Australia-Brazil Research Collaboration: "One Health"

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Australian Government
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Australian Government
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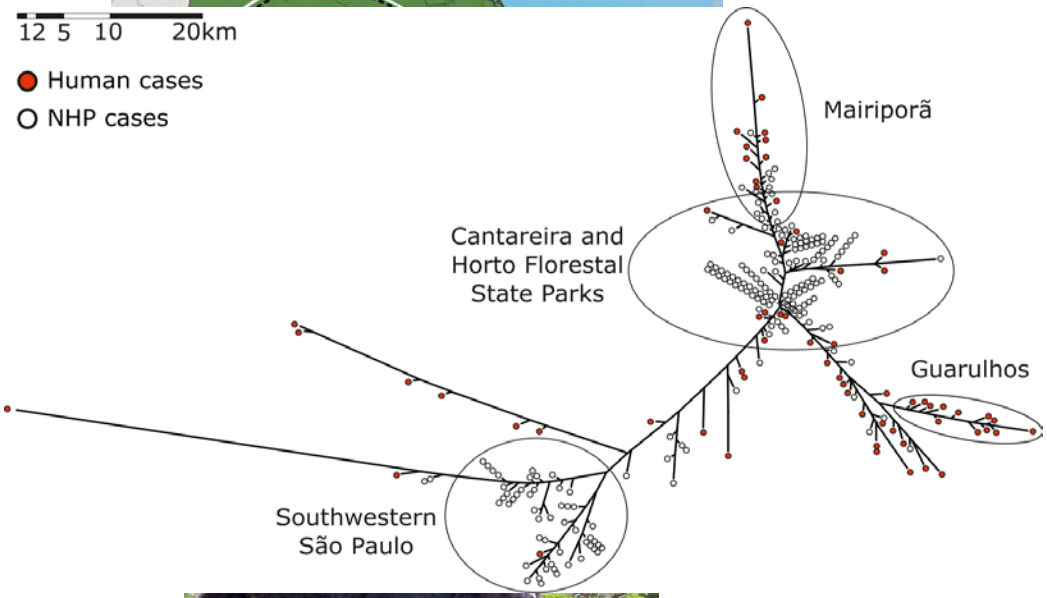
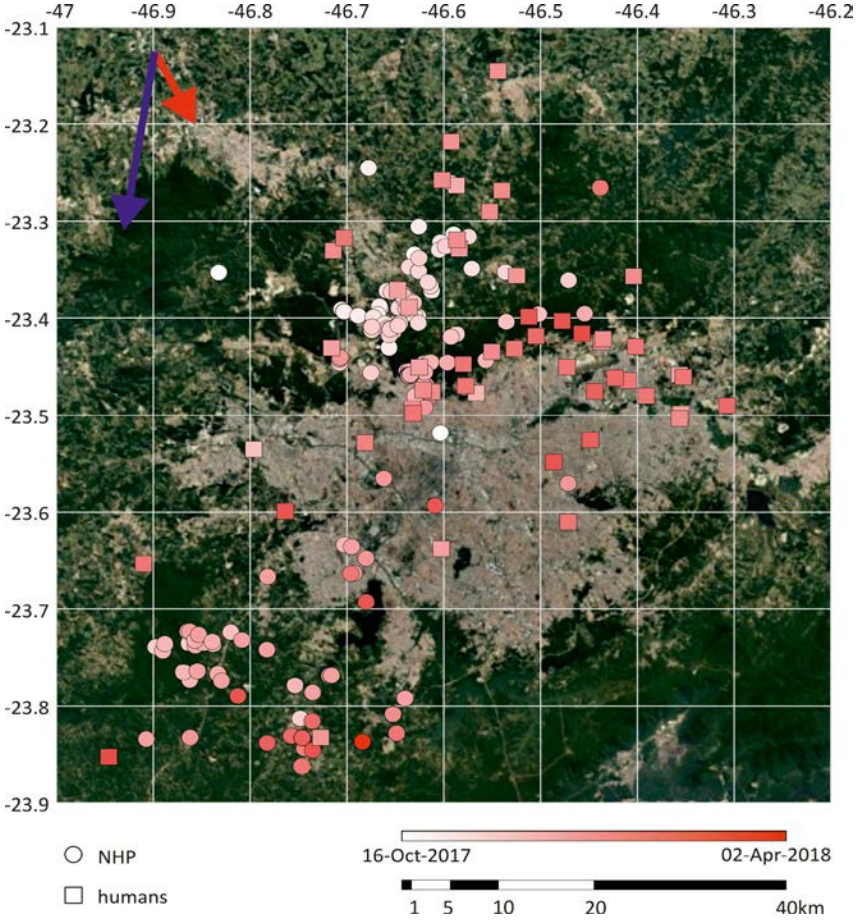
NHMRC

Yellow Fever in São Paulo, Brazil, 2017-2018

Largest outbreak of yellow fever of the 21st century in the Americas started in 2016, with intense circulation in southeastern Brazil, including São Paulo.





- Virus r rea with little human and towards the Atlanti an spill-over
- Textbook zoonosis and a textbook example of the importance of One Health.

Genomic Tracking of Zika Virus in Brazil

ZIBRA

ZIKA IN BRAZIL REAL TIME ANALYSIS

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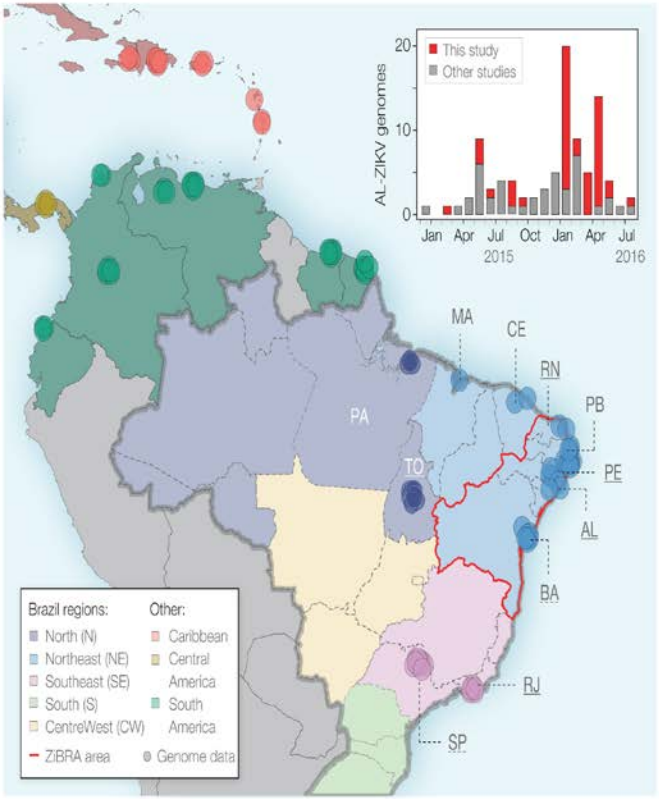
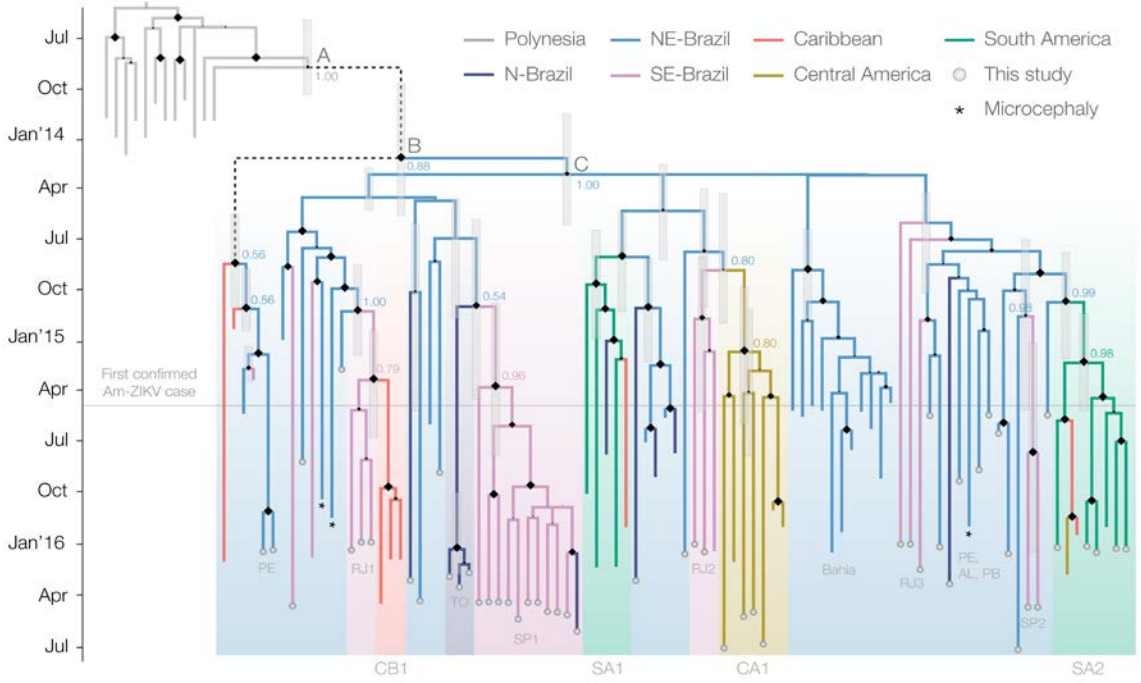




- Phylogeny reveals the duration of pre-detection cryptic virus transmission
- Unknown animal reservoir

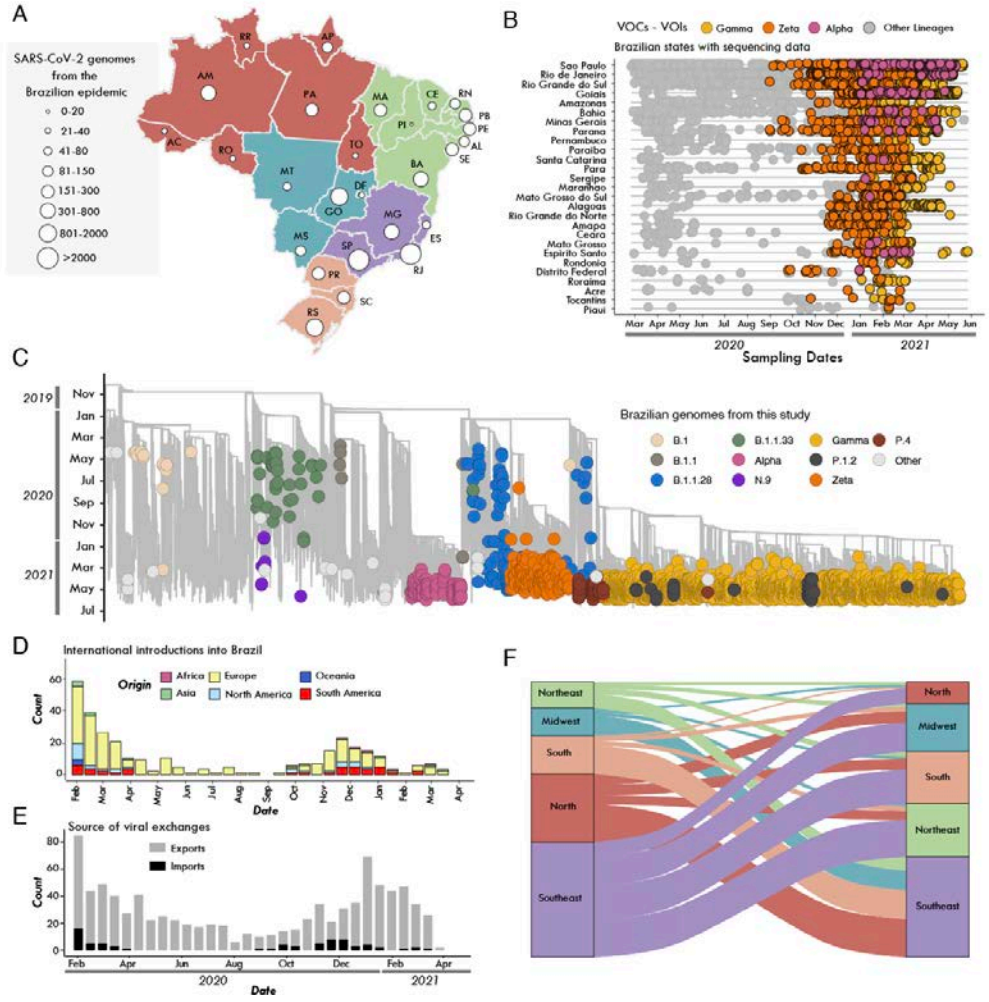
Faria *et al*. Nature **546**, 406-410; 2017.

COVID-19 in Australia and Brazil

SARS-CoV-2 genomes sequenced (7th Nov. 2021)

Australia: 180,361 cases; 39,896 virus genomes; 22.12% cases sequenced

Brazil: 21,874,324 cases; 69,522 virus genomes; 0.32% cases sequenced



Evolution of SARS-CoV-2 in Brazil

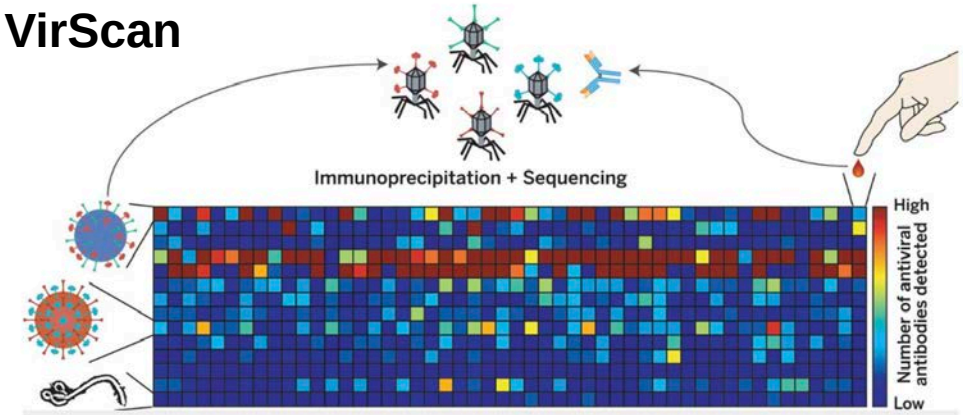
- Early COVID-19 pandemic in Brazil epidemic characterized by the co-circulation of multiple SARS-CoV-2 lineages, linked to importations predominantly from Europe.
- A lack of effective restriction measures led to the local emergence and international spread of Variants of Concern and of Interest, including Gamma (P.1) and Zeta (P.2).
- Spread from Brazil to other localities.
- Need for widespread and ongoing genomic surveillance in Brazil and the region for pandemic monitoring and following the real-time spread of emerging viruses.

A Global “Pandemic Radar”

- Active surveillance of people living/working at the human-animal interface: wildlife trade and fur farming, in animal production and slaughter, live animal markets, animal hunting/bushmeat, people living around bat roosts, animal carers and animal rescue centres etc.
- Active surveillance of animal mortality events
- Regular immunological surveillance (e.g. VirScan/GIO) and occasional metagenomic surveillance (may need new computational tools)
- Rapid and open data sharing

The Lancet 2020, DOI: (10.1016/S0140-6736(20)31027-8)

VirScan



VirScan, or systematic viral epitope scanning, works by displaying bits of protein from more than 1,000 strains of virus. Antibodies in a blood sample latch onto the bits they recognize. Now, scientists have updated VirScan to include the novel coronavirus. Credit: G. Xu et al./*Science* 2015

SCIENCE FORUM

A Global Immunological Observatory to meet a time of pandemics

Abstract SARS-CoV-2 presents an unprecedented international challenge, but it will not be the last such threat. Here, we argue that the world needs to be much better prepared to rapidly detect, define and defeat future pandemics. We propose that a Global Immunological Observatory and associated developments in systems immunology, therapeutics and vaccine design should be at the heart of this enterprise.

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Collaborations:

Yellow Fever in Brazil

- Paolo Zanotto, Marielton dos Passos Cunha (University of São Paolo)

Zika in Brazil

- Nuno Faria, Oliver Pybus (University of Oxford)
- Nick Loman, Josh Quick (University of Birmingham)
- Luiz Carlos Junior de Alcantara (Fundação Oswaldo Cruz)
- Ester Sabino (University of São Paolo)
- Marcio Nunes (Instituto Evandro Chagas)

SARS-CoV-2 in Brazil

- Marta Giovanetti, Vagner Fonseca, Luiz Carlos Junior de Alcantara (Fundação Oswaldo Cruz)
- Svetoslav Nanev Slavov, Simone Kashima, Dimas Tadeu Covas (University of São Paolo)
- Sandra Coccuzzo Sampaio, José Salvatore Leister Patané, Maria Carolina Elias (Butantan Institute)
- Eduan Wilkinson, Houriiyah Tegally (University of KwaZulu-Natal)