

RAGE



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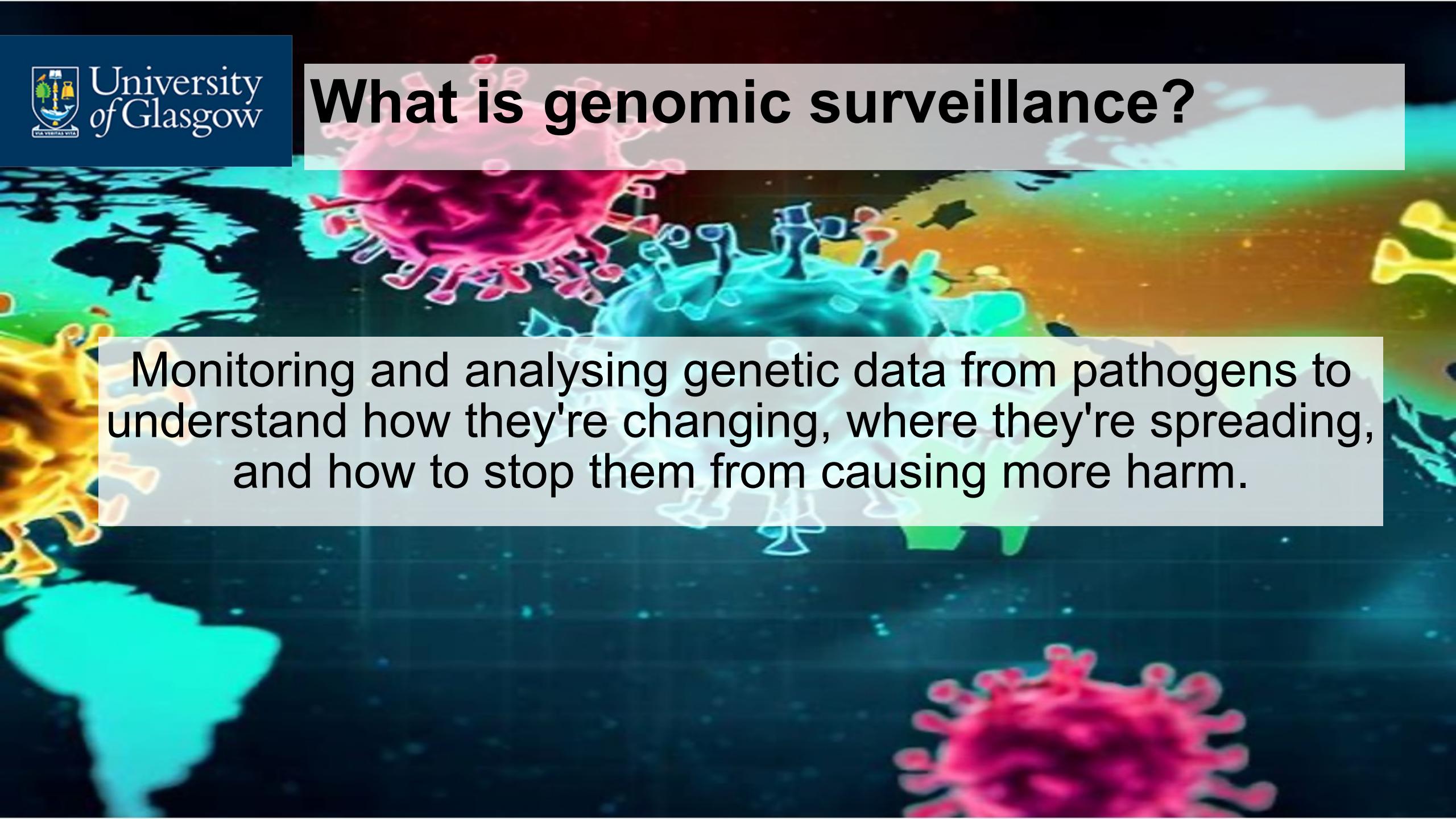
R
A

Genomic Epidemiology



Image: HudsonAlpha.org

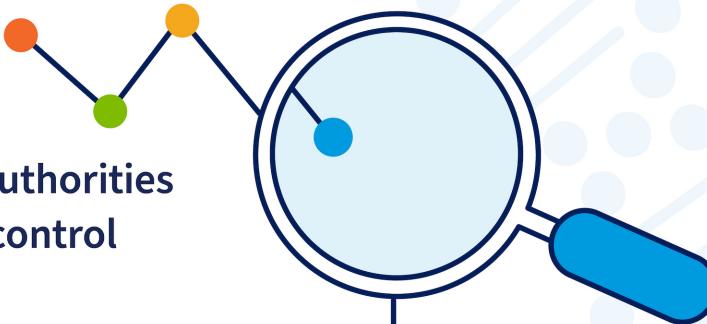
What is genomic surveillance?



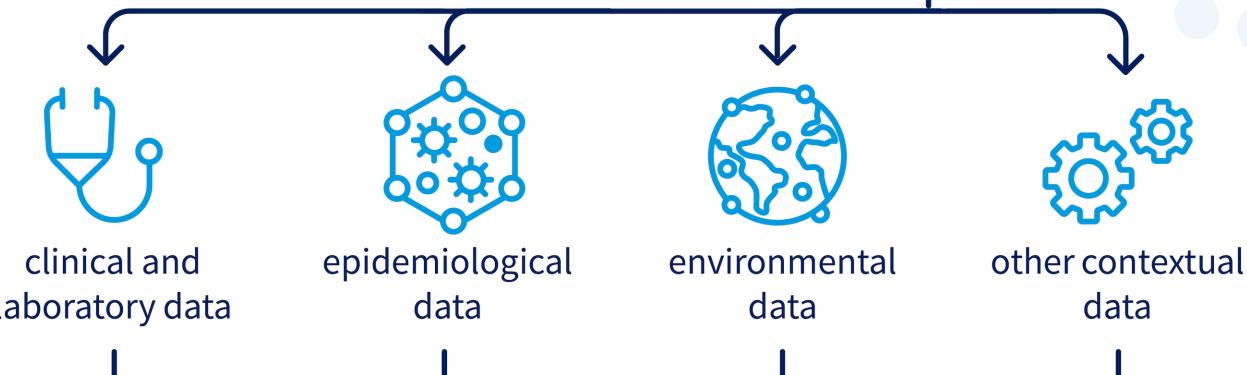
Monitoring and analysing genetic data from pathogens to understand how they're changing, where they're spreading, and how to stop them from causing more harm.



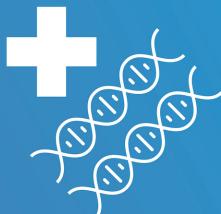
Why is GENOMIC SURVEILLANCE important?



Disease detectives and health authorities need different types of data to control outbreaks, including:



By adding genomic data, they can more quickly understand how a pathogen behaves and how to control it.



This is a powerful tool in public health surveillance.

From Academic Luxury to Indispensable Tool

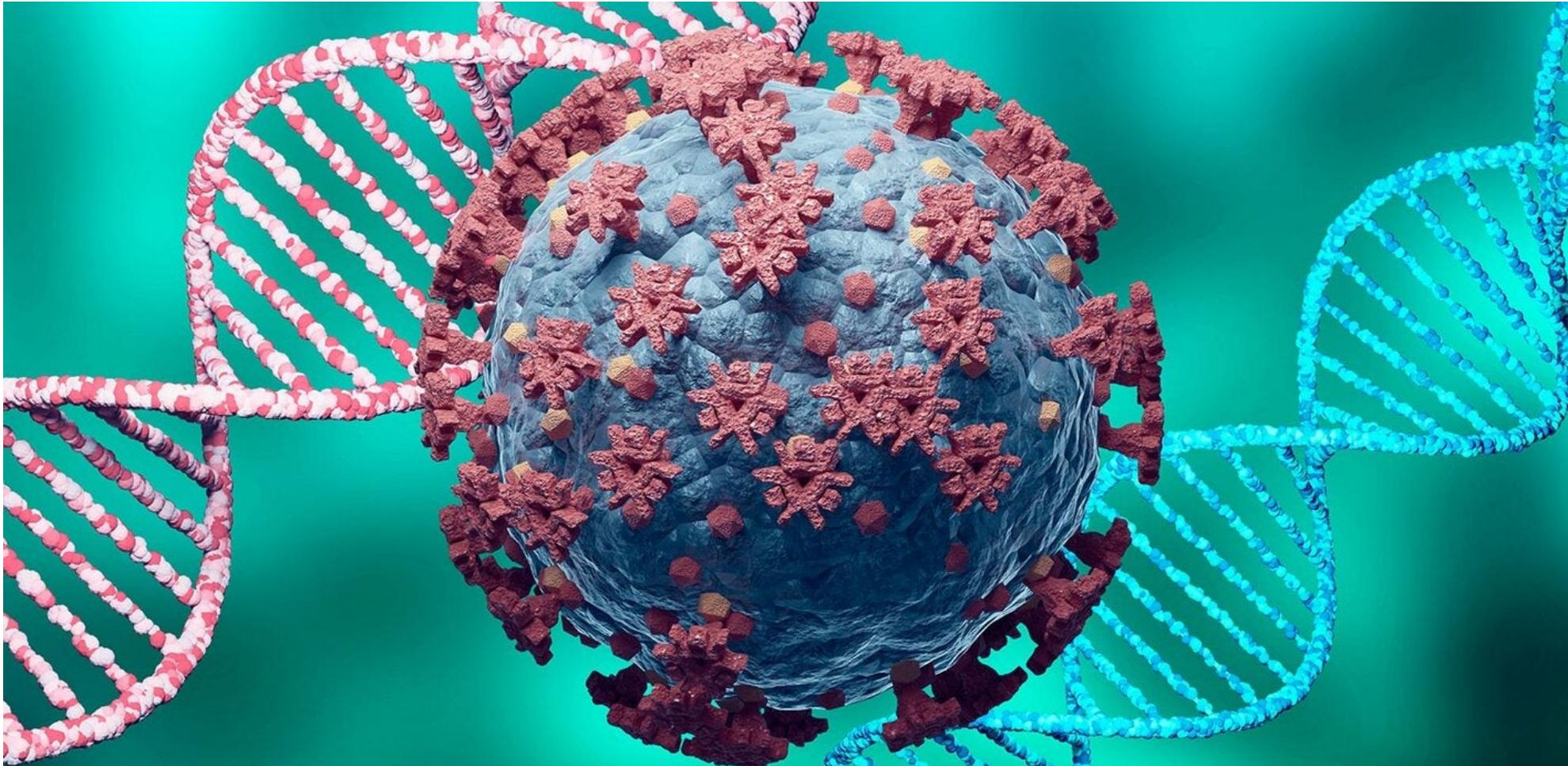
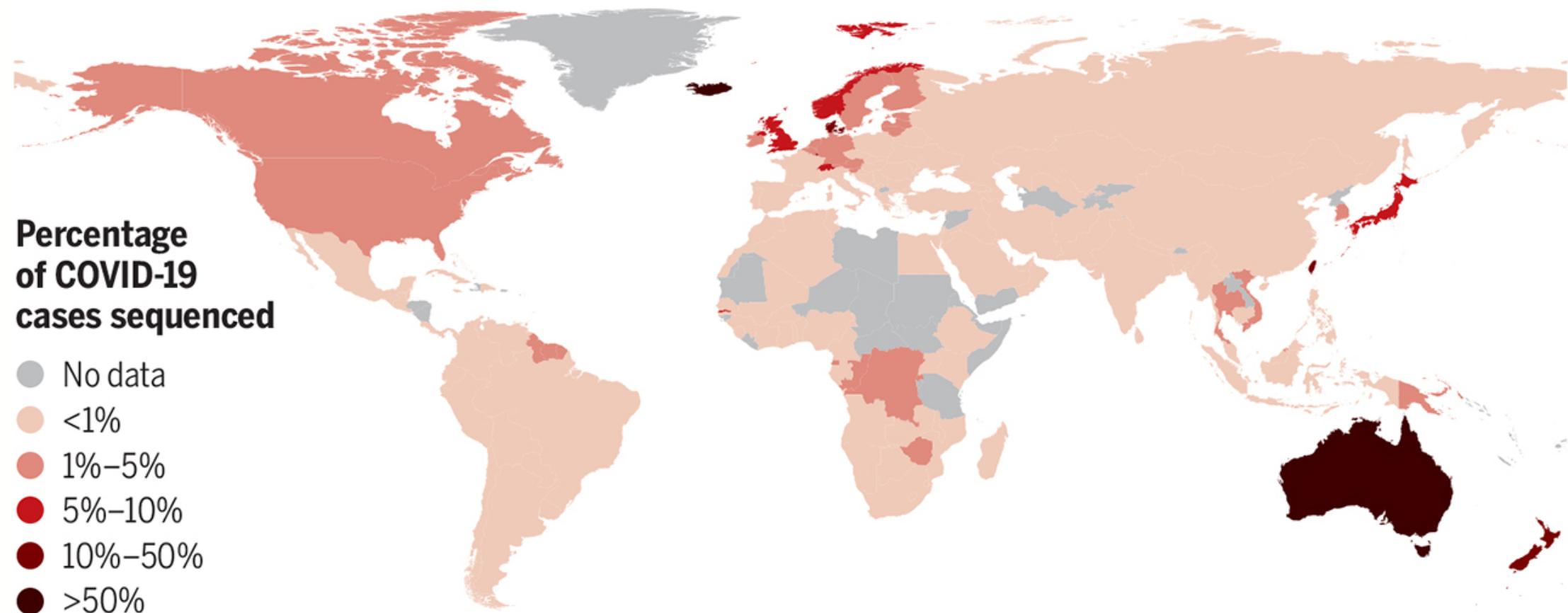


Image: PAHO



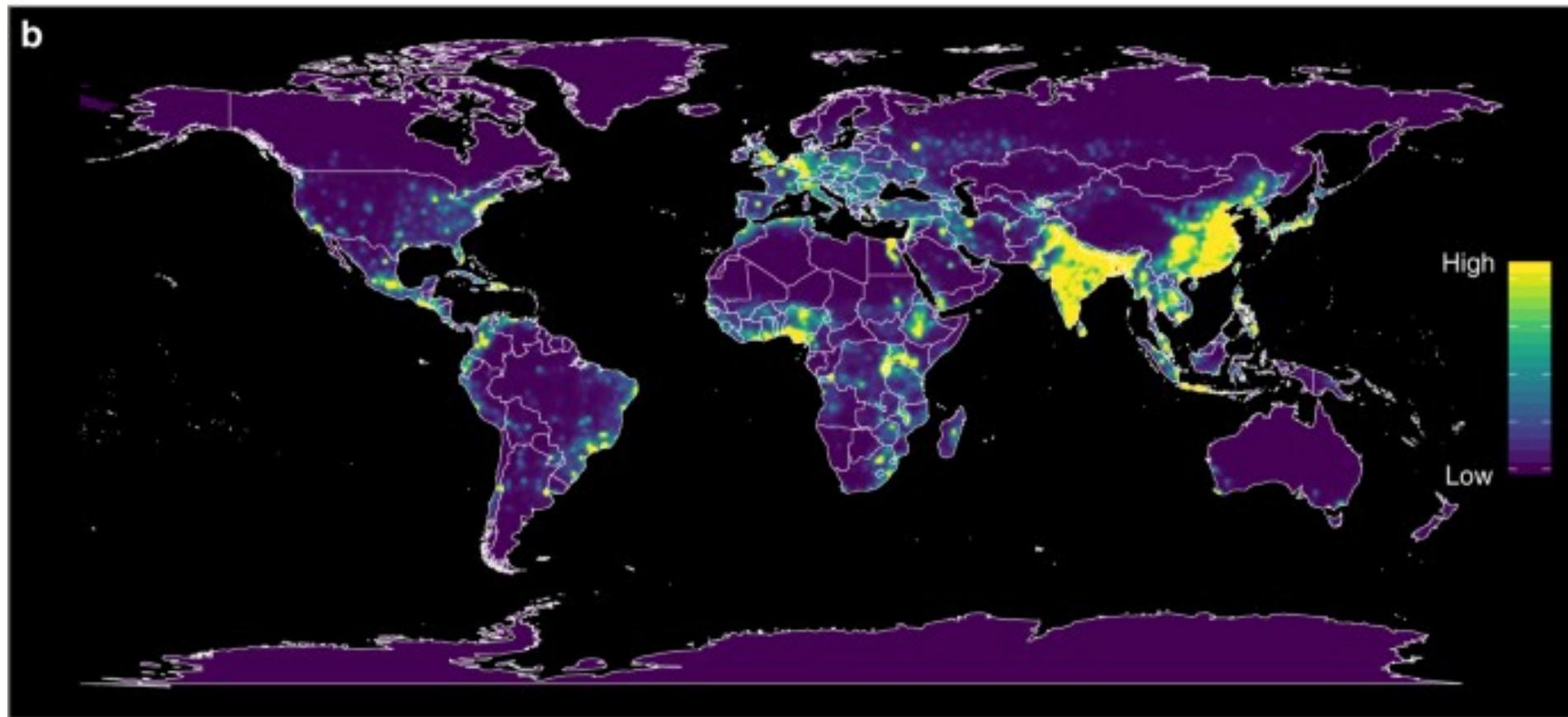
A patchy picture

Sequencing of the pandemic coronavirus is minimal in most countries around the world, so scientists often have little insight into emerging new variants.



Blind spots in the areas where we need the greatest visibility

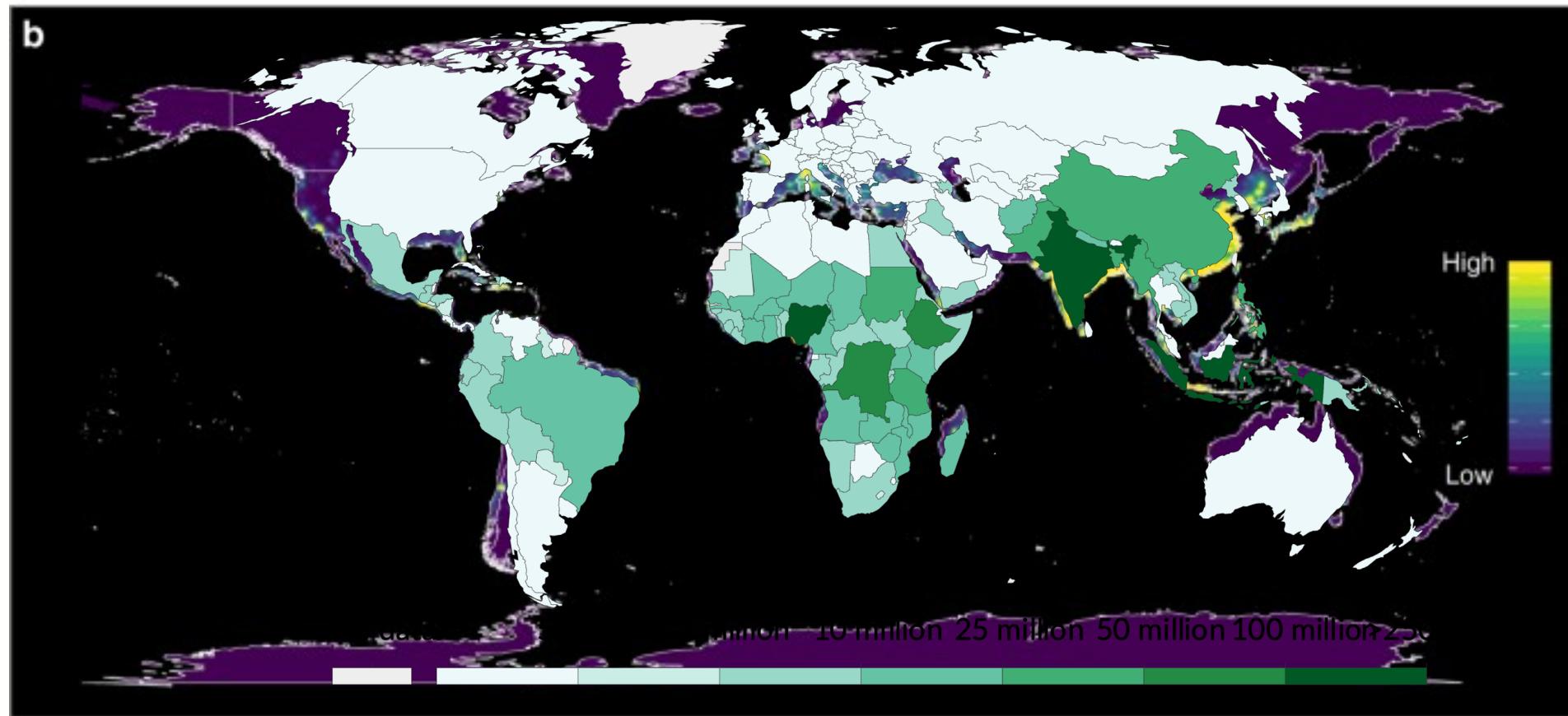
Emerging disease risk map



Allen *et al.* *Nat Commun* 8, 1124 (2017)

Blind spots in the areas where we need the greatest visibility

Emerging disease risk map



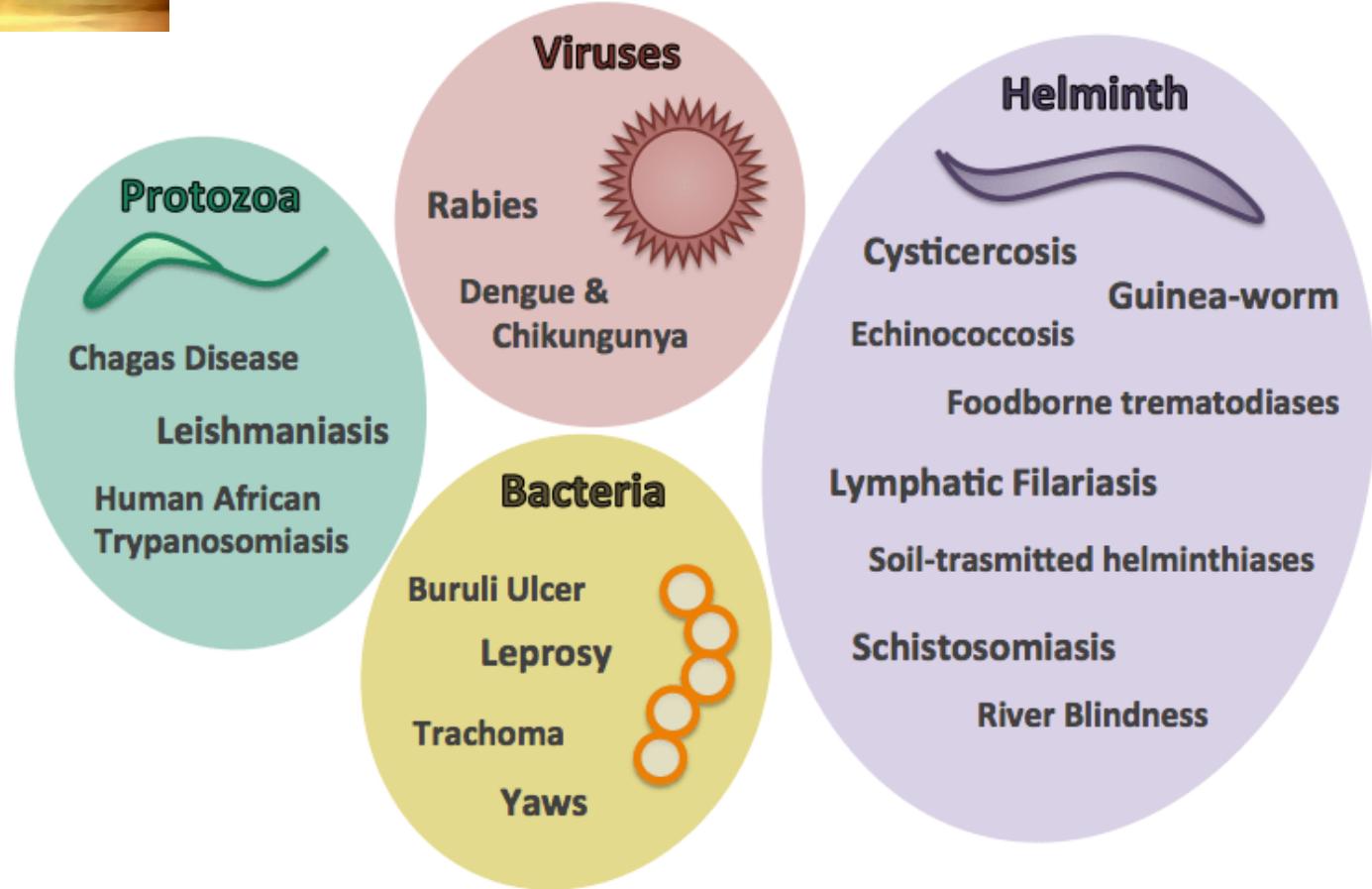
Allen et al. *Nat Commun* 8, 1124 (2017)

*Number of people requiring interventions against
neglected tropical diseases (NTDs) , WHO*

Hiding in plain sight



Neglected Tropical Diseases



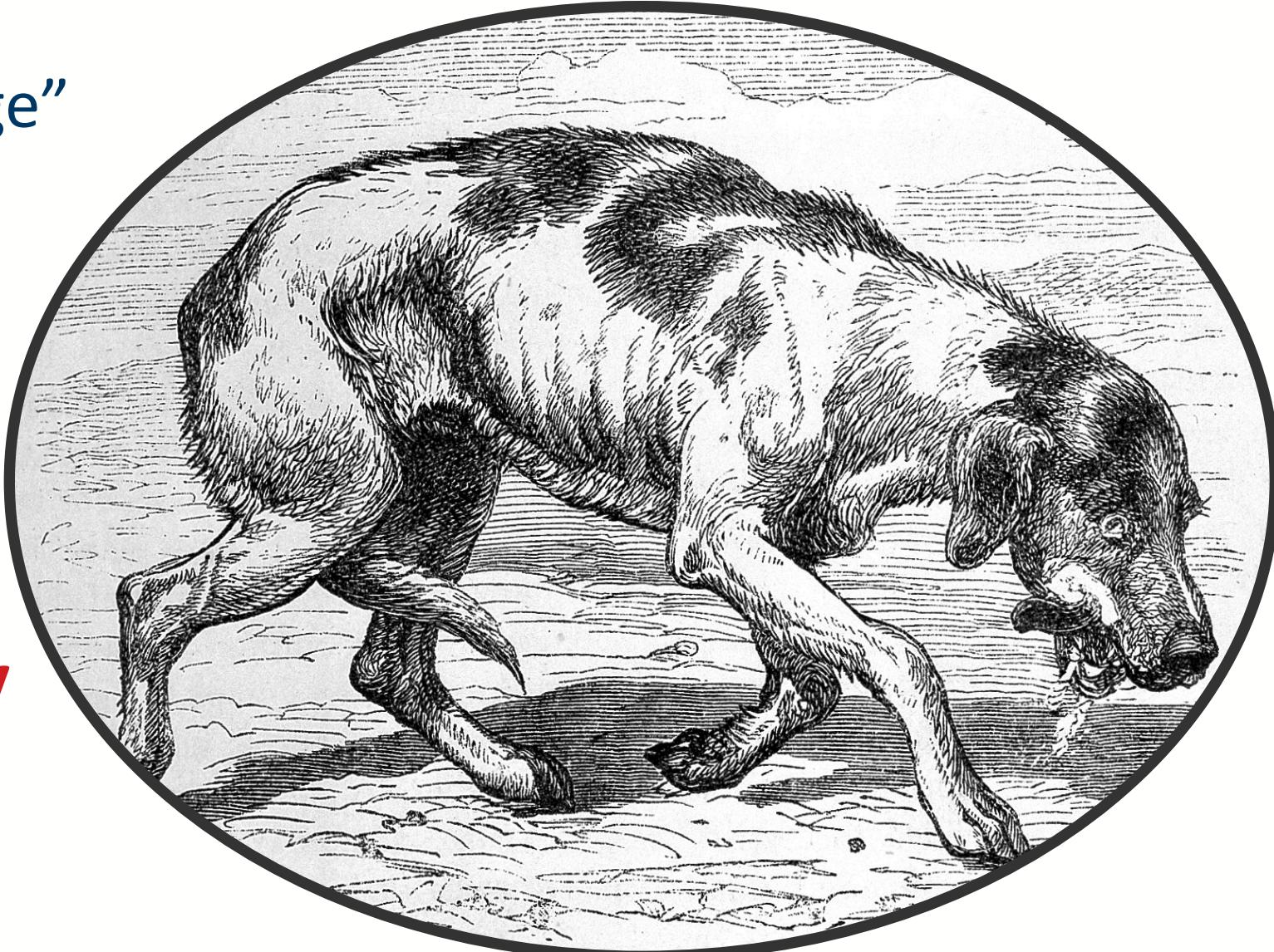
“Indiscriminate weapons of mass destruction in slow motion”

Rabies

A

Genomic
Epidemiology

“La rage”



RABIES

99%

human cases
result from
dog bites



One death

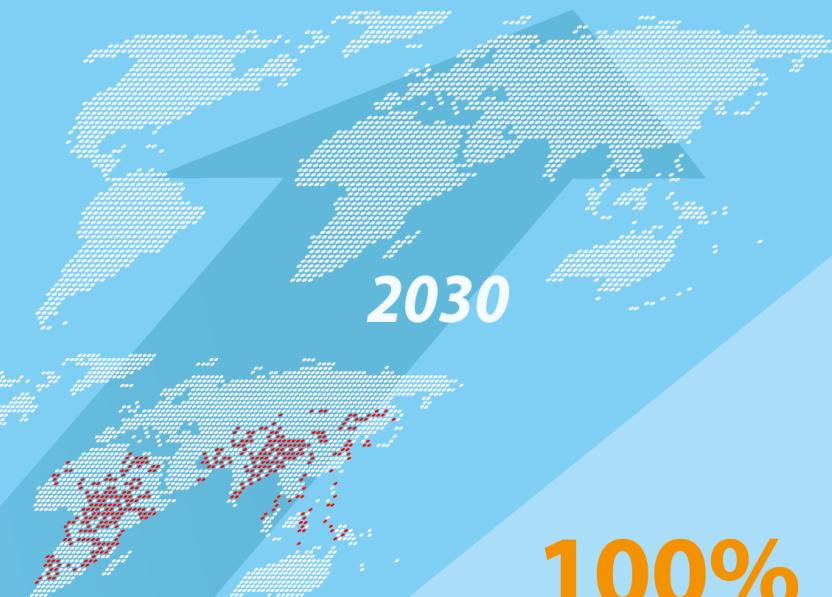
 every 9 minutes
worldwide

4 out of 10 deaths
are in children



Zero deaths by 2030

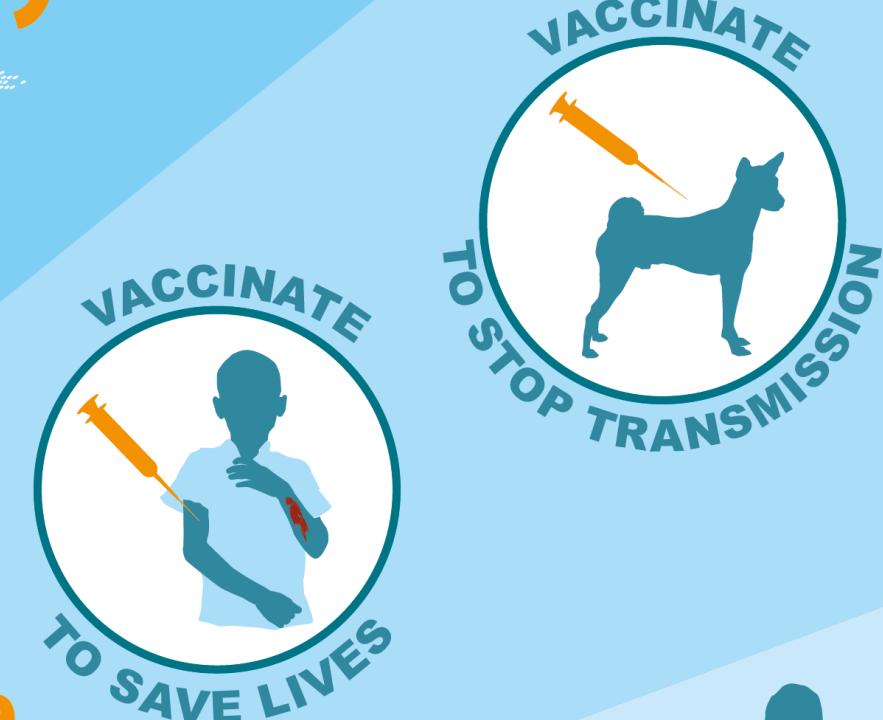
2030



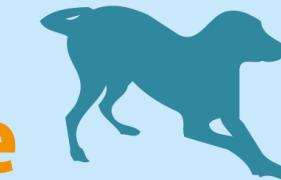
100%
vaccine
preventable



no bite
no rabies

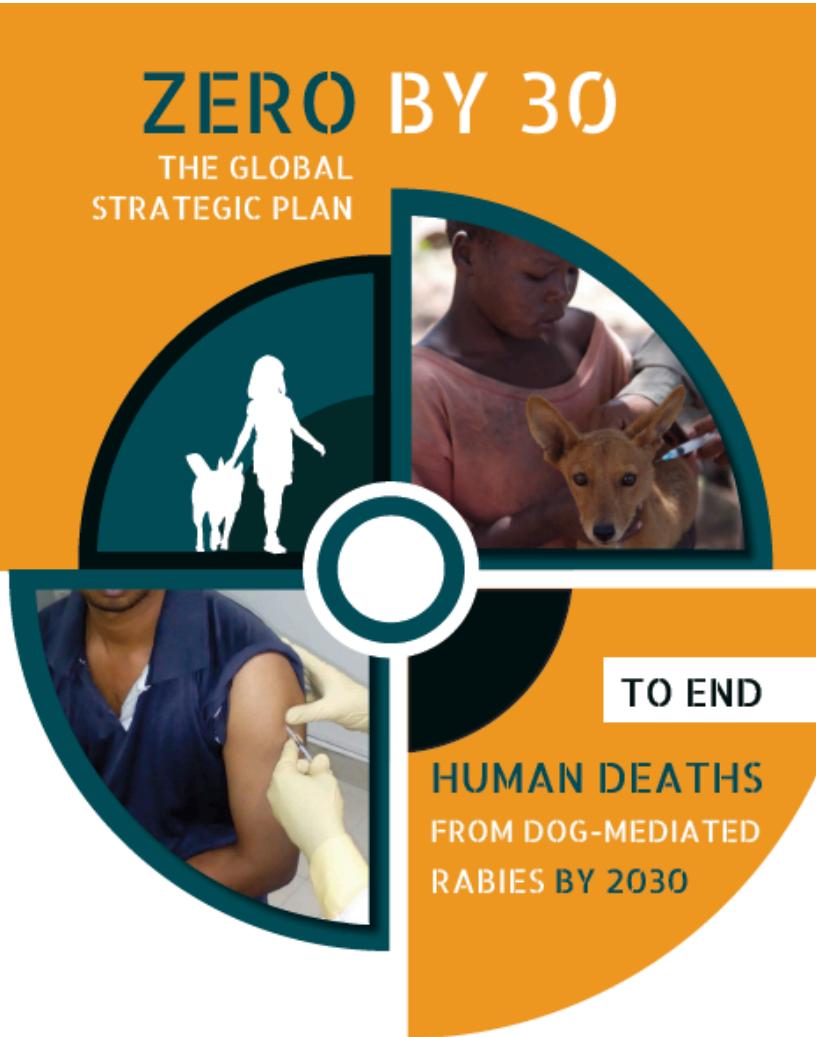


learn
how to
interact

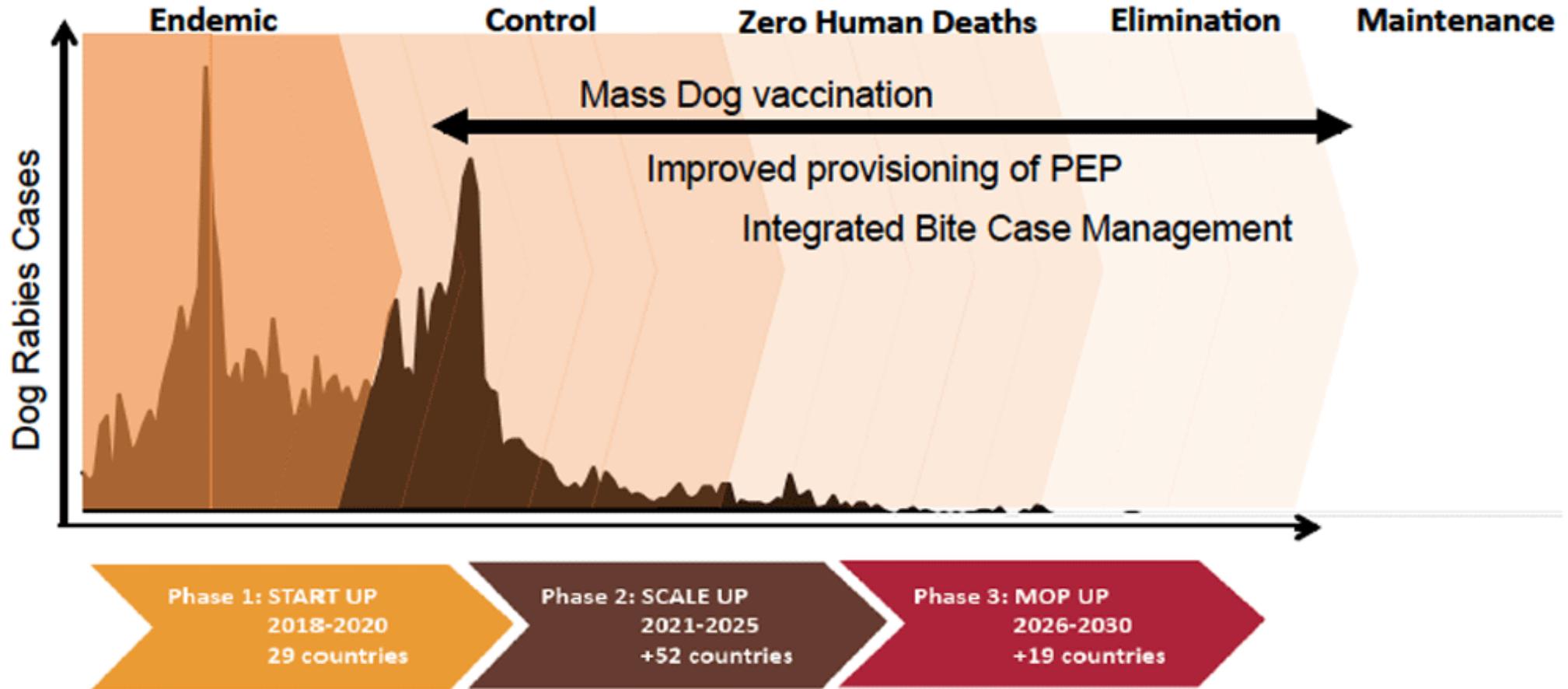


#rabies

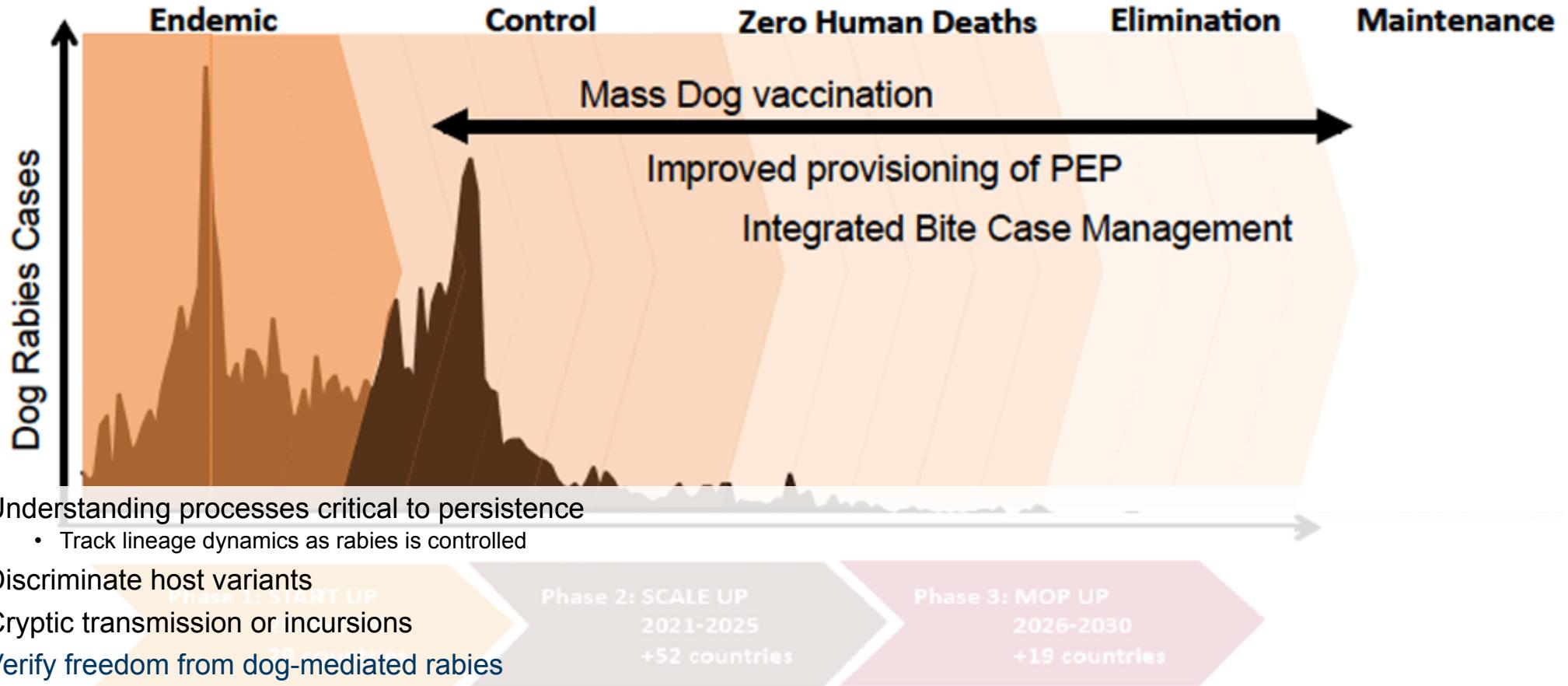
The road to elimination: how genomics can help



The road to elimination: how genomics can help



The road to elimination: how genomics can help





**Variants and cross
species transmission**



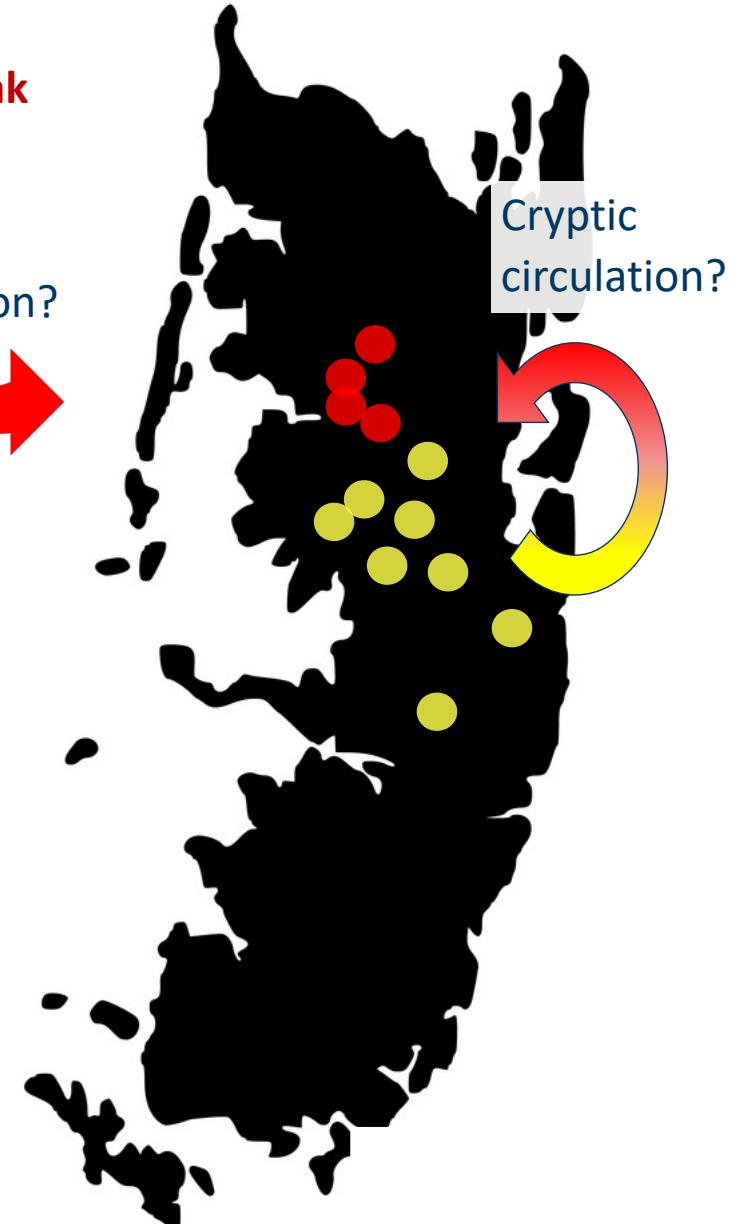
**Monitor impact
of interventions**



Drivers

Outbreak

Introduction?





**Variants and cross
species transmission**



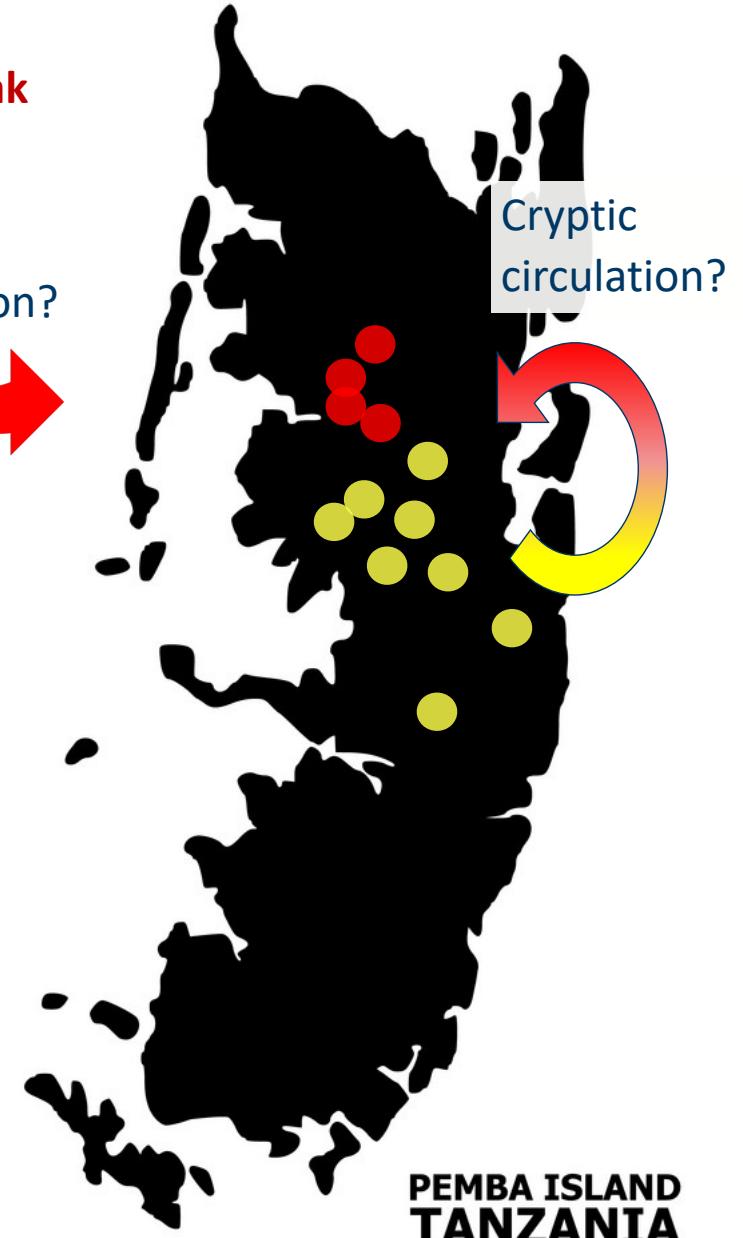
**Monitor impact
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Drivers

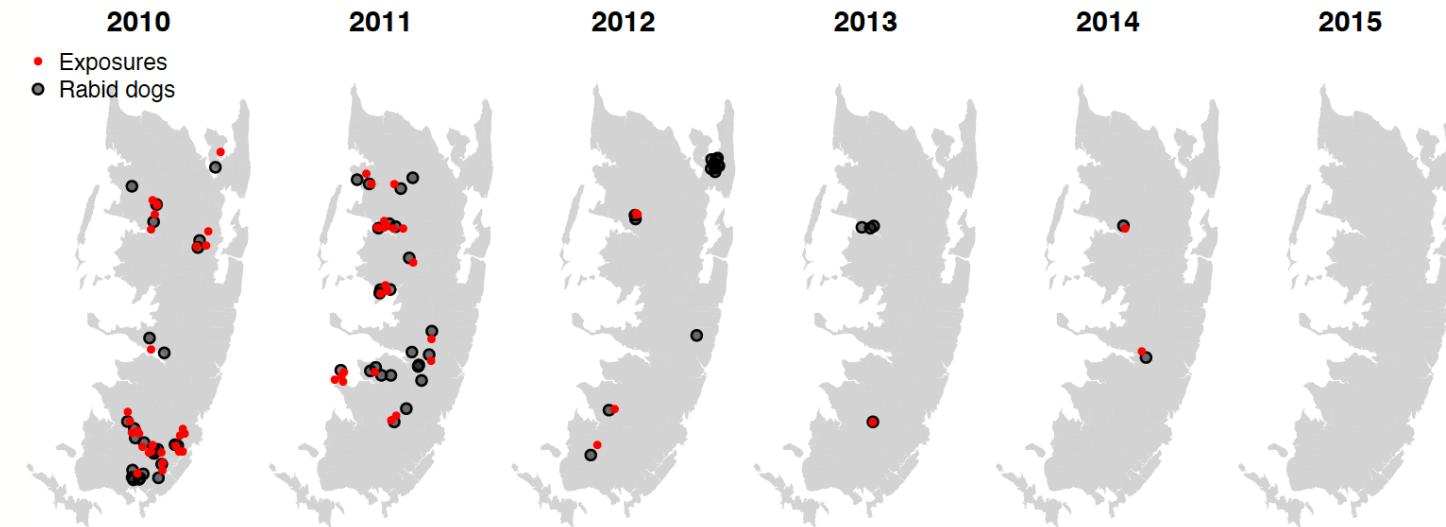
Outbreak

Introduction?





Understanding Rabies on Pemba: A One Health Approach



10 km

~4,000 dogs

14



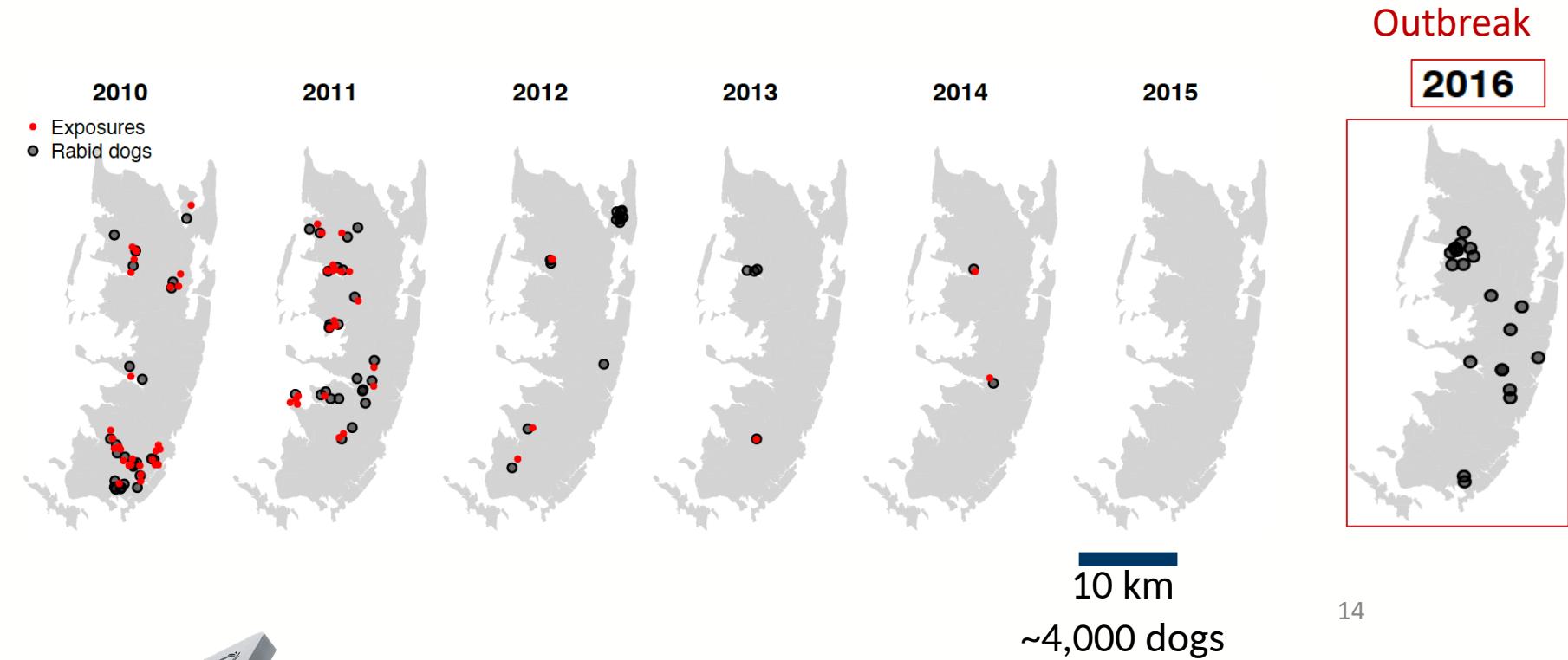
Rapidly sequenced outbreak cases
in-country

Lushasi/Brunker *et al* (2023), *Elife*





Understanding Rabies on Pemba: A One Health Approach



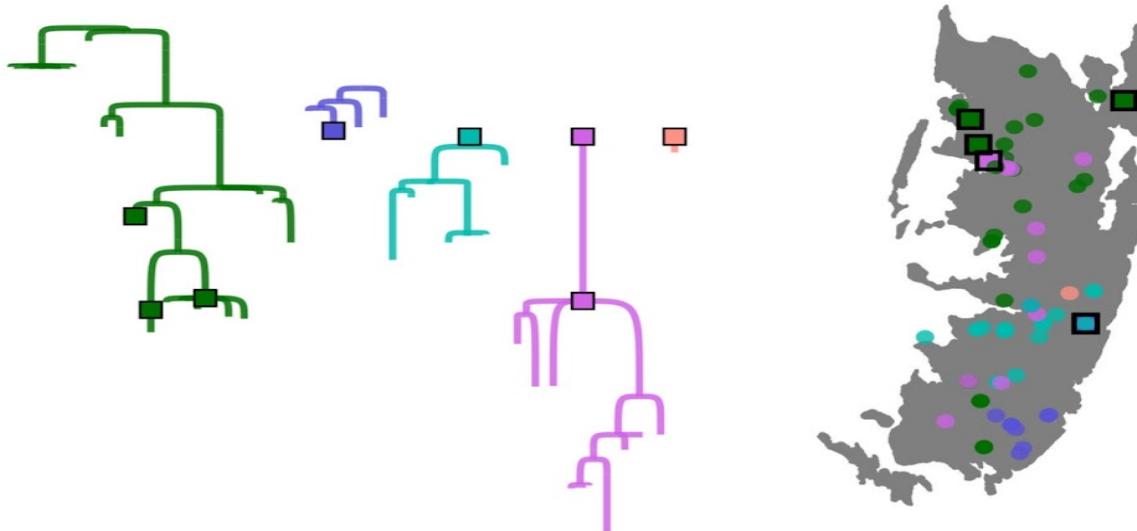
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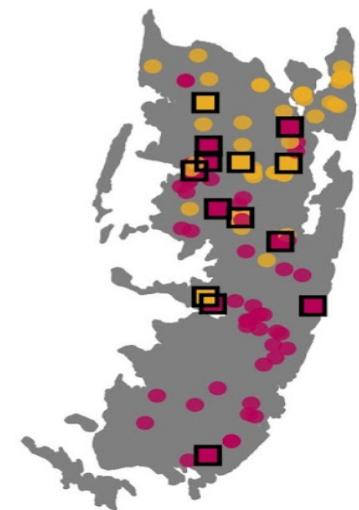
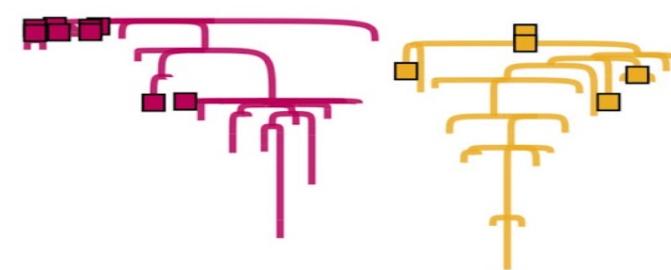


Endemic period (2010–2014)



2 years no detected rabies cases

Outbreak (2016–2018)



Lineage

1	3	5	7
2	4	6	

Rabies A ccessible Genomic Epidemiology



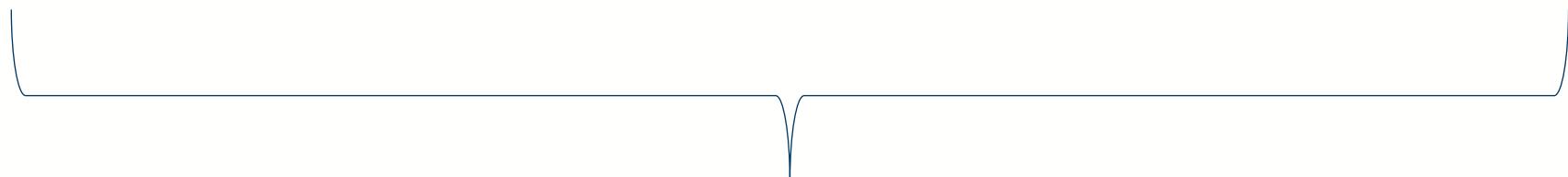
The usual situation



Sequencing
provider

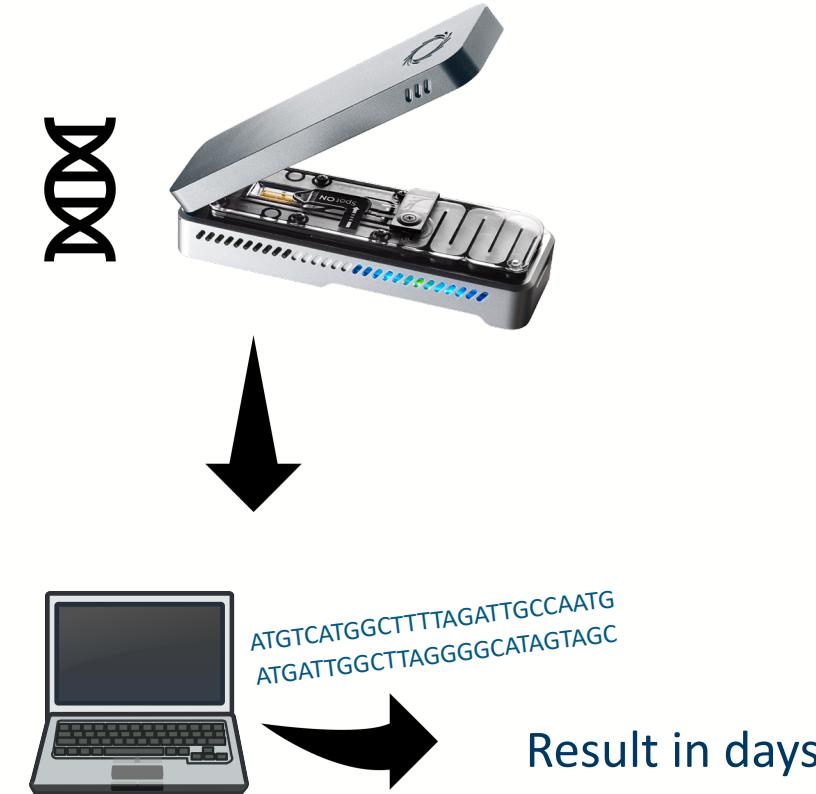


Answer

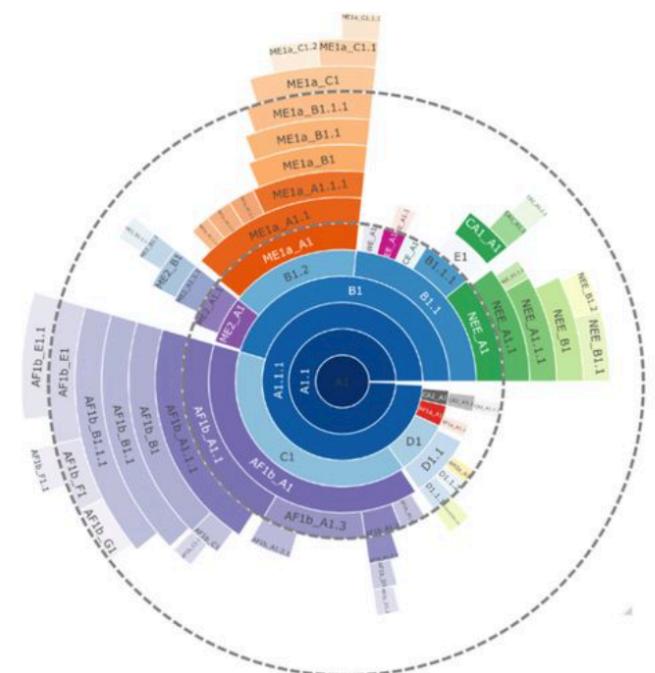


3-6 months

Taking the lab to the sample



Brunker *et al* (2020), *Well. Open Res.*; Bautista *et al* (2023), *JoVE*.



In-country sequencing



UNIVERSIDAD PERUANA
CAYETANO HEREDIA



Veterinærinstituttet
Norwegian Veterinary Institute





University
of Glasgow





RAGE

Rabies Accessible Genomic Epidemiology

RAGE training in Nigeria

Instructors and facilitators:

Dr Kirstyn Brunker Organiser	Dr Grace Kia Organiser	Criselda Bautista
		

Dr Kathryn Campbell	Dr Sandeep Kasaragod	Martha Luka
		



University of Glasgow

Katie Hampson & research team

Criselda Bautista (PhD student)

Kathryn Campbell

Sandeep Kasaragod

Smitha Abraham

Martha Luka

Rowan Durrant

Ahmadu Abello University, Zaria

Grace Kia

Agatha Ukande

Nsadzetsen Gilbert Adzemye

Dickson Anoibi Mathew

Agatha Ukande Seember

Nigerian Centre for Disease Control- Public Health Laboratories

MRC-University of Glasgow Centre for Virus Research

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Stellenbosch University

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