

Genomic history of the seventh pandemic of cholera in Latin America and Africa

NR Thomson, François-Xavier Weill, Marie-Laure Quilici, Daryl Domman, Matthew Dorman and many others.

Global Task Force for Cholera Control

16th April 2018

Merieux Foundation Annecy



University of St Andrews | FOUNDED 1413



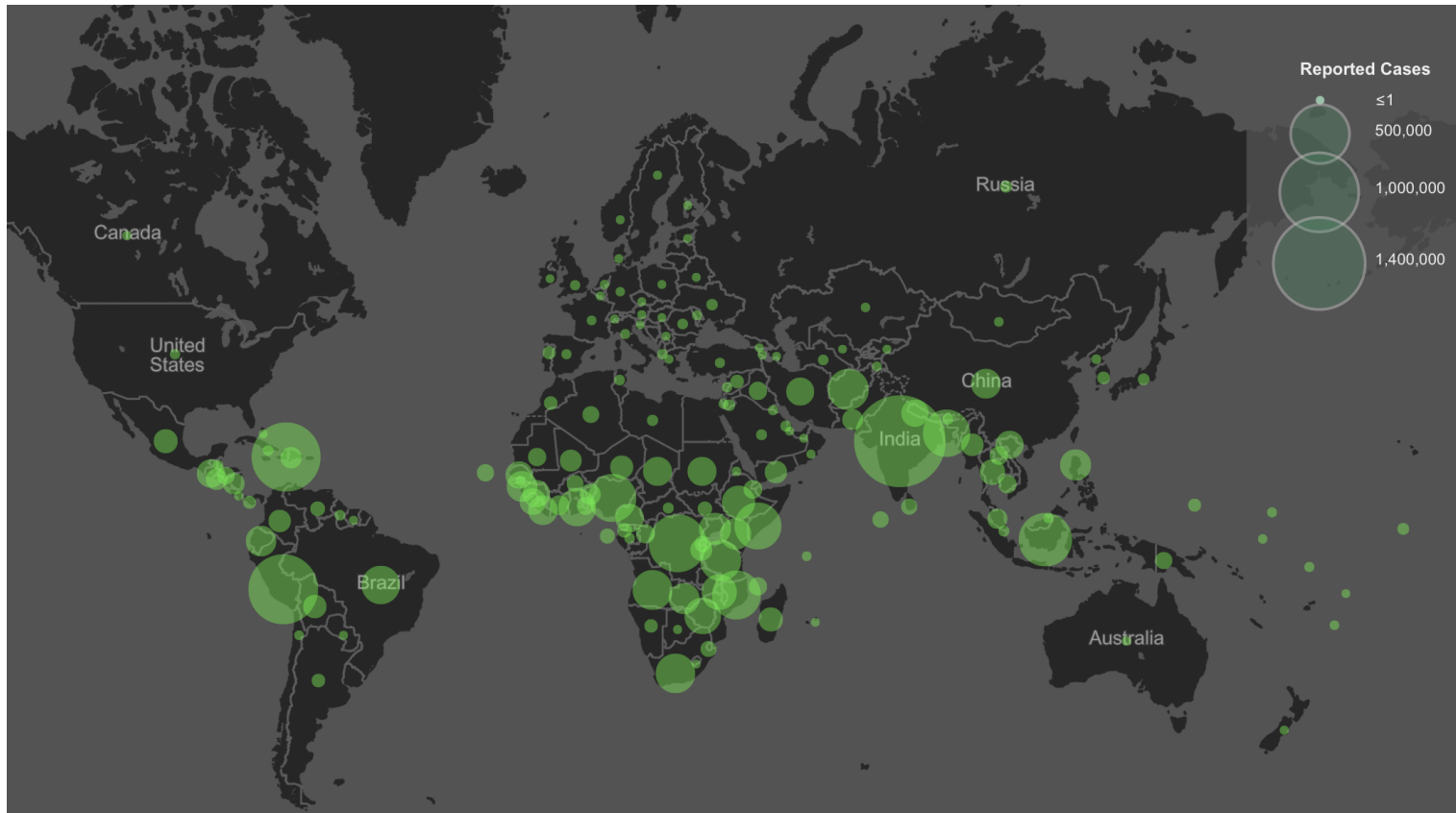
wellcome sanger institute

LONDON SCHOOL of HYGIENE & TROPICAL MEDICINE



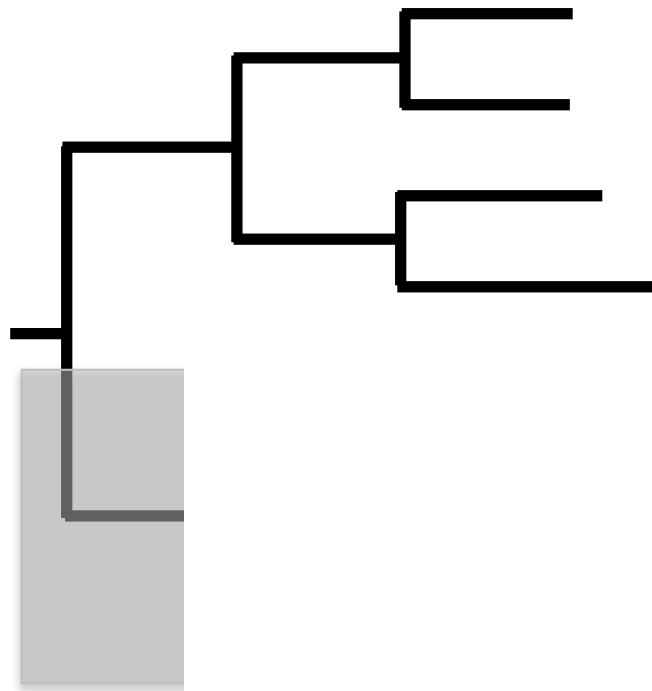
Aim: understand the relationships between isolates

Cholera vs *Vibrio cholerae*



WGS SNPs can be used to draw a phylogenetic tree

If a SNP is shared by a number of isolates, it is evidence that they may be related and form a group on the tree



'Phylogeography'

V. cholerae Oxford

V. cholerae Oxford

V. cholerae Oxford

V. cholerae Oxford

Cambridge

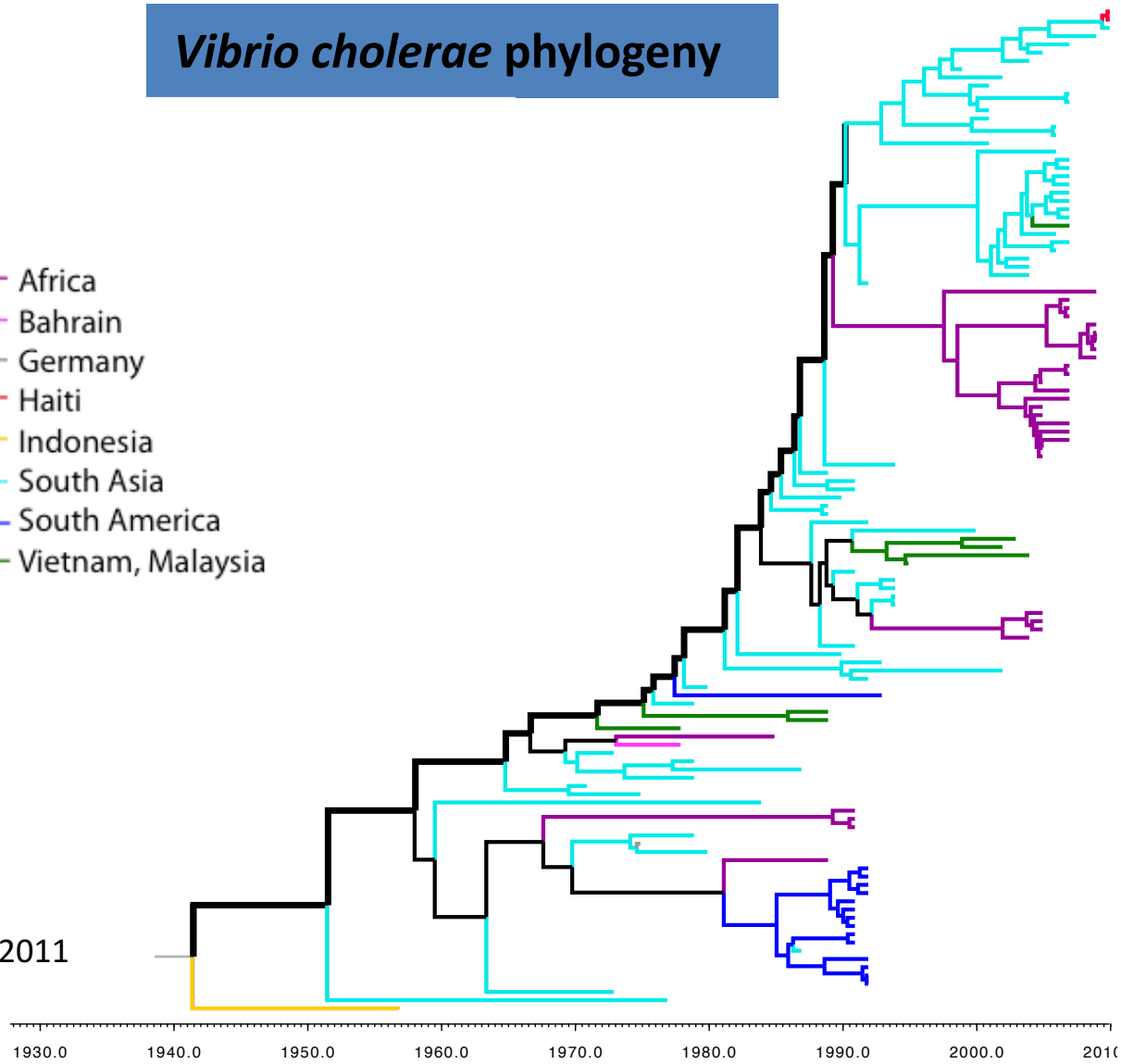
Cambridge

Cambridge

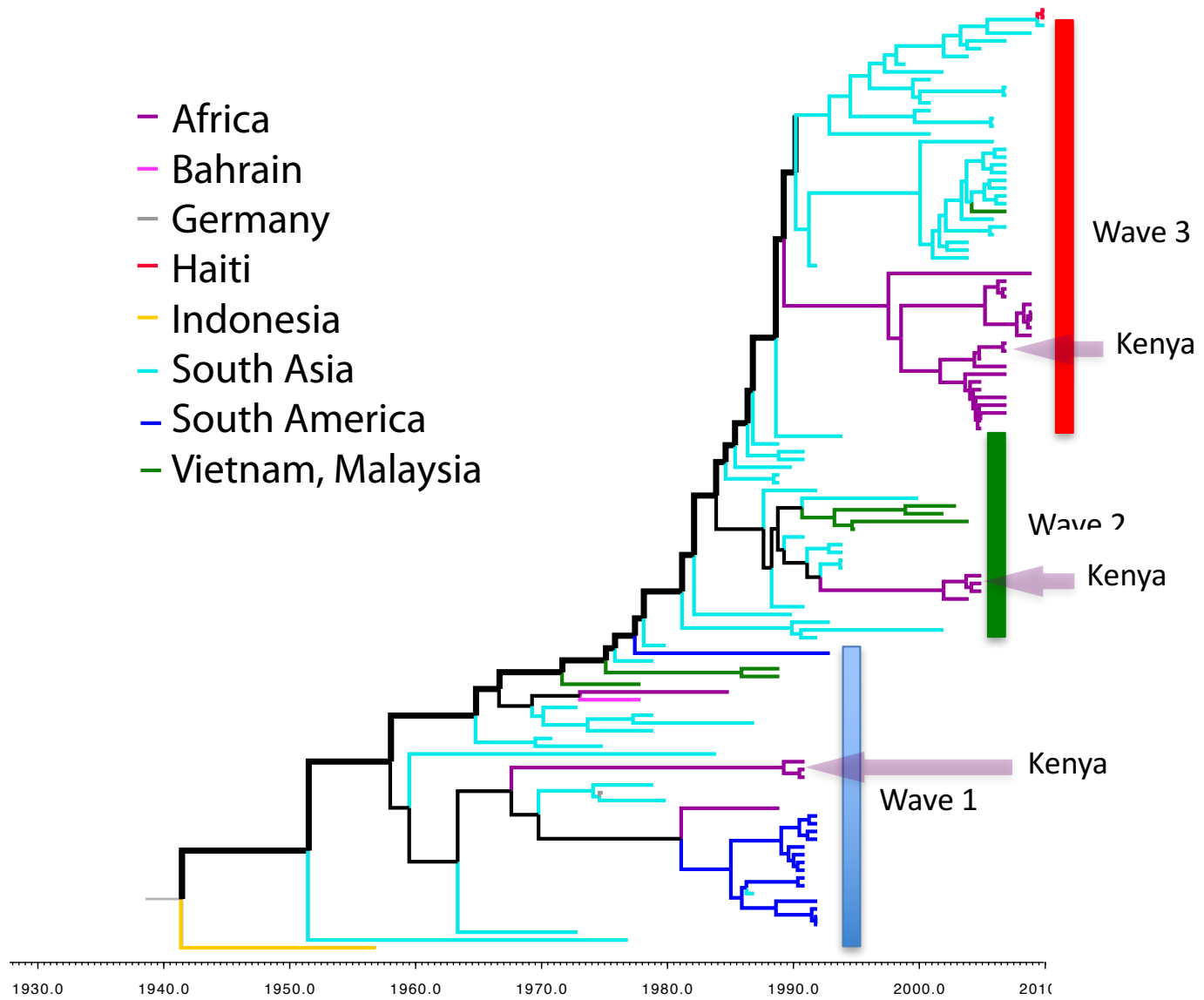
Cambridge

Vibrio cholerae phylogeny

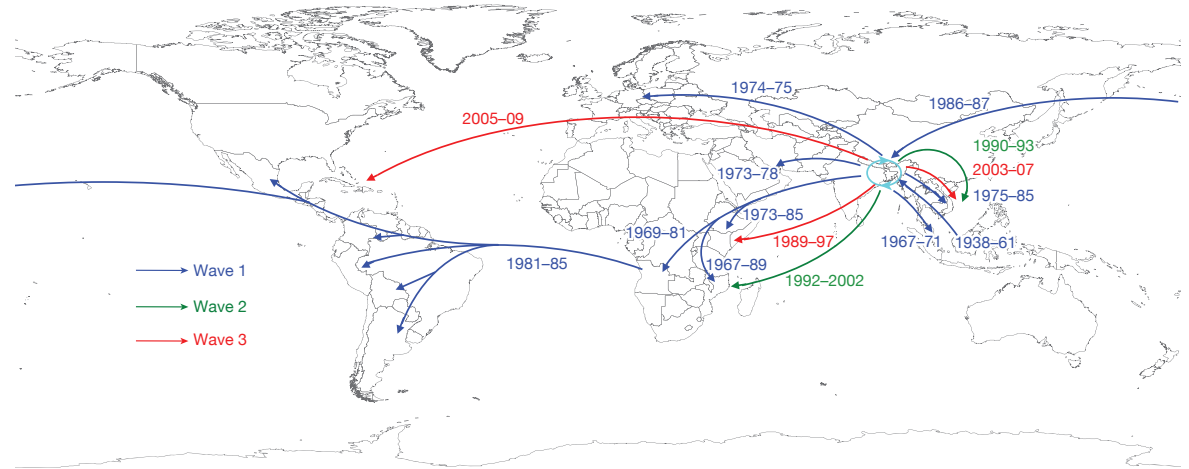
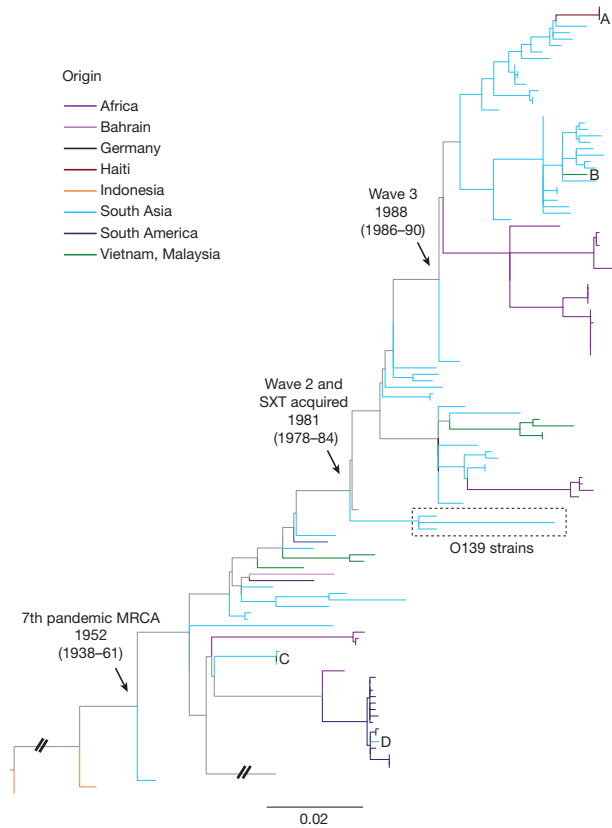
- Africa
- Bahrain
- Germany
- Haiti
- Indonesia
- South Asia
- South America
- Vietnam, Malaysia



Mutreja et al., Nature 2011

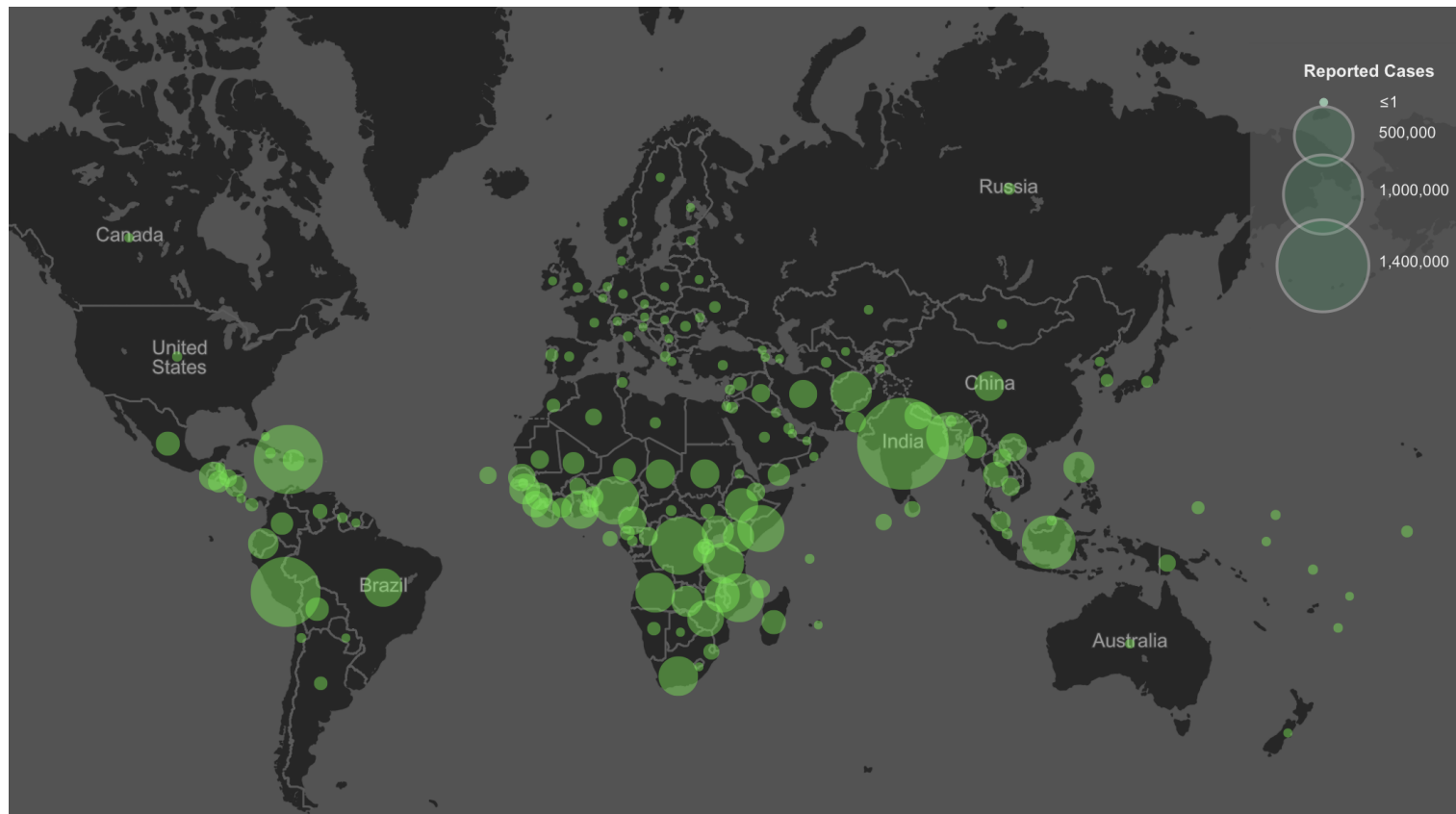


Global spread of the 7th pandemic



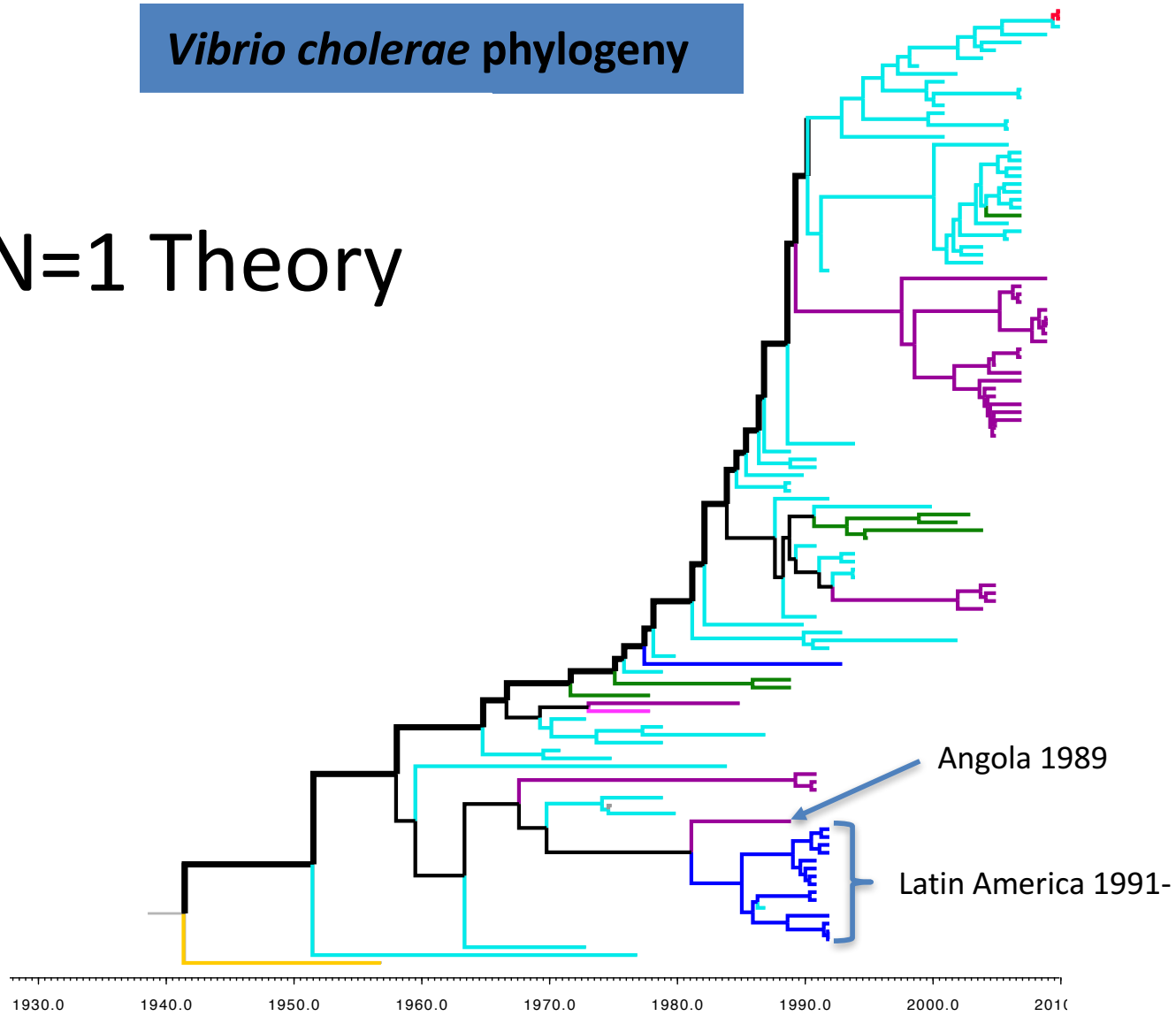
(Mutreja *et al*, 2011)

Cholera vs *Vibrio cholerae*

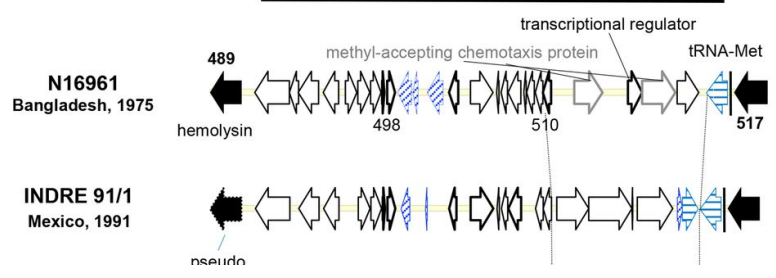
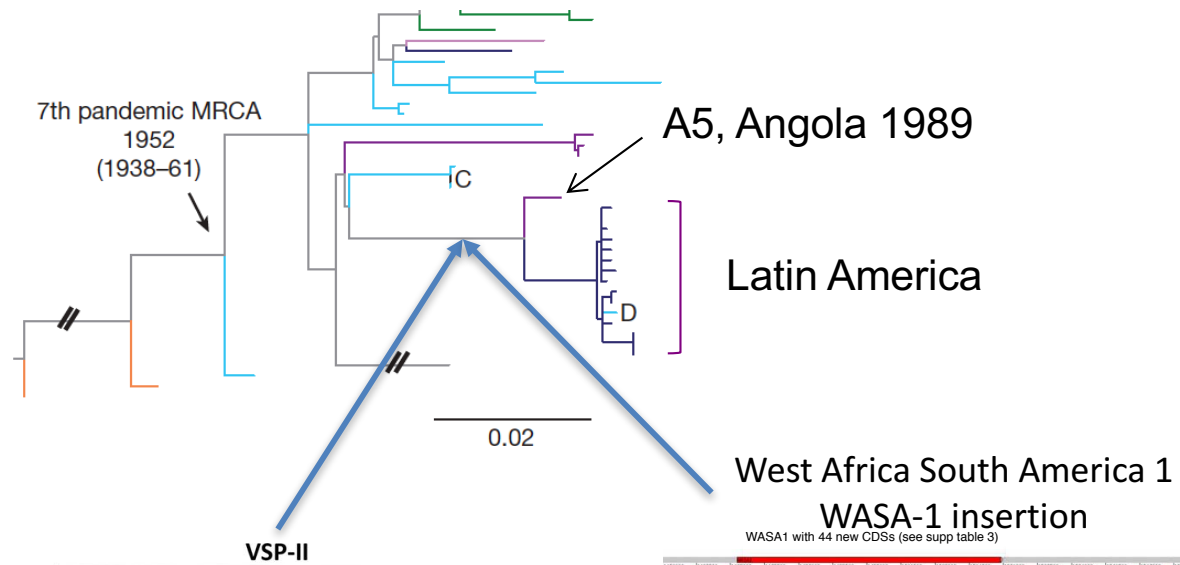


Vibrio cholerae phylogeny

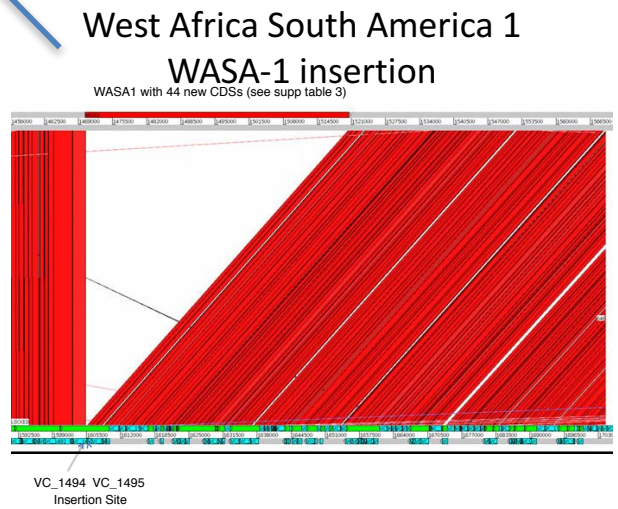
N=1 Theory



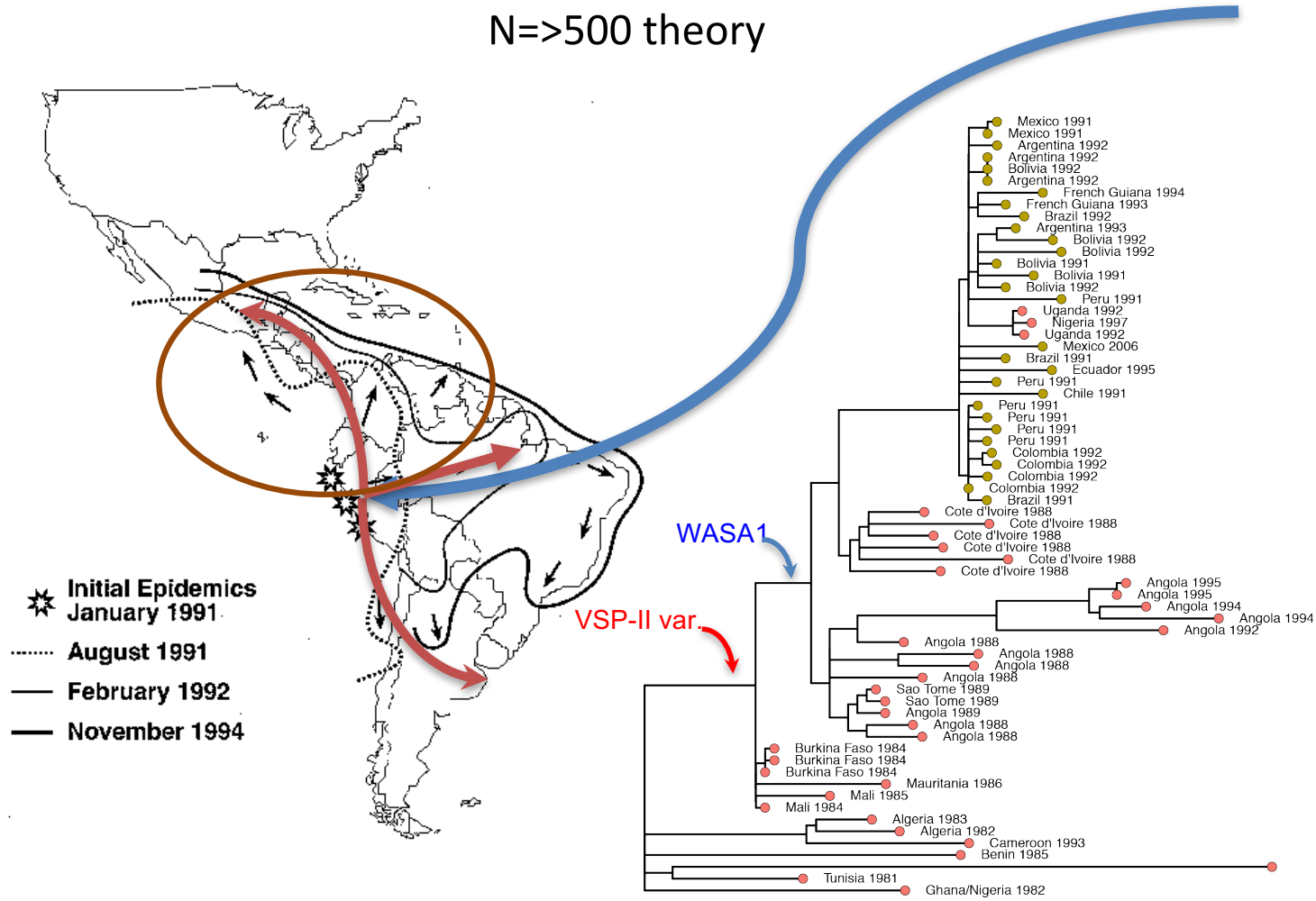
Vibrio cholerae phylogeny

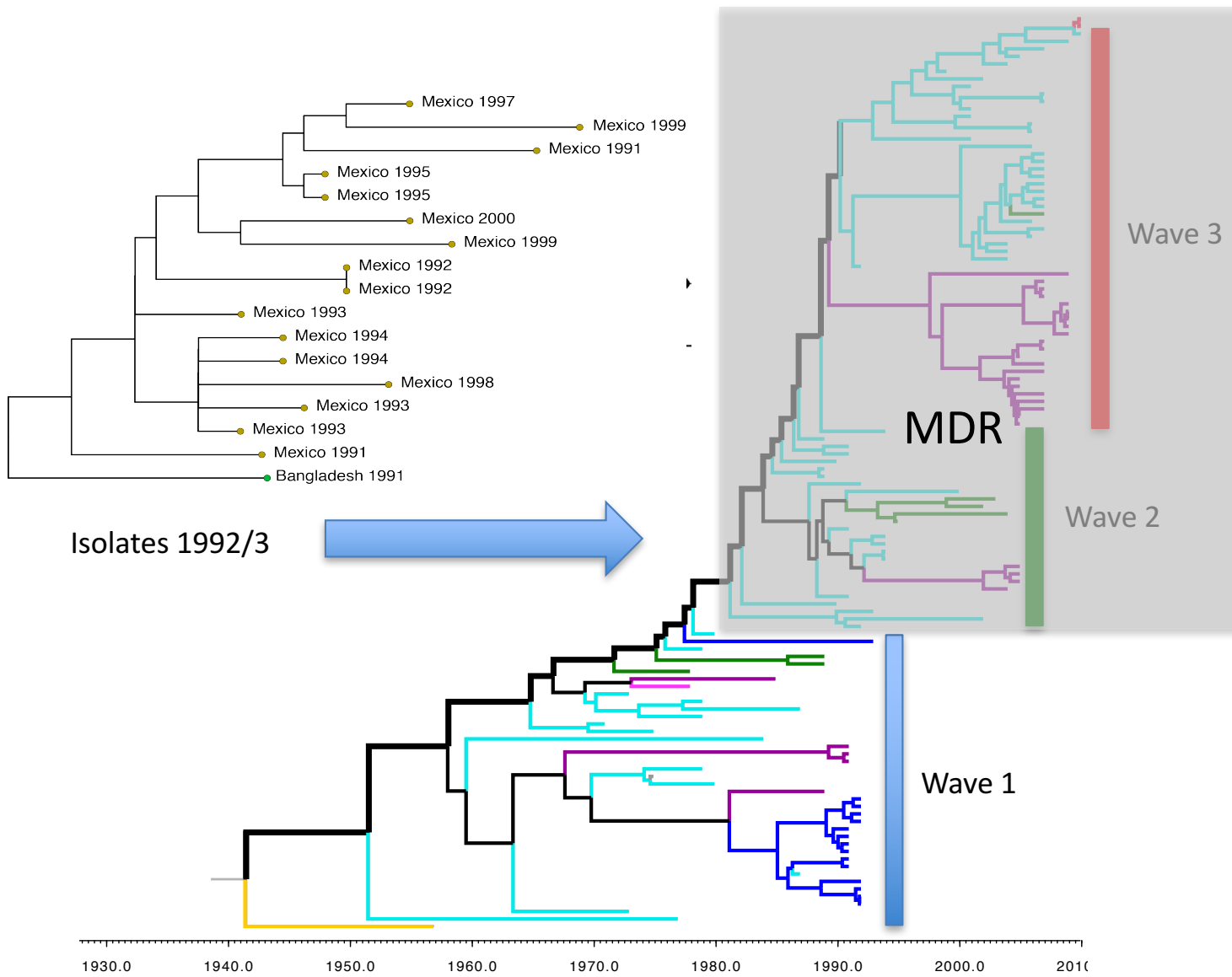


VSP-II Adapted from Choi et al Mbio 2016



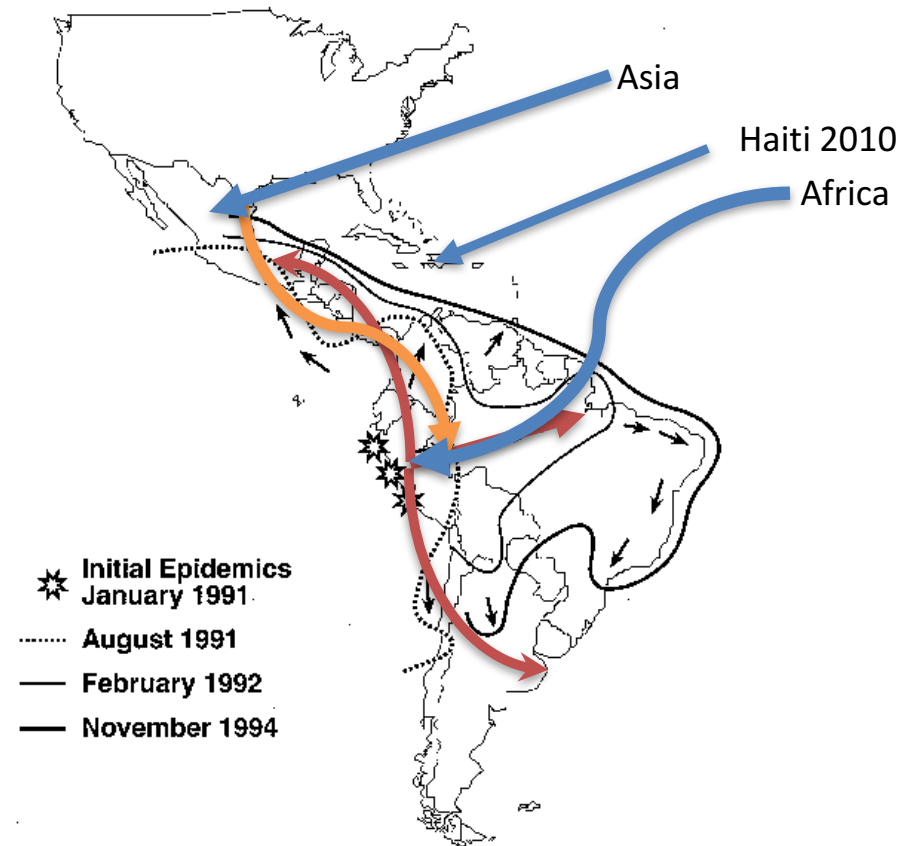
N=>500 theory



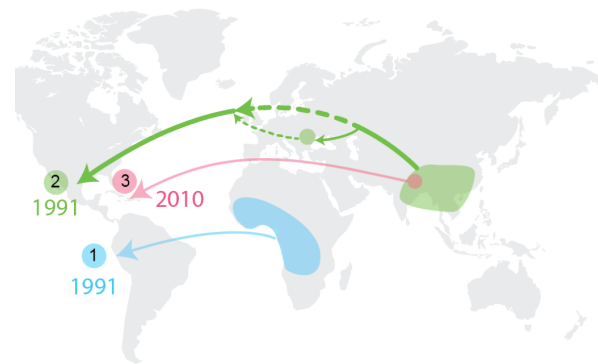
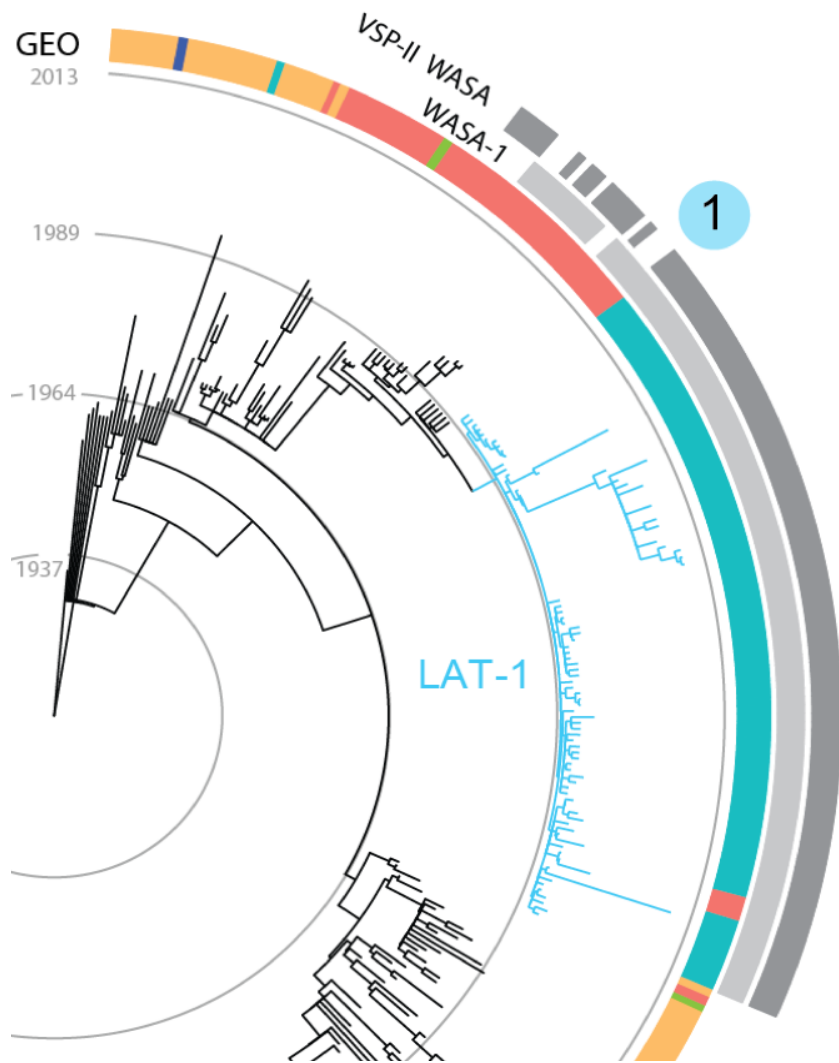


Summary

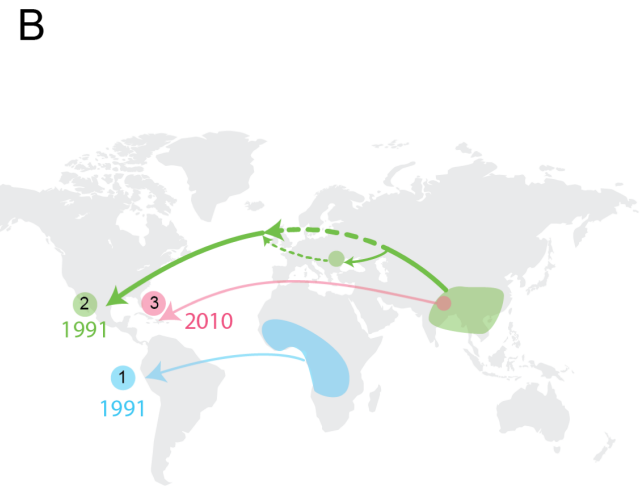
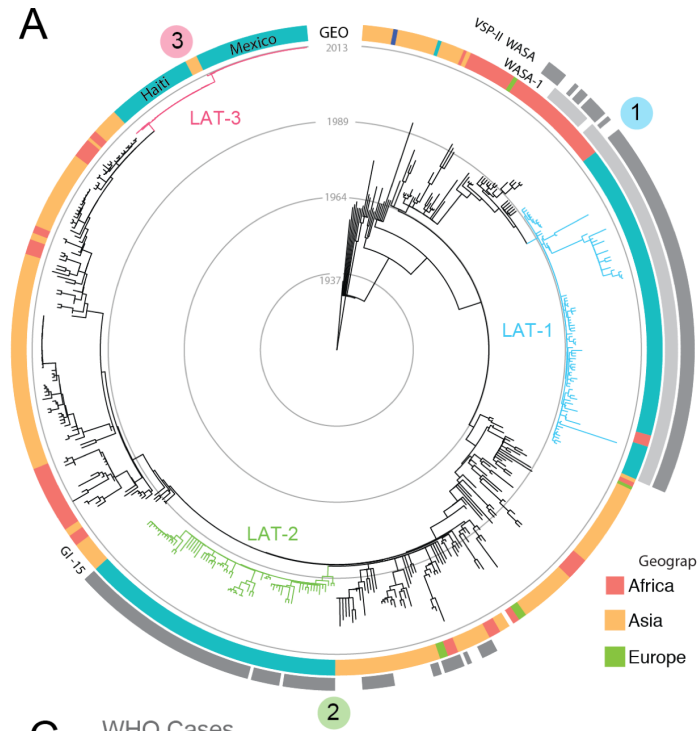
- LA linked to the global 7th Pandemic
- 1990's, Not a single introduction
- With WGS we can explain inconsistencies with MLEE, PFGE, Virulence gene typing etc



(Tauxe *et al*, 1995)

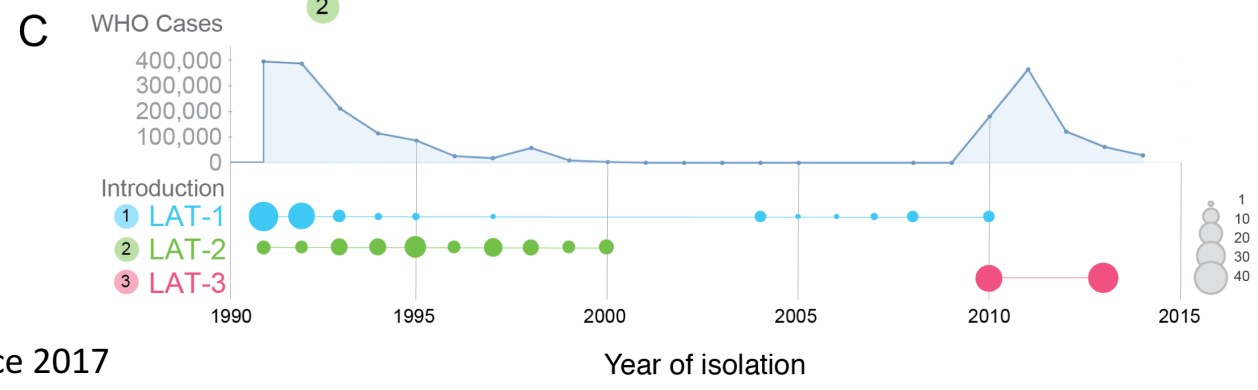


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 America
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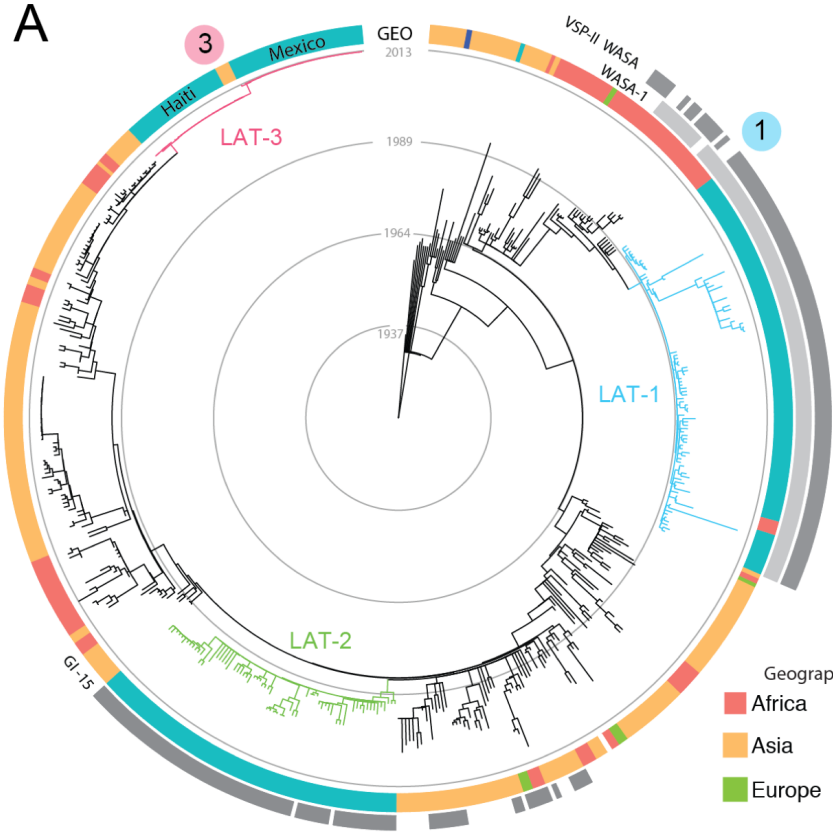
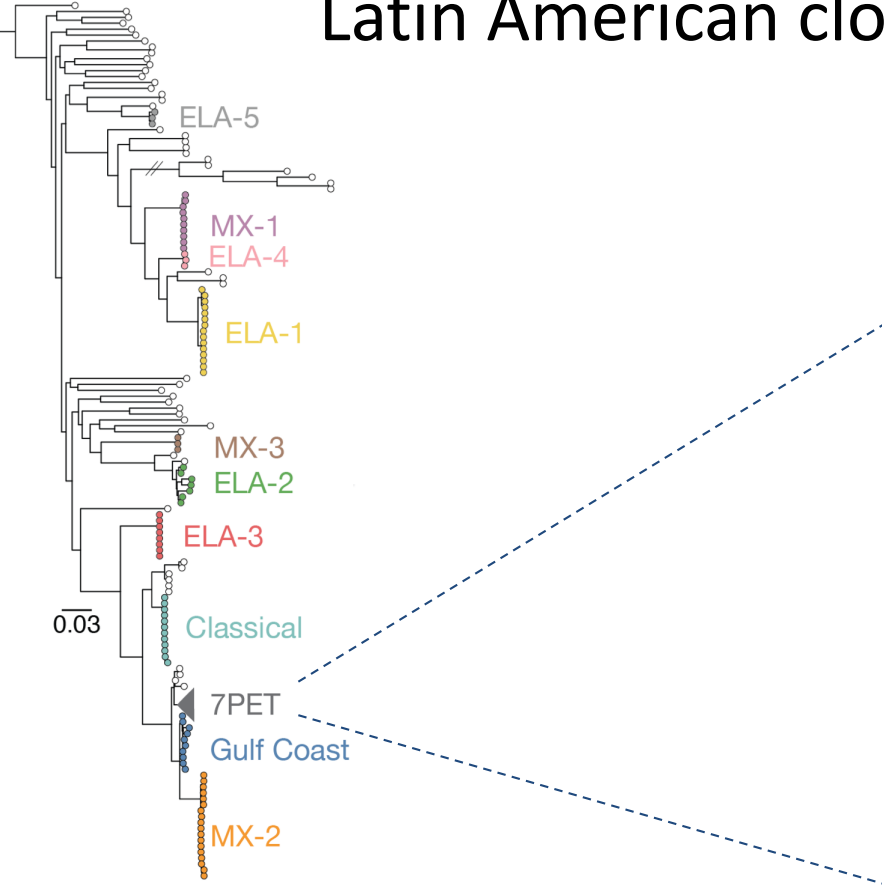
Geographic area (GEO)

- Africa
- Latin America
- Asia
- Oceania
- Europe
- Unknown

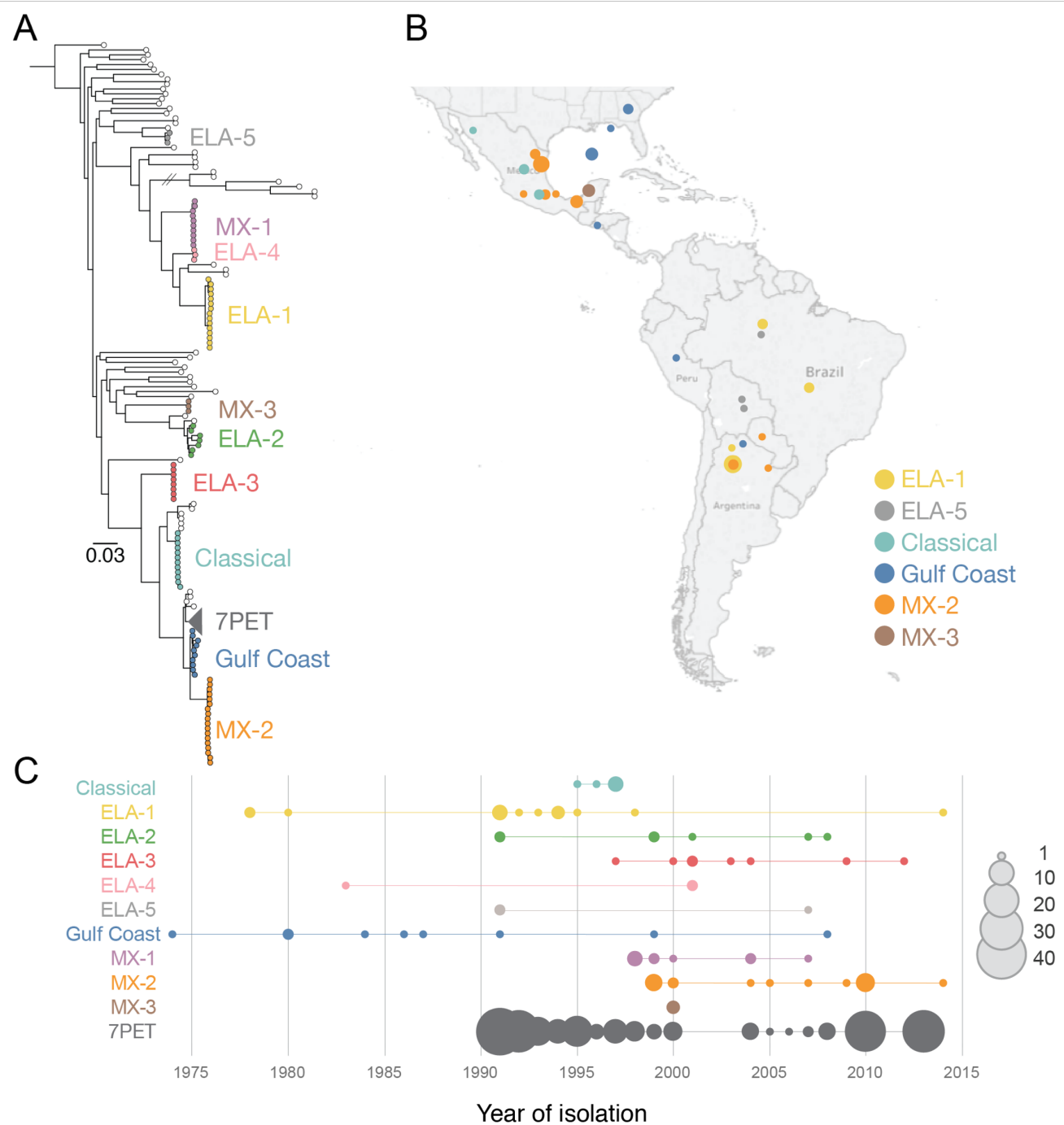


Domman et al., Science 2017

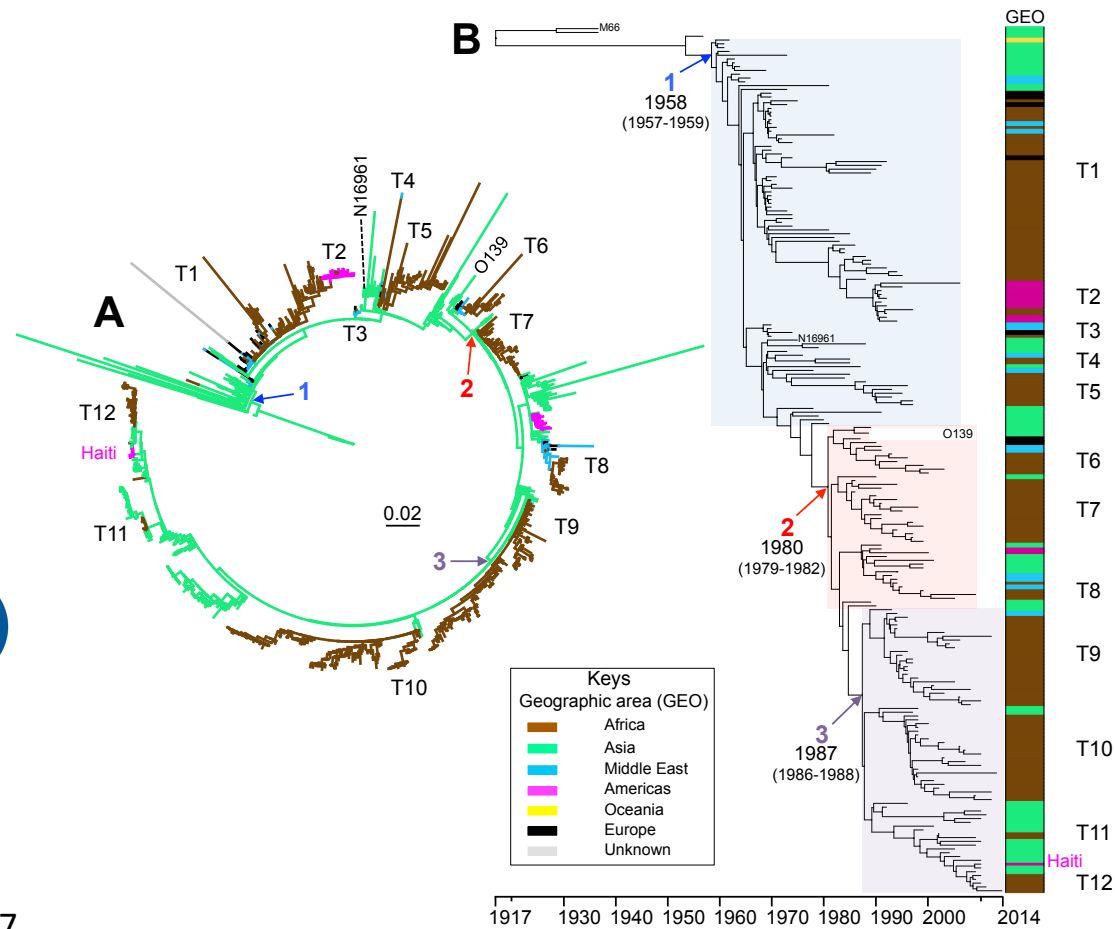
Latin American clones are 7th Pandemic El Tor



Domman et al., Science 2017



655 samples across Africa since 1970



Institut Pasteur

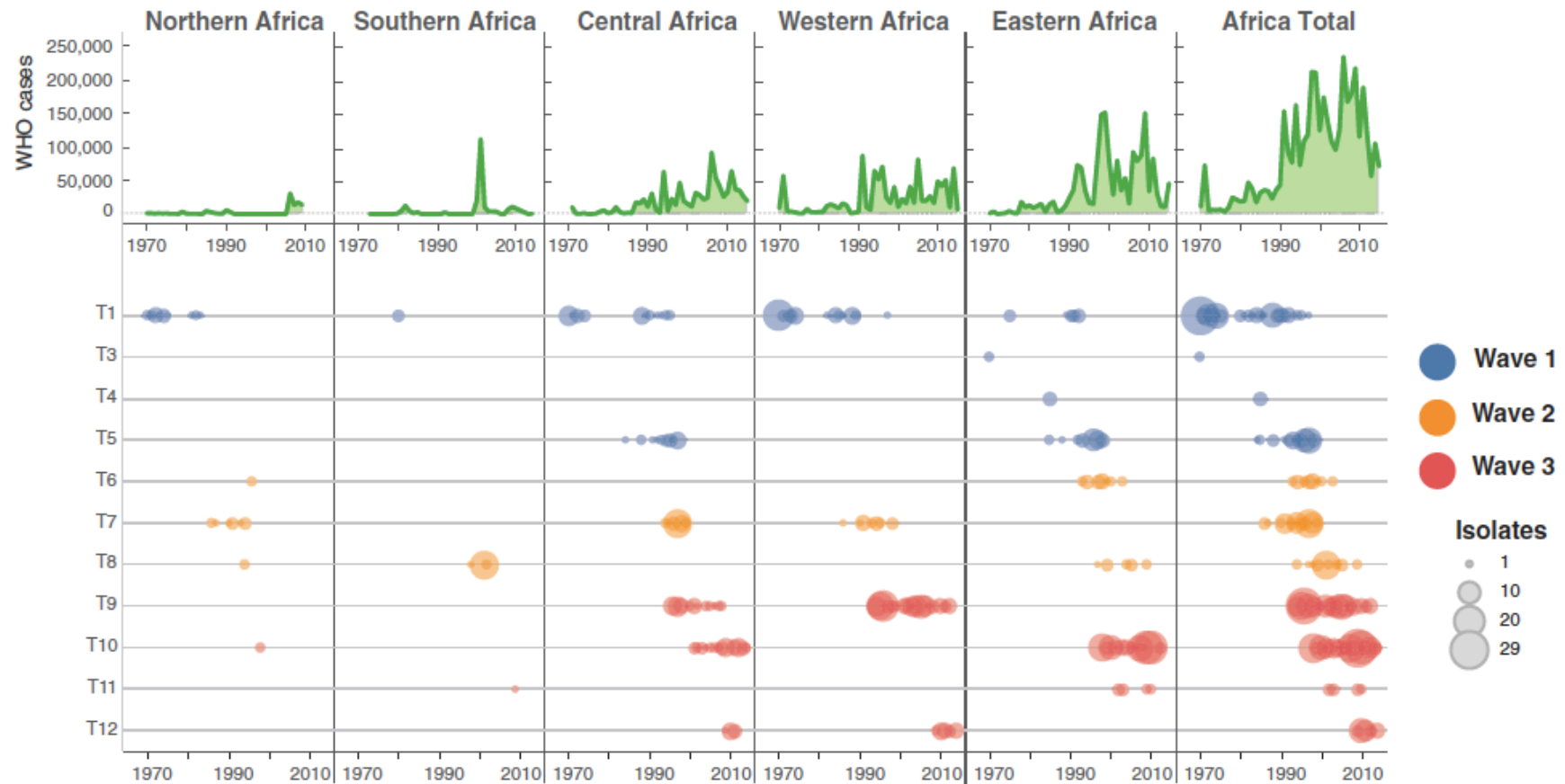
Francois-Xavier

Weill

Marie-Laure Quilici

Weill et al., Science 2017

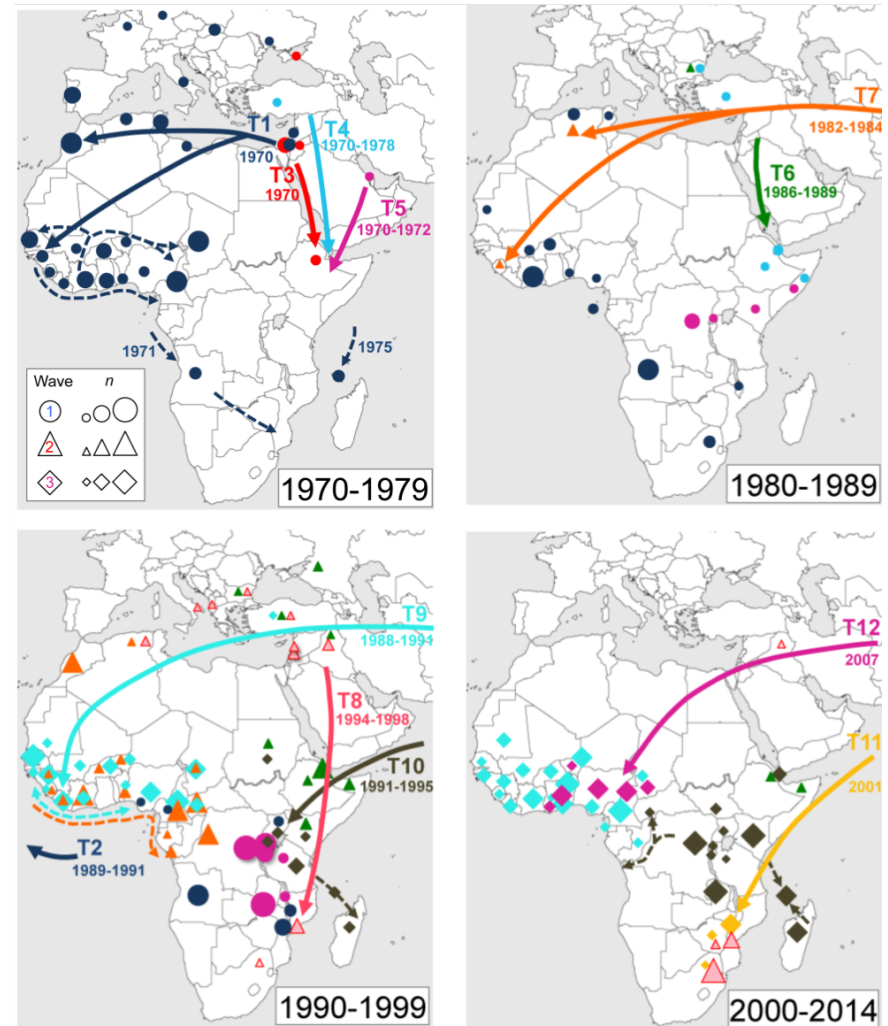
Geographic and temporal distribution of seventh pandemic *V. cholerae* El Tor isolates from Africa according to their inferred introduction events (T1 to T12).



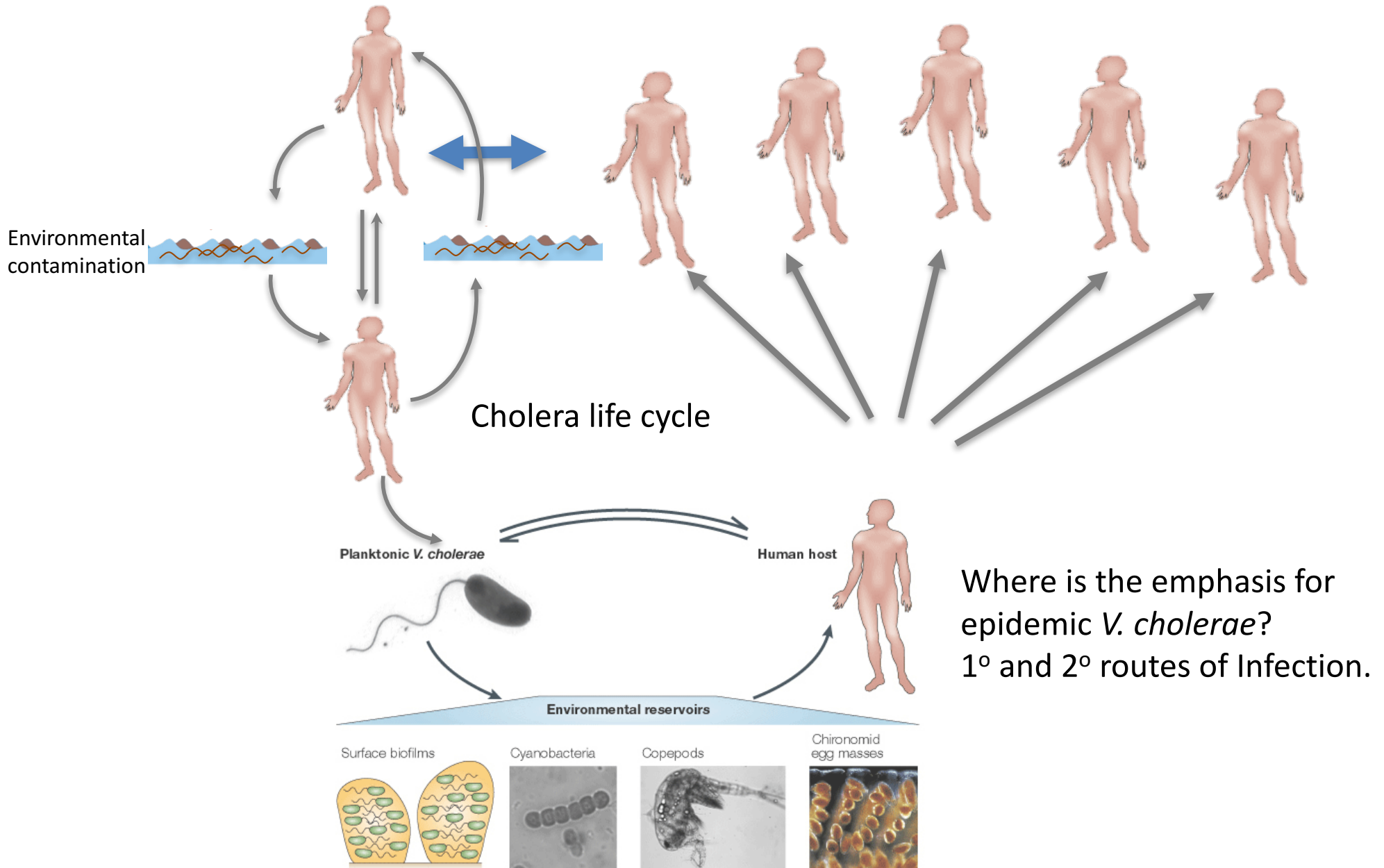
11 introductions into Africa

Elements of periodicity
and patterns

Resistance is imported



Building on the "cholera paradigm" theory



Where is the emphasis for epidemic *V. cholerae*?
1^o and 2^o routes of Infection.



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Matthew Dorman



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Marie-Laure Quilici

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