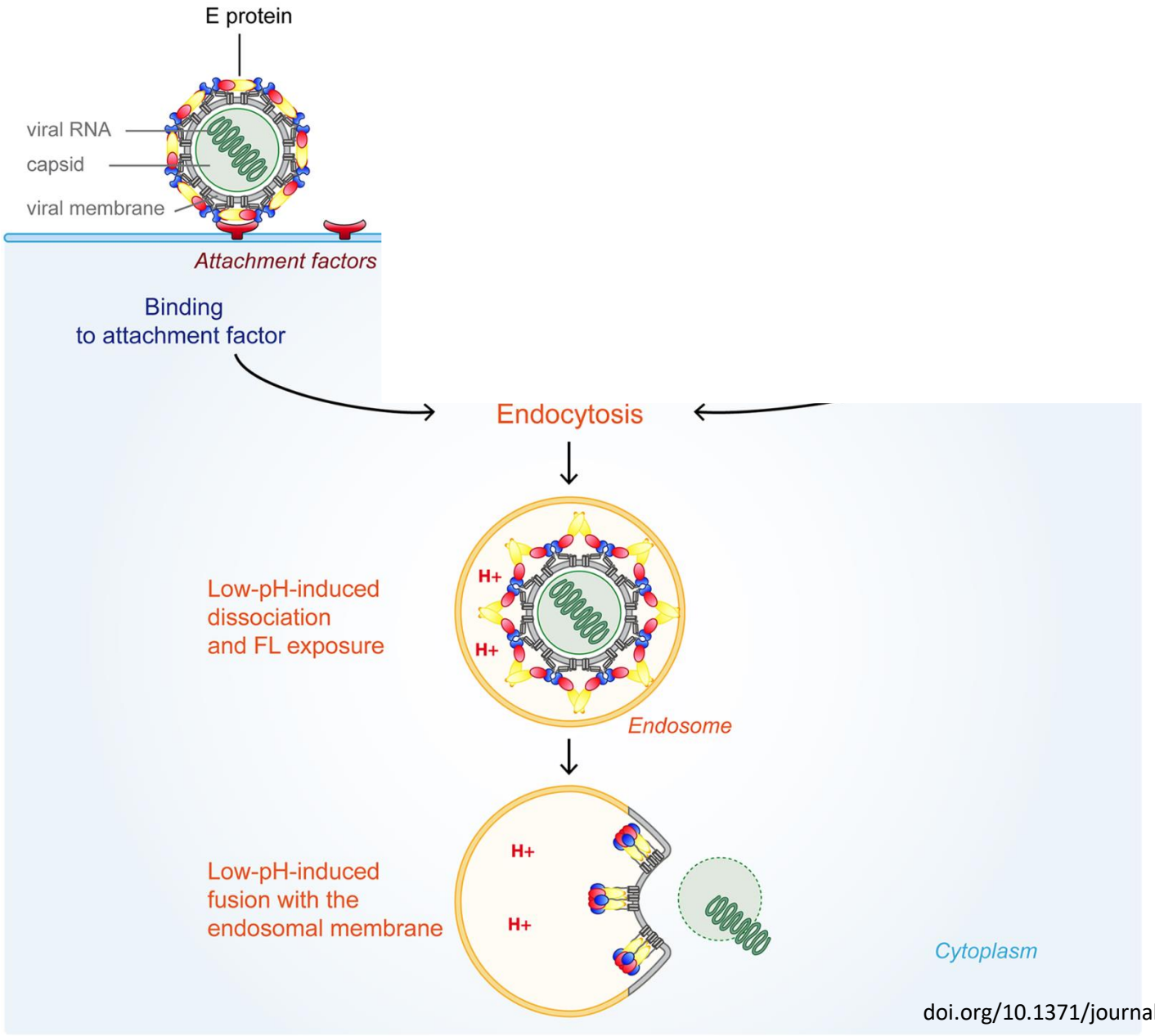
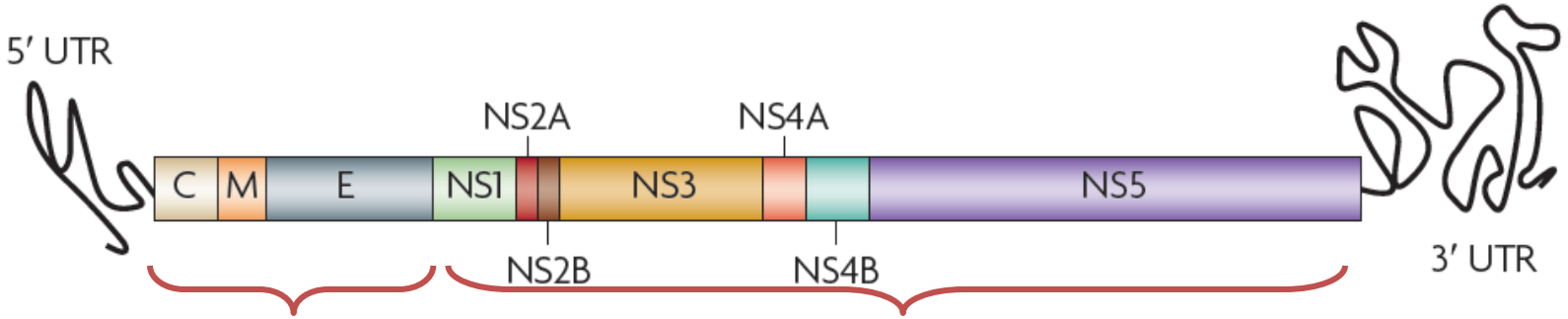
Flavivírus: Entrada do vírus



doi.org/10.1371/journal.ppat.1006643.g010

Febres hemorrágicas virais

Genoma dos *Flavivírus*



Três genes que codificam para proteínas estruturais

Sete genes que codificam para proteínas não estruturais

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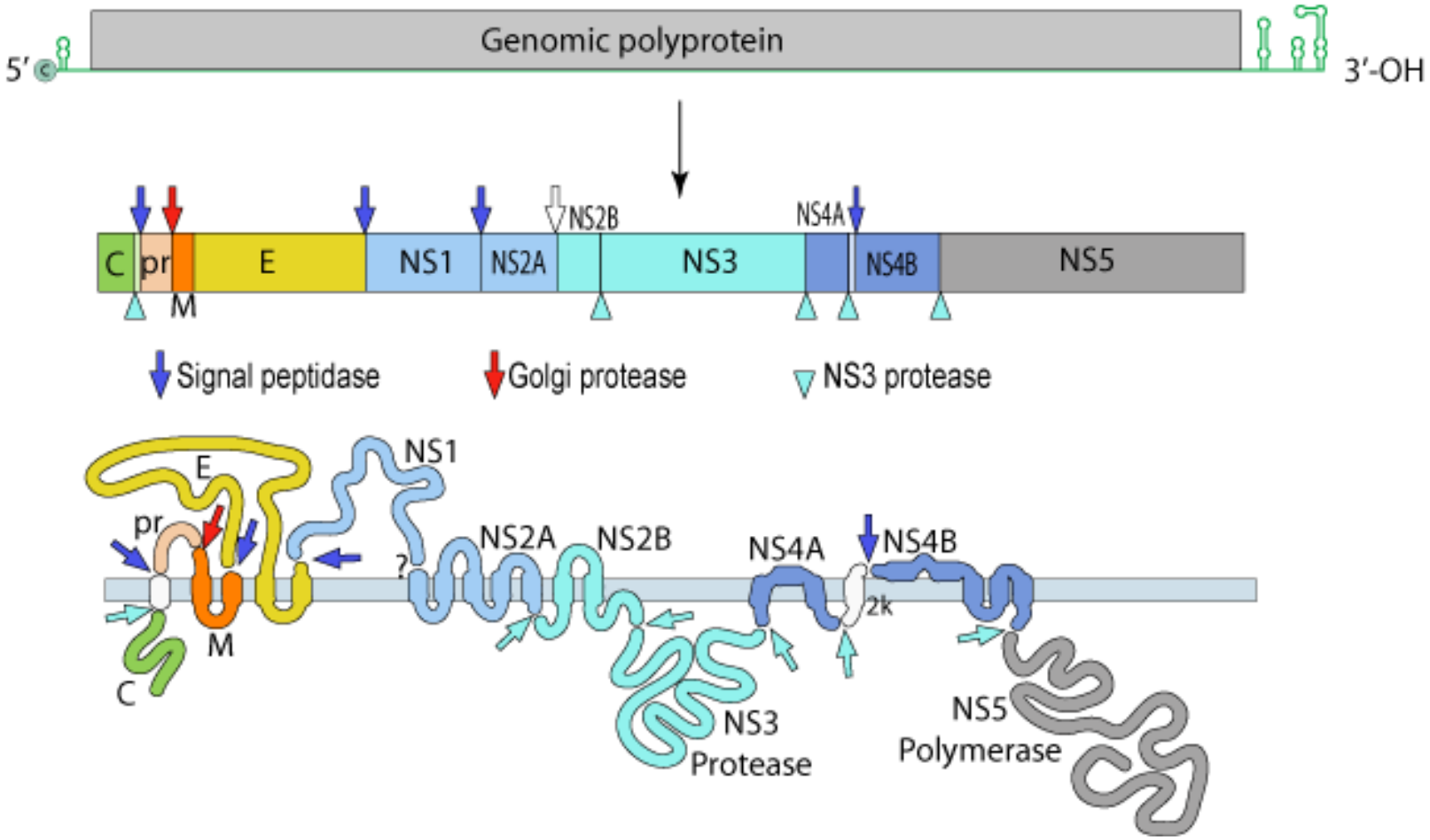
Genoma dos *Flavivírus*



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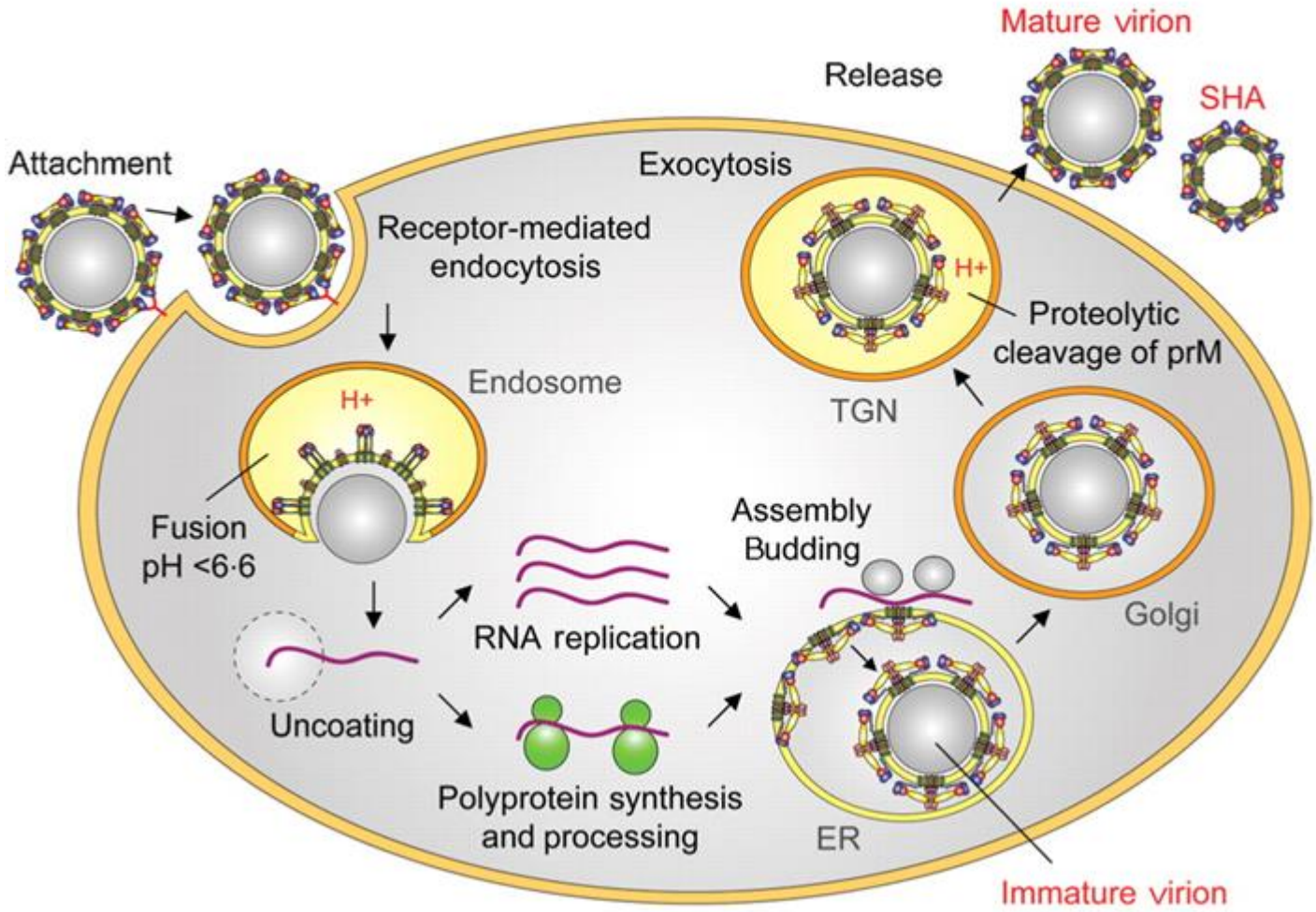
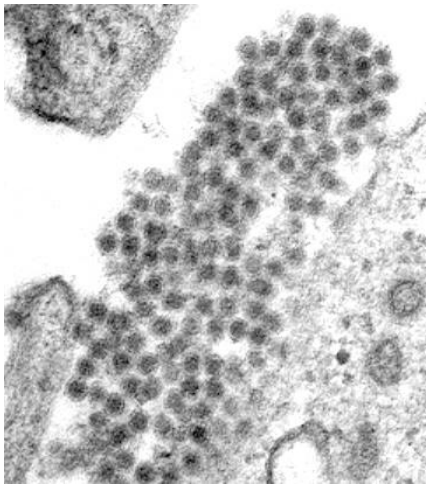
Replicação dos Flavivírus



doi: 10.1099/vir.0.82210-0 *J Gen Virol October 2006 vol. 87 no. 10 2755-2766*



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Febre amarela

Dengue

Família: *Flaviviridae*

Gênero: *Flavivírus*

Transmissão: vetor artrópode - *Haemagogus janthinomis e Aedes aegypti*

Hospedeiros: *Silvestre - macacos; Urbano - homem*

Partículas virais: Esféricas 45 nm, envelopadas

Proteínas estruturais: glicoproteína E ; nucleoproteína: C; membrana: M

Genoma: ss-RNA polaridade positiva

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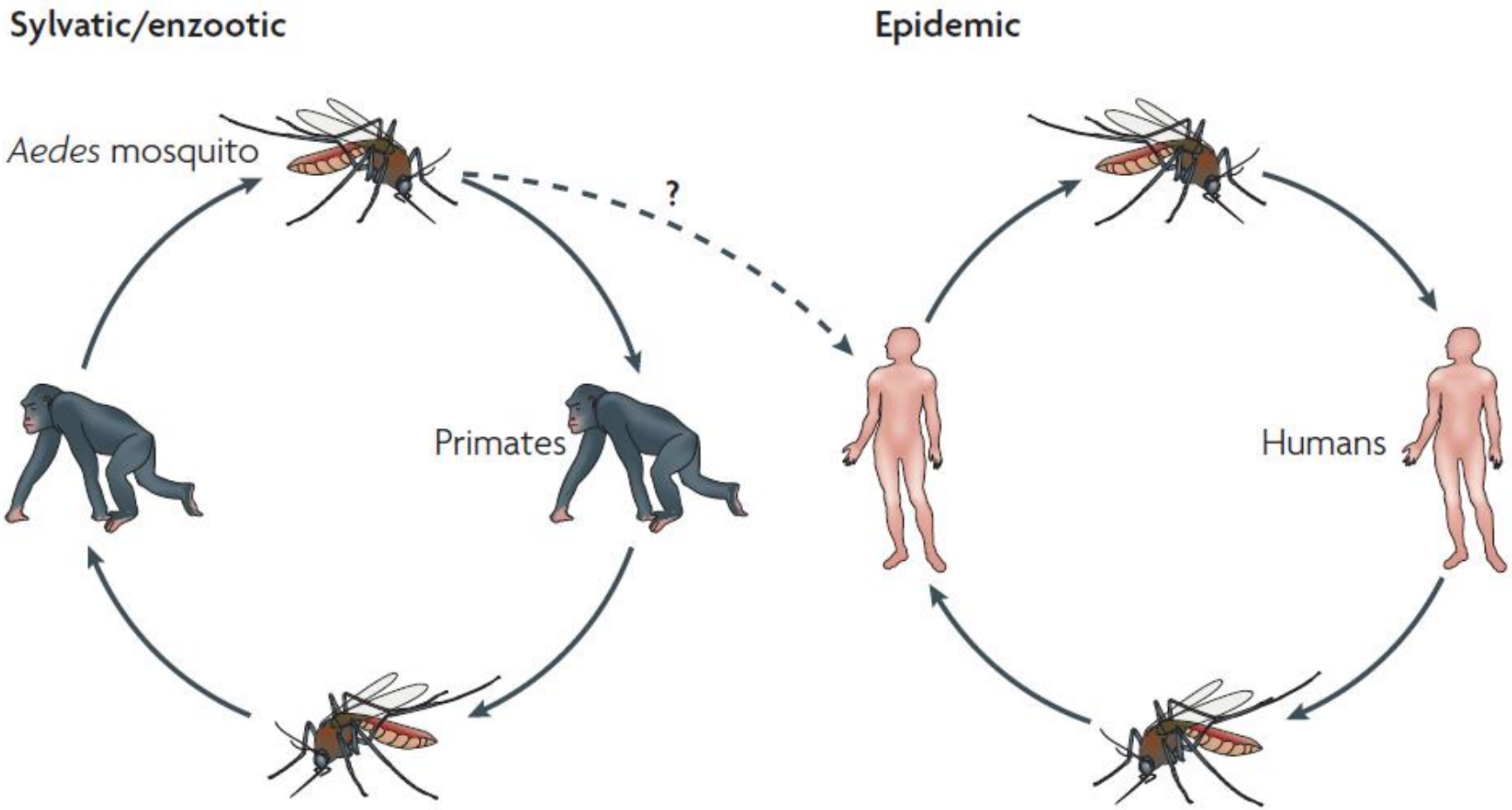
Replicação e transmissão do DENV, YFV (e outros arbovírus)



1- O mosquito infectado pica o hospedeiro e libera o vírus pela saliva.
2- O vírus replica-se nos órgãos alvos do hospedeiro.
3- O vírus infecta os linfócitos e tecidos linfáticos.
4- O vírus é liberado na circulação sanguínea.

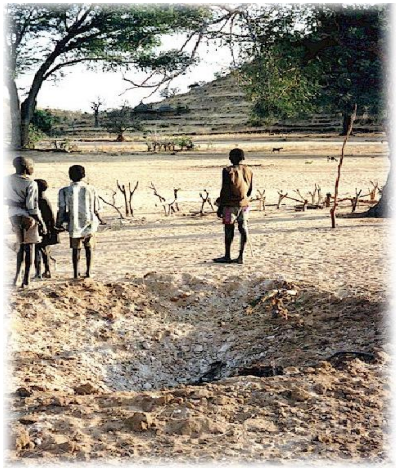
5- Um segundo mosquito pica o hospedeiro infectado.
6- O mosquito ingere o vírus com o sangue. O vírus multiplica-se no trato digestivo do mosquito.
7- O vírus passa para as glândulas salivares, replica-se e será liberado da próxima vez que o inseto se alimentar.

Arboviroses

Febre amarela

Silvestre

Urbana



Haemagogus janthinomis
Aedes albopictus

Aedes aegypti

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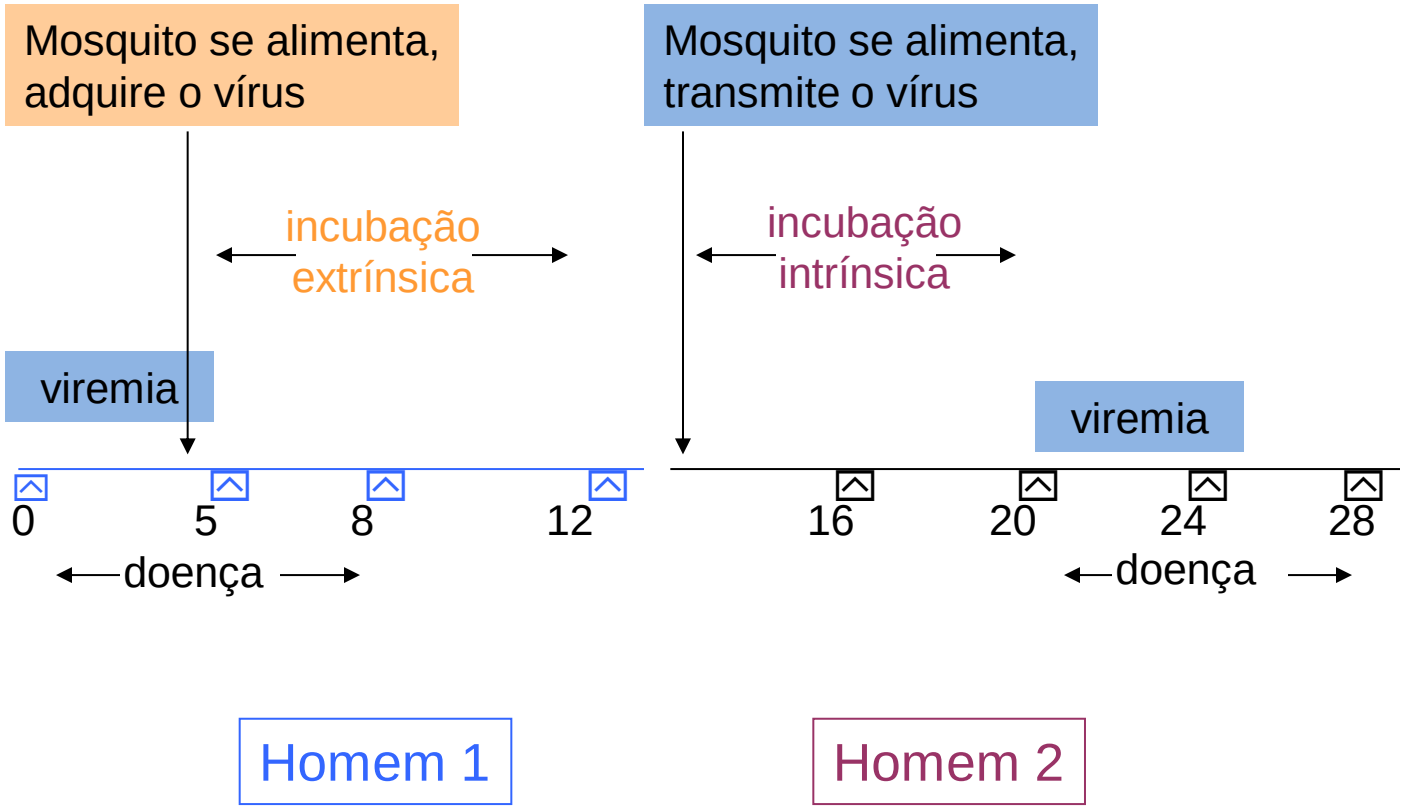
Transmissão da dengue por *A. aegypti*



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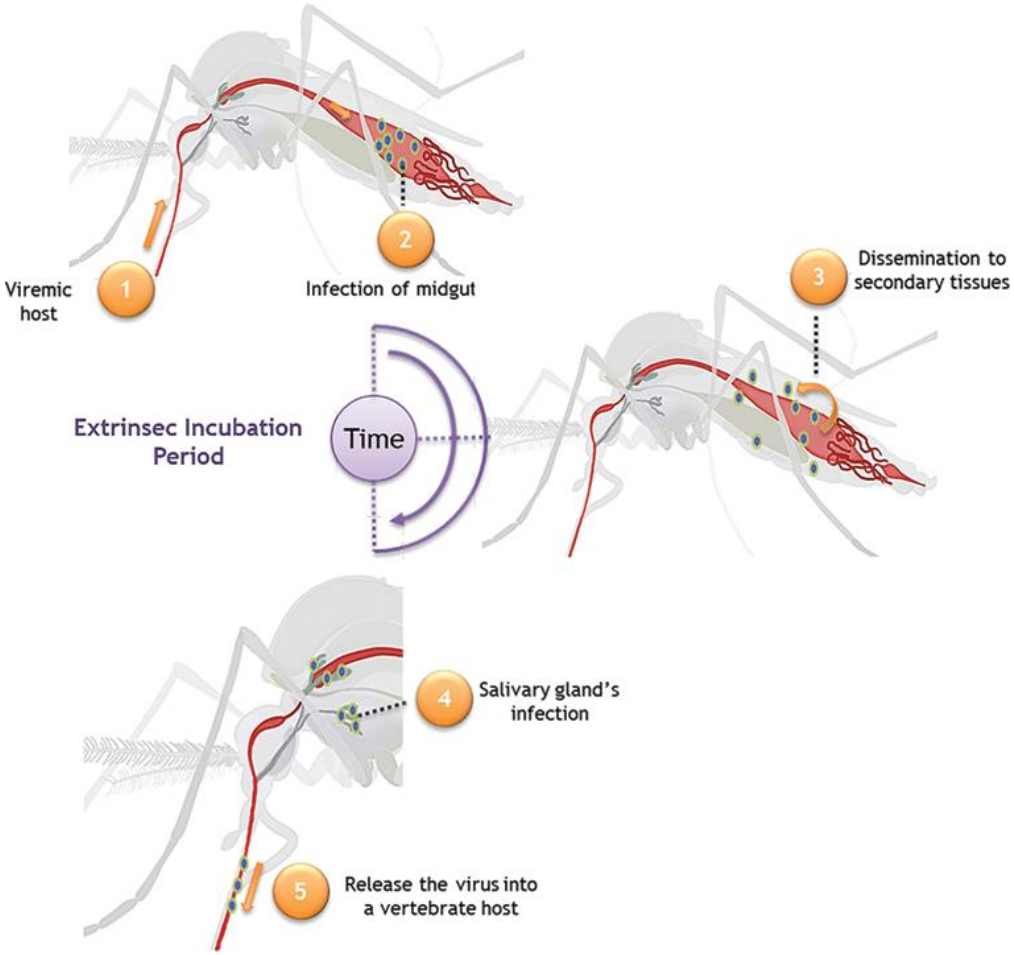
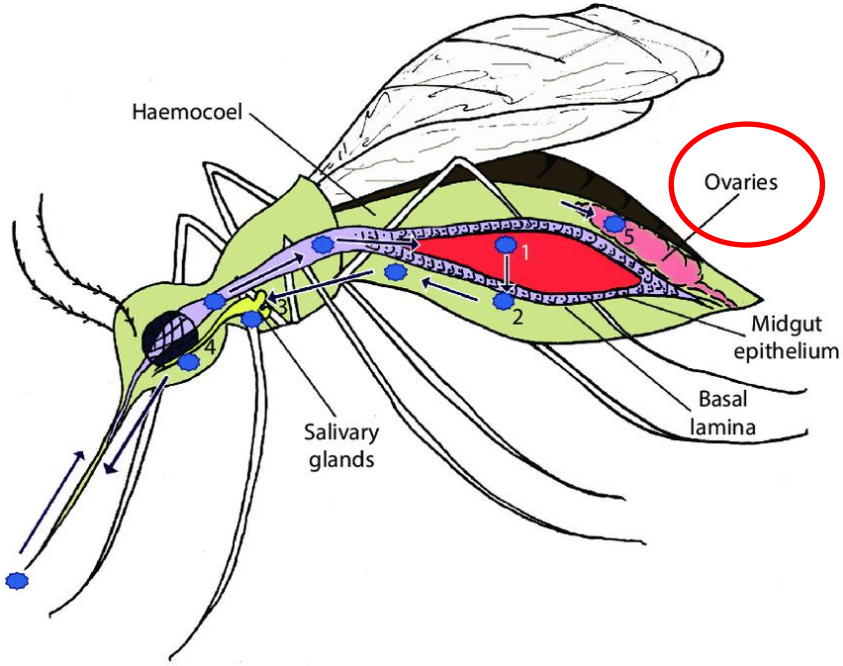
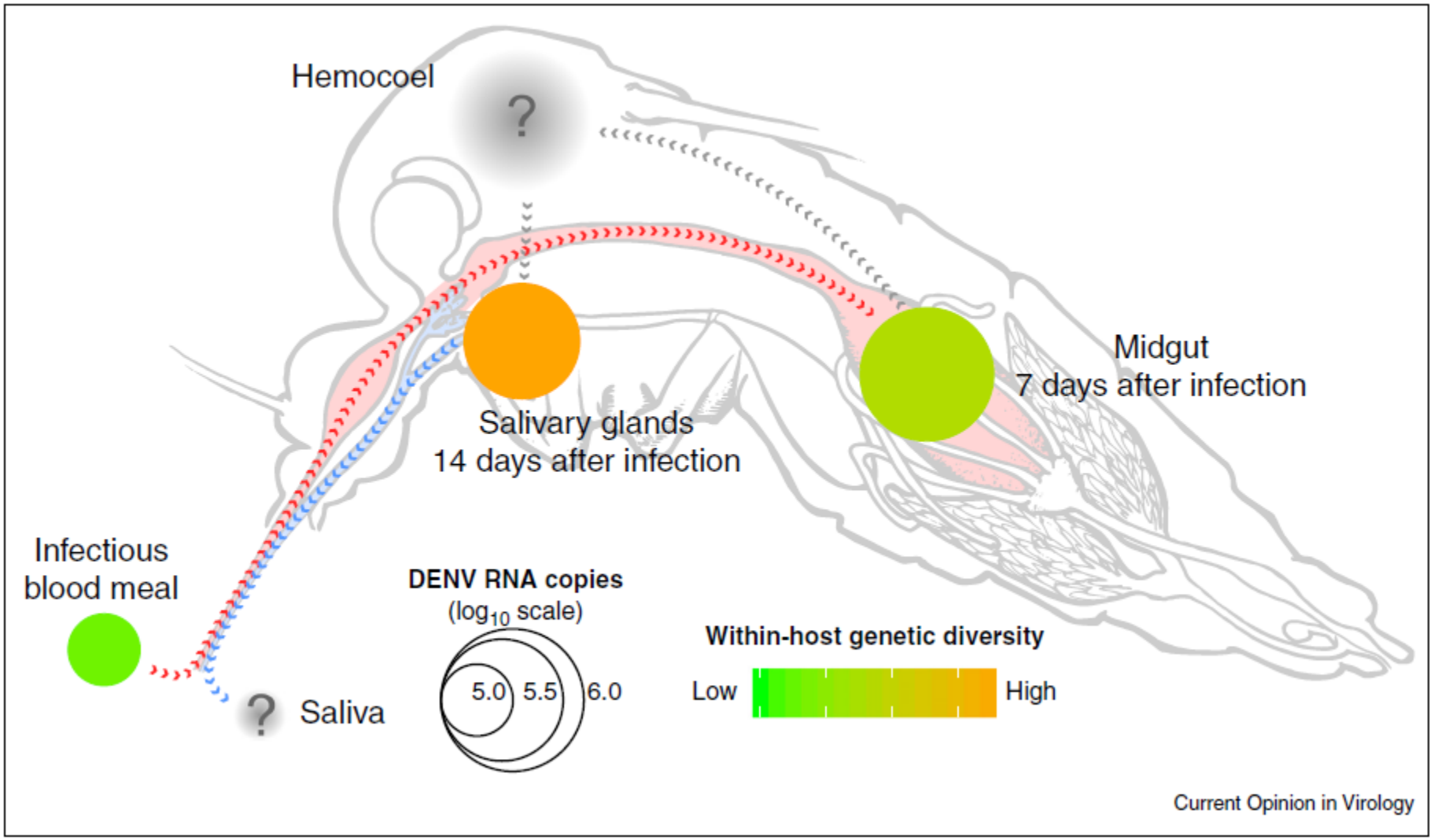
Incubação extrínseca





Arboviroses

Incubação extrínseca



http://dx.doi.org/10.1016/j.coviro.2016.07.013

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Prevenção

- Controle do hospedeiro artrópode

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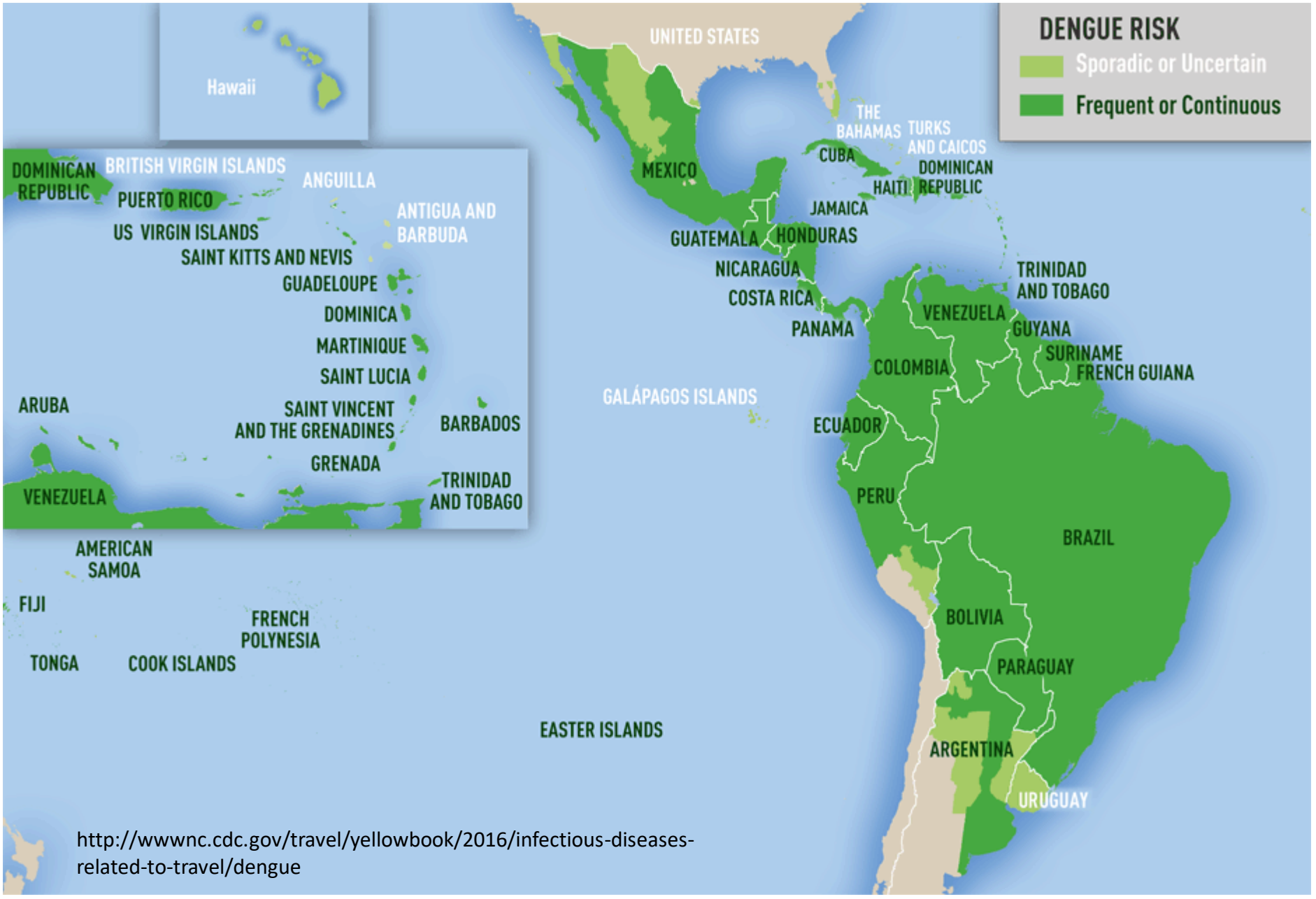
Prevenção

1970

Arboviroses

Prevenção



http://wwwnc.cdc.gov/travel/yellowbook/2016/infectious-diseases-related-to-travel/dengue

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Prevenção

Febre Amarela

- Vacinação preventiva da população:

  Vacina de vírus atenuados 17D

Arboviroses

Diagnóstico Laboratorial e Prevenção

- Diagnóstico Laboratorial
  - Isolamento viral em culturas de células de macaco (Vero ou LLC-MK2)
  - Soroneutralização
  - Imunofluorescência
  - Ensaio imunoenzimático (ELISA)
  - RT-PCR – hibridação
  - PCR

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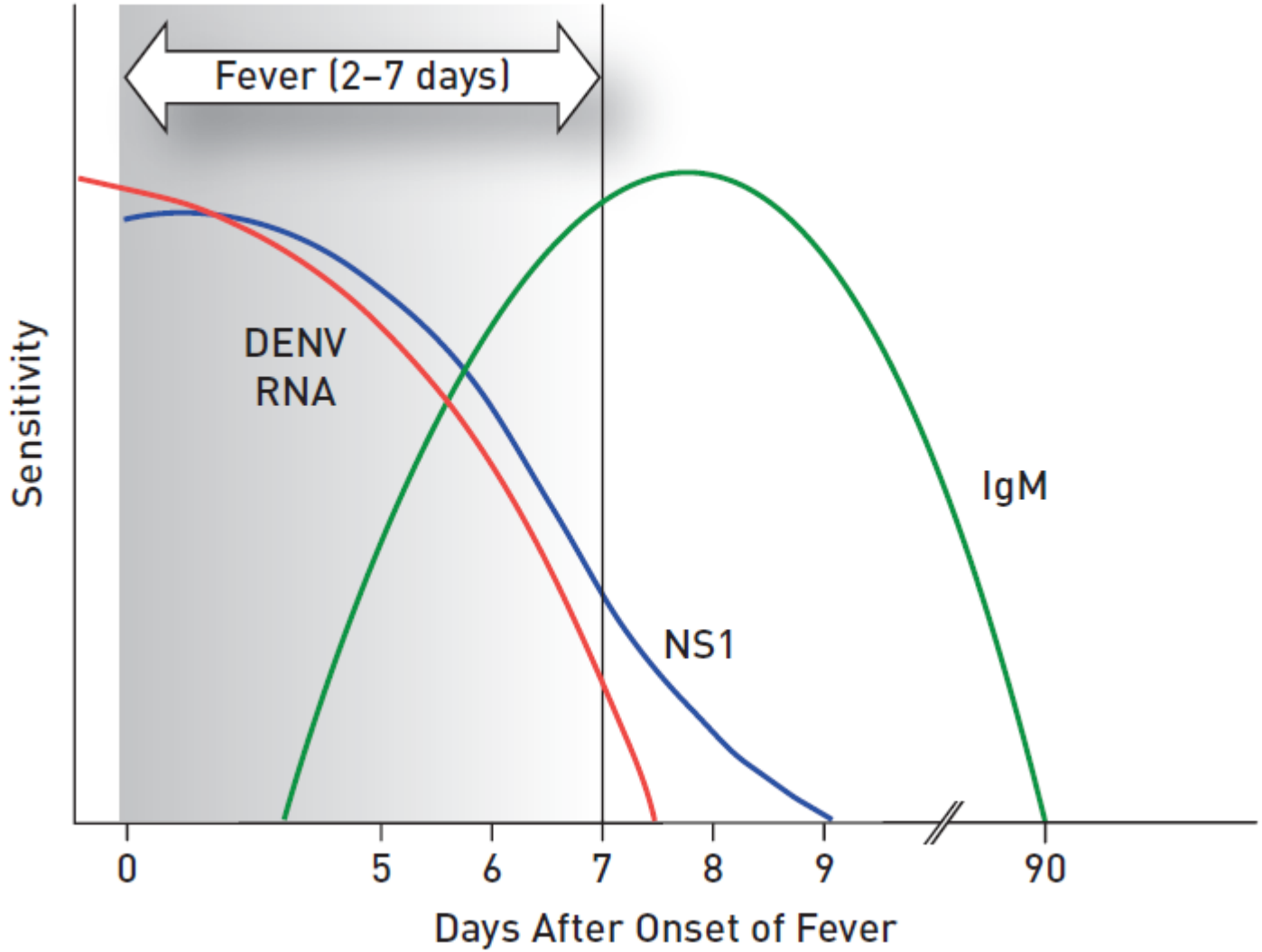
Dengue: Diagnóstico Laboratorial



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Dengue: Diagnóstico Laboratorial

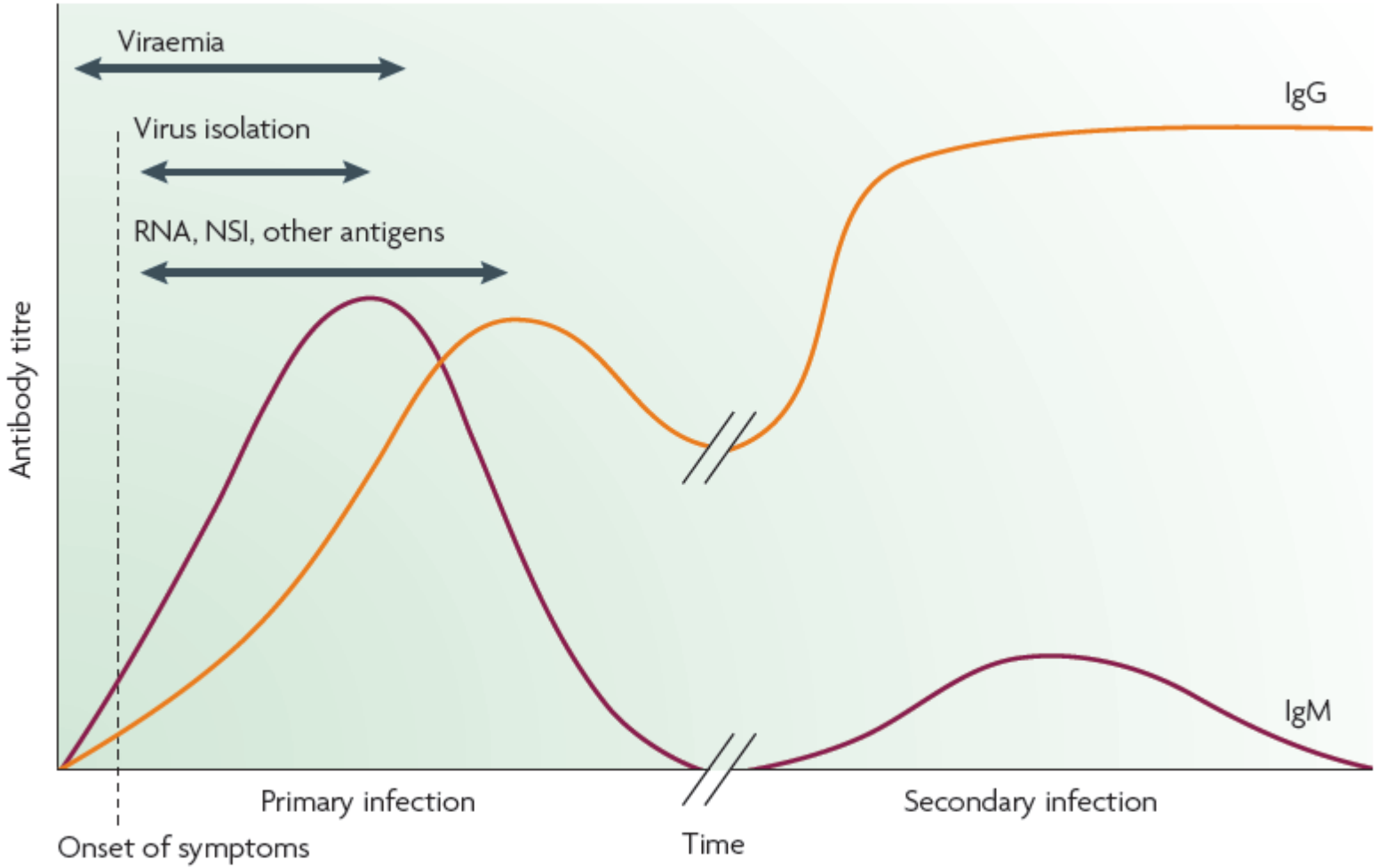

Figure 2 | **Major diagnostic markers for dengue infection.** The titre of the IgM and IgG response varies, depending on whether the infection is a primary or secondary infection.

doi:10.1038/nrmicro2459

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Dengue: Diagnóstico Laboratorial

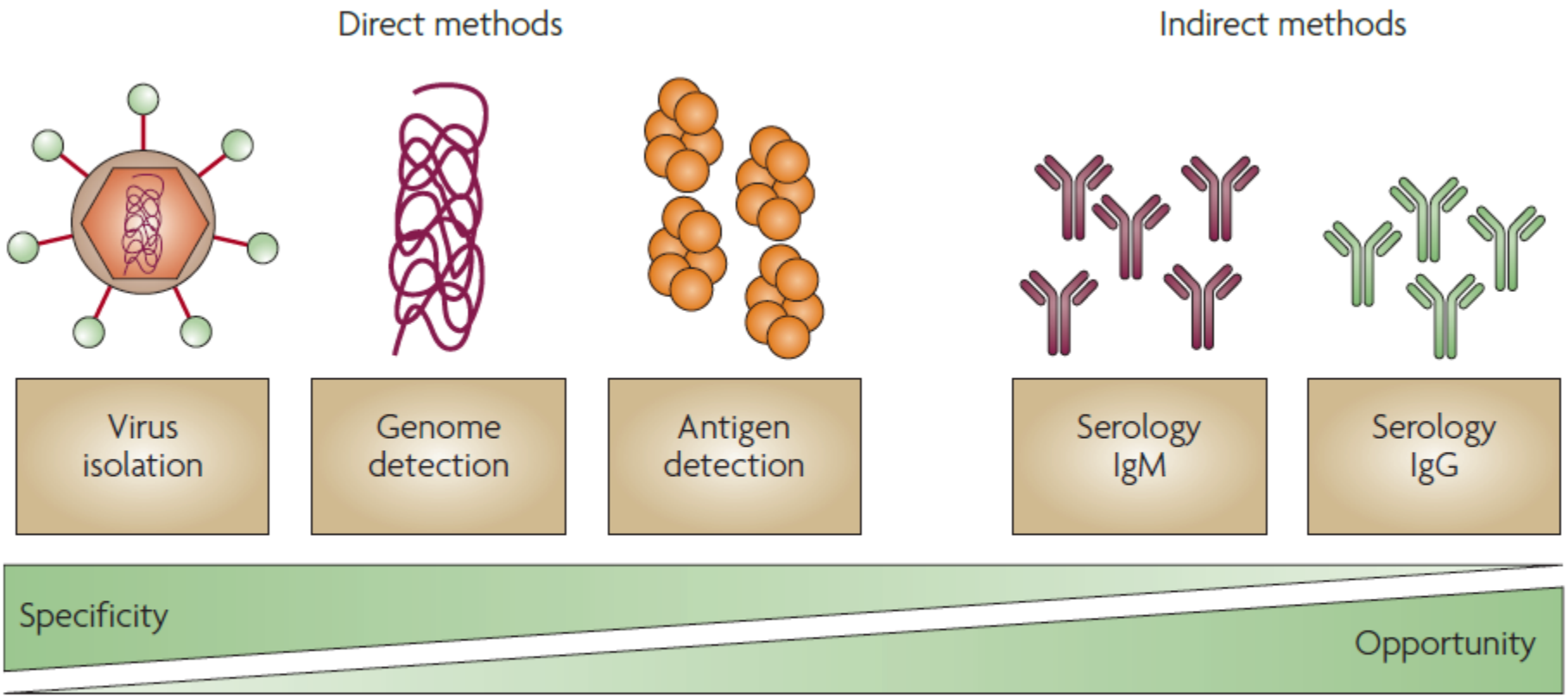

Figure 1 | **Comparative merits of direct and indirect laboratory methods for the diagnosis of dengue infections.** Opportunity refers to the fact that antibody testing is usually the most practical diagnostic option available.

doi:10.1038/nrmicro2459

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Dengue: Diagnóstico Laboratorial

Table 1 | **Advantages and limitations of different dengue diagnostic tests**

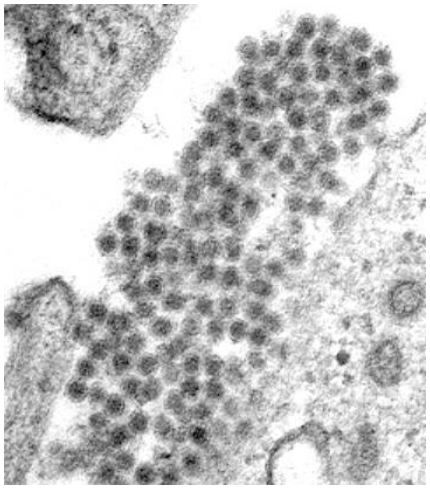
Diagnostic tests	Advantages	Limitations
Viral isolation and identification	• Confirmed infection • Specific • Identifies serotypes	• Requires acute sample (0–5 days post onset) • Requires expertise and appropriate facilities • Takes more than 1 week • Does not differentiate between primary and secondary infection • Expensive
RNA detection	• Confirmed infection • Sensitive and specific • Identifies serotype and genotype • Results in 24–48 hours	• Potential false-positives owing to contamination • Requires acute sample (0–5 days post onset) • Requires expertise and expensive laboratory equipment • Does not differentiate between primary and secondary infection
Antigen detection		
Clinical specimens (for example, using blood in an NS1 assay)	• Confirmed infection • Easy to perform • Less expensive than virus isolation or RNA detection	• Not as sensitive as virus isolation or RNA detection
Tissues from fatal cases (for immunohisto-chemistry, for example)	• Confirmed infection	• Not as sensitive as virus isolation or RNA detection • Requires expertise in pathology
Serological tests		
IgM or IgG seroconversion	• Confirmed infection • Least expensive • Easy to perform	• IgM levels can be low in secondary infections • Confirmation requires two or more serum samples • Can differentiate between primary and secondary infection*
IgM detection (single sample)	• Identifies probable dengue cases • Useful for surveillance, tracking outbreaks and monitoring effectiveness of interventions	• IgM levels can be low in secondary infections

*Primary infection: IgM-positive and IgG-negative (if samples are taken before day 8–10); secondary infection: IgG should be higher than 1,280 haemagglutination inhibition in convalescent serum.

doi:10.1038/nrmicro2459

ARBOVIROSES “EMERGENTES”

Arboviroses Emergentes

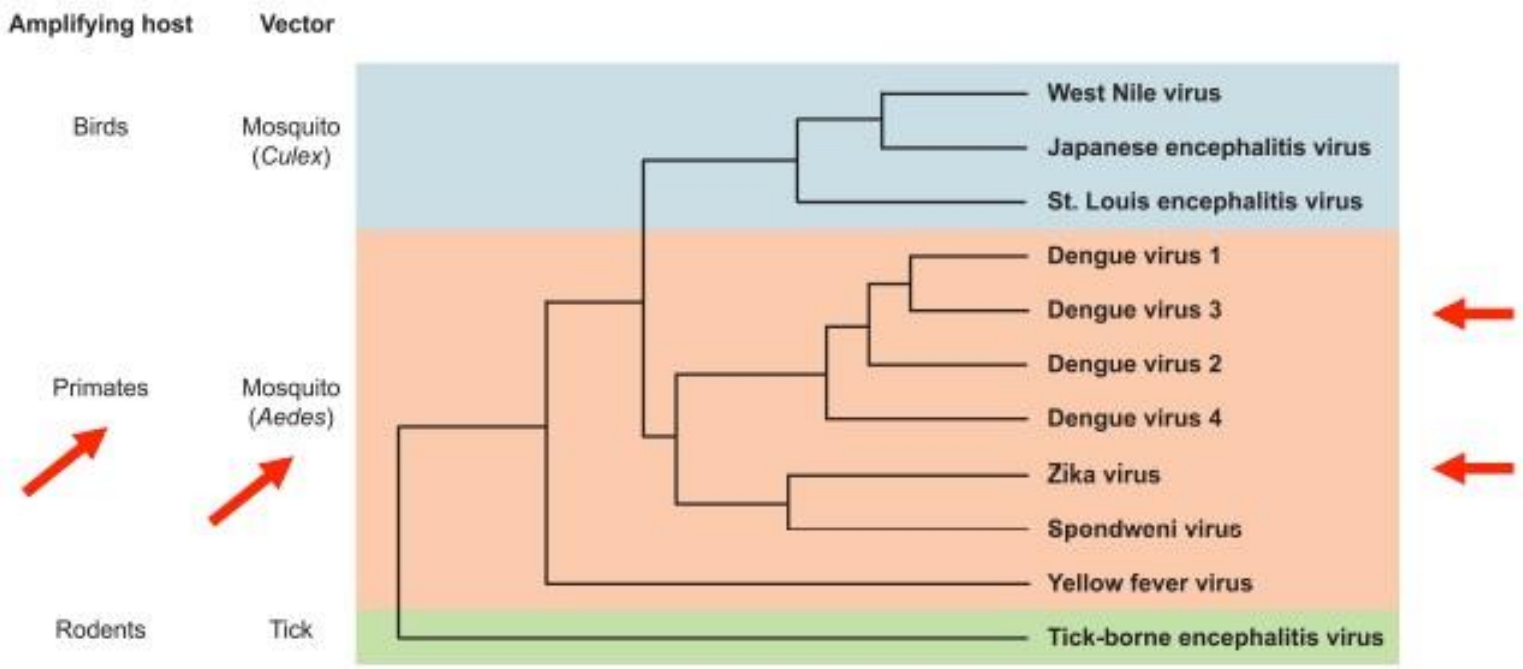


Zika Vírus

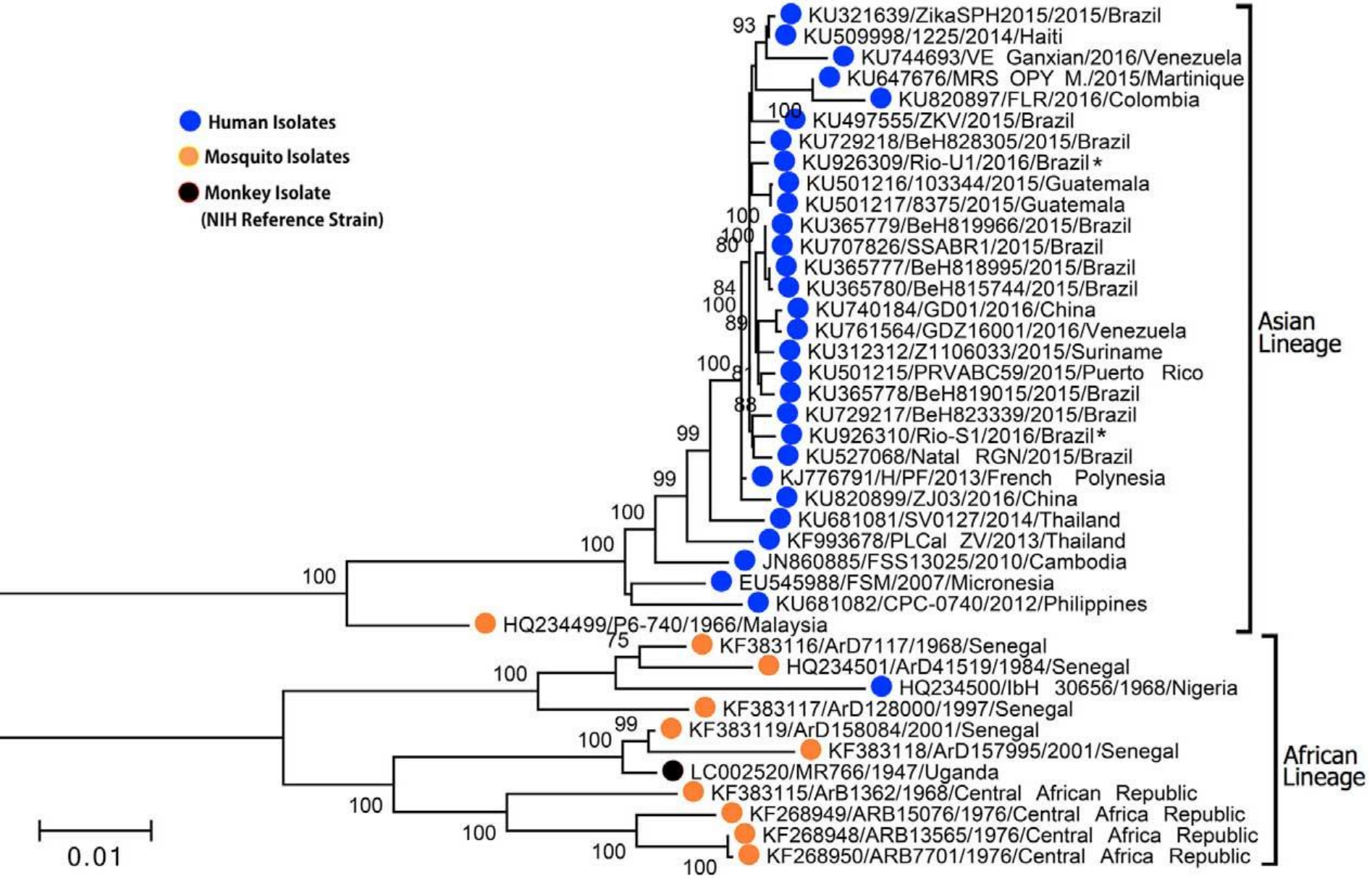
Família:	*Flaviviridae*
Gênero:	*Flavivirus*
Transmissão:	vetor artrópode - *Aedes aegypti*
Partículas virais:	esférico 45 nm, envelopado
Proteínas estruturais:	glicoproteína E ; nucleoproteína: C; membrana: M
Genoma:	ss-RNA polaridade positiva

Arboviroses Emergentes: Zika Vírus

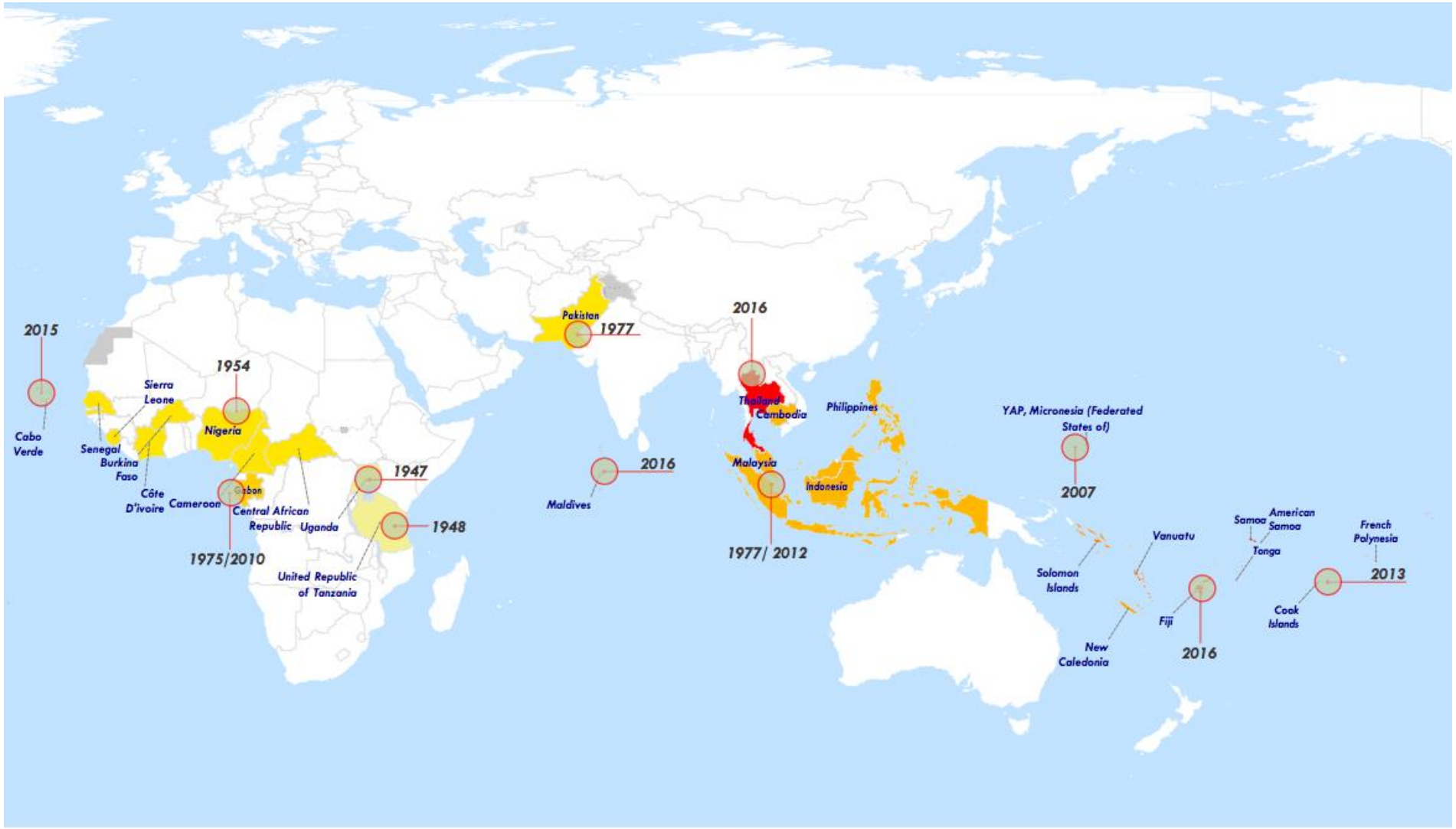
Zika virus is a flavivirus that is closely related to Dengue virus



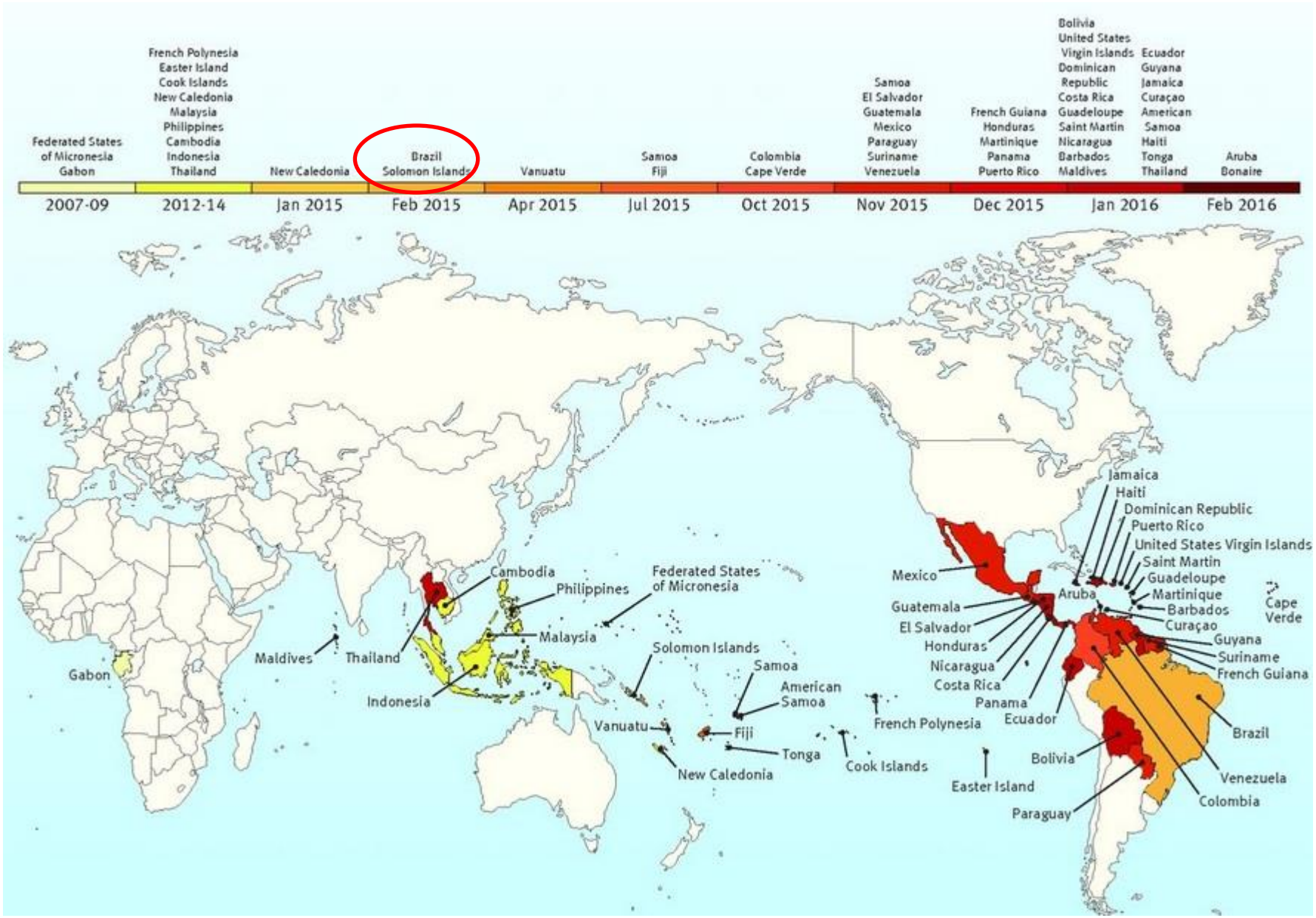
Arboviroses Emergentes: Zika Vírus



Arboviroses Emergentes: Zika Vírus

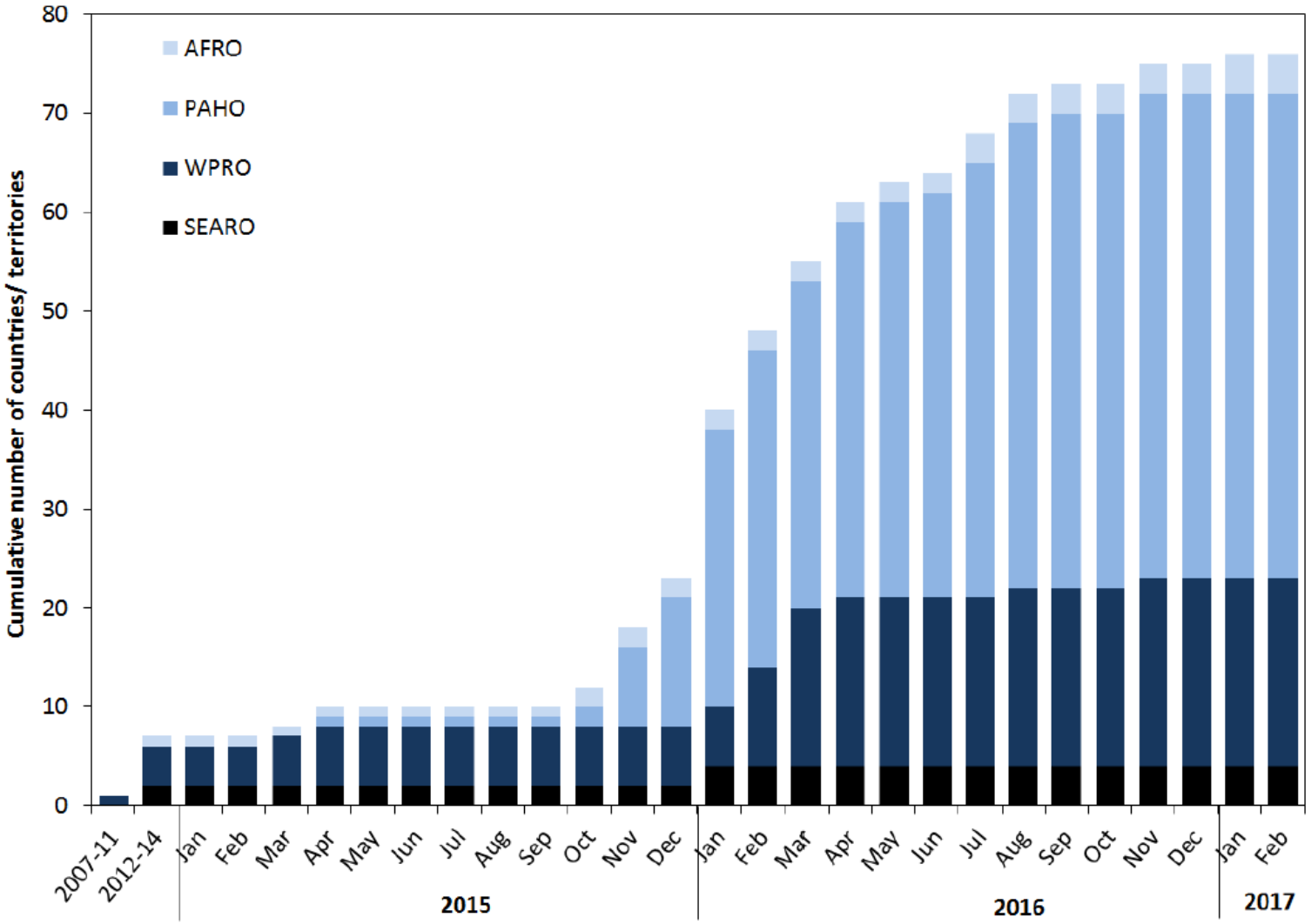


Arboviroses Emergentes: Zika Vírus



Arboviroses Emergentes: Zika Vírus

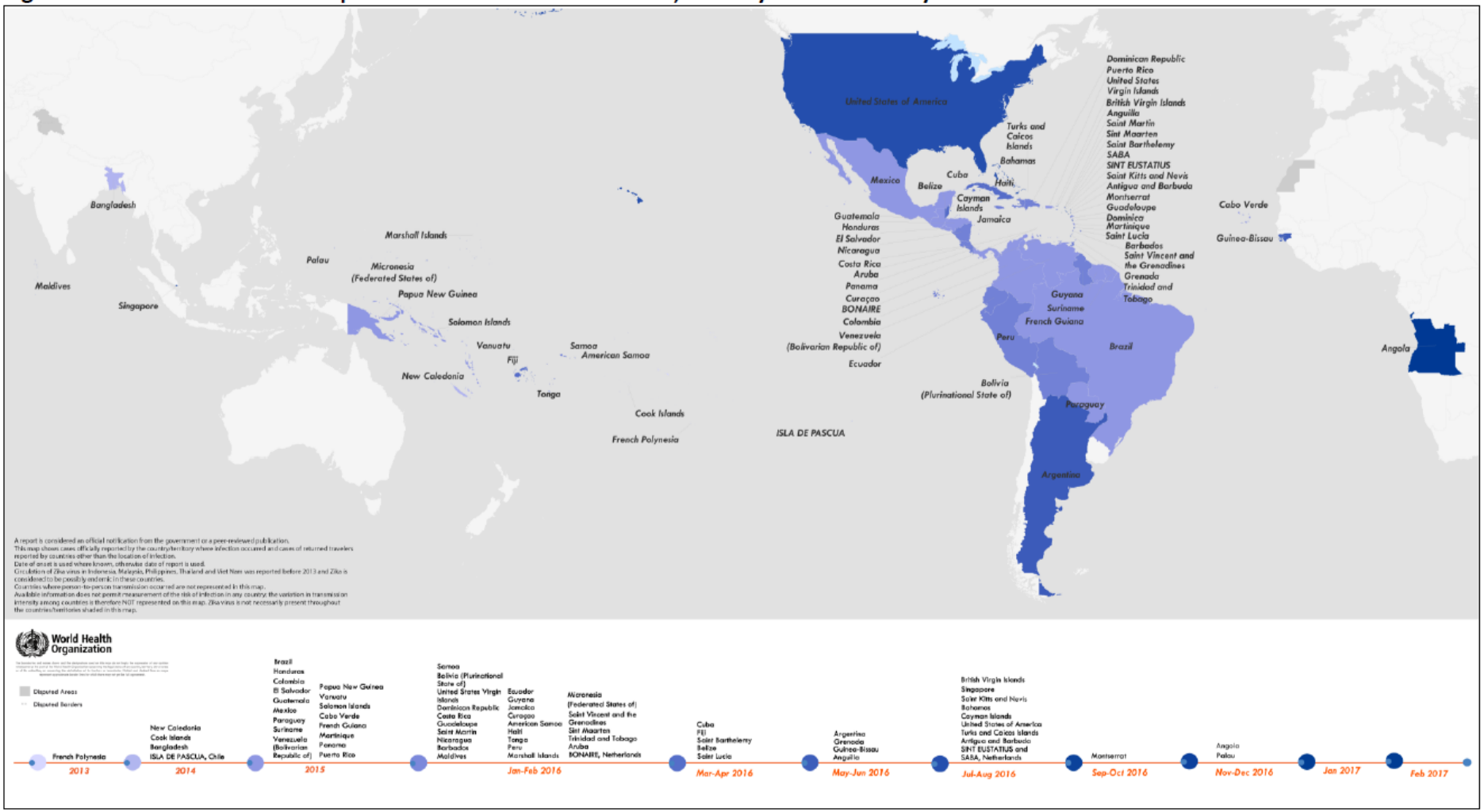
Figure 1. Cumulative number of countries and territories by WHO region[1] reporting mosquito-borne Zika virus transmission for the first time by year (2007–2014), and by month from 1 January 2015 to 1 February 2017



http://apps.who.int/iris/bitstream/10665/254507/1/zikasitrep2Feb17-eng.pdf?ua=1

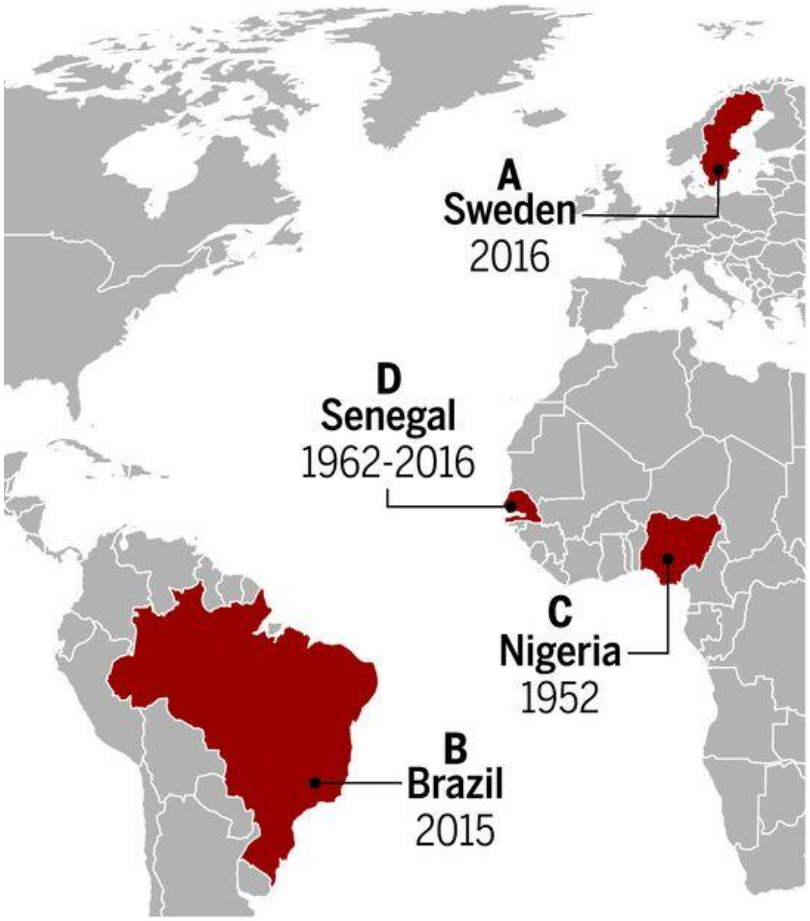
Arboviroses Emergentes: Zika Vírus

Figure 2. New detection of mosquito-borne Zika virus infections, January 2013–February 2017

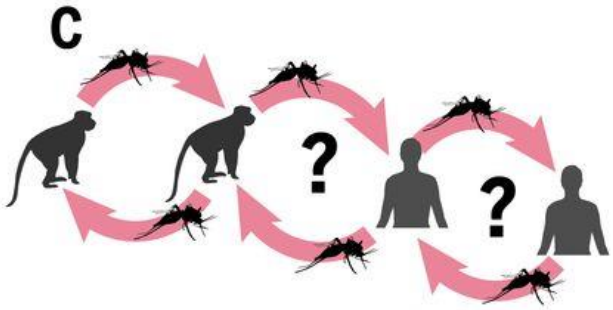


A report is considered an official notification from the government or a peer-reviewed publication. This map shows cases officially reported by the country/territory where infection occurred, and cases of returned travellers reported by countries other than the location of infection. Date of onset is used where known, otherwise date of report is used. Circulation of Zika virus in Indonesia, Malaysia, Philippines, Thailand and Viet Nam was reported before 2013, and Zika is considered to be possibly endemic in these countries. Countries where person-to-person transmission occurred are not represented in this map. Available information does not permit measurement of the risk of infection in any country; the variation in transmission intensity among countries is therefore NOT represented on this map. Zika virus is not necessarily present throughout the countries/territories shaded in this map.

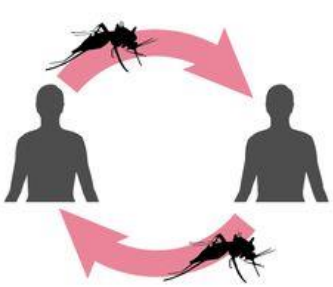
Arboviroses Emergentes: Zika Vírus



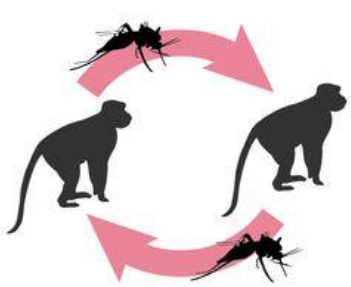
Not at risk
(Importations only)



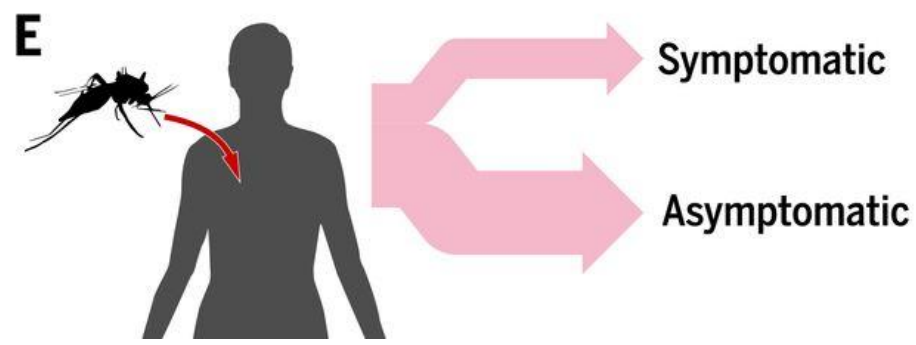
"Endemic"
(Moderate/low incidence)

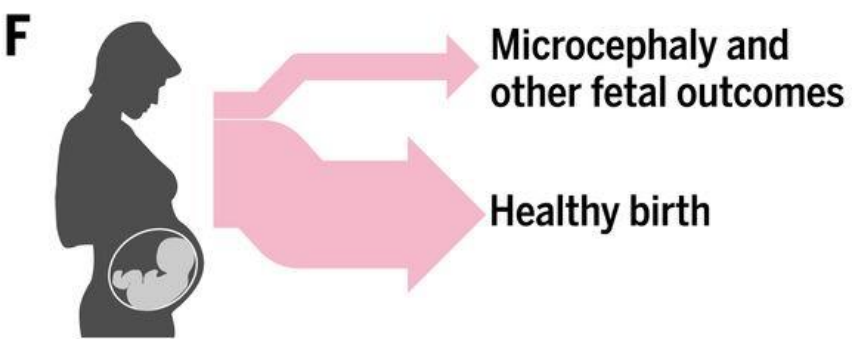


Epidemic
(High incidence)

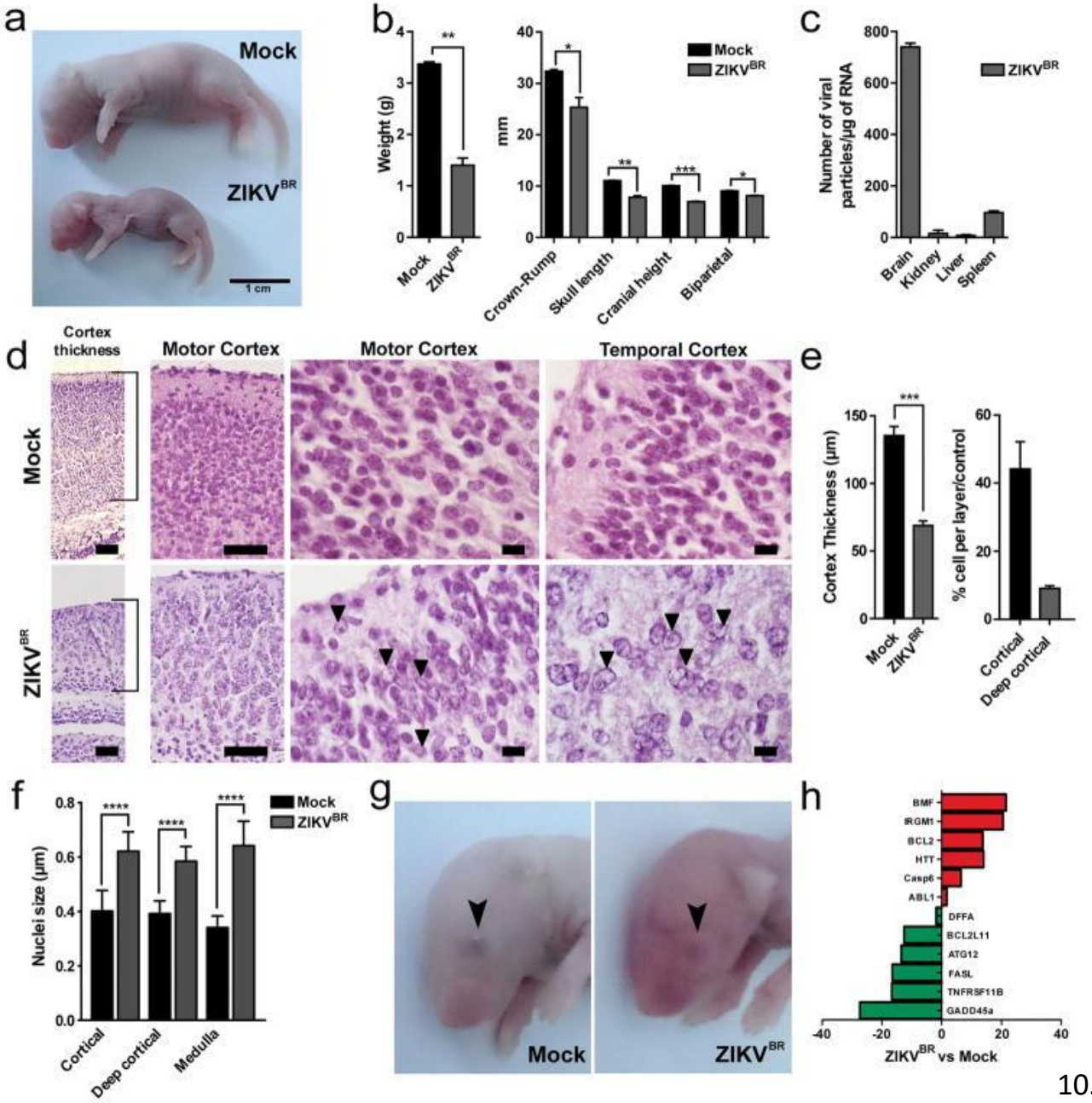


Sylvatic only
(Almost zero incidence)



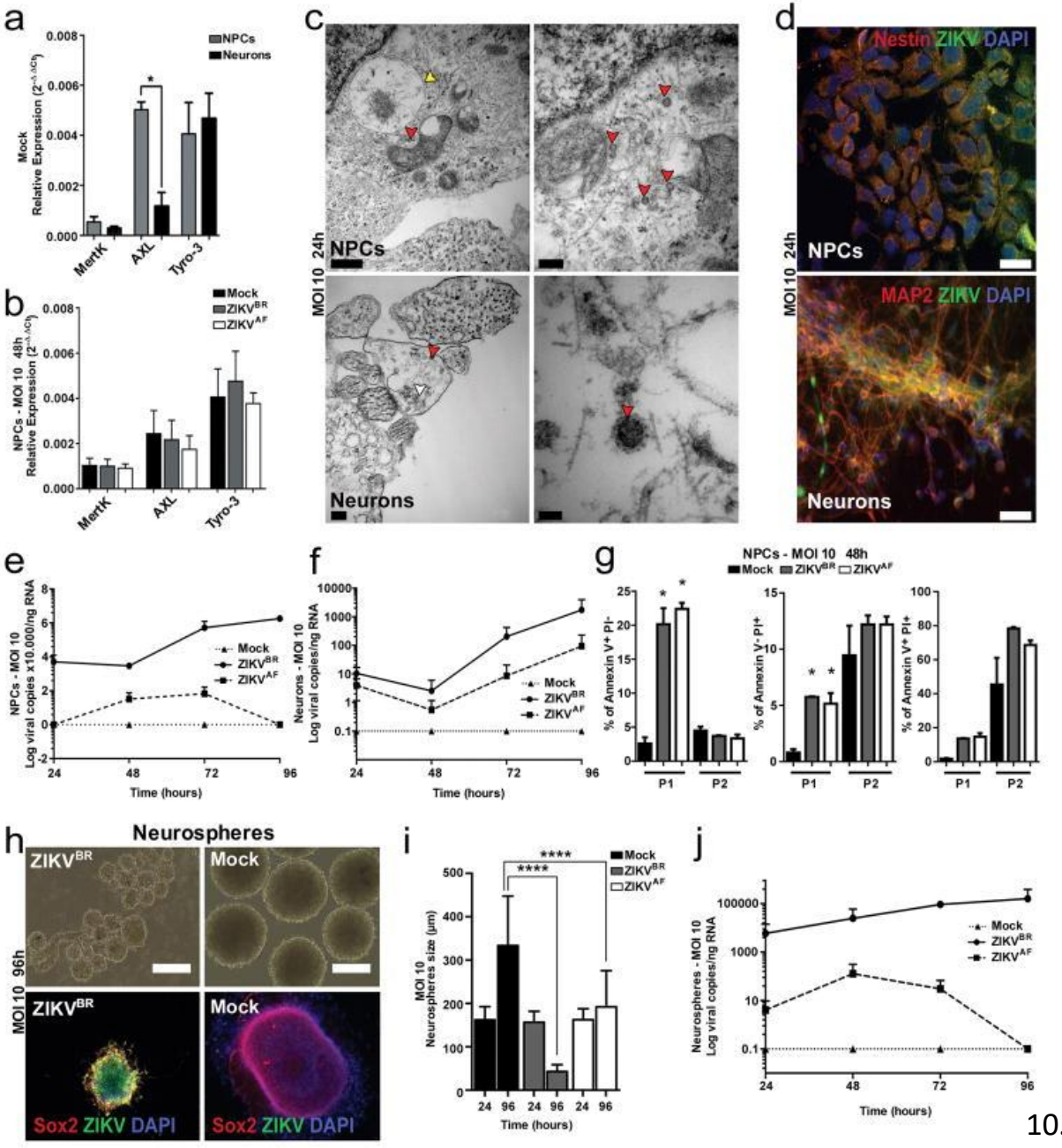


Arboviroses Emergentes: Zika Vírus



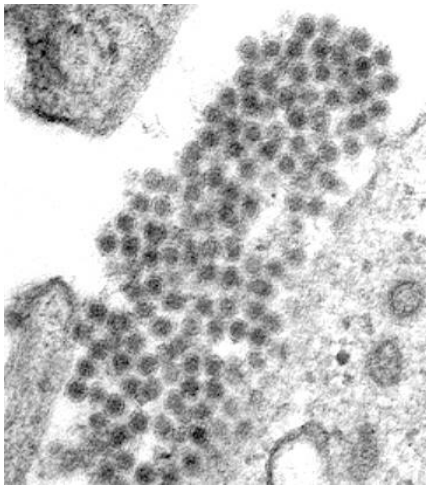
10.1038/nature18296

Arboviroses Emergentes: Zika Vírus



10.1038/nature18296

Arboviroses Emergentes



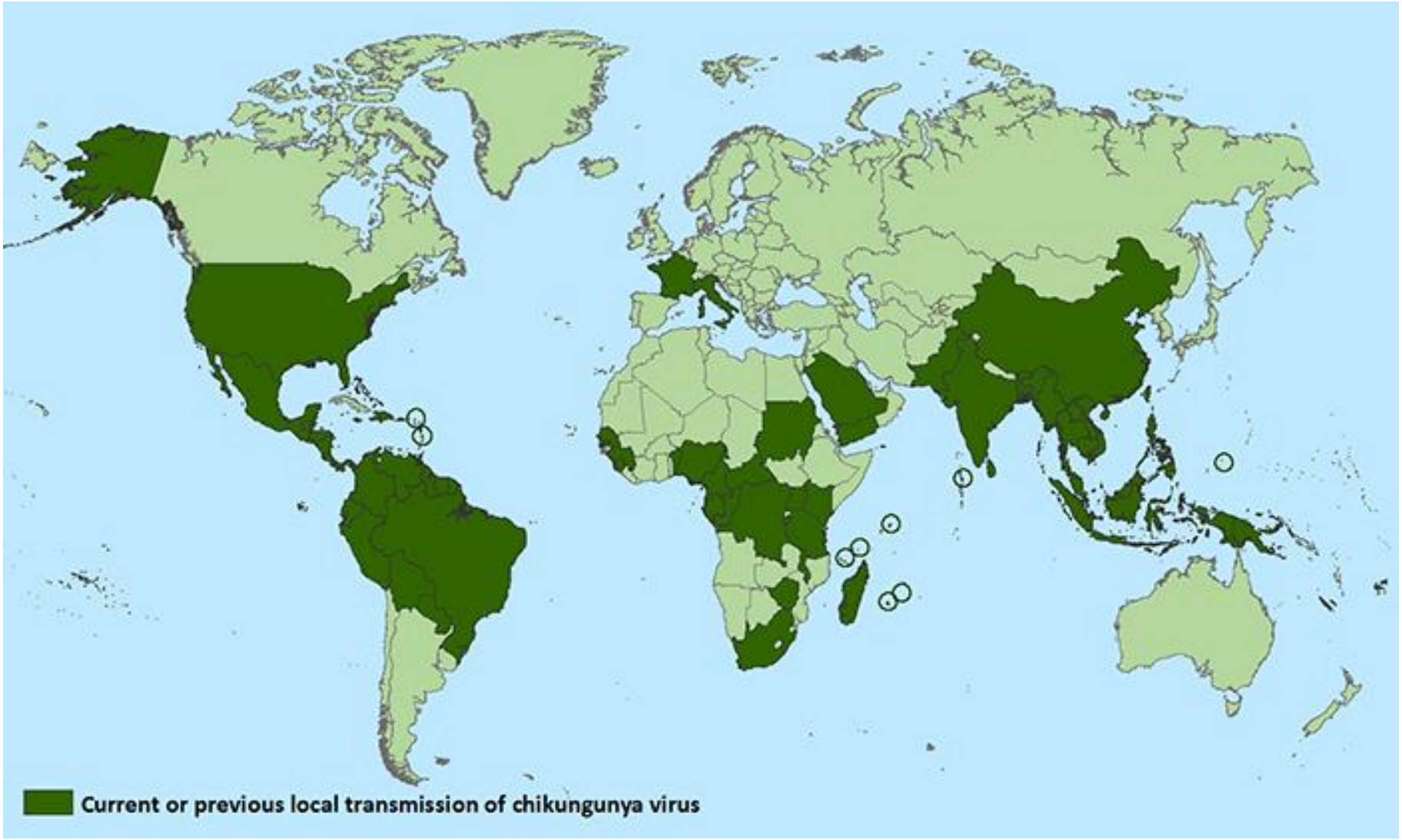
Chikungunya **(Tanzania 1952)**

Mayaro **(Trinidad in 1954) (Genótipos D e L)**

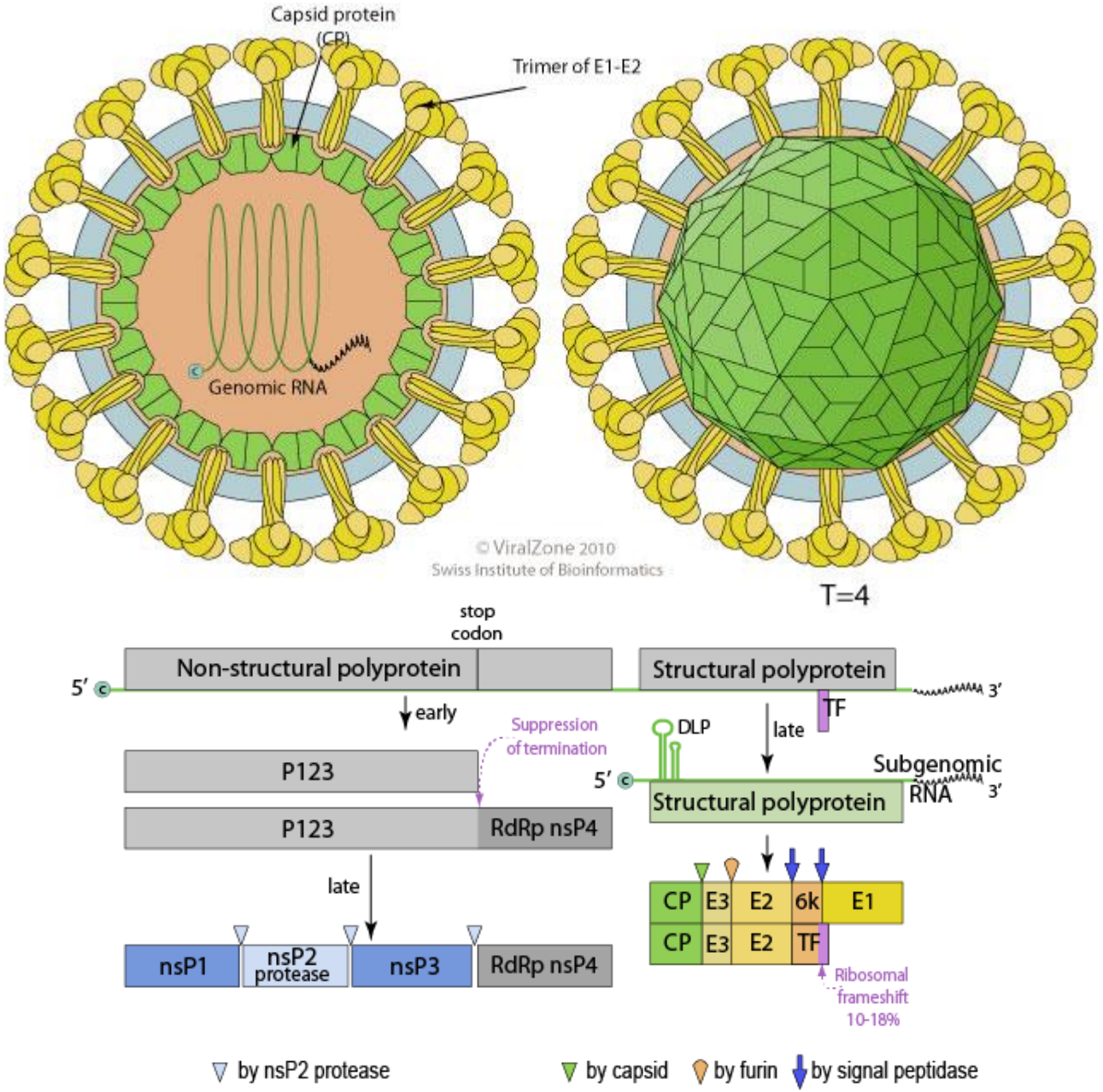
(Ross River virus, O'nyong'nyong virus, and Semliki Forest Virus (SFV)

Família:	*Togaviridae*
Gênero:	*Alphavirus*
Transmissão:	vetor artrópode - *Aedes aegypti ((Ae. furcifer, Ae. taylori e Ae. luteocephalus)*
Partículas virais:	esférico 60-70 nm, envelopado
Proteínas estruturais:	E2,E3, CP, 6k e TF
Genoma:	ss-RNA polaridade positiva 11.6 kb

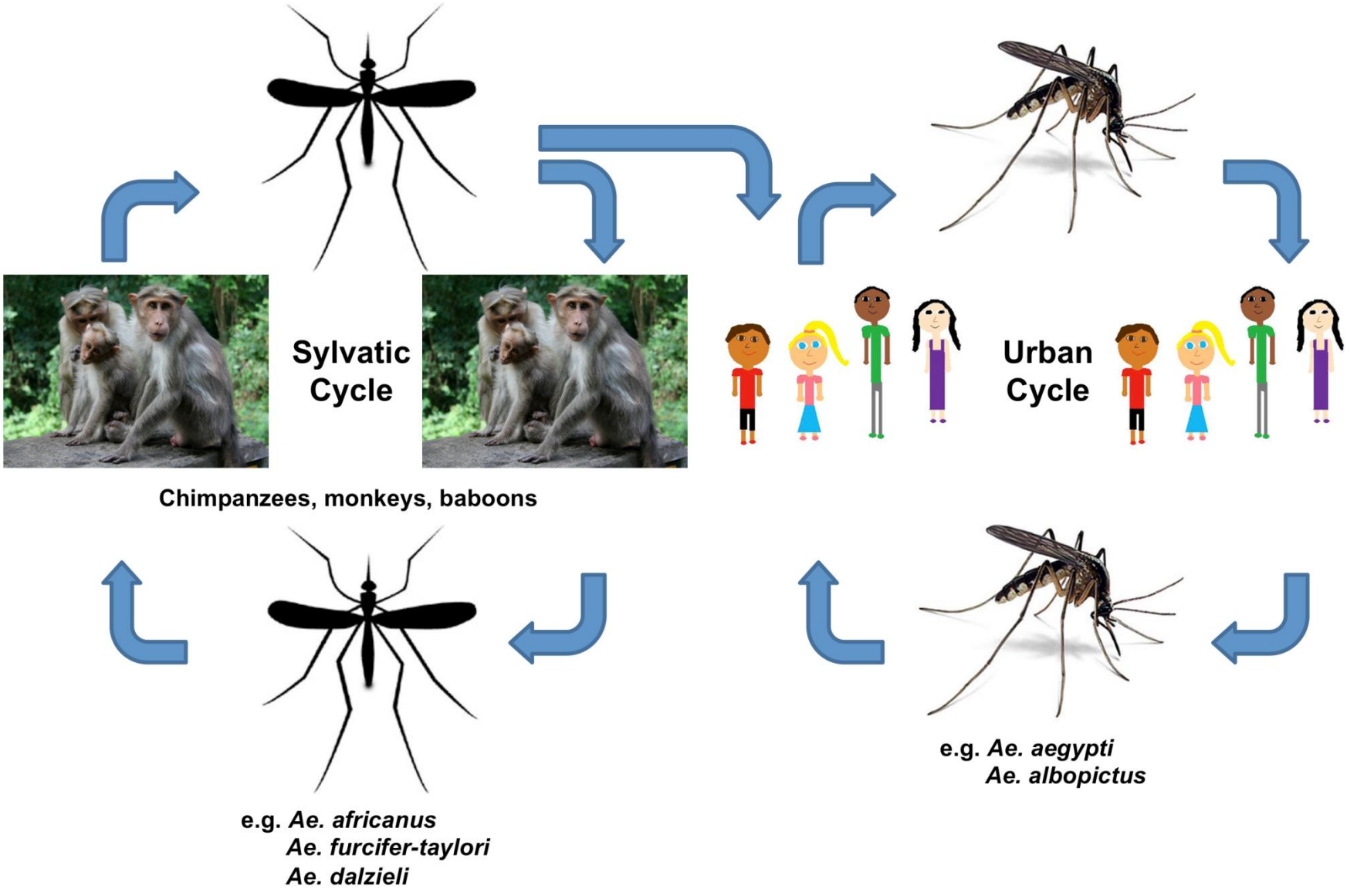
Arboviroses Emergentes: Chikungunya



Arboviroses Emergentes: Chikungunya



Arboviroses Emergentes: Chikungunya

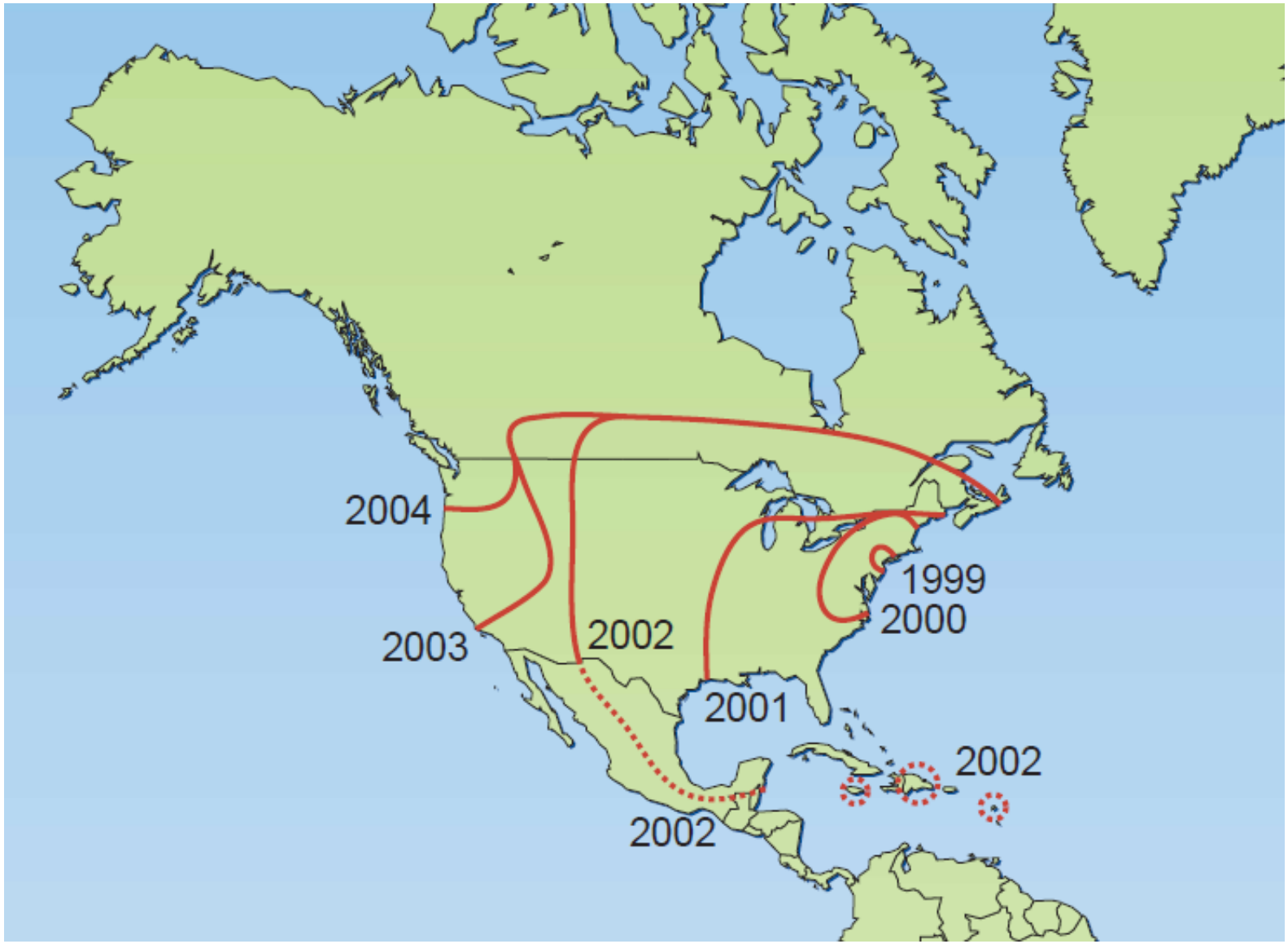


Arboviroses Emergentes...

É bom ficarmos atentos!!!

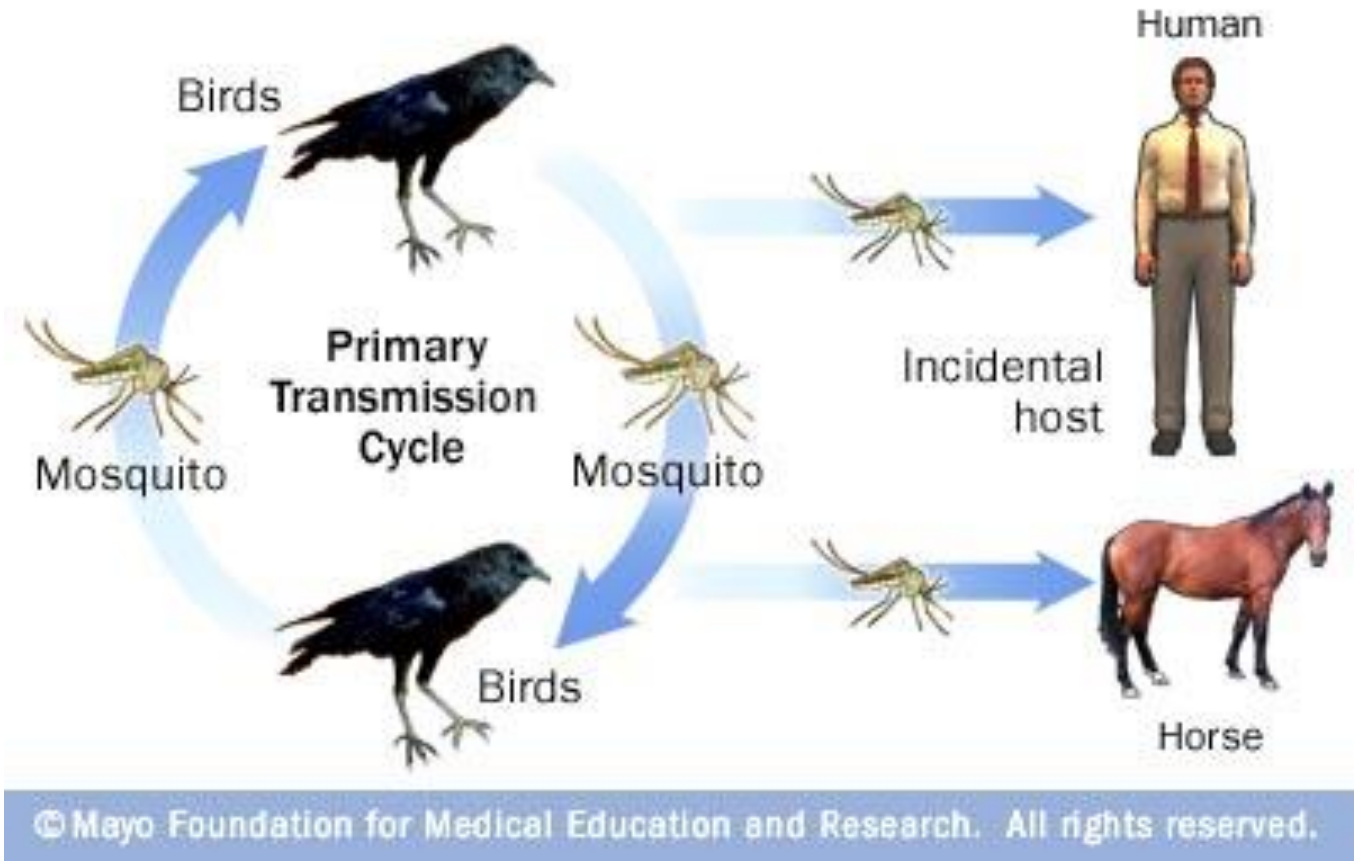
Arboviroses Emergentes: West Nile (flavivírus)

West Nile virus (WNV)

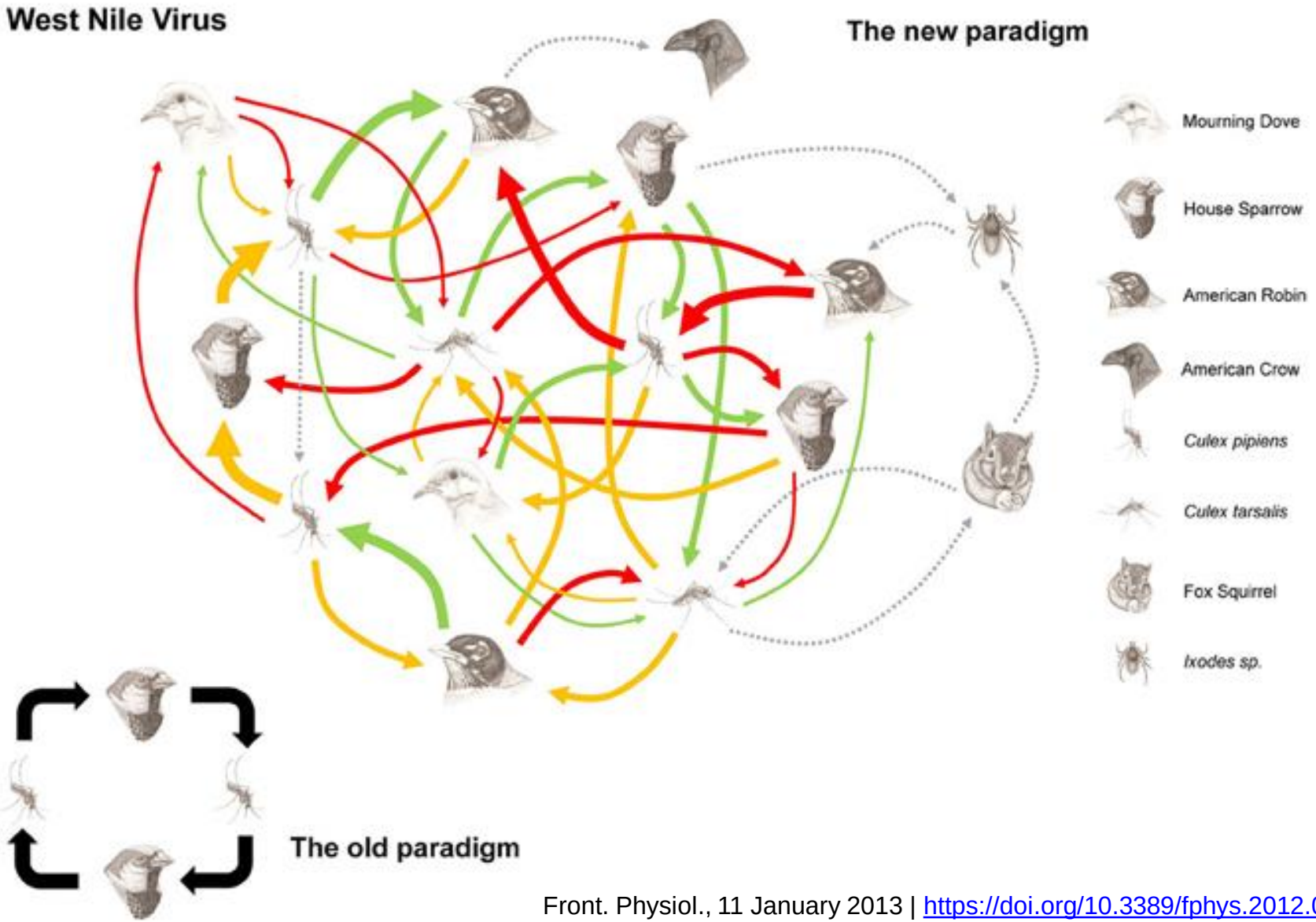


Arboviroses Emergentes: West Nile (flavivírus)

West Nile virus (WNV)

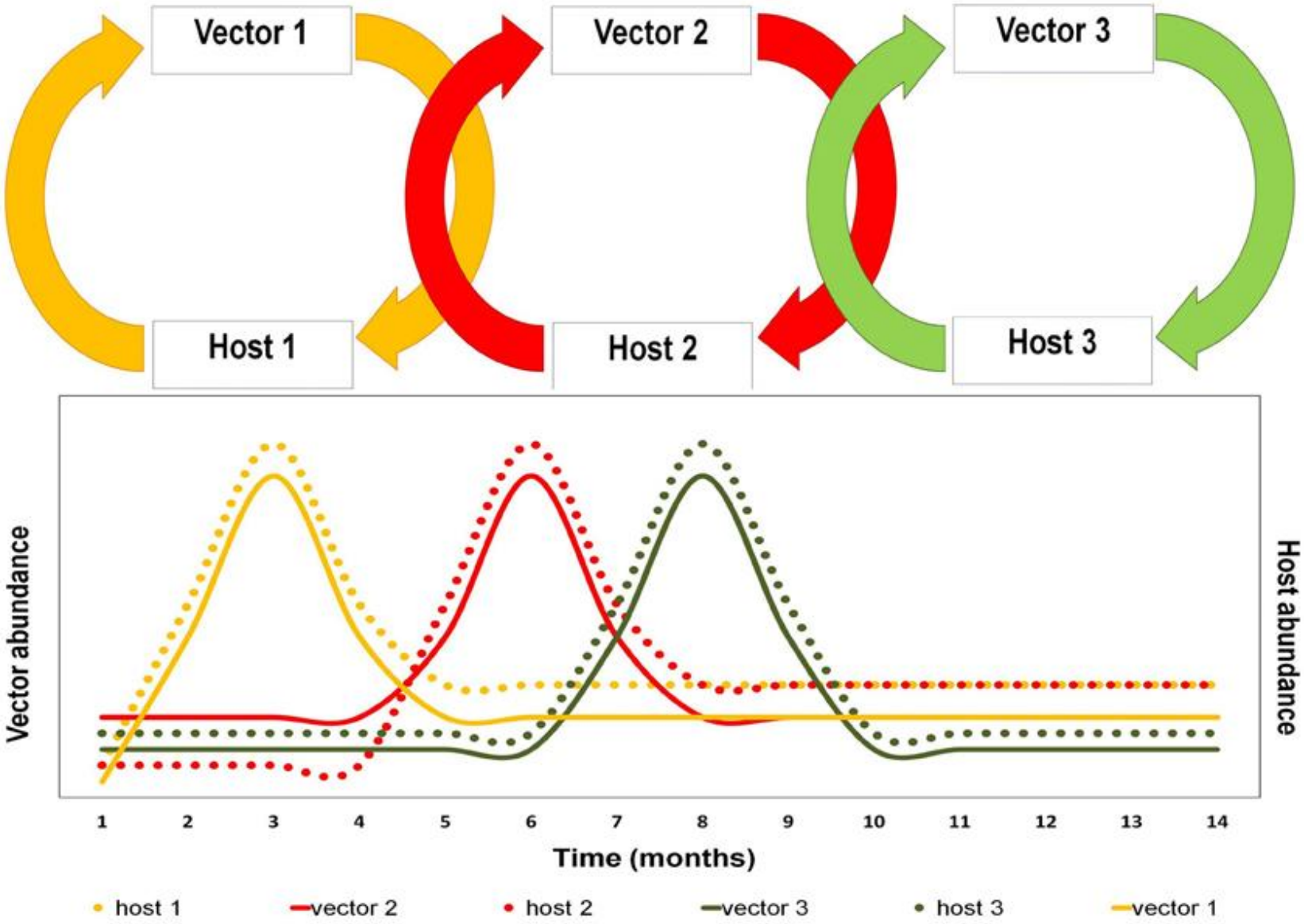


Arboviroses:
ciclos de transmissão mais complexos?



Front. Physiol., 11 January 2013 | https://doi.org/10.3389/fphys.2012.00493

Arboviroses:
ciclos de transmissão mais complexos?



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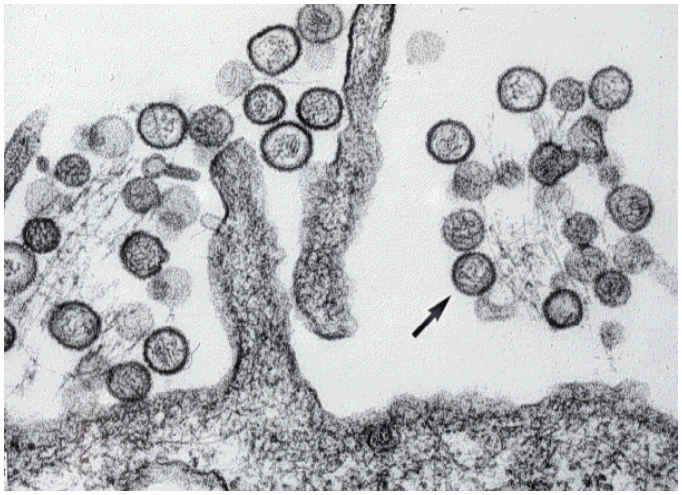
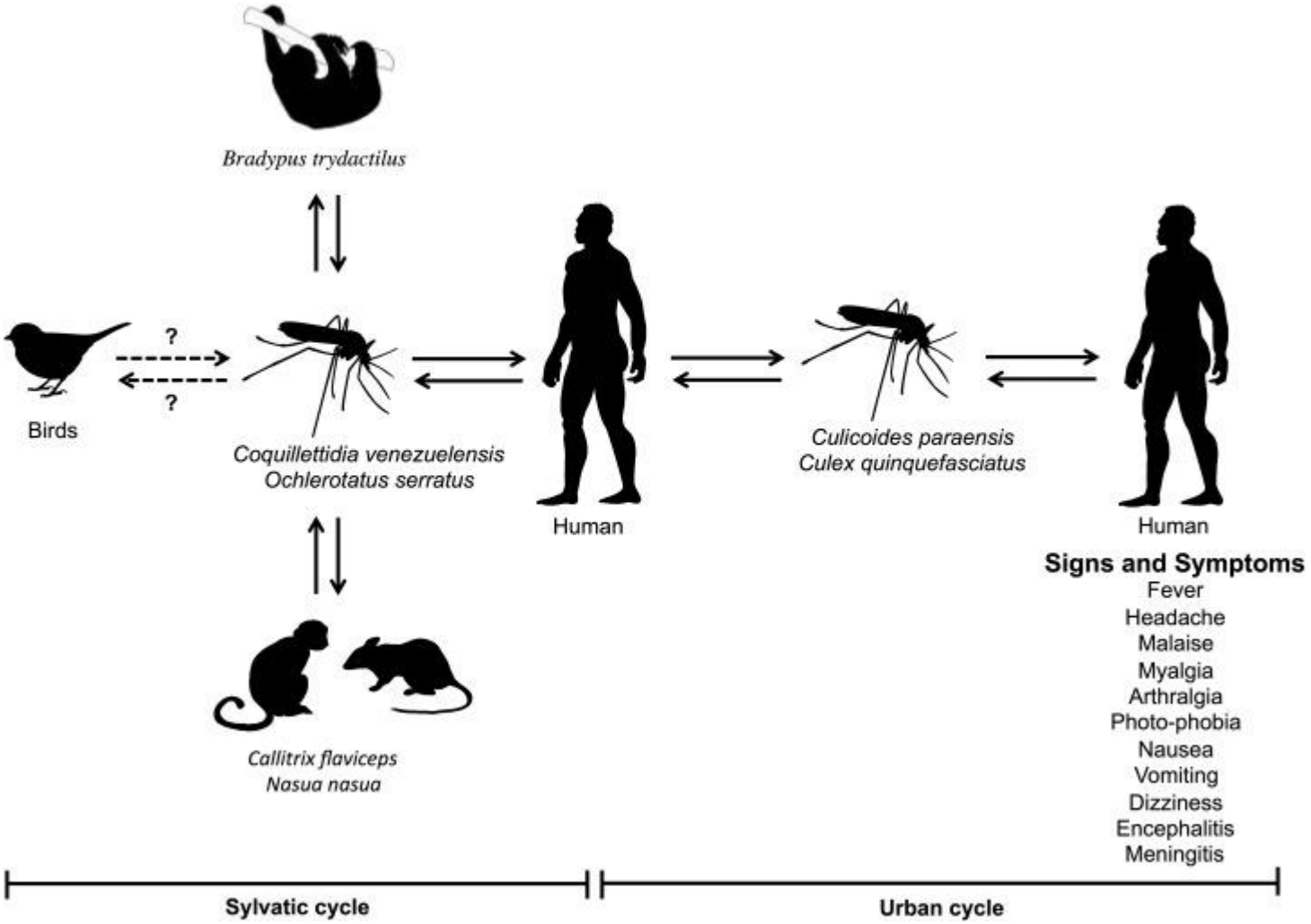
Outras Arboviroses: Oropouche



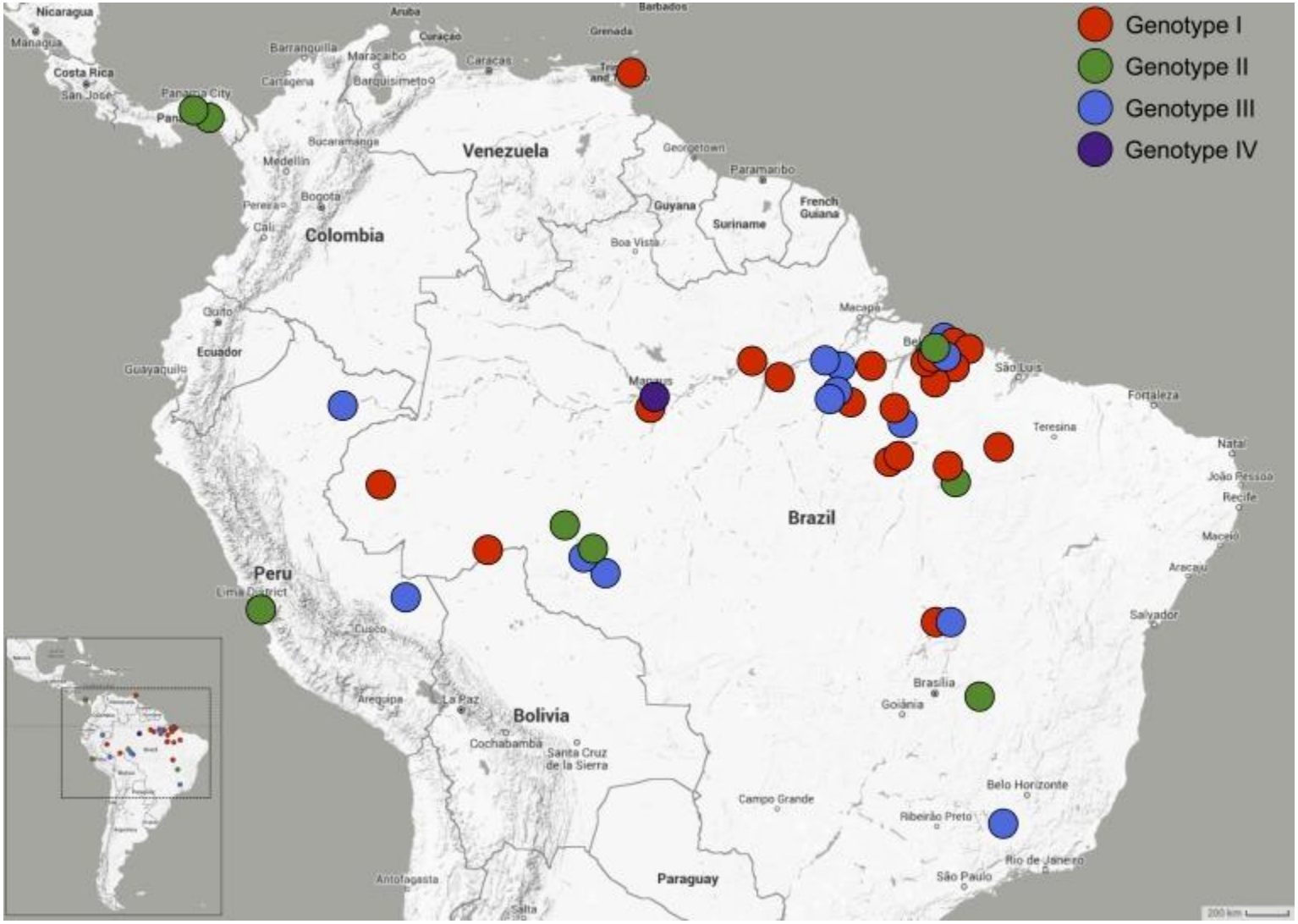
Família:	*Bunyaviridae (*Gênero *Orthobunyavirus)*
Transmissão:	hospedeiro vertebrado, sem vetor artrópode
Partículas virais:	esférico, 80-110 nm
Proteínas estruturais:	glicoproteínas: G1, G2 ; nucleoproteína: N
Genoma:	ss-RNA, trisegmentado, polaridade negativa

Outras Arboviroses: Oropouche



10.4269/ajtmh.16-0672

Outras Arboviroses: Oropouche



10.4269/ajtmh.16-0672

VÍRUS EMERGENTES

Alterações nas populações de hospedeiros e no meio ambiente podem expandir os nichos para diseminassão viral:

Exemplos:

- Poliomielite e saneamento básico
- Varíola e Sarampo no novo mundo
- Hantavírus e mudanças climáticas (Sin nombre vírus, 1993)
- Aedes...
- Barragens...

OBRIGADO!!!