

XX. TÜRK KLİNİK MİKROBİYOLOJİ VE İNFEKSİYON HASTALIKLARI KONGRESİ

Yeni Ortaya Çıkan İnfeksiyonlar

Nicola **PETROSILLO**

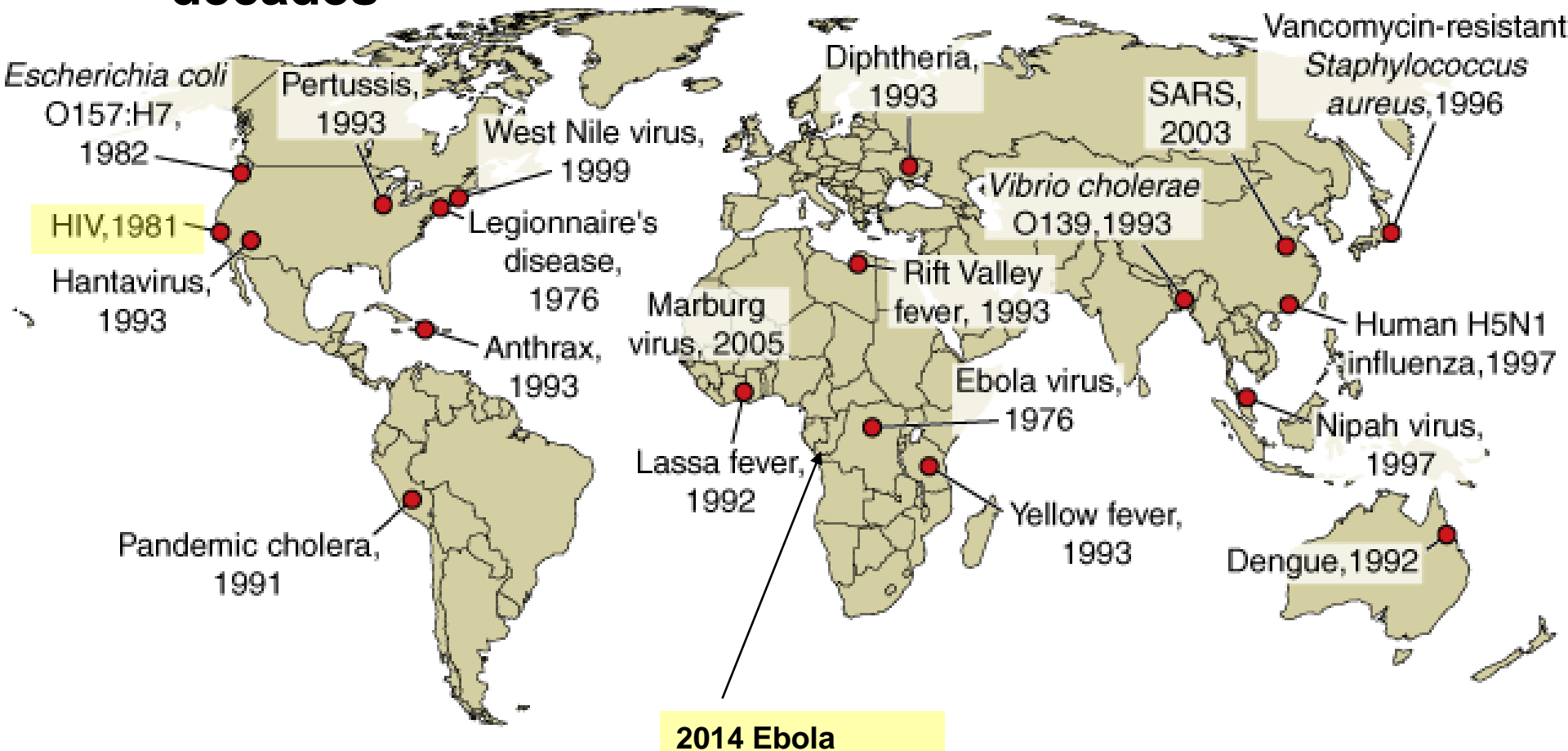
(Emerging Infections Task Force)

ESCMID Emerging Infections Task Force (EITaF)

Competing interests disclosure

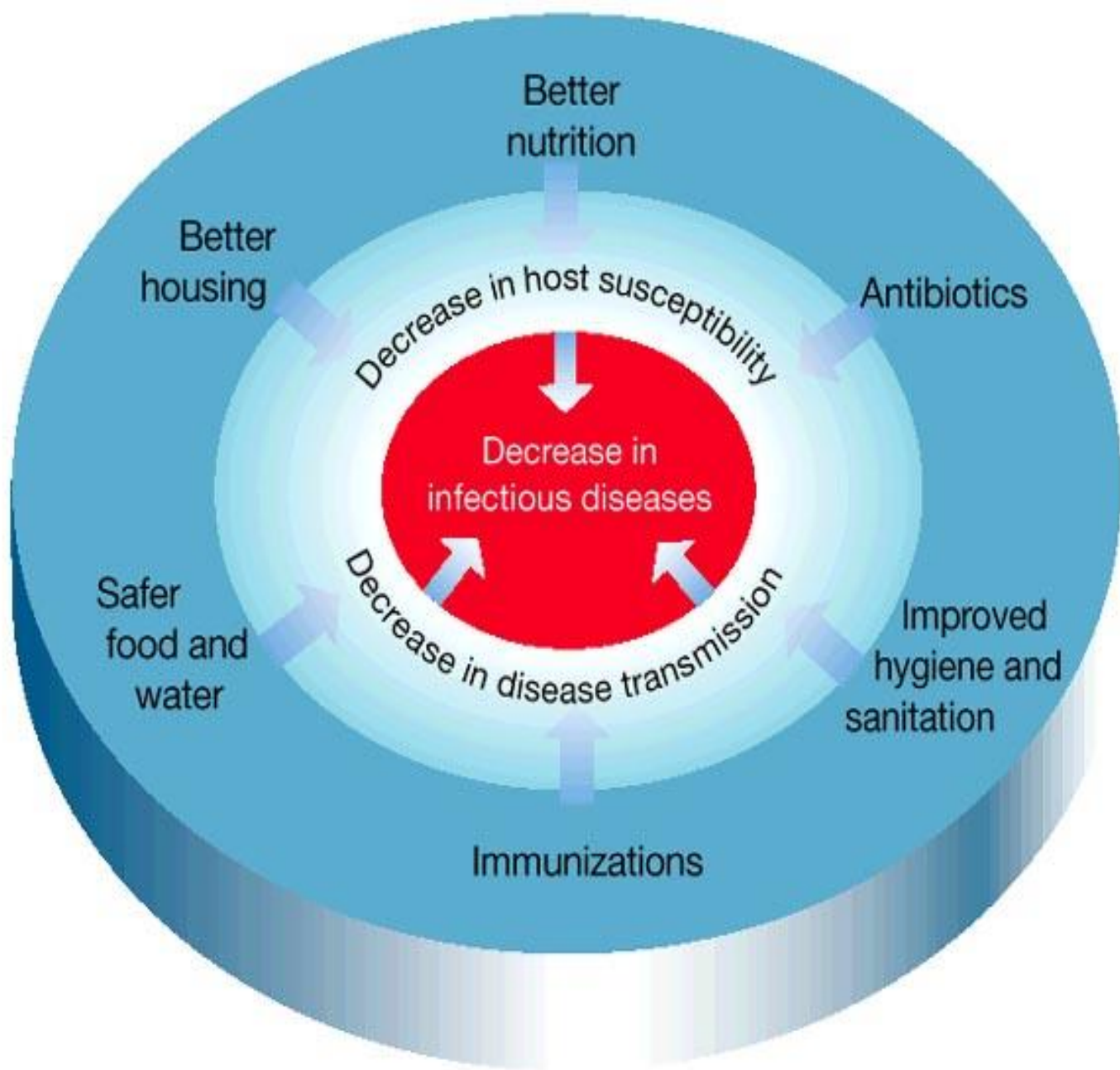
- **Honorary as speaker for Astellas, MSD, Pfizer, Novartis, Gilead, GSK, Johnson & Johnson, Angelini, Zambon, Takeda, Becton & Dickinson**
- **Honorary as member of scientific board for Pfizer, MSD, Astellas, Novartis**
- **President, Infection Control Multidisciplinary Joint Committee, UEMS**

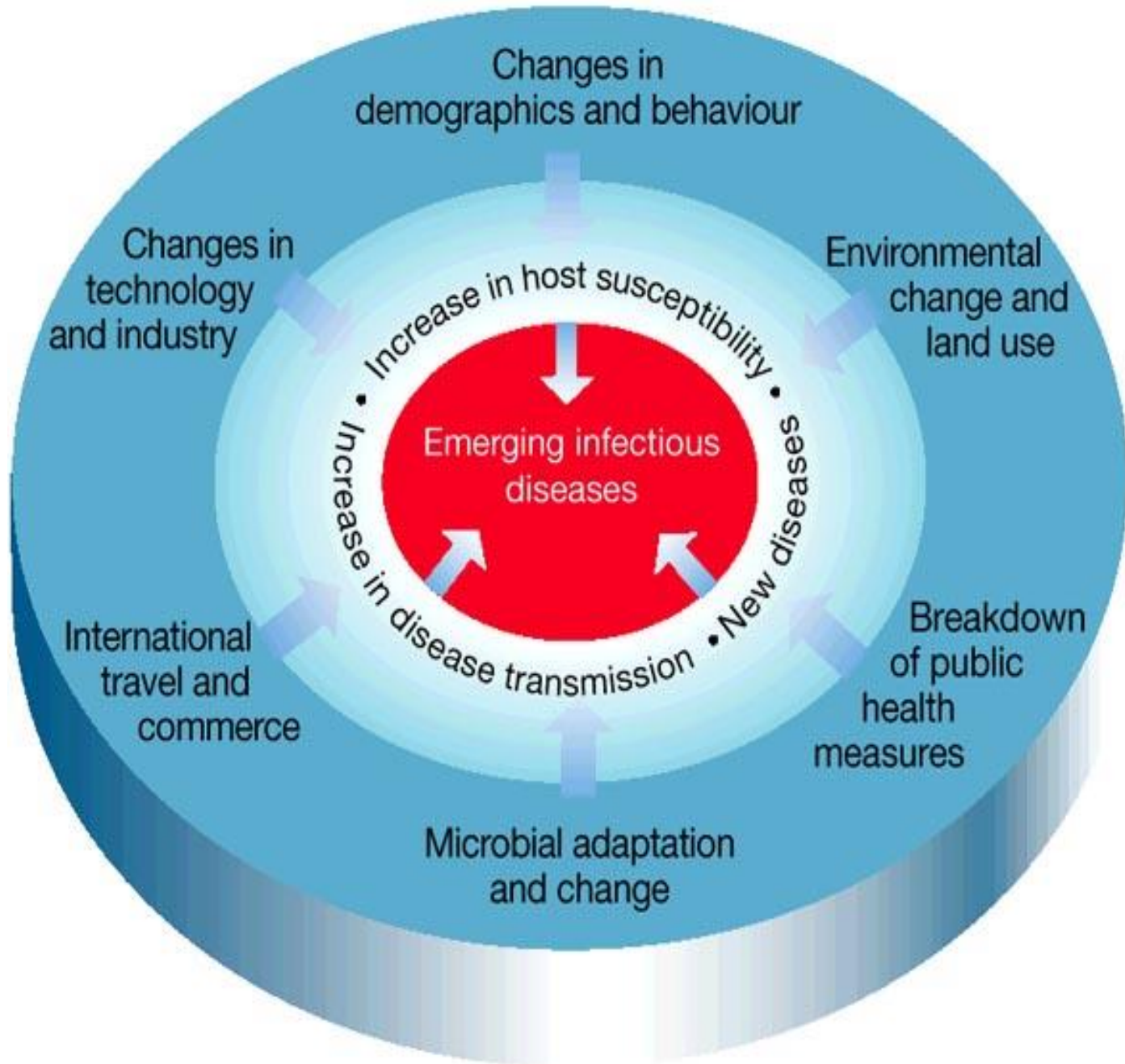
From AIDS to Ebola: a history of the last 3 decades



Source: Fauci AS, Kasper DL, Braunwald E, Hauser SL, Longo DL, Jameson JL, Loscalzo J: *Harrison's Principles of Internal Medicine*, 17th Edition: <http://www.accessmedicine.com>

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What is EID?

Events caused by

- **newly evolved strains of pathogens** (for example, multi-drug-resistant tuberculosis and chloroquine-resistant malaria),
- **pathogens that have recently entered human populations** for the first time [for example, HIV-1, severe acute respiratory syndrome (SARS) coronavirus], and
- **pathogens that have probably been present in humans historically, but which have recently increased in incidence** (for example, Lyme disease).

The emergence of these pathogens and their subsequent spread have caused an extremely significant impact on global health and economies.

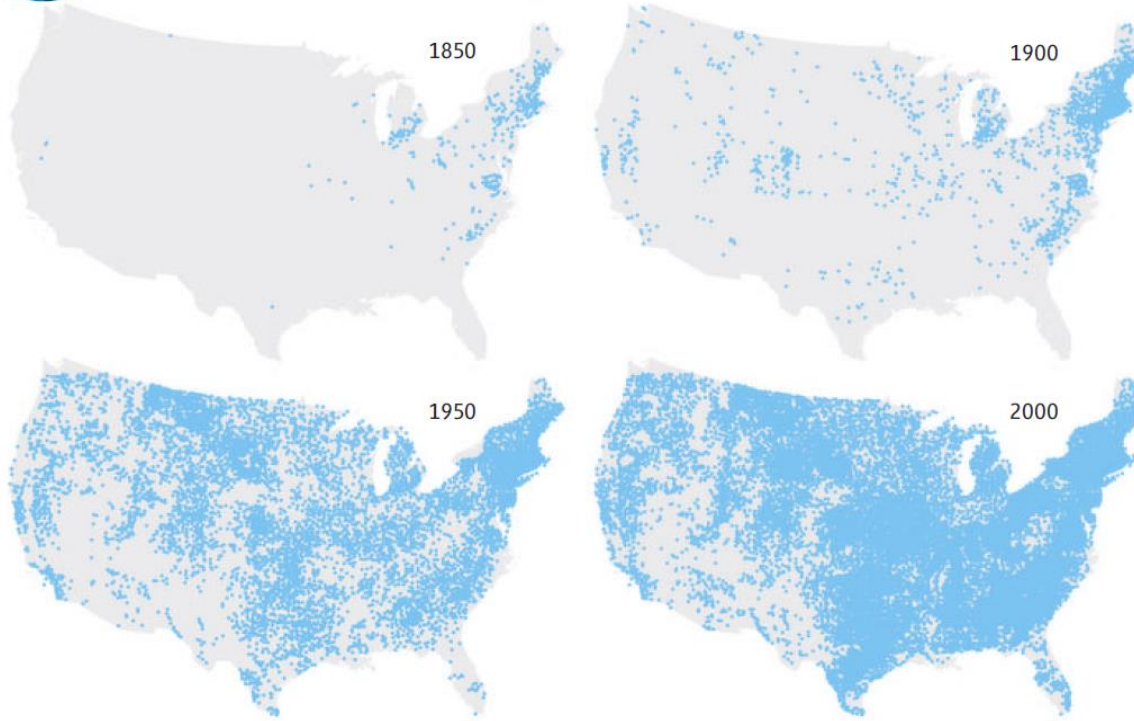
Main causes of EID spread

- **Crowding** (SARS, MERS-CoV, HCAI, etc.)
- **Mobility** (tourism, migration and refugees) (HIV, TB, HBV, Leishmaniasis, MDR organisms, etc...)
- **Centralized, industrial production of food** (BSE, HUS, *Cyclospora cayetanensis*, etc...) **and equipment** (*M chimaera*)
- **Age and immuno-incompetence** (HCAI, etc...)
- **War** (Polio, Cholera, etc...)
- **Change in vector distribution and vector susceptibility** (Zika, Dengue, Chikungunya, West Nile, etc...)

A Global Perspective on the Anthropocene



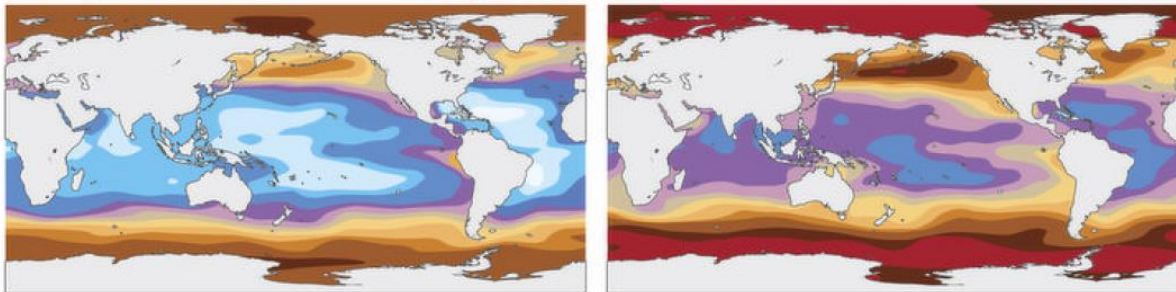
Growth of U.S. Dams and Reservoirs



SOURCE: JAMES P. M. SYVITSKI ET AL., *PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY A* 369, (2011)

Getting More Acidic

Aragonite saturation state 1 2 3 4 5



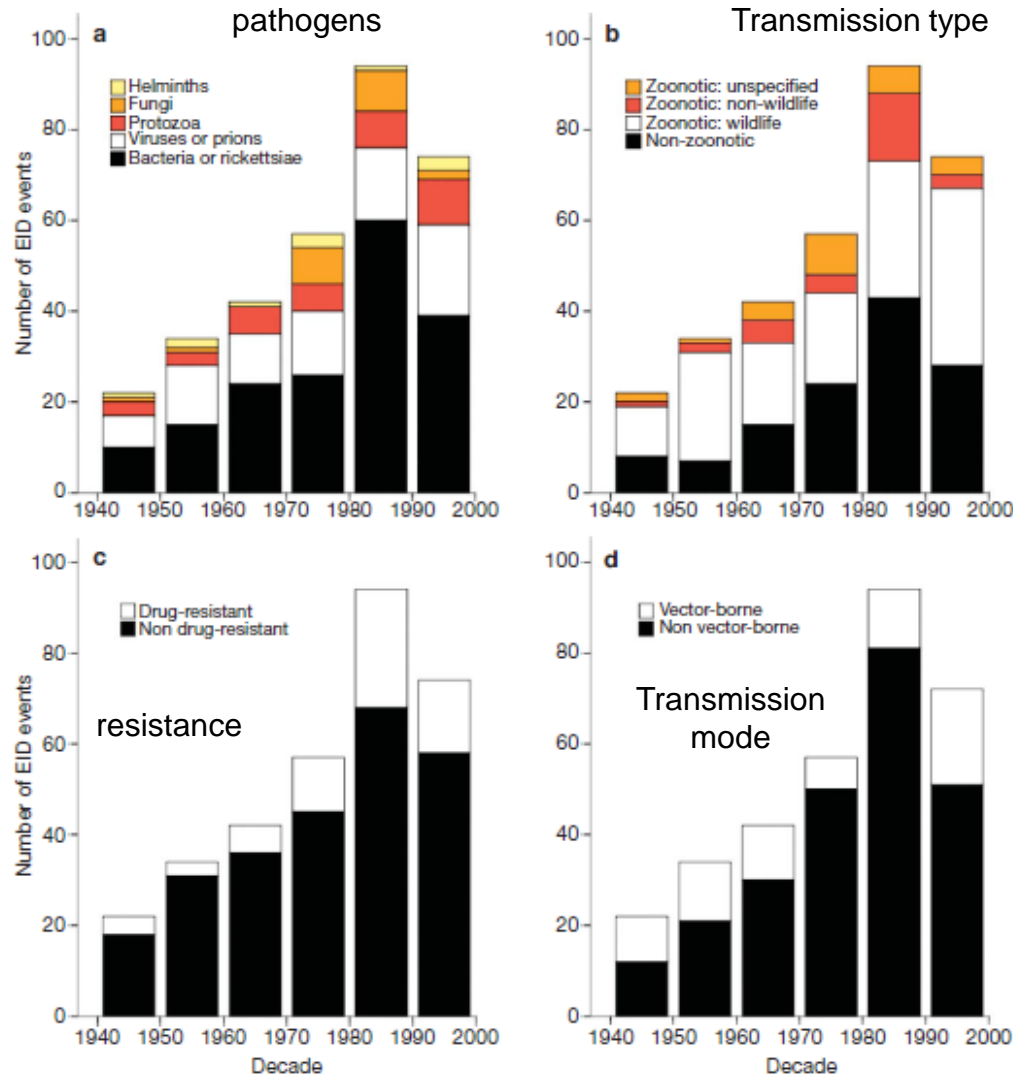
CO₂ 280 PPM

CO₂ 450 PPM

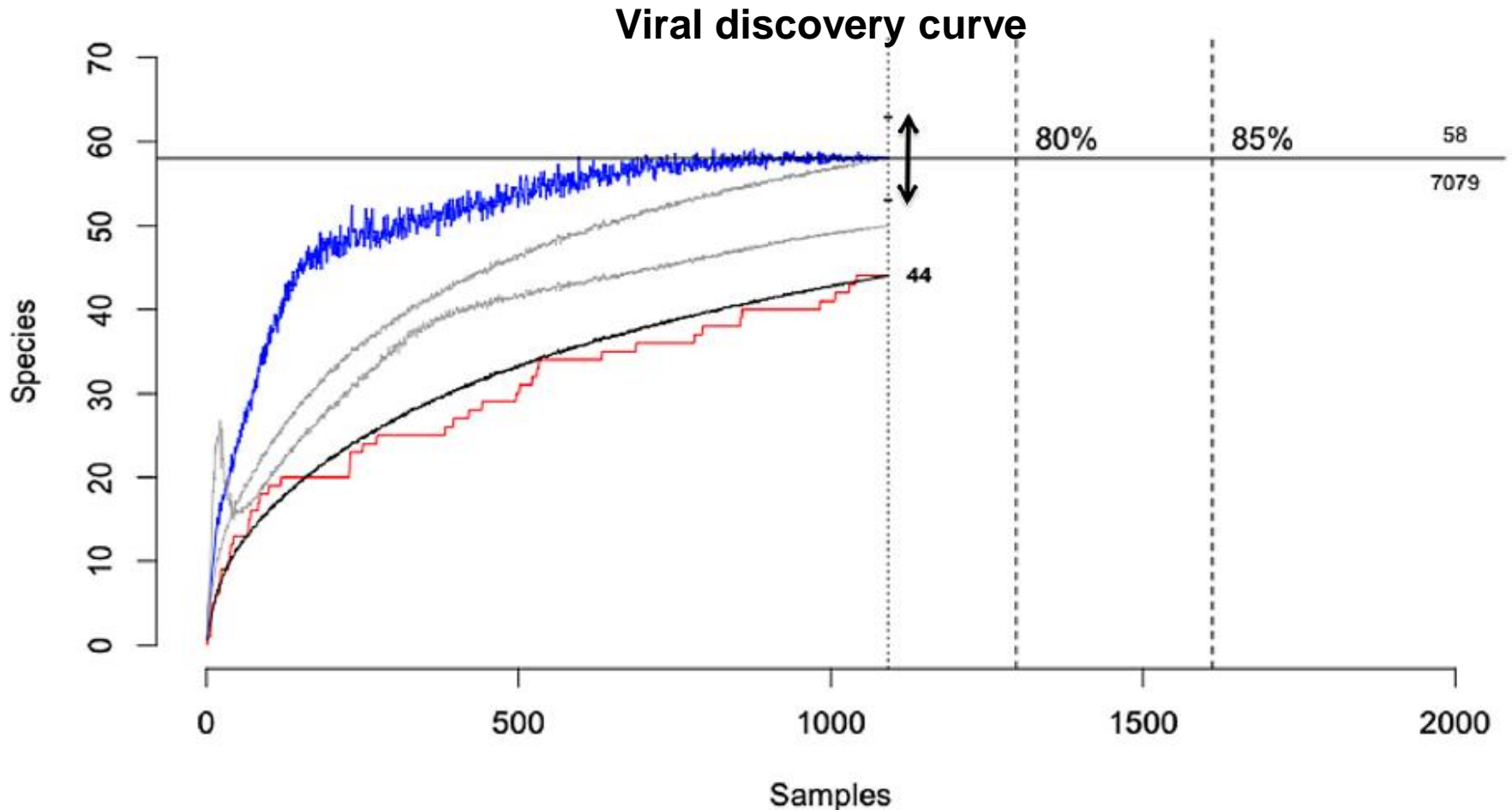
SOURCE: O. HOEGH-GULDBERG ET AL., *SCIENCE* 318, 5857 (14 DECEMBER 2007)

Vince G. Science
2011;334:32-3, 37

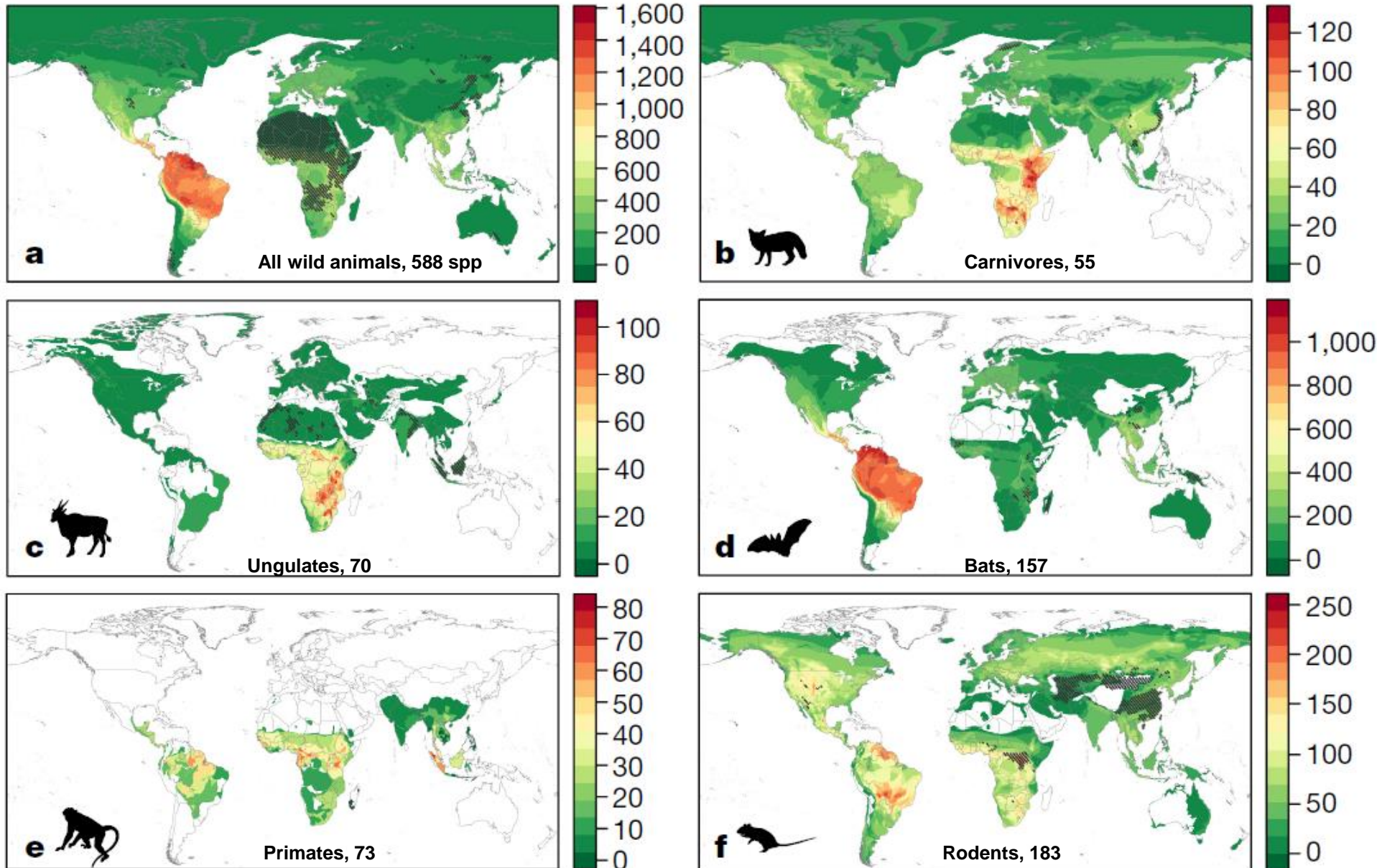
335 new human pathogens have been discovered between 1940 and 2004. The majority (60.3%) of EID events were caused by zoonosis of which 71.8% had a wildlife origin and 22.8% were vector-borne.



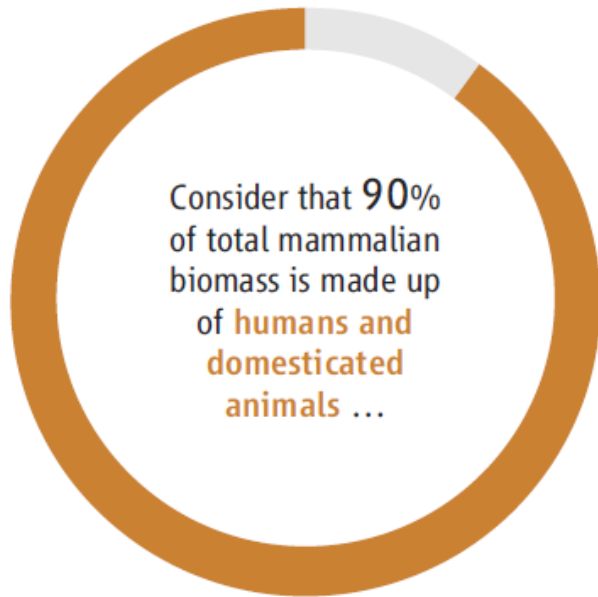
Most emerging diseases originate from animals and thus are zoonoses, and it has been estimated that there are up to 320,000 unknown viruses in zoonotic reservoirs.



Global distribution of the predicted number of «missing zoonoses» by order.



Domesticating the Planet



VACLAV SMIL, *THE EARTH'S BIOSPHERE: EVOLUTION, DYNAMICS, AND CHANGE*. MIT PRESS (2002)

The sources and mode of transmission of EID

Today 90% of the earth's biomass is in the human-domestic animal sphere compared to 0.1 % in the neolithic age.

Currently there is a further evolution, the transformation of a microorganism from showing only animal to animal transmission gradually evolving to being only human to human transmission.

It is the “viral chatter” that means repeated short introductions into humans, initially without the ability to sustain human to human transmission.

HIV made at least ten entries into humans before sustained human-to-human transmission was established.

**Wolfe ND. Nature 2007;447:279-83.
Vince G. Science 2011;334:32-3, 37**

The sources and mode of transmission of EID

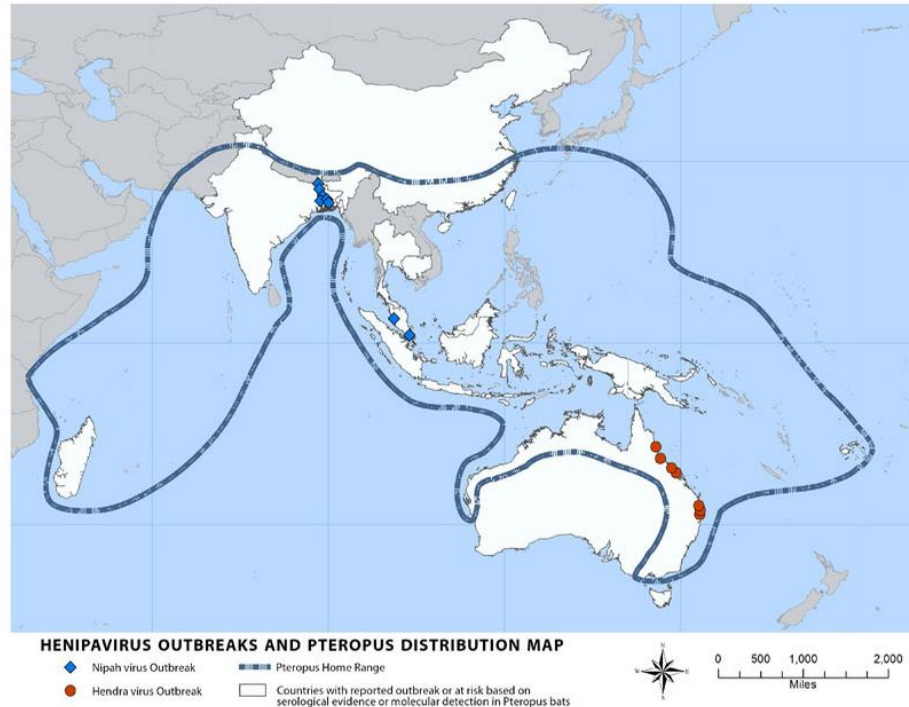
- Viral chatter? -

- **The Severe Acute Respiratory Syndrome (SARS) corona virus (SARS-CoV) outbreak is believed to have been introduced into humans from civit cats sold for consumption at markets, but that the original reservoir probably was Horseshoe bats** (Lau SK et al. Proc Natl Acad Sci U S A 2005;102:14040-5).
- **Civit cats are what is so called “bushmeat” i.e. meat from wild animals sold for human consumption, and it has been estimated that 4.5 million tons of bushmeat are sold from the West and Central Africa alone every year** (Smith KM et al. PLoS One 2012;7:e29505).



The sources and mode of transmission of EID - Viral chatter? -

- The Nipah virus outbreak in Malaysia was caused by a draught which drove the reservoir host, the fruit bats, from the tree-tops now without fruits to pig farms, where pigs were feed surplus fruit from markets.
- The pigs got infected and infected humans from respiratory tract secretions (Lo MK et al. J Clin Virol 2008;43:396-400).

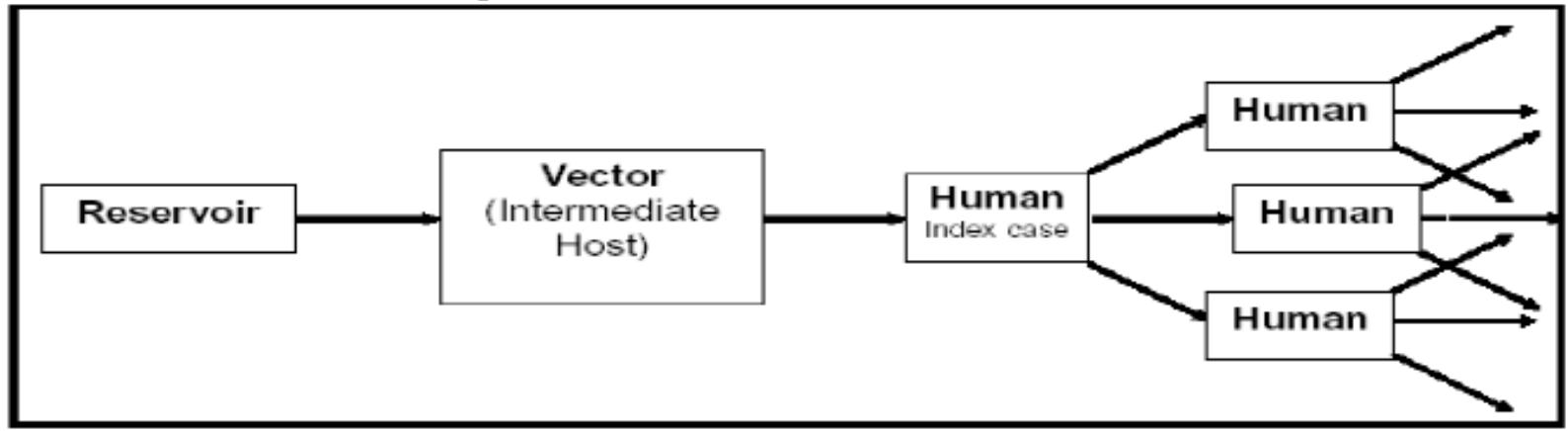


- Another example of RVF spillover into human populations occurred in west Africa in 1987, and was linked to construction of the Senegal River Project.
- The project caused flooding in the lower Senegal River area, altering ecological conditions and interactions between animals and humans.
- As a result, a large RVF outbreak occurred in animals



Ebola – transmission

Route of transmission and amplification



Natural host: Likely fruit bats

→ intermediate organism: non-human primate

→ Human (index case) → Human (= secondary transmission)



Epor



Wolfe et al. categorized zoonotic diseases by their ability to spread among humans after a species jump into five stages, ranging from

- **dead-end primary infections (stage 2)**
- **to human-transmissible zoonotic threats (stage 4) and**
- **ultimately to new fully human pathogens (stage 5)**

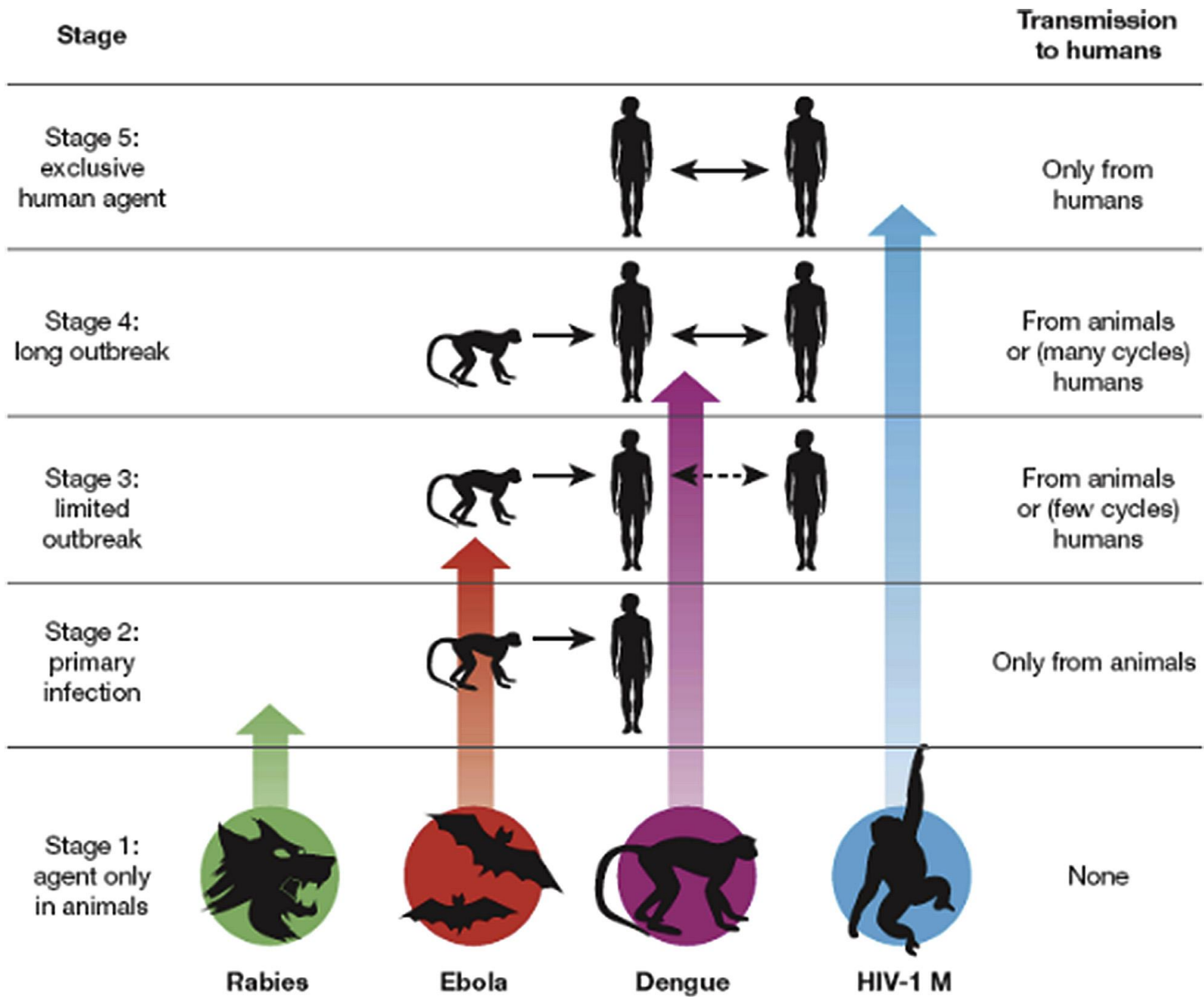


Fig. 1. Illustration of five stages through which pathogens of animals evolve to cause diseases confined to humans. From Wolfe et al. [13].

ESCMID expertise

- **ESCMID has the experts needed to address new emerging and re-emerging threats both with regards to knowledge and with access to laboratories equipped with state of the art technologies able to provide rapid analysis of any specimens.**
- **The latest large outbreak of a new infection was the SARS outbreak of 2003. It took two months before the virus was identified.**
- **New techniques have developed since then: With metagenomics, identification of a new microorganism should be reduced to a few weeks, provided proper samples are obtained, shipped and analyzed in a laboratory which has all the technical and bioinformatic expertise available.**
- **ESCMID does have the expertise.**

ESCMID expertise

- **ESCMID has also the experts needed to address new emerging and re-emerging threats with regards to IPC and clinical management.**
- **EVD, Lassa, Cholera, Plague outbreaks require ID/CM experts. We can be the liason with international agencies (WHO, ECDC) that deploy experts on the field.**

The **Emerging Infections Task Force (EITaF)** has been established by ESCMID's Executive Committee (EC) in March 2017.

The **terms of reference** of EITaF are:

- provide ESCMID members with up-to-date information on outbreaks of epidemic or pandemic potential, or outbreaks posing a threat to individuals travelling to an outbreak area.
- provide regular updates to the ESCMID's EC on emerging infections, including threat evaluation.

- **establish a group of experts (clinicians and microbiologists) who can assist to evaluate emerging infection threats and provide guidance on their diagnosis. This included identification of unknown pathogens.**
- **provide background material on emerging threats through reviews and position papers,**
- **organize workshops on emerging infections in collaboration with the ESCMID study groups.**
- **stimulate research on emerging infections including surveillance and diagnostics.**

Lassa fever in travelers

Sources:

CDC <https://dx.doi.org/10.3201/eid2502.180836>

WHO <https://www.who.int/csr/don/14-february-2019-lassa-fever-nigeria/en/>
<https://www.who.int/emergencies/diseases/lassa-fever/geographic-distribution.png?ua=1>

NCDC: <https://ncdc.gov.ng/news/163/press-release%3A-ncdc-initiates-response-to-rising-lassa-fever-cases-in-nigeria> ; <https://ncdc.gov.ng/news/164/press-release%3A-ncdc-reviews-lassa-fever-outbreak-response-amidst-reducing-number-of-cases>

March 11, 2019

Global Disease Outbreaks and El Niño

Date: Sunday 3rd March 2019

Source: [Anyamba A](#) et al. Global Disease Outbreaks Associated with the 2015–2016 El Niño Event Sci Rep. 2019 Feb 13;9(1):1930. doi: 10.1038/s41598-018-38034-z; and Science Daily <http://www.sciencedaily.com/releases/2019/02/190228141259.htm>

Measles is still spreading in Europe

Source: ECDC <https://ecdc.europa.eu/sites/portal/files/documents/measles-rubella-monthly-surveillance-report-january-2019.pdf>

February 1, 2019

ESCMID Emerging Infections Task Force

The task force aims to establish a **network of experts** within clinical microbiology and infectious diseases who can **raise awareness on EID** within the society and beyond, **liaise with other networks** focusing on emerging diseases, **develop a knowledge base on early detection and diagnosis** of EID and stimulate **research on emerging infections** including surveillance and diagnostics.



ESCMID Emerging Infections Task Force

An important aim of the task force is to ensure that **awareness of emerging infections becomes part of the workup** of every patient with a suspected infection.

Just as a travel history is mandatory for all patients, the thought that an illness may be important **when it defies standard diagnostic investigations** should be in the mind of every specialist in infectious diseases and microbiology.



EITaF People

Co-Chairs: Nicola Petrosillo (Italy) and Eskild Petersen (Denmark).

Expert panel

Effrossyni Gkrania – Klotsas, MD (UK),

Merete Storgaard, MD (DK),

Nick Beeching, MD, (UK),

Rogelio López-Vélez. MD, (ES),

Marion Koopmans, DVM (NL),

Alemka Markotic, MD (CR),

Ymkje Stienstra, MD (NL),

Antonino Di Caro, MD, (IT),

Kantele Anu, MD, (FI),

John Rossen, PhD (NL),

Rebekka Kohlmann, MD (DE),

Poh-Lian Lim, MD, (Singp),

Laurent Poirel (FR).

https://www.escmid.org/research_projects/emerging_infections_task_force/

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Mainland Hospital (for Ebola infected patients) in Yaba, Lagos-Nigeria (2016)



Thank you