

The global threat of infectious diseases



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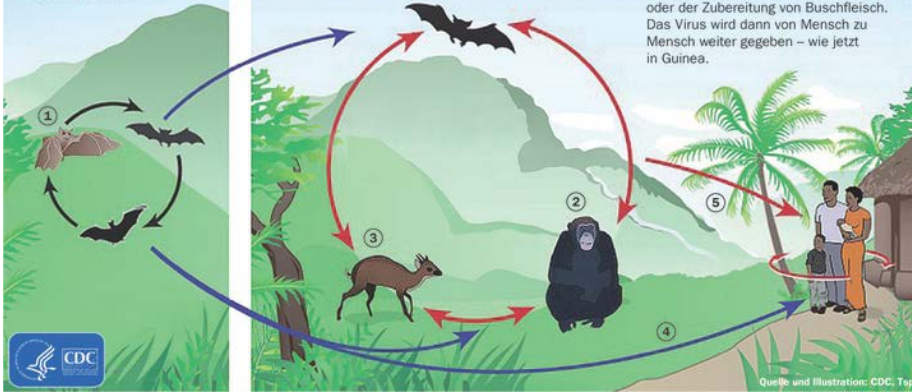
Ebola Virus

Wie sich Ebolaviren verbreiten

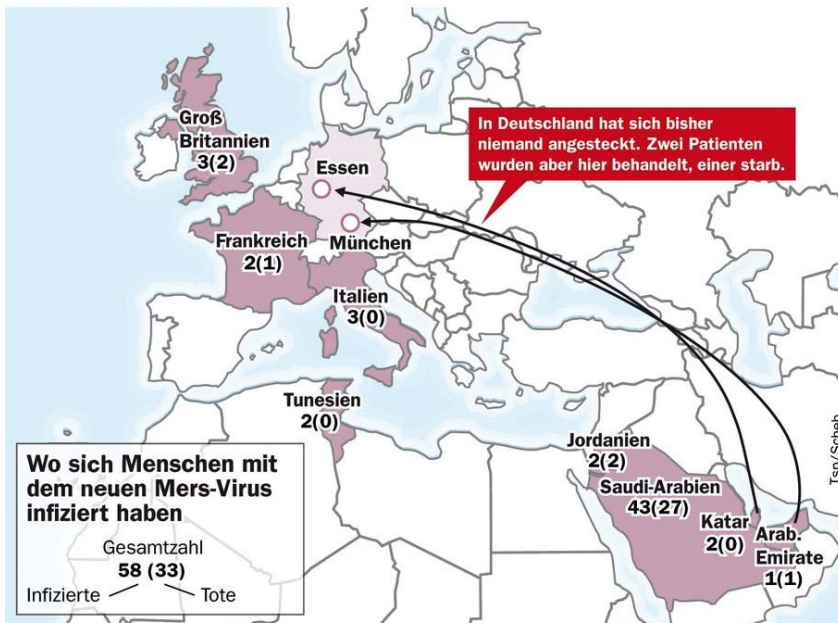
Das natürliche Reservoir für Ebolaviren sind vermutlich **Fledermäuse (1)**. Die Erreger können sich in diesen Tieren offenbar über lange Zeit halten, ohne sie zu töten.

Fledermäuse übertragen die Viren gelegentlich auf **Affen (2) oder Ducker, kleine Waldantilopen (3)**. Das Immunsystem dieser Tiere ist mit dem Virus überfordert, die meisten sterben.

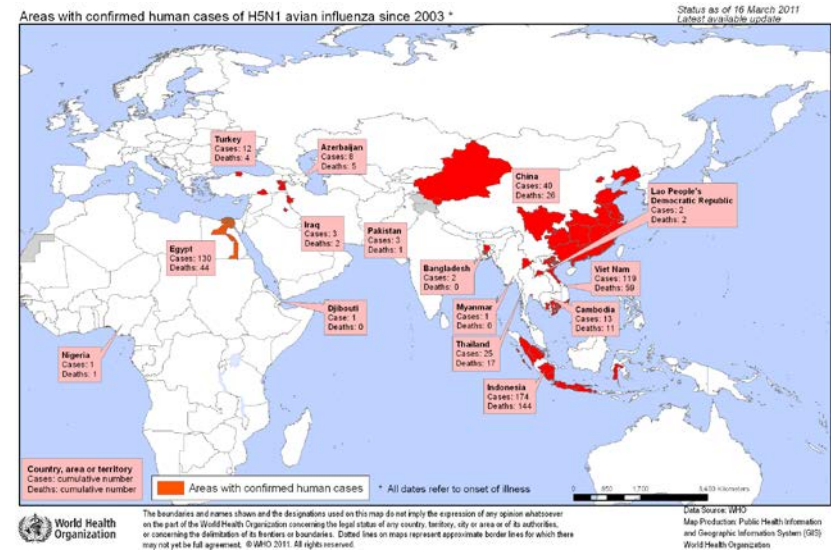
Ein **Ebolaausbruch** beginnt vermutlich, wenn sich ein Mensch bei einer Fledermaus (4) oder einem anderen infizierten Tier (5) ansteckt, zum Beispiel beim Jagen oder der Zubereitung von Buschfleisch. Das Virus wird dann von Mensch zu Mensch weiter gegeben – wie jetzt in Guinea.



MERS Corona Virus



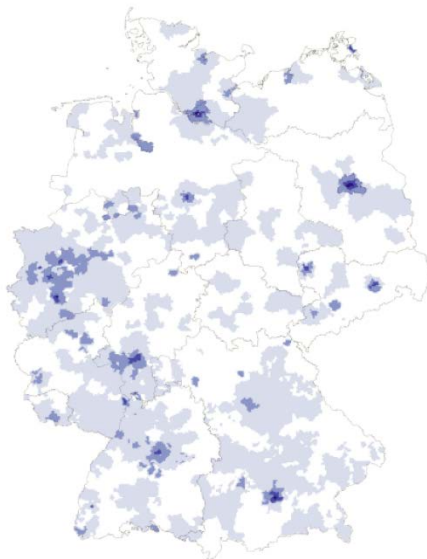
Avian Influenza Virus



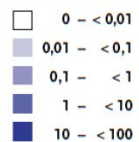
HIV



HIV infections in Germany





Inzidenzen pro
100.000 Einwohner

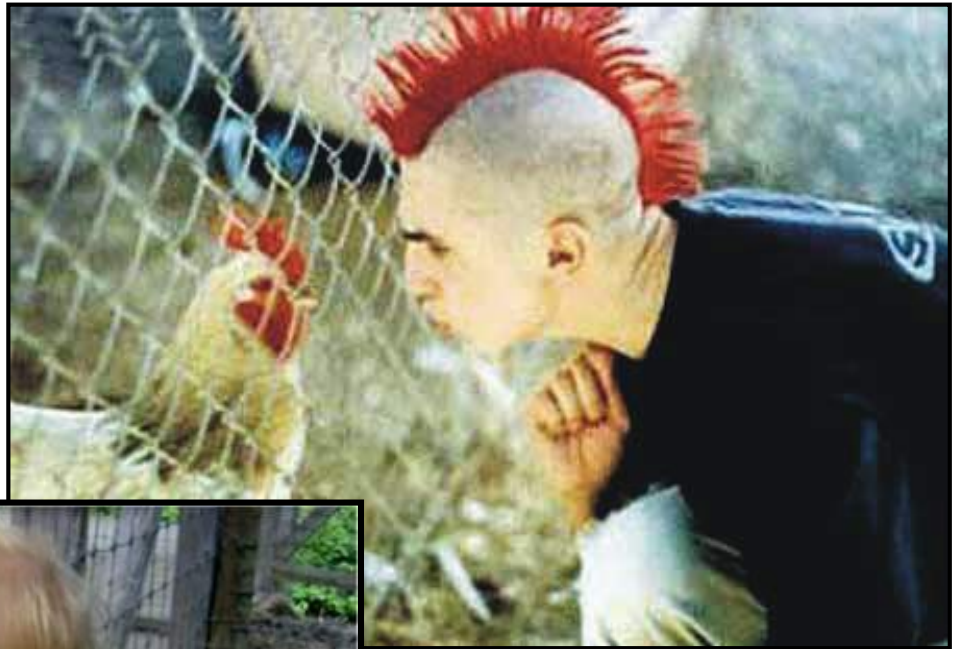


1991

- November 22 announced he had AIDS
- November 23 he died of bronchial pneumonia

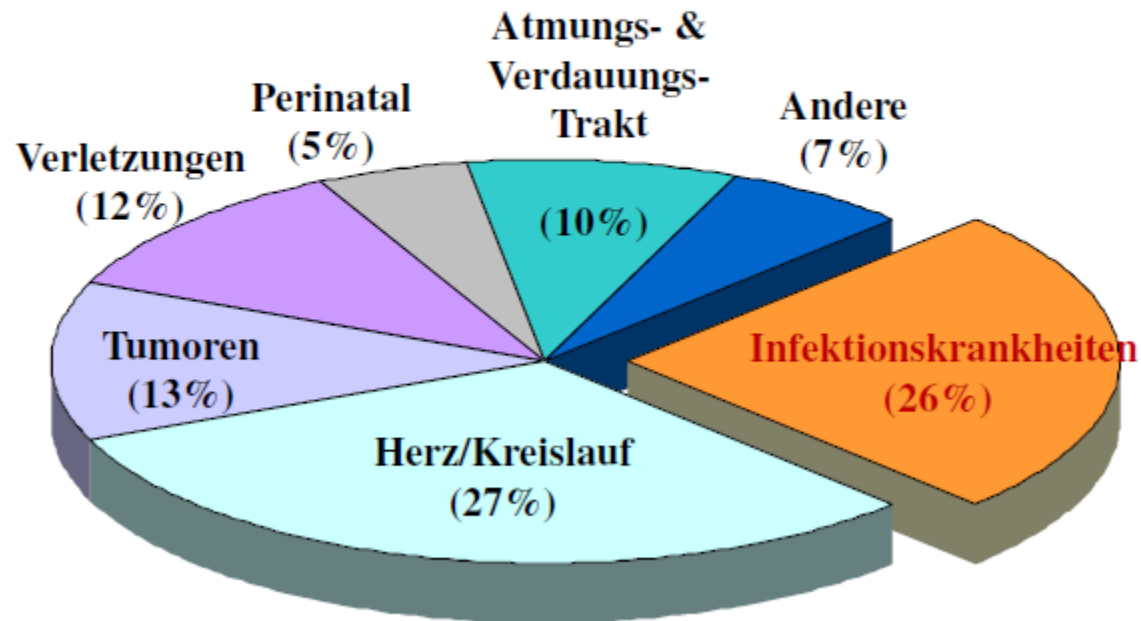


One Health?



Zoonoses

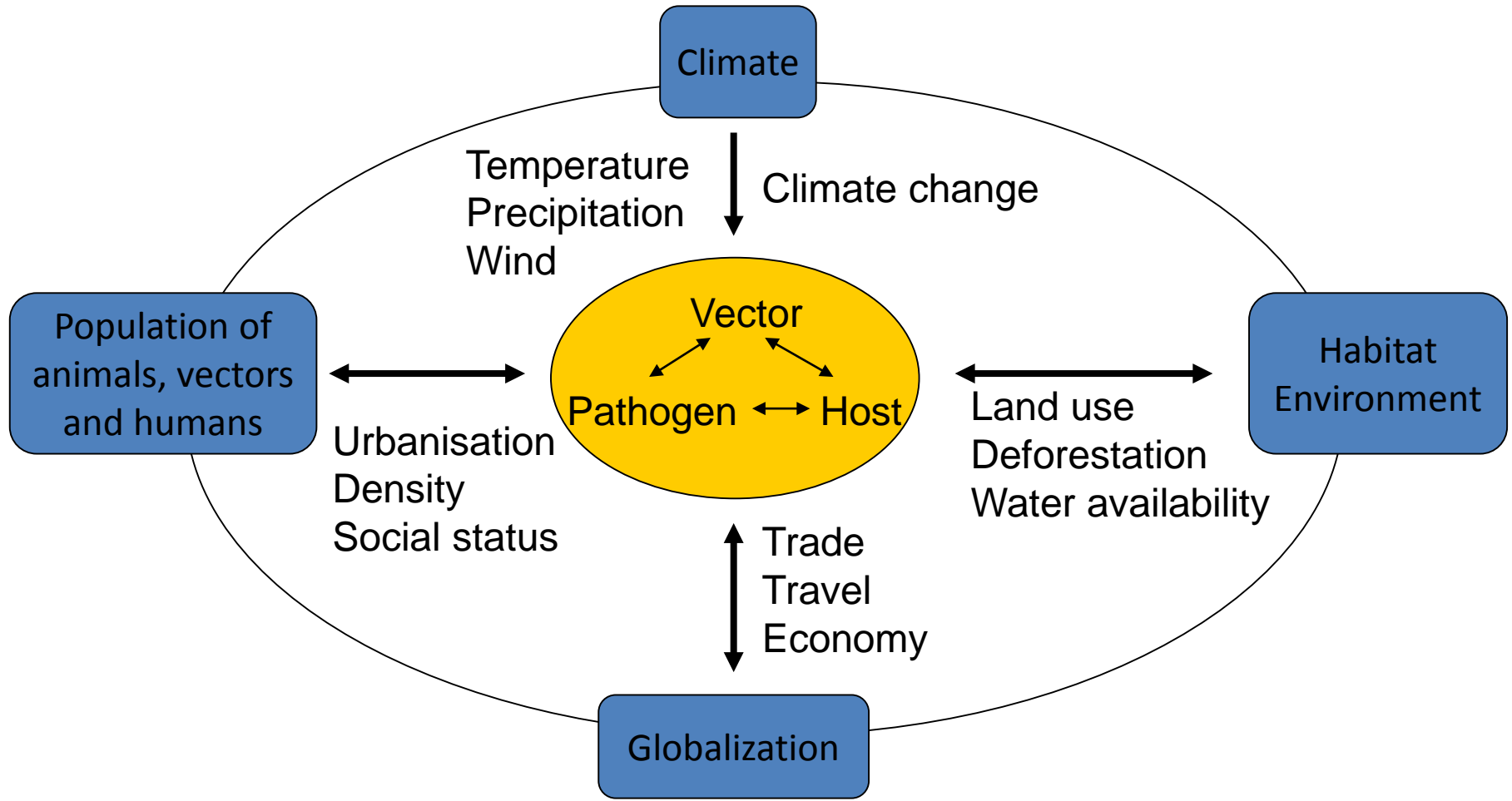
Causes of death worldwide



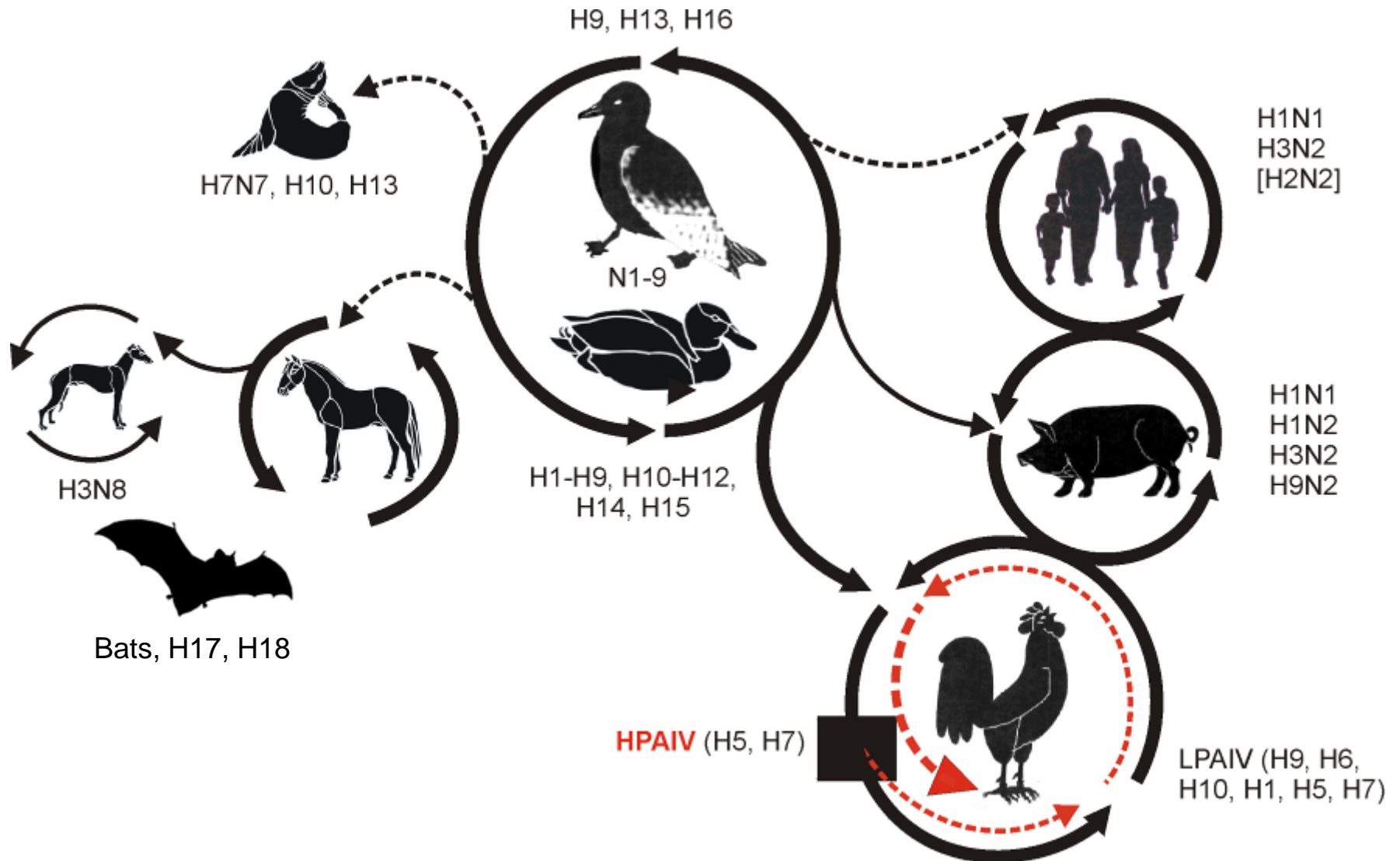
Approx 2/3 (61%) of human infectious diseases come from an animal reservoir/ 75% of newly emerging infectious diseases have an animal source

The 13 most important zoonoses produce 2.2 Million human fatalities and 2.4 Billion illnesses per year

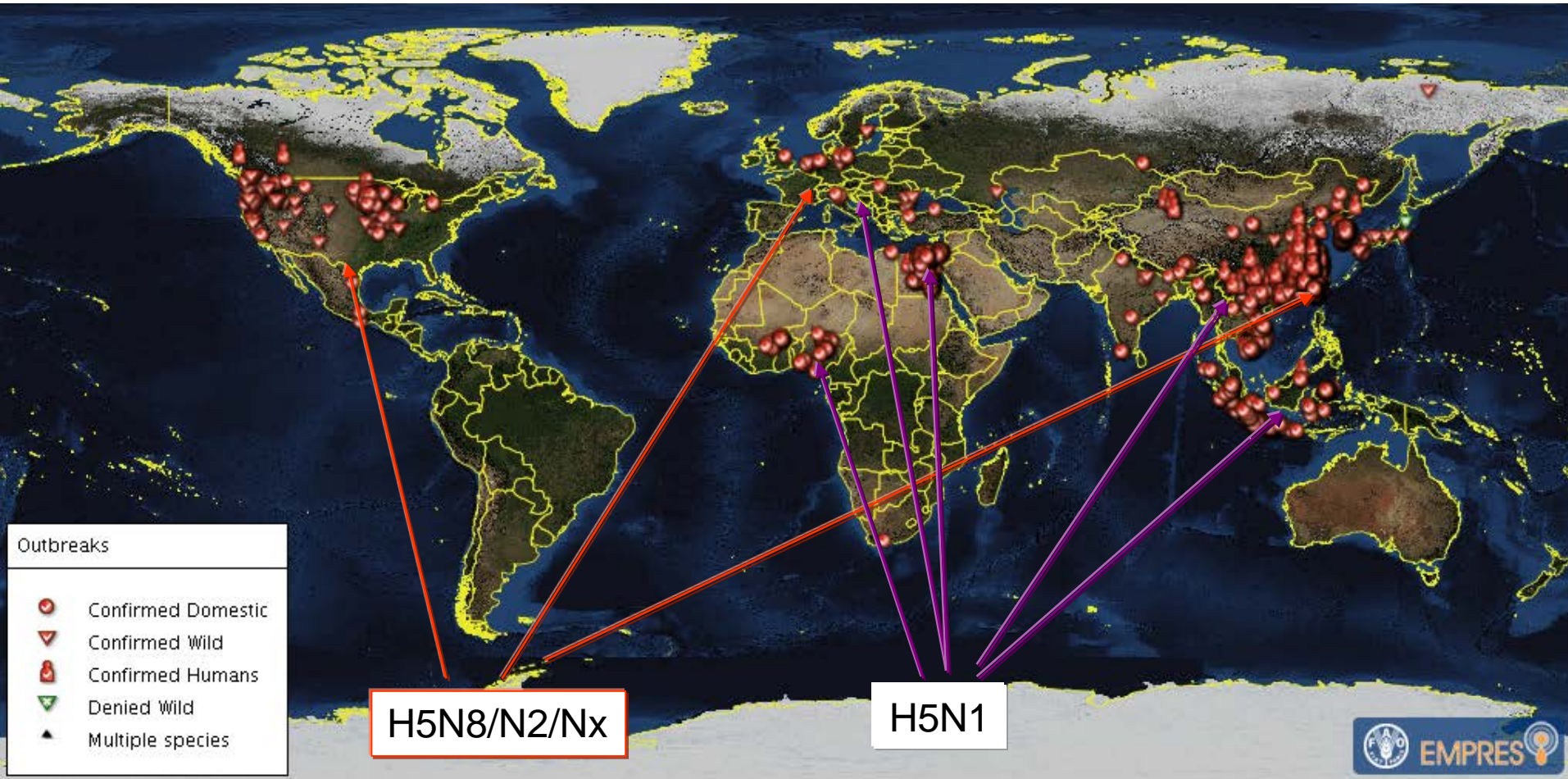
Multiple factors and changes influencing each other and the pathogen – vector - host relationship



Epidemiology of Influenza A



Avian Influenza 2014





MOSQUITOS

Verbreitung der Asiatischen Tigermücke in Mittel- und Südeuropa

Chikungunya-Fieber

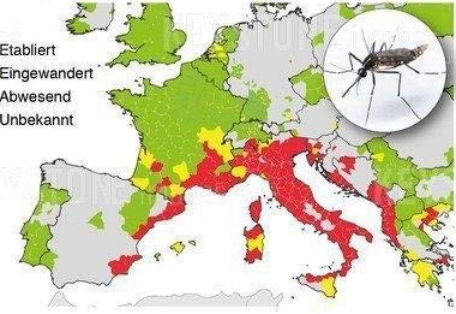
- Starke Gelenks-schmerzen
- Fieber
- Schüttelfrost
- Muskelschmerz
- Hautausschlag
- Bindehautentzündung

Chikungunya-Fieber wird nur selten diagnostiziert

Grafik: KEYSTONE, Quelle: ECDC



- Etabliert
- Eingewandert
- Abwesend
- Unbekannt



Yellow Fiver, Dengue Fiver, West-Nile Fiver, Chikungunya Fiver, Rift-Valley-Fiver, Zika Virus



BATS

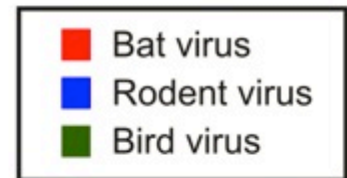
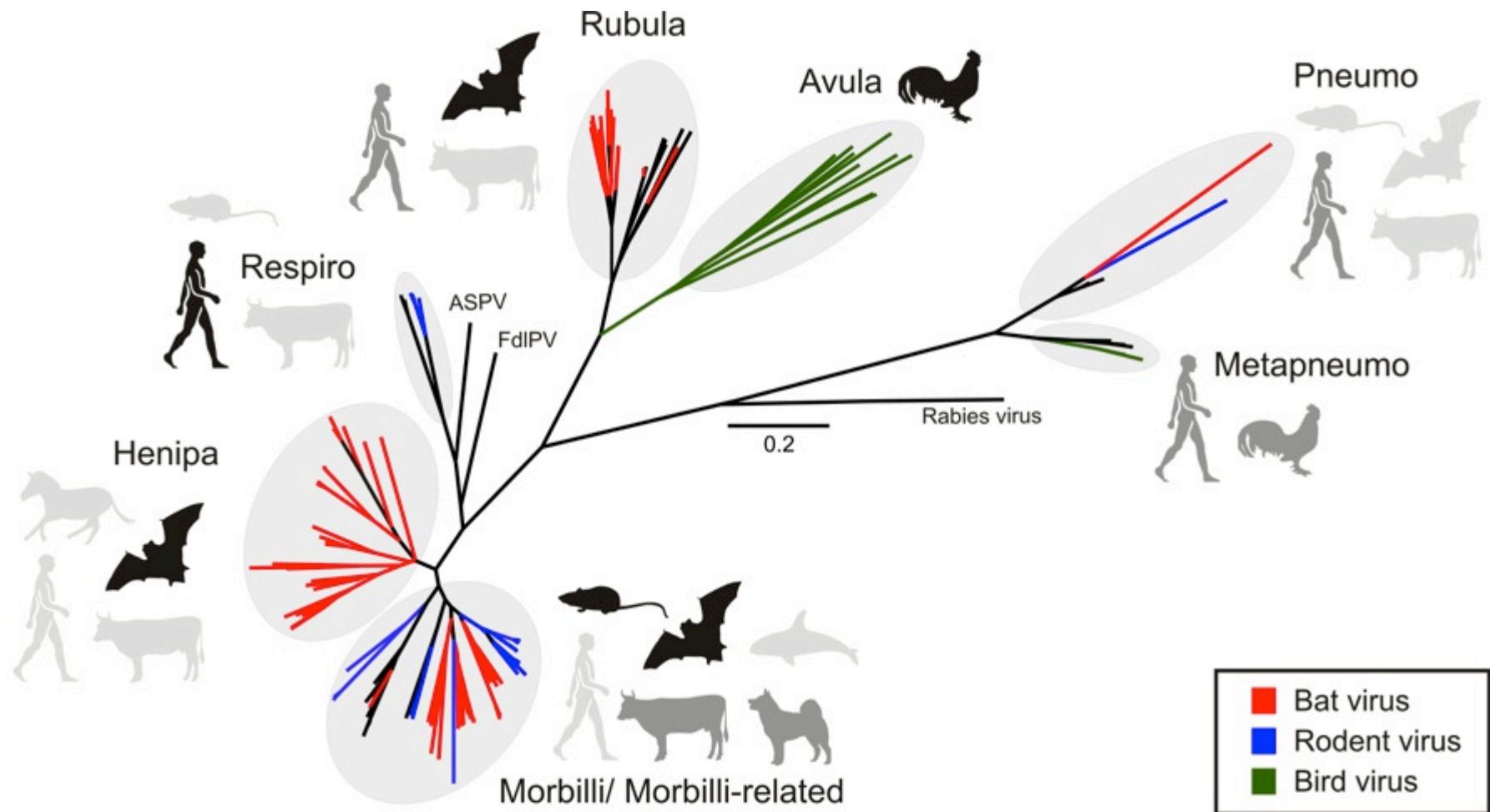
Bild: A. Seebens, Virologie Bonn

**Dense social groups promote
virus amplification**

Photo: R. Swanepoel, Johannesburg



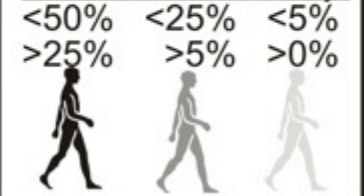
Paramyxoviruses in rodents and bats



Host taxonomic group:



Amino acid diversity:



The field

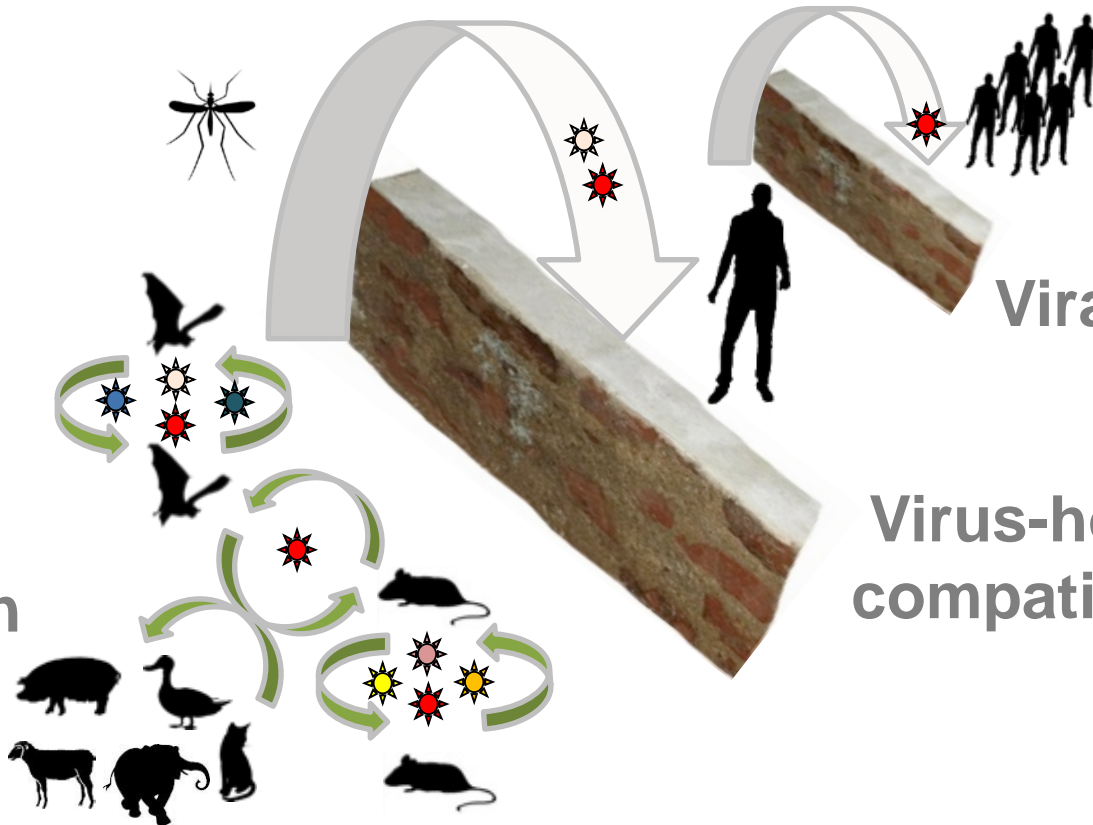
Public Health

Transmissibility

Viral adaptation

Virus-host
compatibility

Ecology
Diversity
Evolution



Preparedness research

36 Medical Faculties at German Universities

Universities are financed by
the Federal States „Länder“
Most institutes of virology
at universities belong to
medical faculties

▲ Chairman in Virology



Five Faculties
for Veterinary
Medicine

Tasks of German BSL-4 facilities

Basic and applied research

- Replication, assembly, immunology, pathogenesis
- diagnostics, antivirals, vaccines

Diagnostic service world-wide (WHO)

Commitment to outbreak response world-wide; mobile units (WHO)

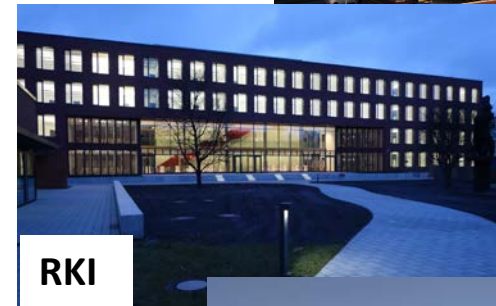
Training and access for European Member states without own BSL4 facilities



FLI



BNi



RKI



UMR



German-Chinese Transregio TRR60
中德跨学科重大合作项目

***Mutual interaction of chronic viruses with cells
of the immune system: from fundamental research
to immunotherapy and vaccination***

**持续性病毒感染中病毒与免疫细胞的相互作用
从基础研究到免疫治疗与预防策略**

Essen/Bochum/Wuhan/Shanghai

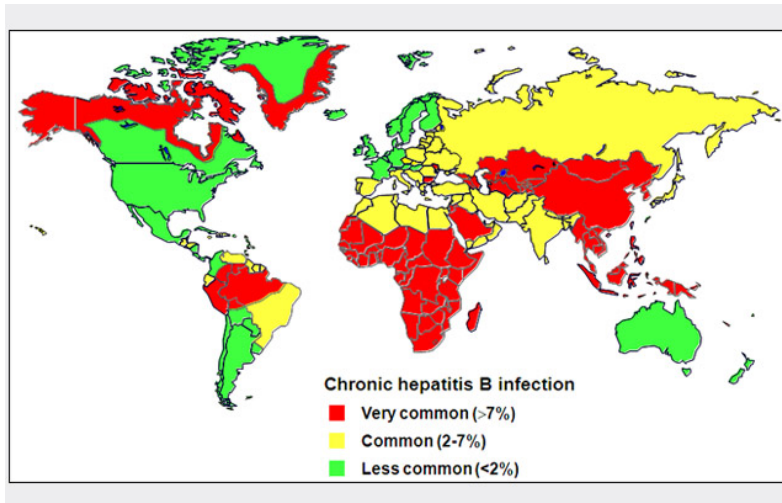
since July 2009



The research topic:

Chronic virus infections

- *human immunodeficiency virus* (HIV)
 - *hepatitis B virus* (HBV)
 - *hepatitis C virus* (HCV)
- more than 500 million chronically infected people worldwide (>7% of world population)
- research on immune defense is important for vaccine development and immunotherapy

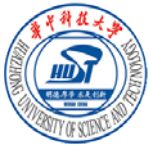




The TRR60 provides the ideal basis for a Sino-German network on infectious diseases:

- research infrastructure in Germany (Essen) and China (Wuhan/Shanghai)
- established contact to all well-known experts in the field (since 1980!)
- long-standing experience in Sino-German cooperations and organizing international workshops, symposia, conferences
- focus on infectious diseases and immunology at the University Hospital Essen and in Wuhan/Shanghai:
 - „Westdeutsches Zentrum für Infektiologie“ www.uk-essen.de/wzi (since in June 2013)
 - coordination of scientific and clinical expertise in the field of infectious diseases
 - infectious diseases unit and isolation ward at the University Hospital Essen





Participating Institutions

University of Duisburg-Essen



Ruhr- University
Bochum



Union Hospital, Tongji Medical College
HUST, Wuhan



Fudan University, Shanghai

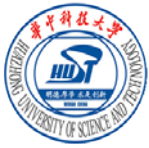
Wuhan University



Wuhan Institute of
Virology, CAS



All ranking
Top 10
among
more than
600
Chinese
Universities



TRR60 activities

Start
of the project:

1st July 2009

1. Workshop
Wuhan

June 2010

2. Workshop
Essen

February 2011

3. Workshop
Shanghai

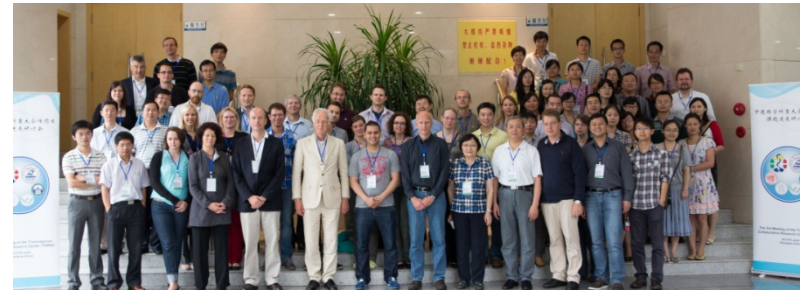
June 2012

Evaluation FP 2
Wuhan

October 2013



2010 Meeting of Transregional Collaborative Research Centre TRR60 中能跨学科重大合作项目 (TRR60) 2010 年度研讨会



4. Workshop
Bochum

October 2014

5. Workshop
Wuhan

October 2015

6. Workshop
Shanghai

October 2016

7. Workshop
Essen

2017 (scheduled)

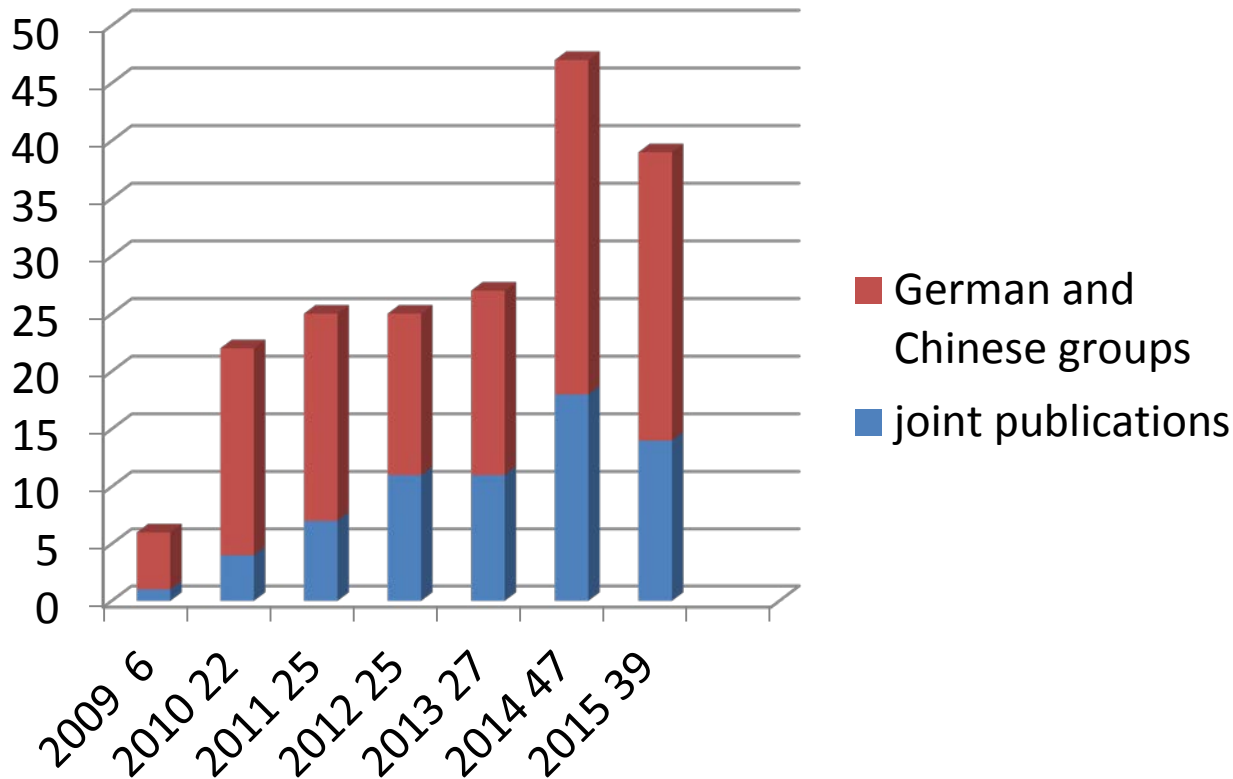
Evaluation FP 3
(until 6/2021)

Essen ?
2017





TRR60 publications (7/2009 – 12/2015)



Total : 191
thereof 66 joint publications