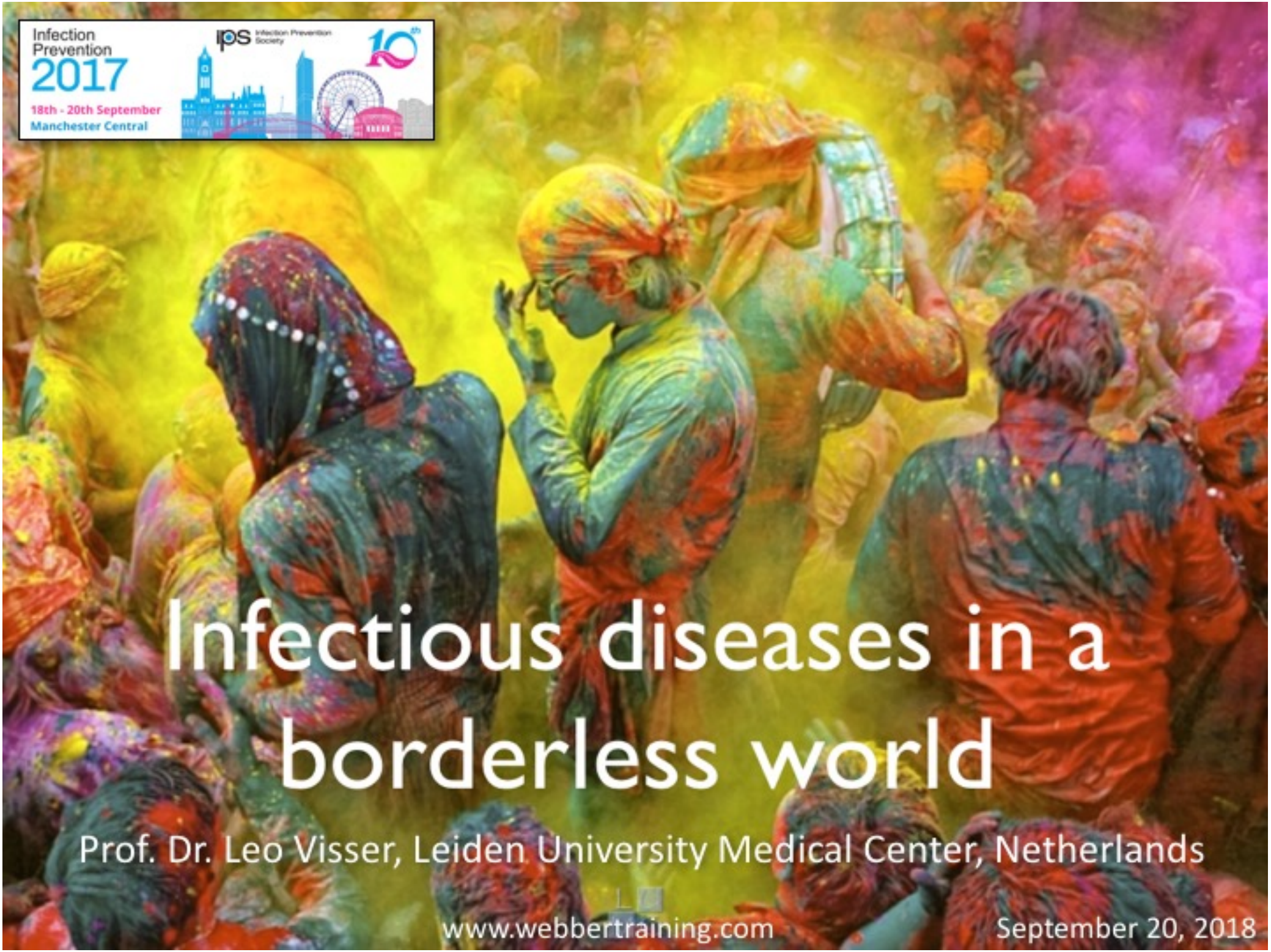
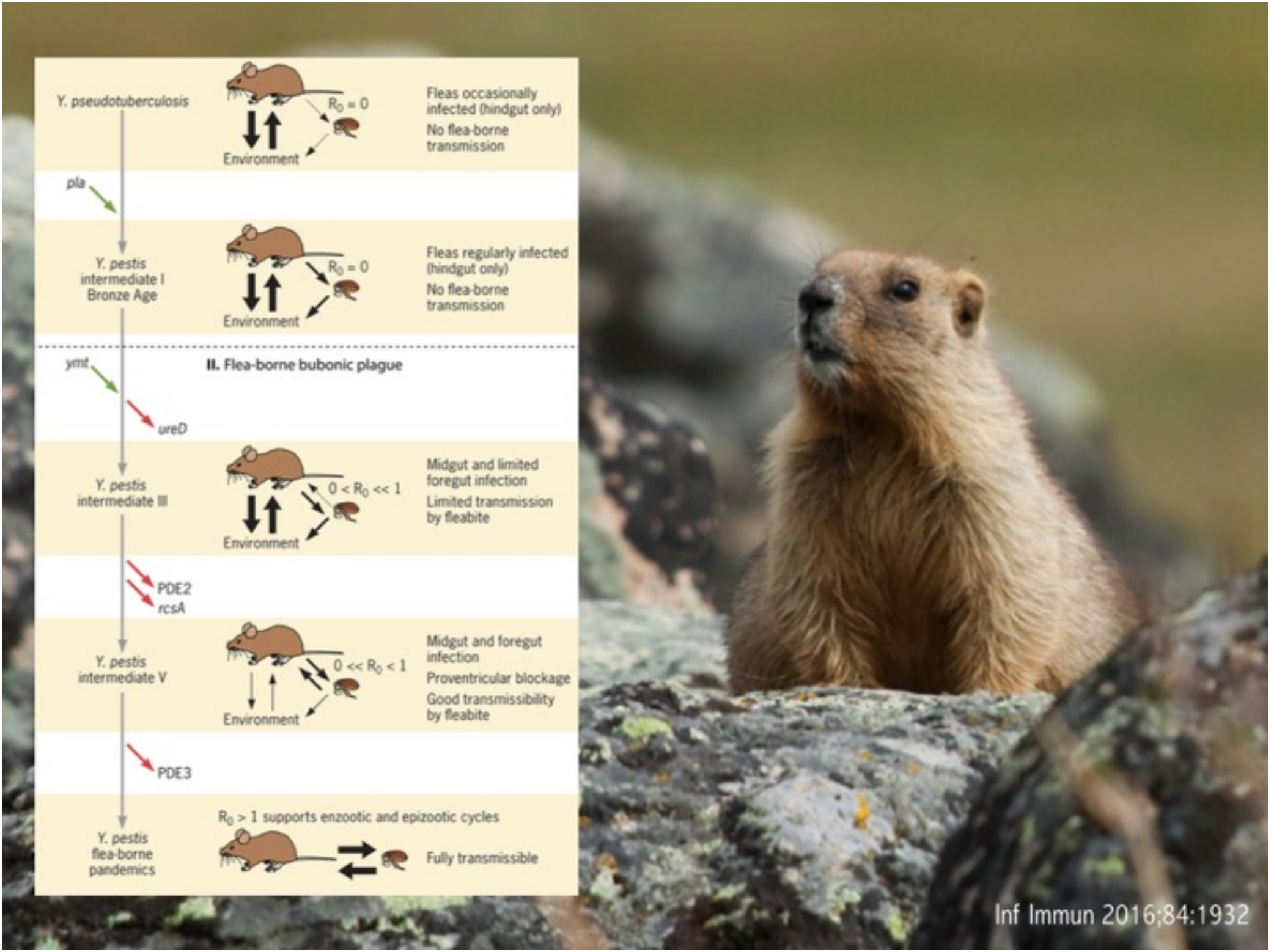
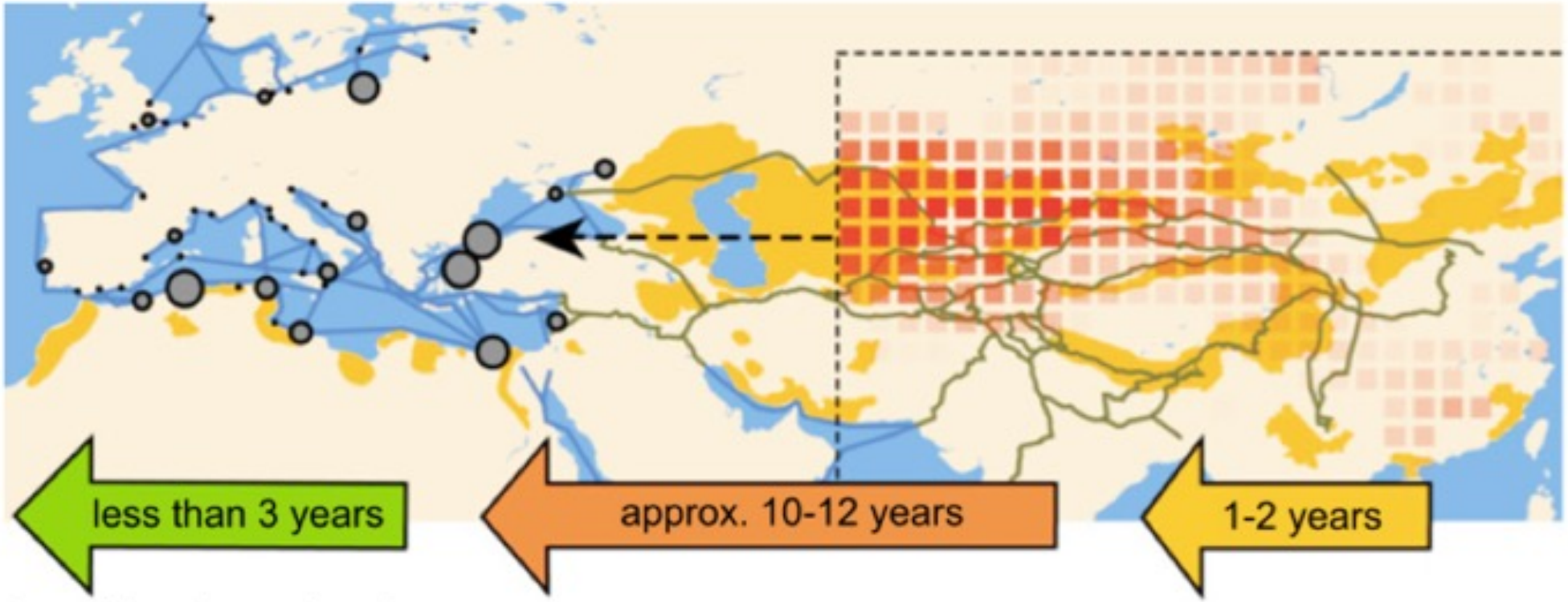

Infection Prevention 2017
18th - 20th September
Manchester Central
IPS Infection Prevention Society
10th
Infectious diseases in a borderless world
Prof. Dr. Leo Visser, Leiden University Medical Center, Netherlands
www.webbertraining.com
September 20, 2018



Inf Immun 2016;84:1932



A new Asian plague pulse arrives in the harbors of Europe, and spreads through the mainland

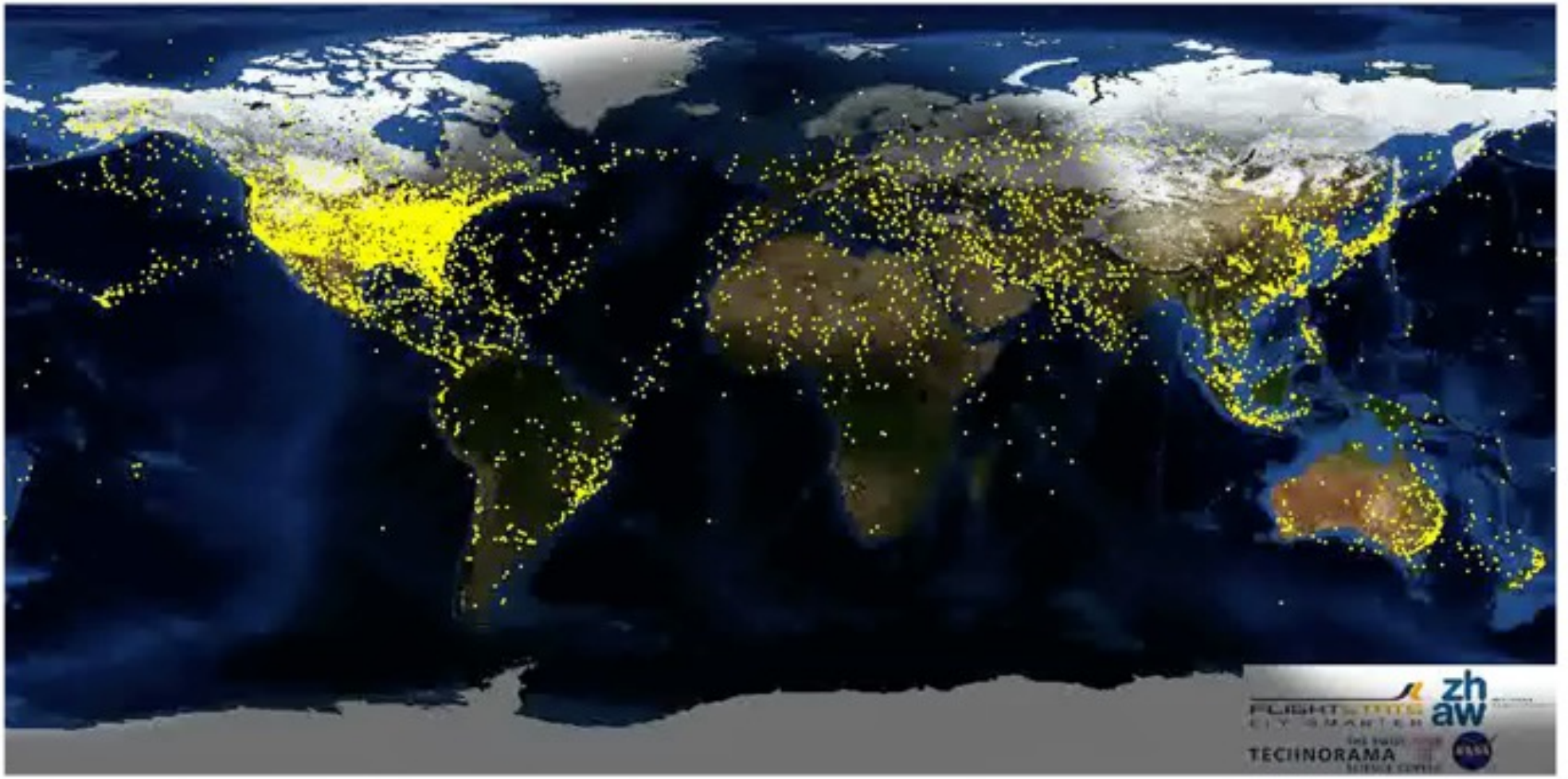
Plague travels overland from western Central Asia to Europe, likely related to activity on existing land traderoutes

Fleas find alternative hosts after a rodent population crash, and come into contact with human populations

PNAS 2015;112:3020

Plague

- Evolutionary genetic adaptation
  Yersinia pseudotuberculosis
- High host plasticity as vector-borne disease with rodent reservoir
- Catalyzing changes in climate and socio-economic conditions
- Trade and travel



http://radar.zhaw.ch/worldwide.html

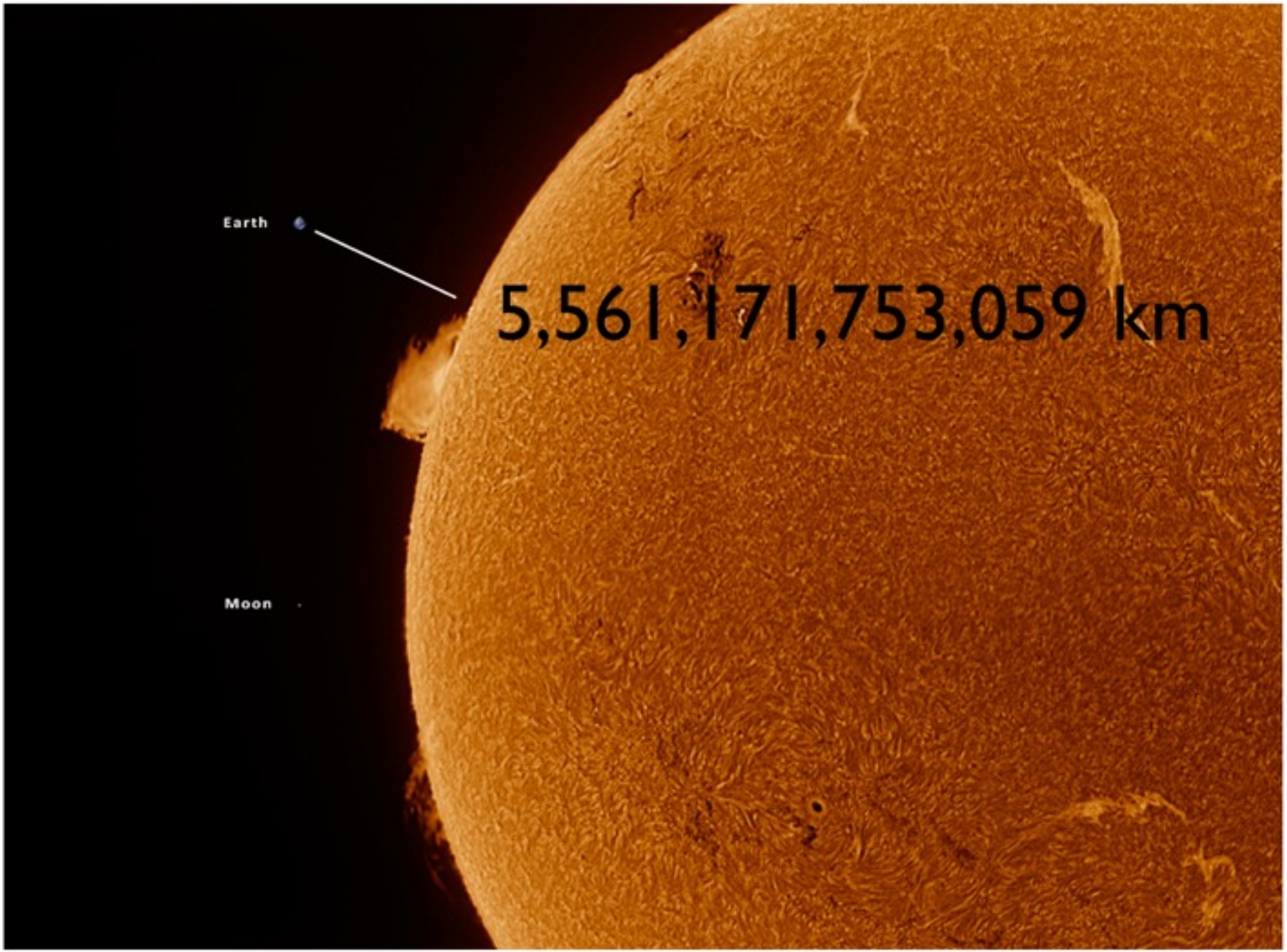

Earth
5,561,171,753,059 km
Moon

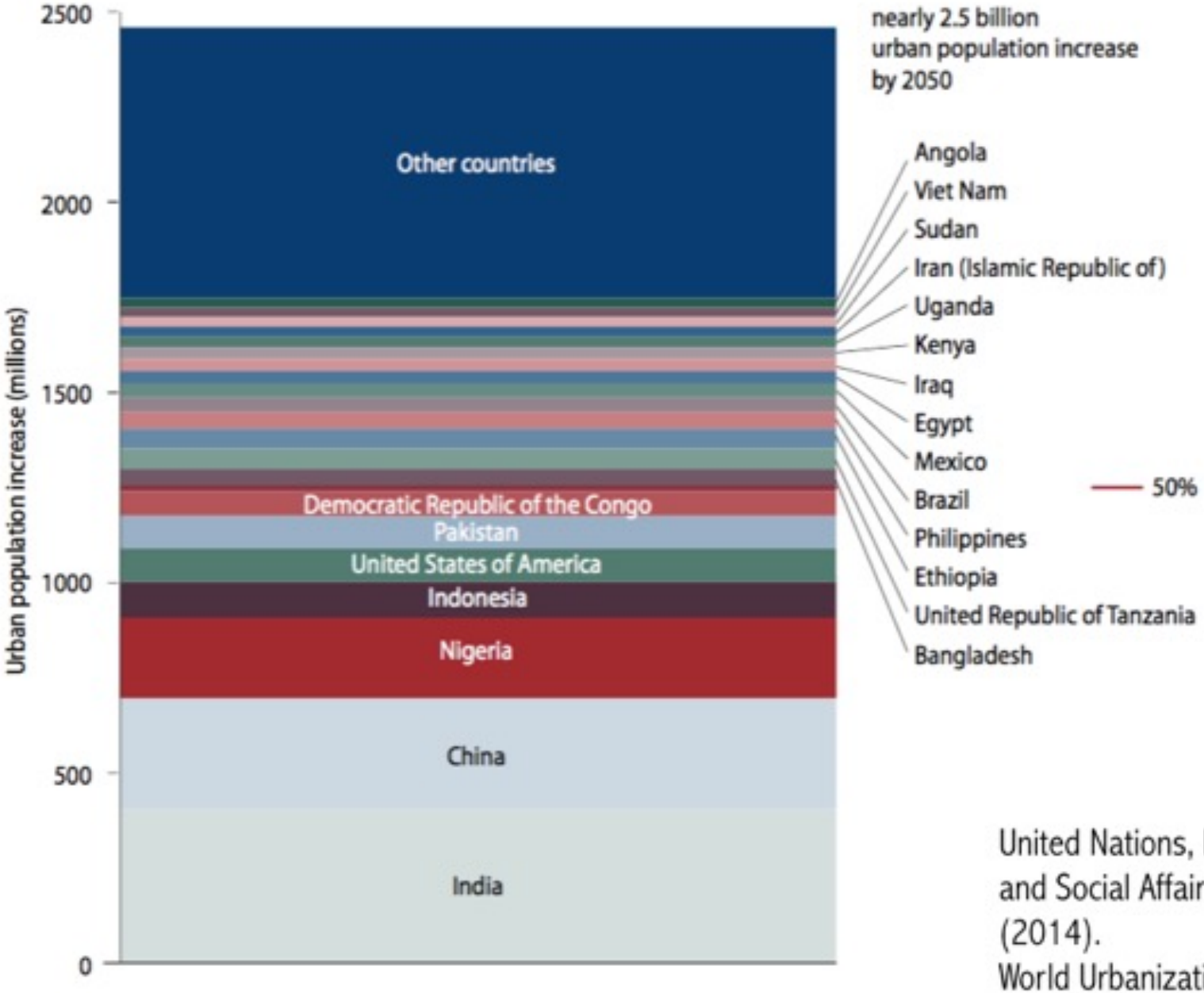
TABLE 1. POPULATION OF THE WORLD AND MAJOR AREAS, 2015, 2030, 2050 AND 2100, ACCORDING TO THE MEDIUM-VARIANT PROJECTION

Major area	*Population (millions)*			
	2015	*2030*	*2050*	*2100*
World	7 349	8 501	9 725	11 213
Africa	1 186	1 679	2 478	4 387
Asia	4 393	4 923	5 267	4 889
Europe	738	734	707	646
Latin America and the Caribbean	634	721	784	721
Northern America	358	396	433	500
Oceania	39	47	57	71

Source: United Nations, Department of Economic and Social Affairs, Population Division (2015). *World Population Prospects: The 2015 Revision*. New York: United Nations.

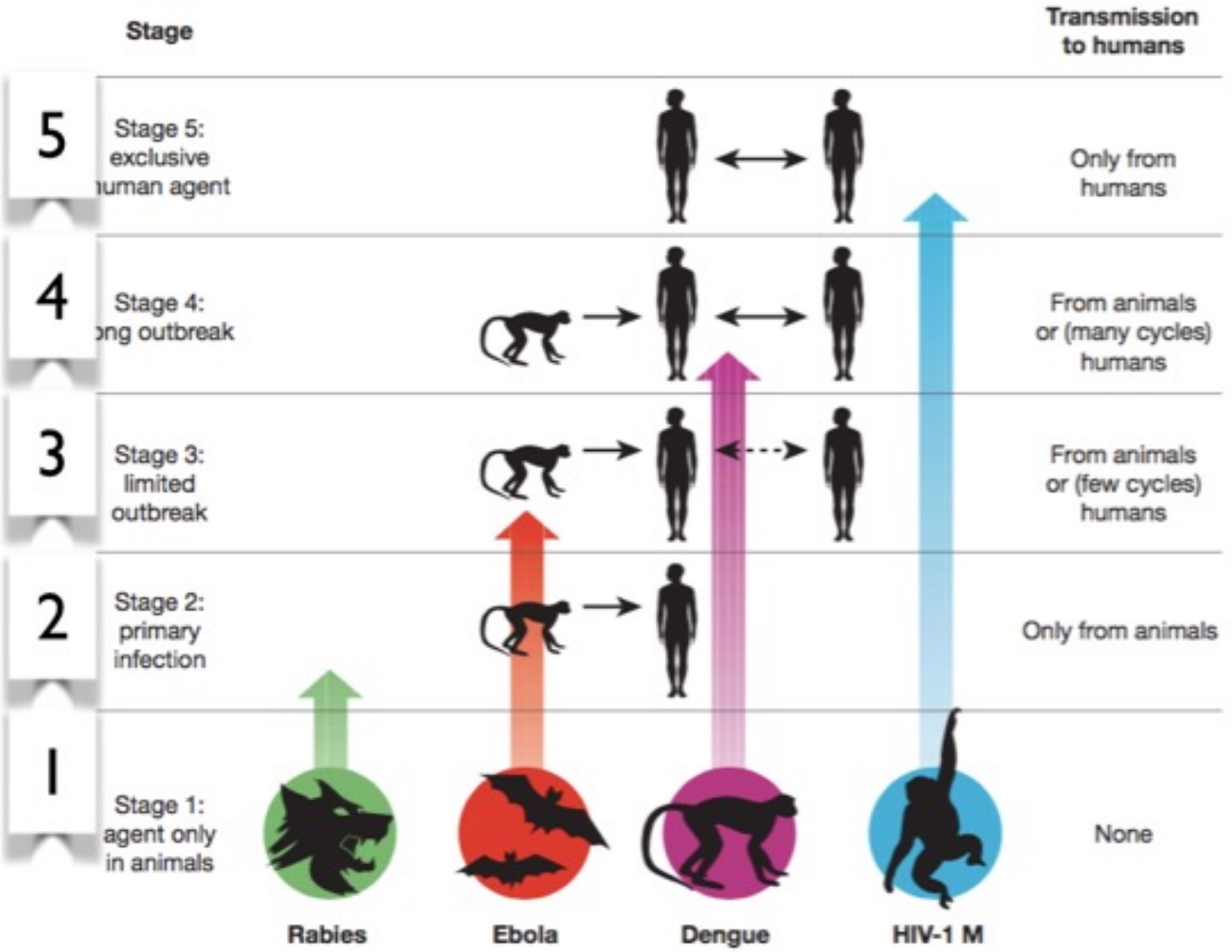
United Nations World Population Prospects:
The 2015 Revision, Key Findings and Advance Tables

Contribution to the increase in urban population by country, 2014 to 2050



United Nations, Department of Economic and Social Affairs, Population Division (2014).
World Urbanization Prospects: The 2014 Revision, Highlights

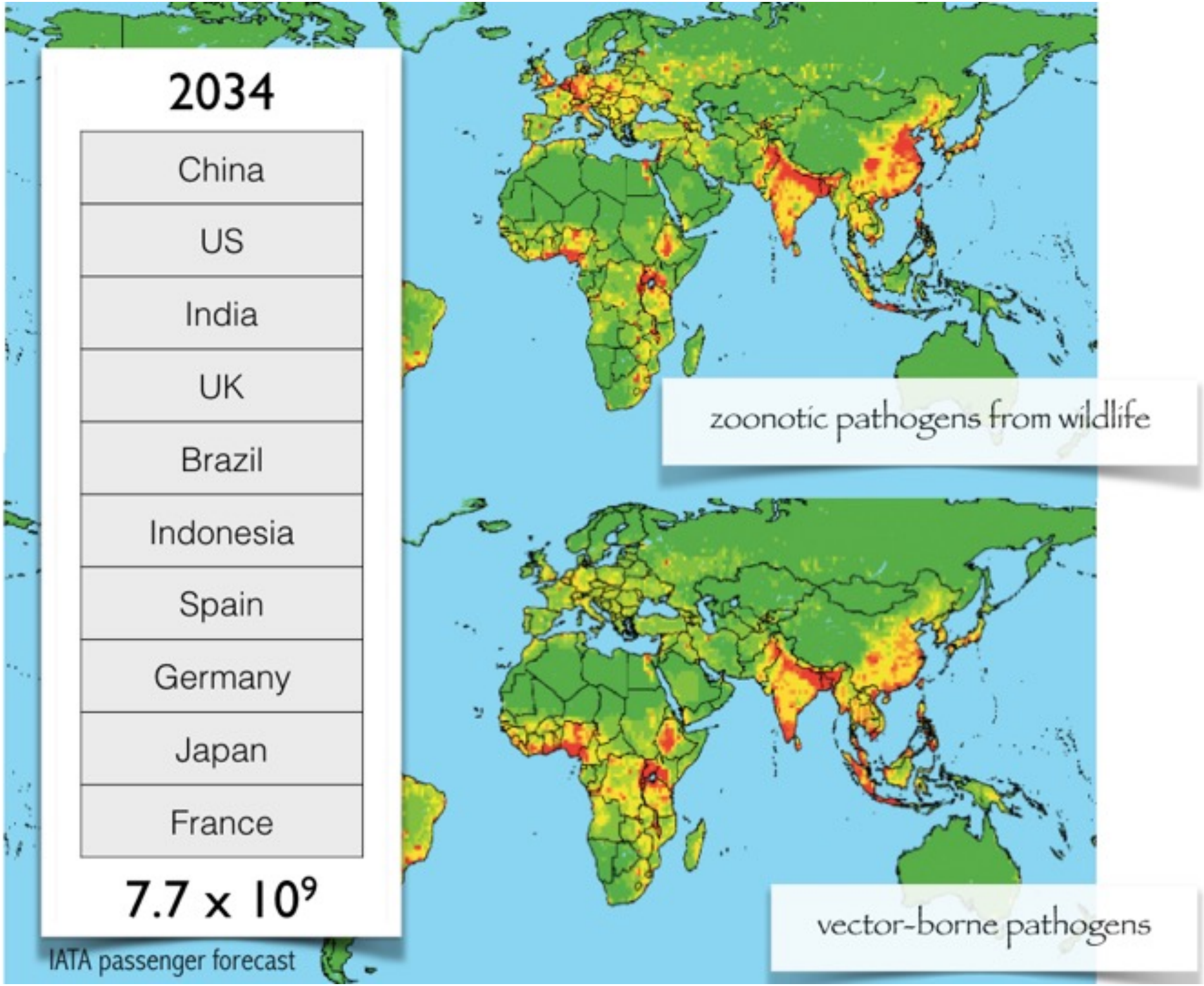
- How do new infections emerge?
- What have we learned
  from epidemics of 21st century?
- What will the future bring
  in this borderless world?



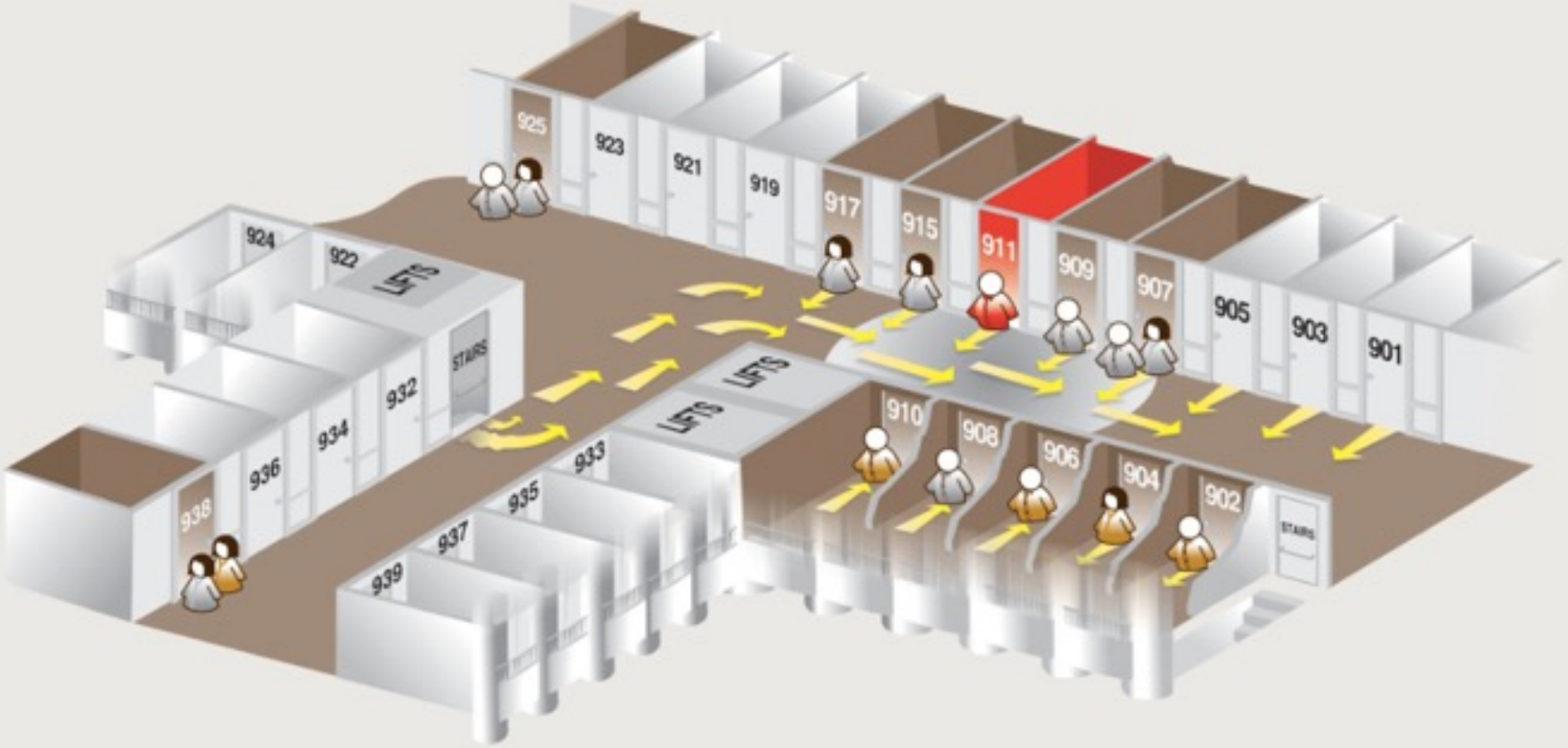
Nature 2007:447:279

Related non-human primate	smallest species barrier	hunting	HIV (Simian TLV)
Vector-borne	high host plasticity	antropophilic biting behaviour	dengue chikungunya zika
Bird or bat	high geographical dispersal	amplification domestic animal	influenza (MERS-CoV)
Domestic animal	intensity of contact	agricultural activity	Measles (Q-fever)
Wild animal	direct or indirect contact	hiking, hunting, wet markets	Leptospirosis (monkey pox)

Scientific Reports 2015;5:14830


2034
China
US
India
UK
Brazil
Indonesia
Spain
Germany
Japan
France
7.7 x 10⁹
IATA passenger forecast
zoonotic pathogens from wildlife
vector-borne pathogens

9th floor of the Metropole Hotel, 21 February 2003



Each room is indicated by its number (e.g. 911, index case); white numbers indicate affected rooms

Index case
Prof LJL, 63
21 infected

SARS case with further transmission

SARS case No further transmission

Air flow (determined by smoke tests)

SARS (2003)

Cross-species transmission CoV	One Health movement
Initial delay reporting	International Health Regulations 2005
Superspreading events (health care facilities)	Rigorous infection control practices
WHO global network virology	National capacity building

Emerg Infect Dis 2013:19:864

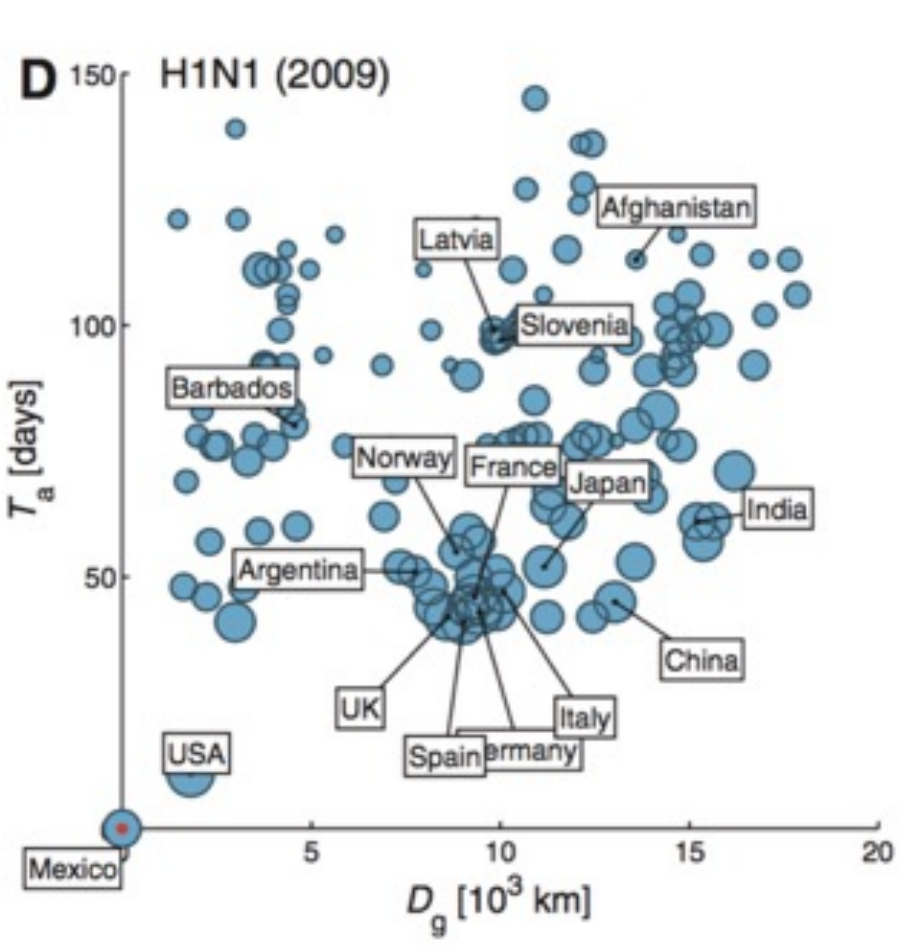

H5N1 (1997)
Science 2014;345:1295

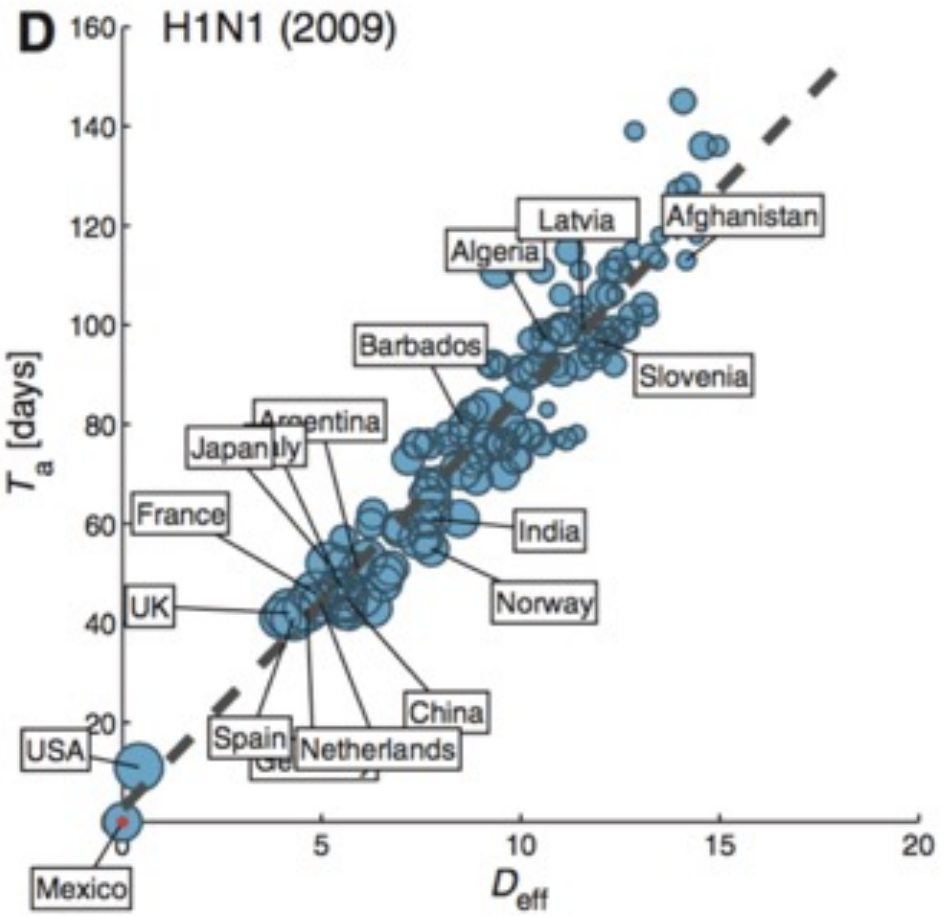
Nature 2010;464:1112

H1N1 (2009)

Reassortment virus in swine	Surveillance in pigs (and man)
Unexpected time and geographic region	Early warning systems <10% IHR countries
Vaccine production too late, too little	New cell-culture based influenza vaccine
Unequal access to vaccines and drugs	Revision vaccine distribution

Effective Distance (D_{eff})





Science 2013;342:1337

MERS-CoV (2012)

Global legal controversy over ownership and sharing of dangerous viruses

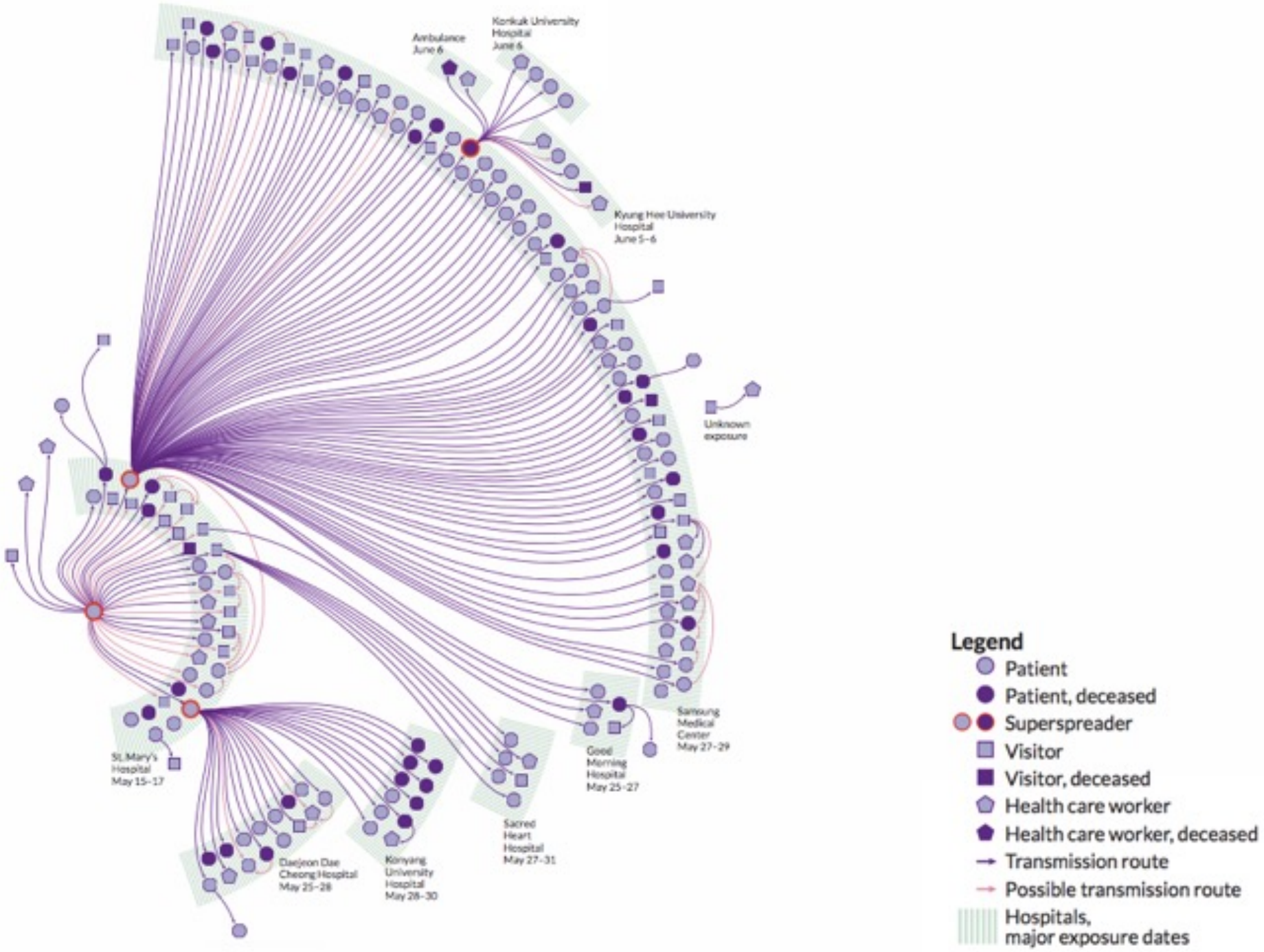
Revision of 2011 Pandemic Influenza Preparedness Framework
- to include non-influenza viruses with pandemic potential
- to include genome sequence data

Science 2014;345:1295
https://www.foreignaffairs.com/print/1071234

MERS-CoV (2015)

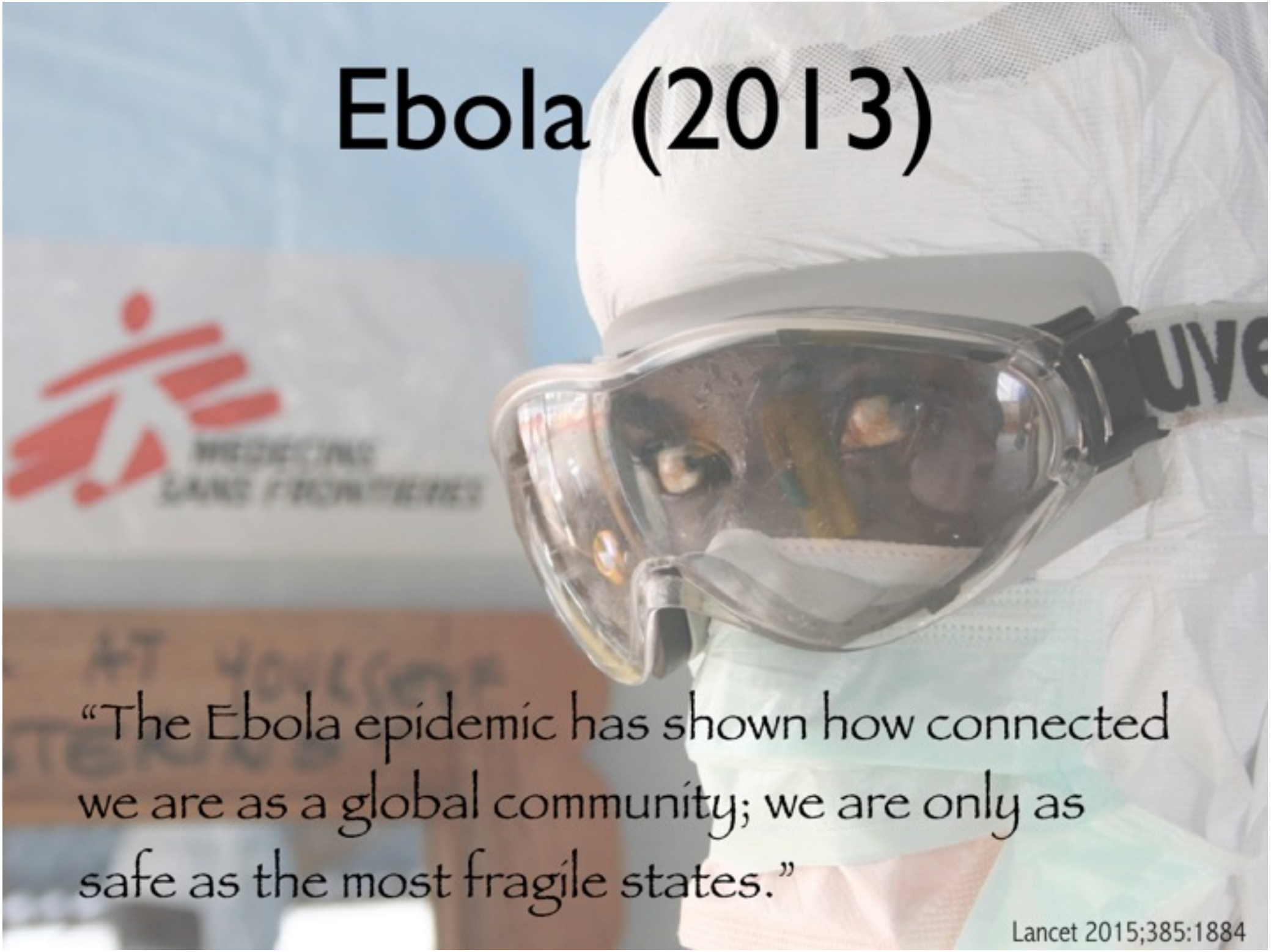
Medical shopping	
Late diagnosis	
Crowding ER and culture of family care-giving	Restrict hospital visitors
Quarantine failure of superspreaders	Hospital hygiene and infection control
Poor communication and failure to build trust	Risk communication

J Hosp Infection 2017;95:207



ScienceNews 2015;188:40

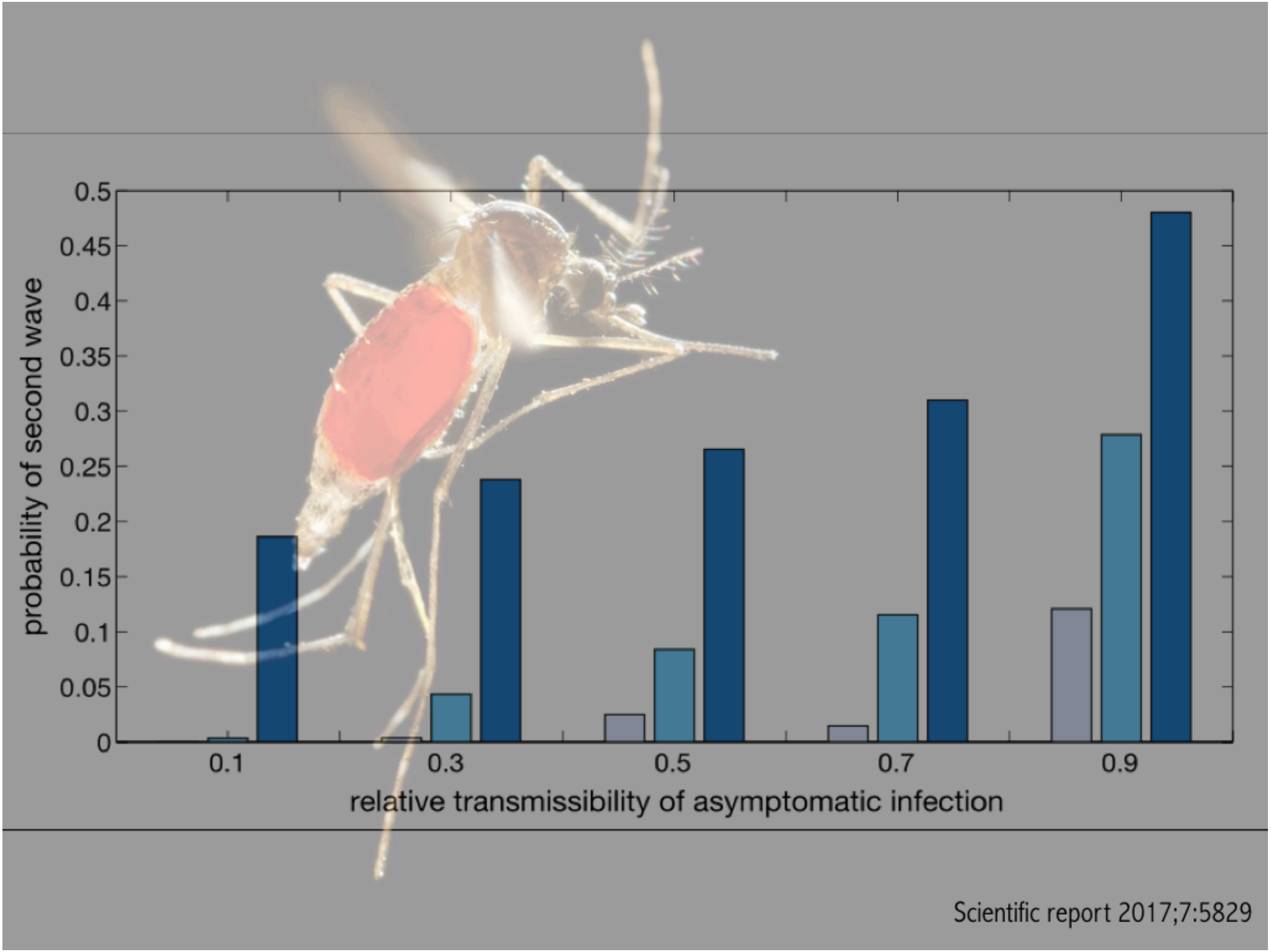
Ebola (2013)



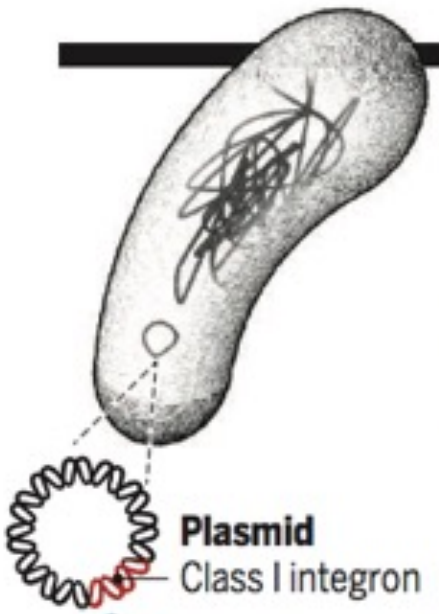
"The Ebola epidemic has shown how connected we are as a global community; we are only as safe as the most fragile states."

Lancet 2015;385:1884

Zika (2015)

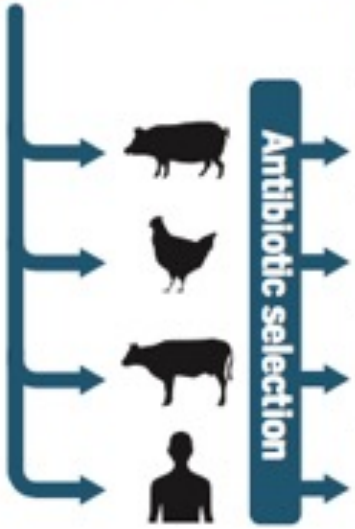


Scientific report 2017;7:5829



Global change for microbes

The clinical class 1 integron illustrates how human activities affect the abundance and distribution of genes and microorganisms. Driven by antibiotic selection, it has colonized different bacteria, vertebrate hosts, and continents. Its spectacular rise in abundance has been driven by antibiotic selection. Large numbers of integron copies are now being shed back into the environment, driving the spread of antibiotic resistance. See supplementary materials for data sources.

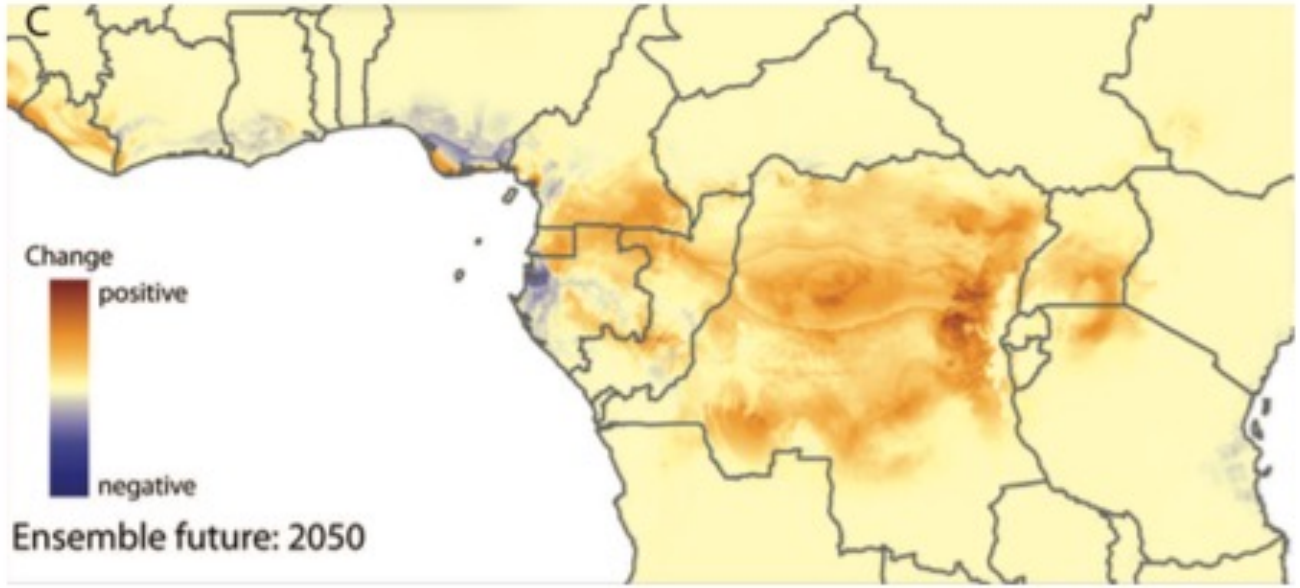


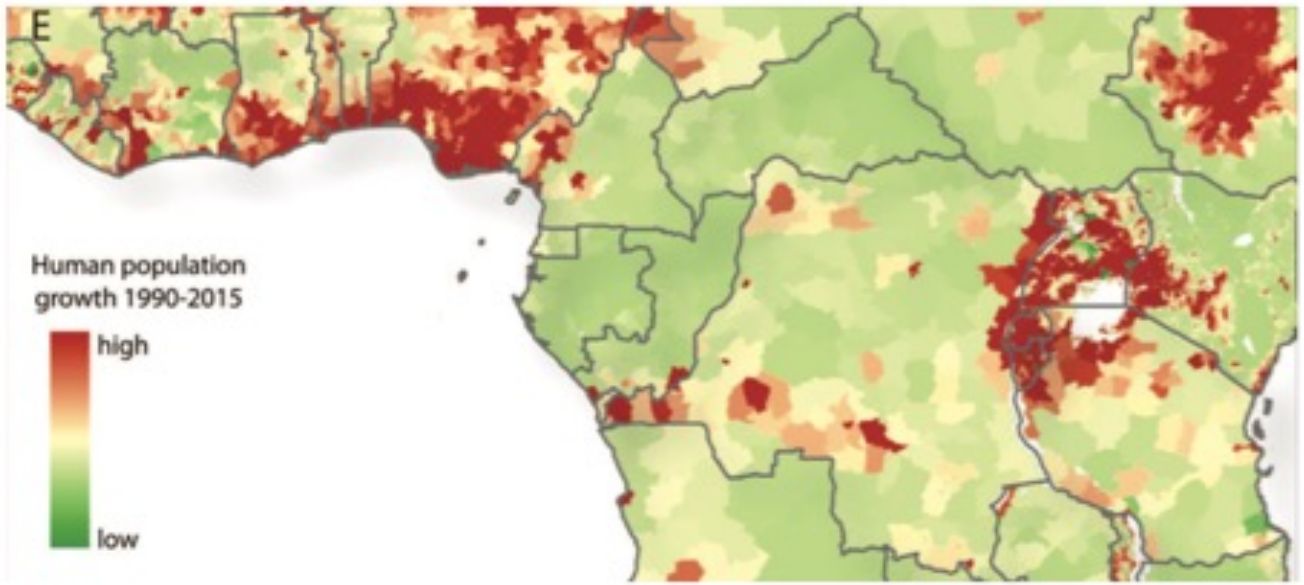
COPIES PER GRAM FECES	GRAMS OF FECES PER DAY	SIZE OF POPULATION	TOTAL COPIES RELEASED PER DAY
$10^8 - 10^{11}$	570	1×10^9	$10^{19} - 10^{23}$
$10^8 - 10^{10}$	20	1×10^{10}	$10^{19} - 10^{21}$
$10^6 - 10^7$	3000	1.4×10^9	$10^{19} - 10^{20}$
$10^6 - 10^7$	160	7.6×10^9	$10^{18} - 10^{19}$

Science 2017 Sept 15

Major increase in human monkeypox incidence 30 years after smallpox vaccination campaigns cease in the Democratic Republic of Congo

PNAS 2010;107:16262





PLOS One 2013;8:e66071

- Recent epidemics showed how densely connected we are as a global community; we are only as safe as the most fragile states
- Air travel, population growth, encroachment on previously sparsely populated areas in Africa and Asia, climate change, civil unrest and conflict amplify the risk of outbreaks and epidemics

- Be prepared for the unexpected
  Make infectious control practices work
- Strengthen existent public health surveillance systems and infrastructure
- Support low-income countries to implement 2005 International Health regulations
- Adapt the Pandemic Influenza Preparedness Framework to other pathogens

Members Area Login | Join IPS

Infection Prevention Society

www.ips.uk.net

Search this website ... GO

Home | Education & Events | Professional Practice | News & Media | Membership | About IPS | Public / Patients | Contact Us

Infection Prevention 2017

Manchester Central

18th - 20th September

@IPS_Infection

#IP2017

Infection Prevention Society

10th Anniversary

Join IPS and Enjoy Access To ...

Influencing

IPS has responded to the EPIC3 consultation. To read the response click above icon.

Conference and Seminar Programmes

For more information on the IPS Annual Conference, 'Infection Prevention 2017', Click on the icon above.

Networking for Infection Prevention Professionals

There is a local IPS branch near you. Why not get involved and meet likeminded colleagues

FREE Access to the Journal of Infection Prevention

All IPS members get free online access to the JIP. Details can be found by clicking the above icon

IPS Twitter and Infection News Updates

With over 1,000 followers you can keep up with the latest conversations here.

Infection Prevention Best Practice

The latest Quality Improvement tool is available for free download, click the icon above

www.webbertraining.com/schedulep1.php

September 28, 2017	HOW TO PUBLISH IN THE JOURNALS AND WHY IT MATTERS Speaker: **Prof. Elaine Larson**, Columbia University, Mailman School of Public Health
October 5, 2017	*(FREE Teleclass)* INFECTION CONTROL GUIDELINES THAT DID NOT WORK AGAINST EBOLA Speaker: **Prof. Bjørg Marit Andersen**, Oslo University Hospital
October 12, 2017	*(FREE Teleclass)* STRENGTHENING IPAC STRUCTURES THROUGH EDUCATION IN LOW-INCOME OR MIDDLE-INCOME COUNTRIES Speaker: **Prof. Shaheen Mehtar**, Infection Control Africa Network, and Stellenbosch University, Cape Town
October 26, 2017	INFECTION CONTROL IN PARAMEDIC SERVICES Speaker: **Jennifer Amyotte**, City of Greater Sudbury Paramedic Services, Canada
October 31, 2017	*(FREE European Teleclass)* INFECTION PREVENTION CHALLENGES AMONG HOSPITALIZED CHILDREN AND NEONATES IN AFRICA Speaker: **Prof. Dr Angela Dramowski**, Stellenbosch University, Cape Town
November 9, 2017	CLEANING THE GREY ZONES OF HOSPITALS: LESSONS FROM A COMMUNITY-BASED TEACHING HOSPITAL Speaker: **Prof. Makeda Semret**, McGill University, Montreal

Thanks to Teleclass Education

Patron Sponsors