

Naissance des pandémies

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Un peu d'histoire

La peste noire (1349-1351)



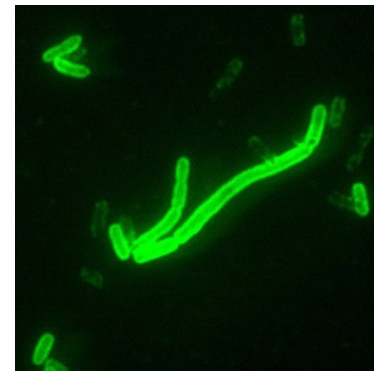
Rattus rattus



La puce du rat,
Xenopsylla cheopis



Gilles de Nuisit, *La peste à Tournai en 1349*

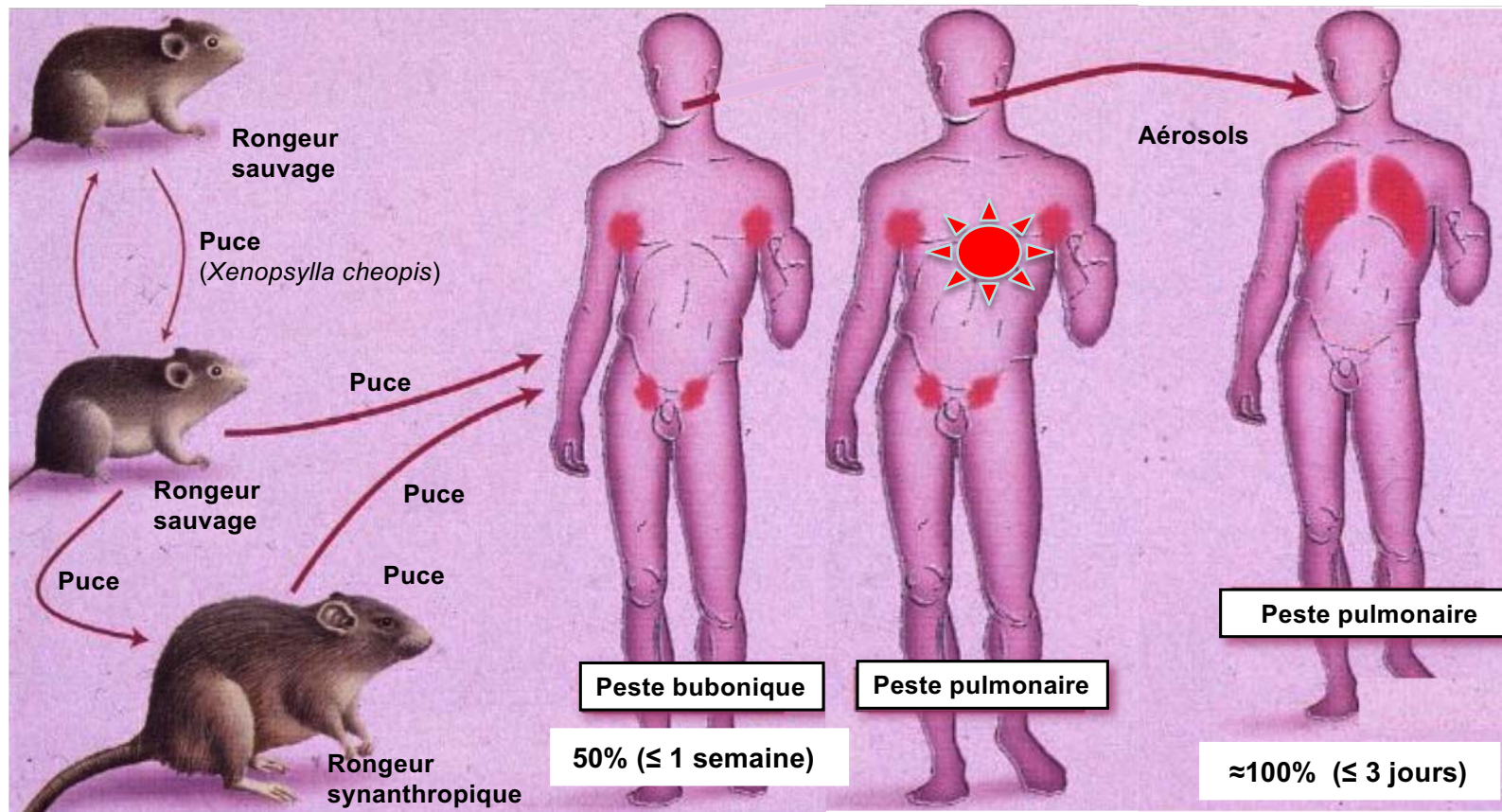


Yersinia pestis



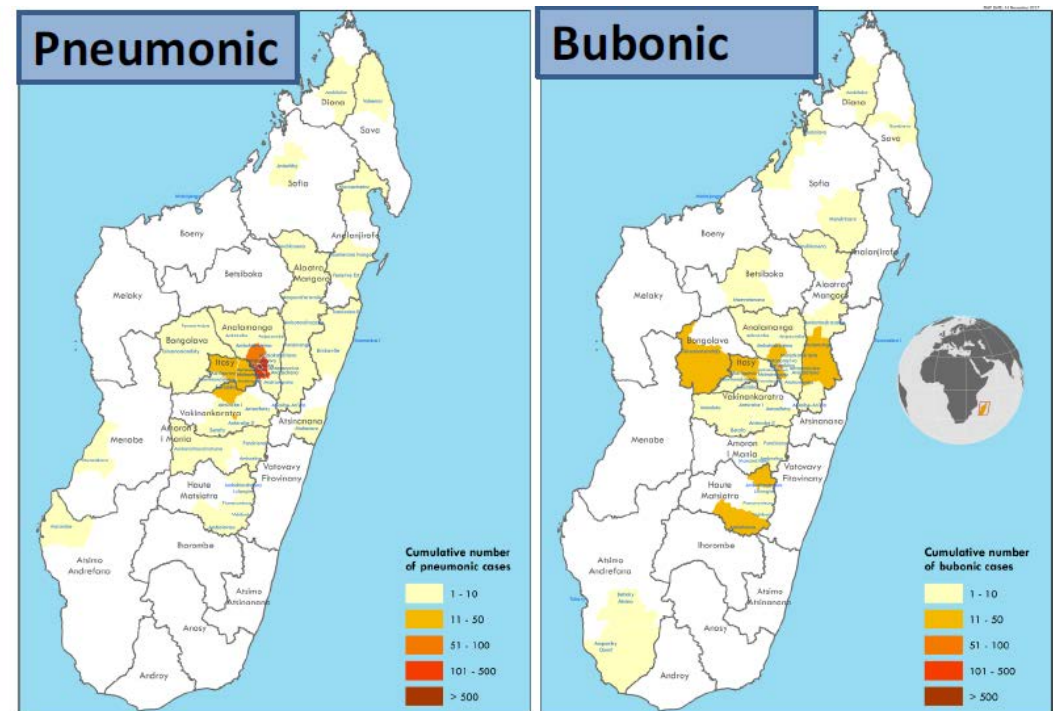
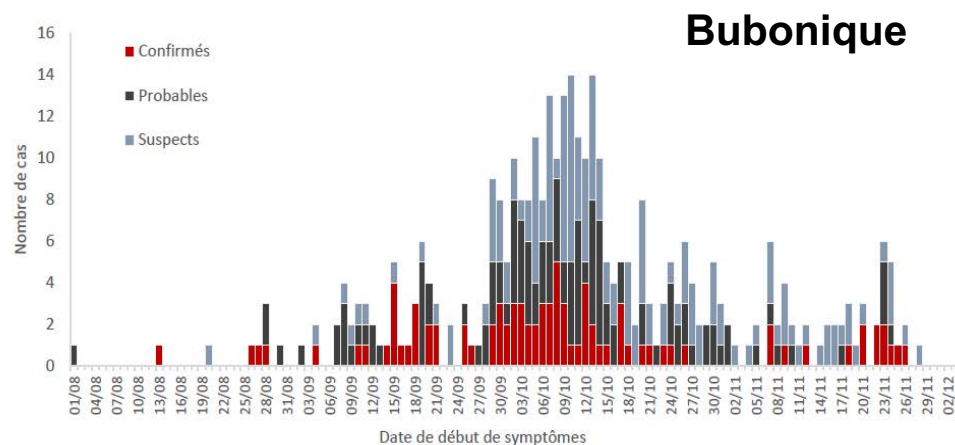
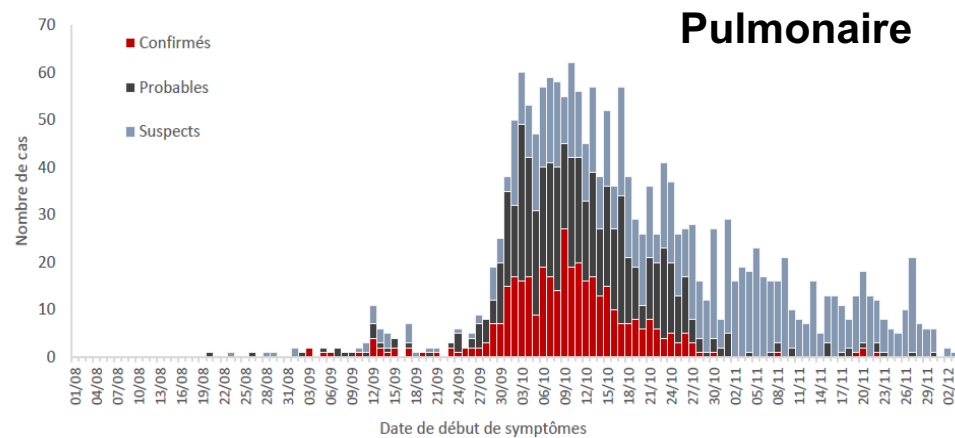
Alexandre Yersin
(1863-1943)

Peste pulmonaire et bubonique



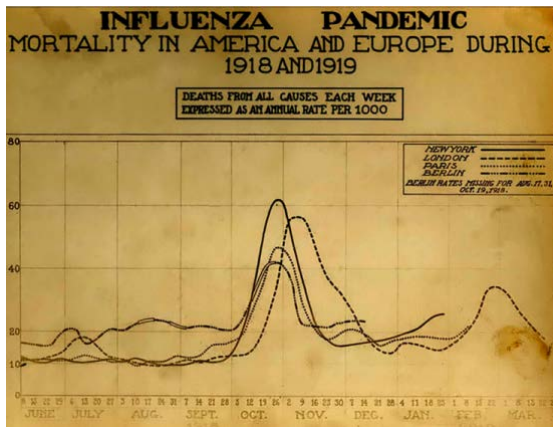
(Courtoisie: AS Le Guern, Centre National Référence de la Peste, Institut Pasteur)

Peste pulmonaire et bubonique, Madagascar, 1^{er} Août au 3 Déc 2017



(Sources: Ministère de la Santé,
Institut Pasteur de Madagascar & OMS)

Grippe espagnole (1918-1919)



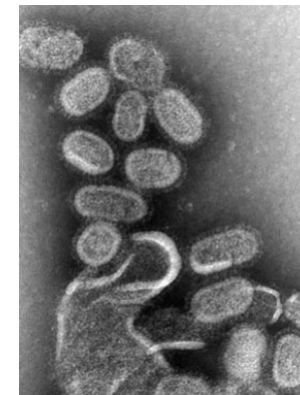
National Museum of Health and Medicine



Red Cross, Seattle, 1918



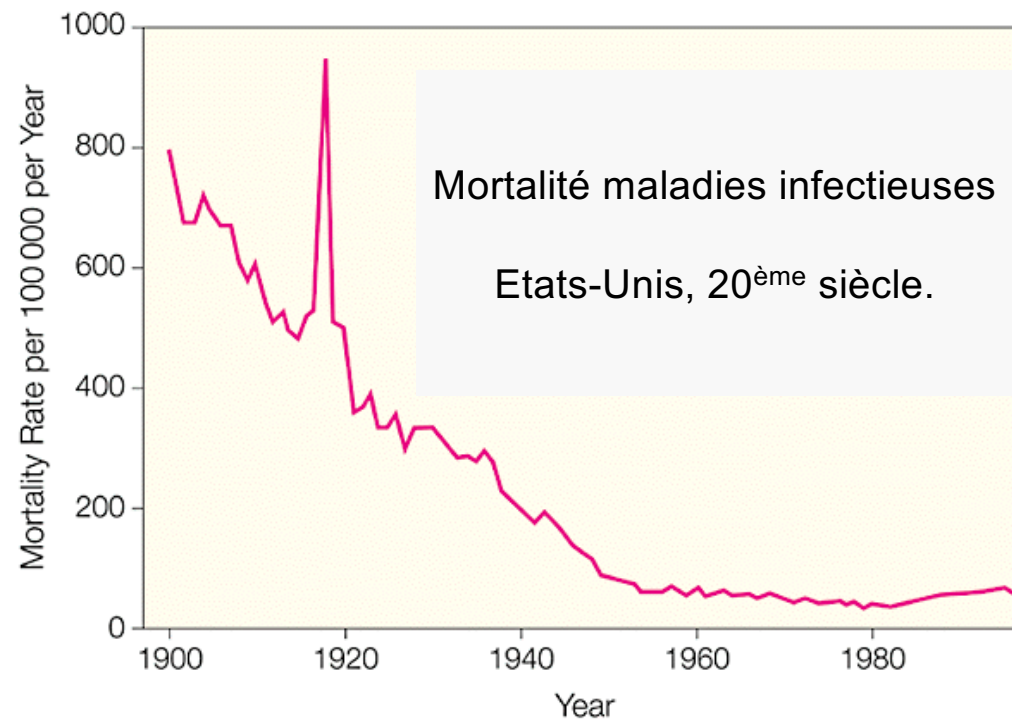
Pays-Bas, 1919 (Piet van Bentum)



CDC: Terrence Tumpey, Cynthia Goldsmith

Qu'entend-on par maladies
émergentes?

20ème siècle: les grandes avancées - hygiène



(D'après Armstrong GL et al. JAMA 1999;281:61-6)

20ème siècle: les grandes avancées - antibiotiques



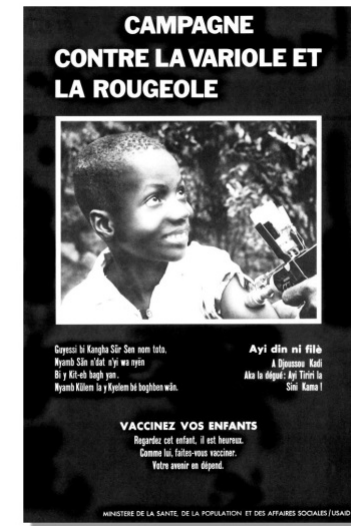
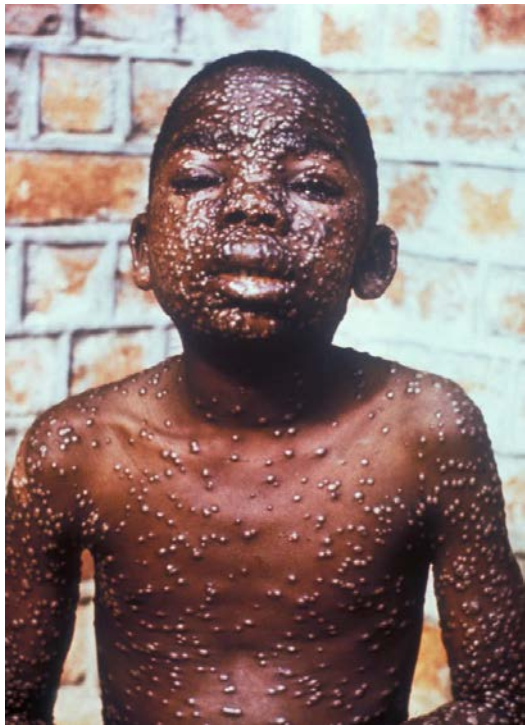
Alexandre
Fleming
(1881 – 1955)



éditions la découverte
textes à l'appui / histoire des sciences

Source: CDC phototèque

20ème siècle: les grandes avancées - vaccins



Source: CDC phototèque

20^{ème} siècle

“It is time to close the books on infectious diseases and shift resources toward non-infectious killers such as cancer, diabetes and heart disease.”

(U.S. Surgeon General William Stewart, 1967)

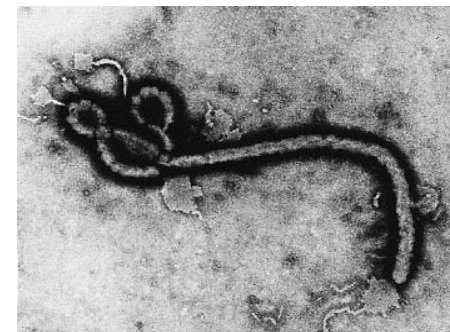
Ebola, Yambuku Hospital, Zaire, 1976



(Yambuku Hospital)

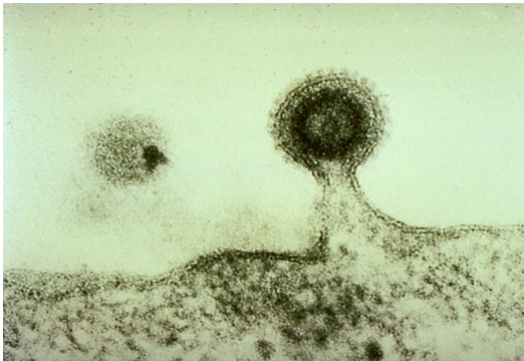


(CDC Public Health Image Library)

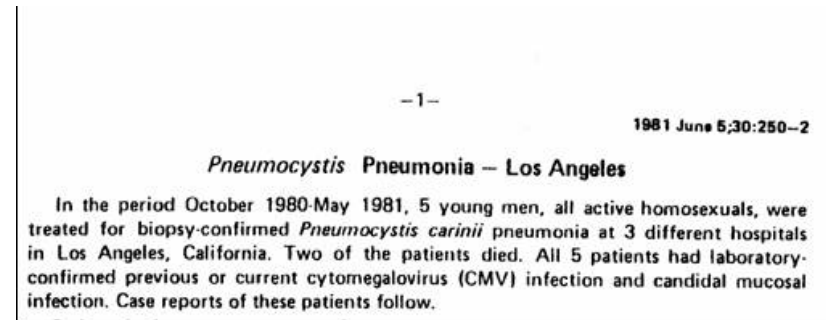


Electron micrograph of Ebola Zaire virus. This is the first photo ever taken (10/13/76) by Dr. F. A. Murphy, now at UC Davis, then at CDC.
Diagnostic specimen in cell culture at 160,000X magnification.

1981: SIDA



H.R. Gelderblom, Robert-Koch-Institut, Berlin



MMWR 1981:30:250-252

Luc Montagnier

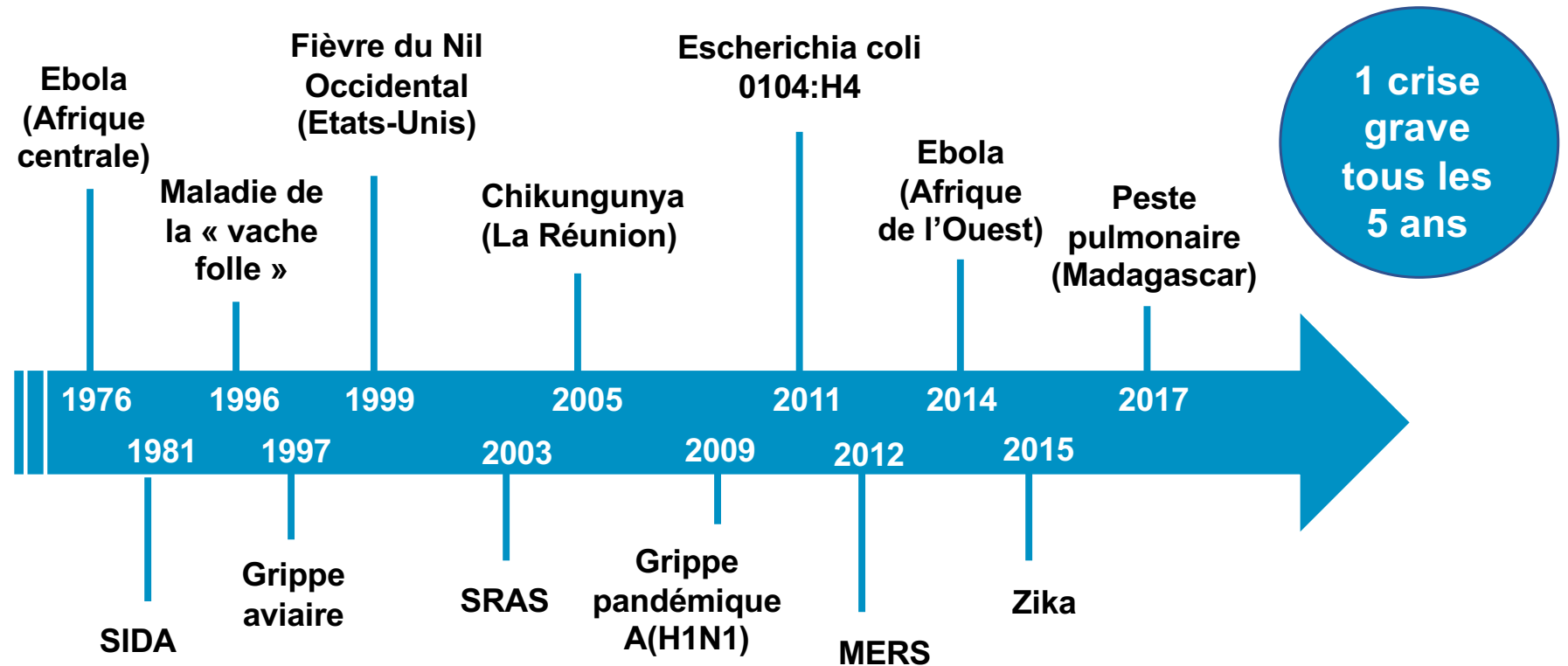


Françoise
Barré-Sinoussi

Concept des maladies émergentes

- Infections passées de **l'animal à l'homme** et devenues épidémiques en population humaine (SIDA, SRAS, Ebola).
- Infections dues à des pathogènes ayant **muté** et contre lesquels il n'existe pas de protection immunitaire (ex: grippe) ou devenus résistants aux anti-infectieux (ex: bactéries multi-résistantes).
- Infections ayant récemment gagné de nouvelles **zones géographiques** (Fièvre du Nil Occidental, Chikungunya, Zika).

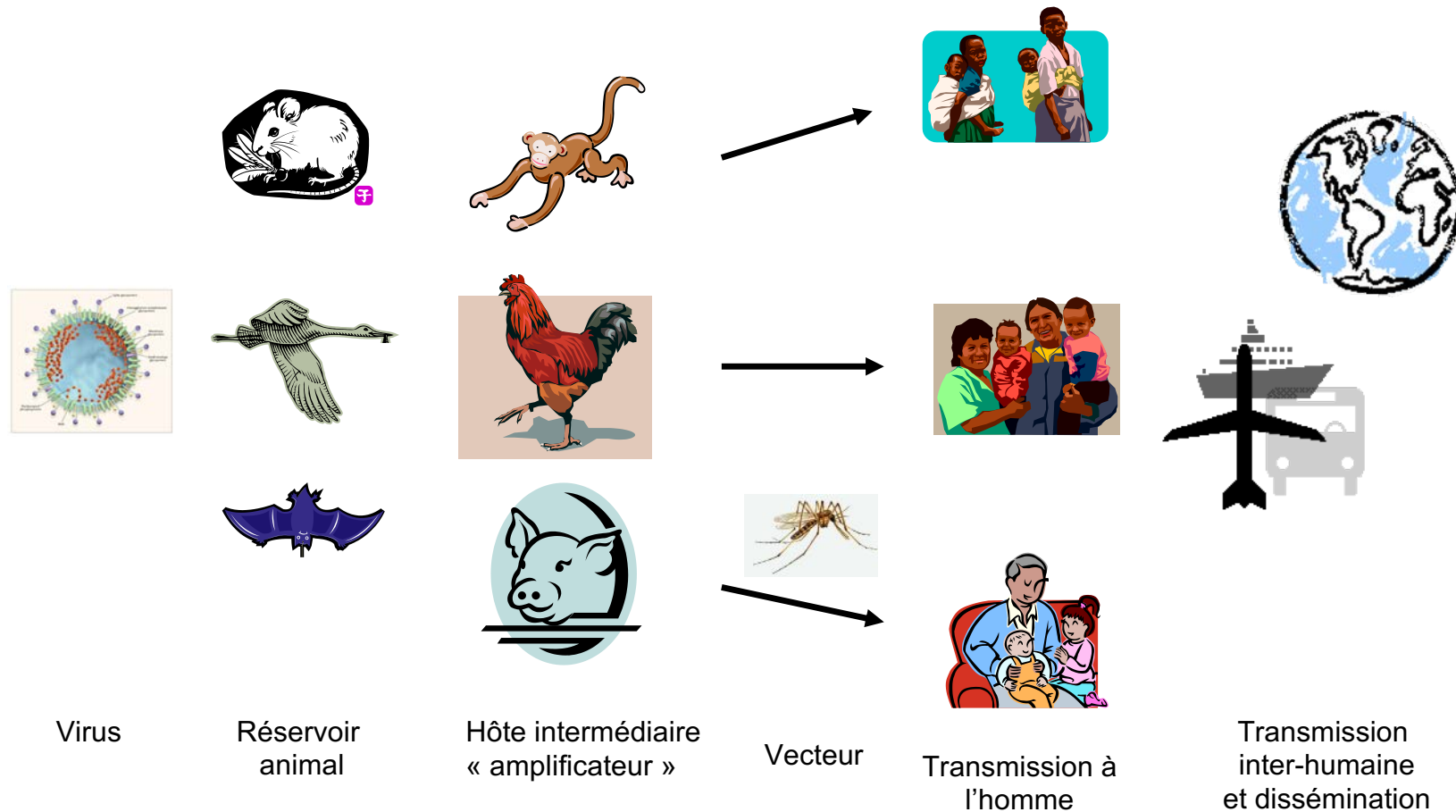
Chronologie des crises sanitaires récentes



Le plus souvent, un virus, d'origine animale

D'où viennent-elles?

Mécanismes de l'émergence



Contact animal-homme

Déforestation et chasse

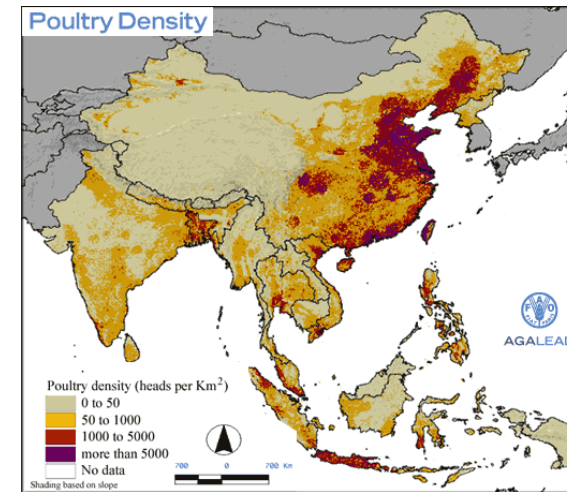


(Source: HS de Jong)



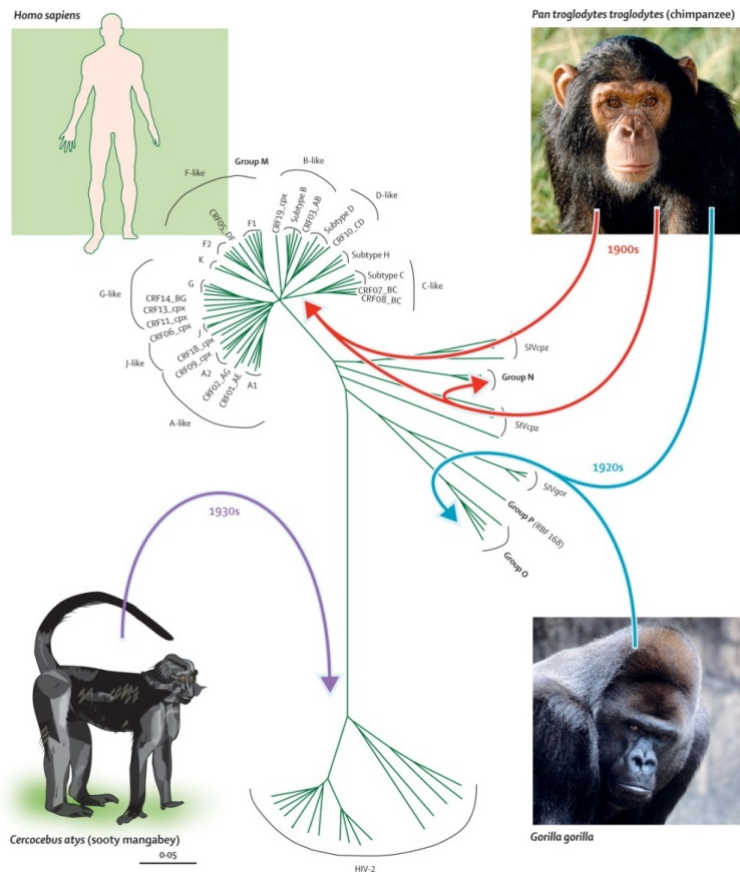
(Source: IDA Africa)

Elevage et densité des volailles

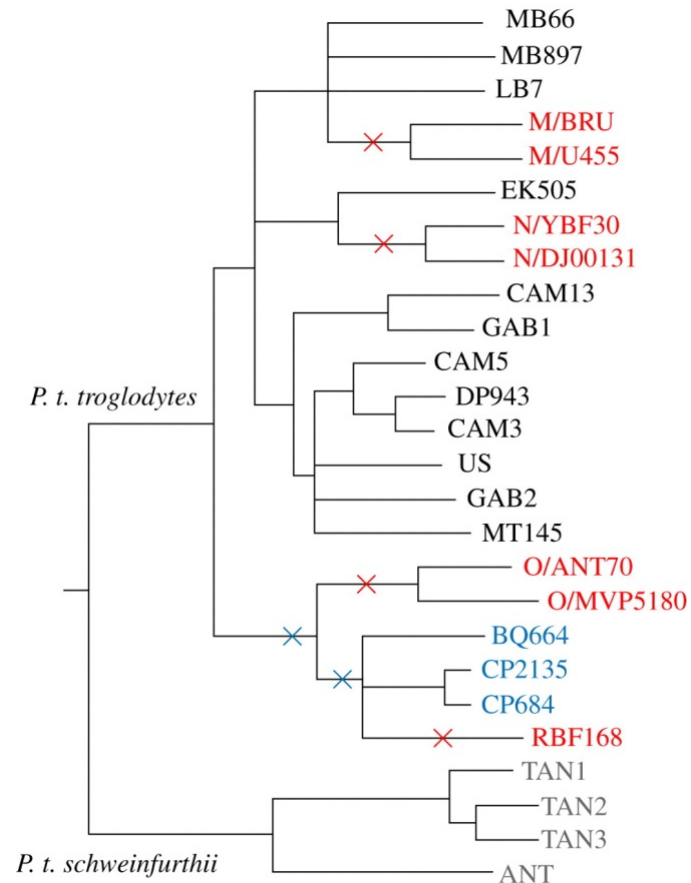


Weiss RA, Nature Medicine, 2004

Relations entre VIH-1, VIH-2, SIVs et franchissement de la barrière d'espèces



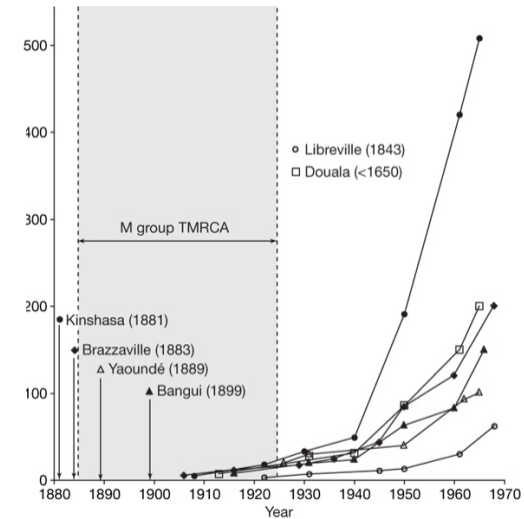
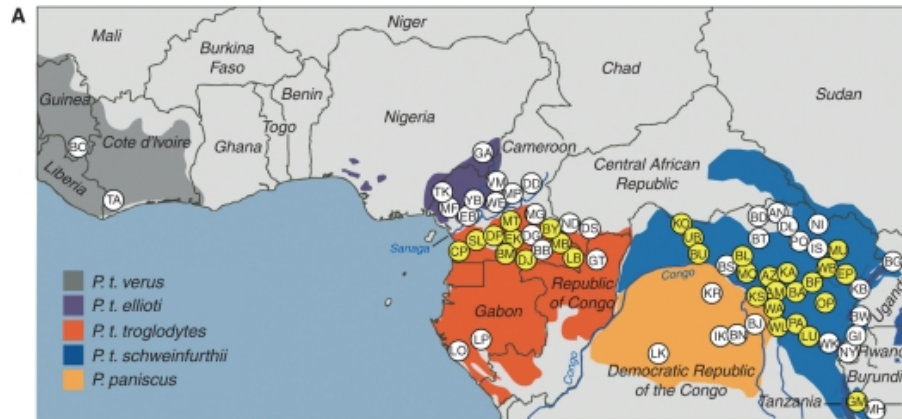
Tebit DM, Arts EJ Lancet Infect Dis 2011



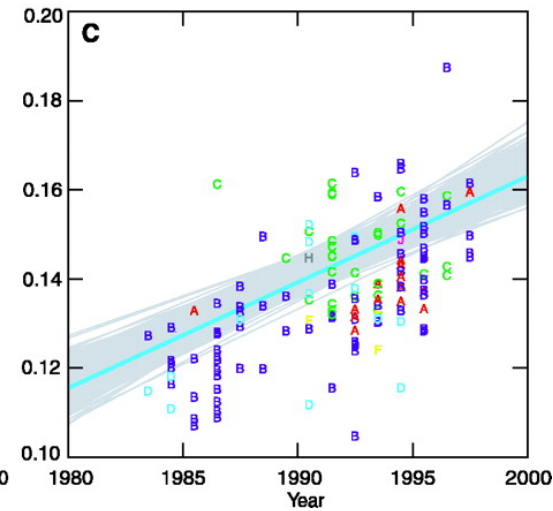
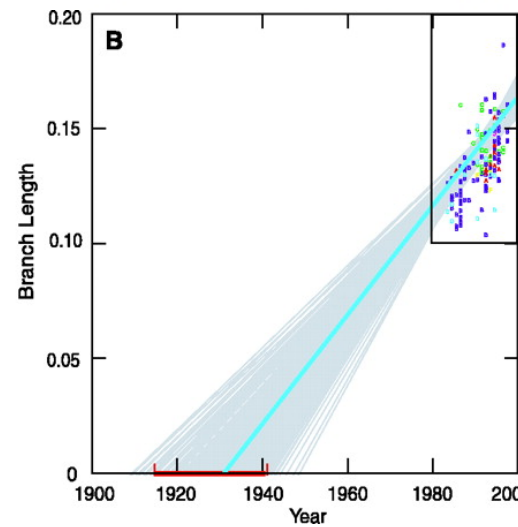
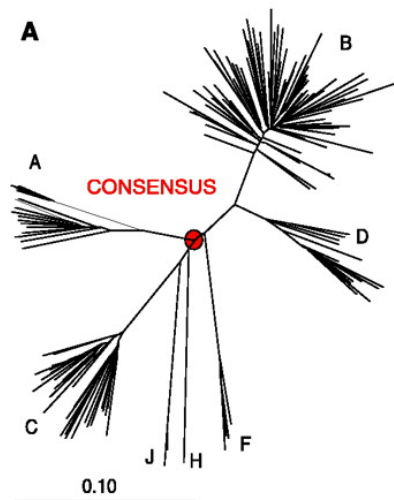
Sharp P M , Hahn B H Phil. Trans. R. Soc. B 2010

Lieu et moment de l'émergence du VIH-1

P Sharp & B Hahn, CSHPM, 2011

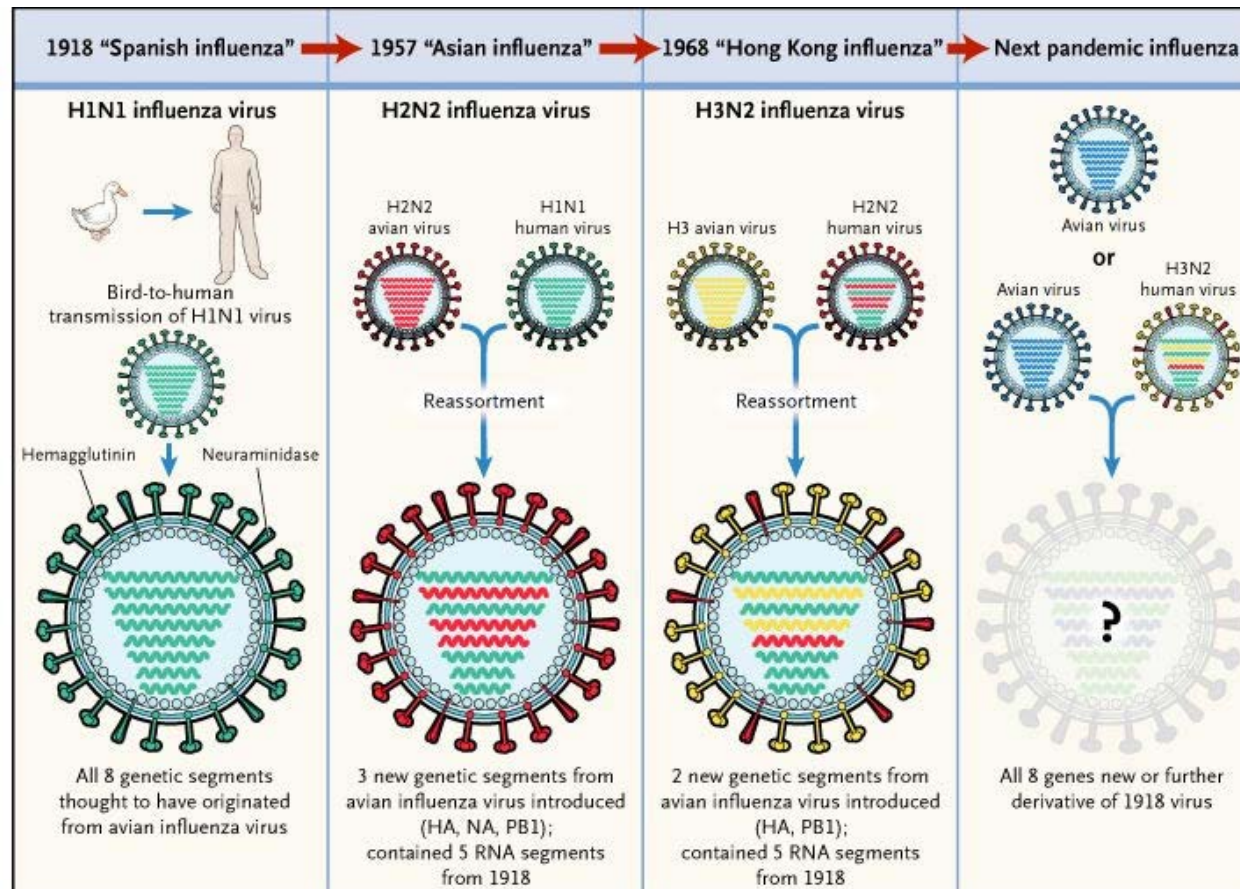


M Worobey et al. Nature 2008



B Korber et al. Science 2000

Virus de la grippe

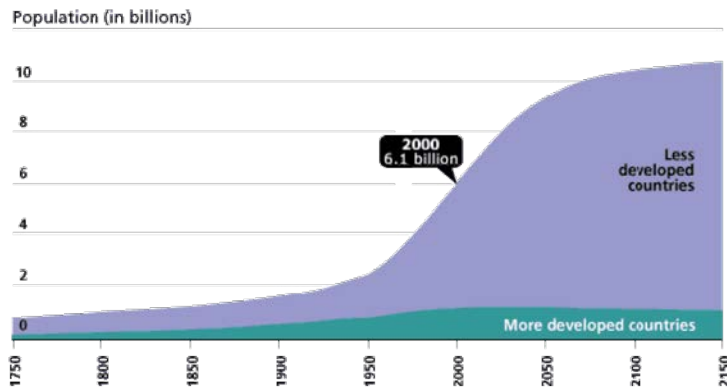


(Belshe, NEJM, 2005)

Quels sont les facteurs favorisant leur propagation?

Densité et mouvements de population

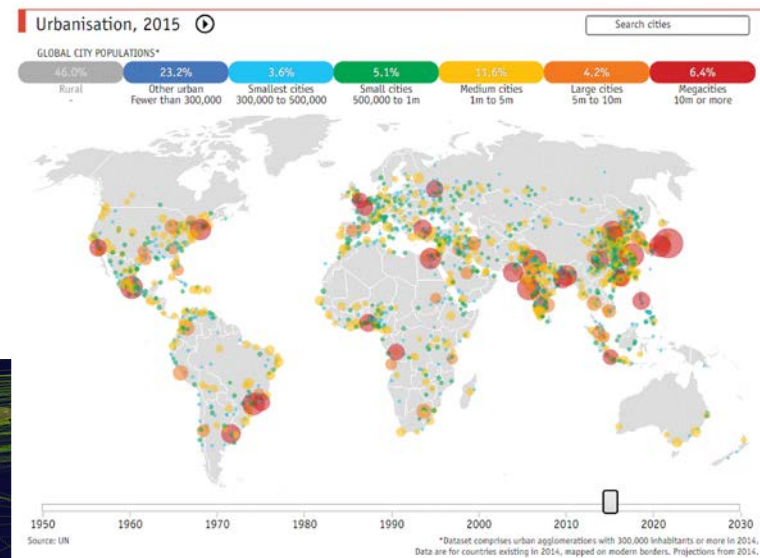
Population mondiale 1750 - 2150



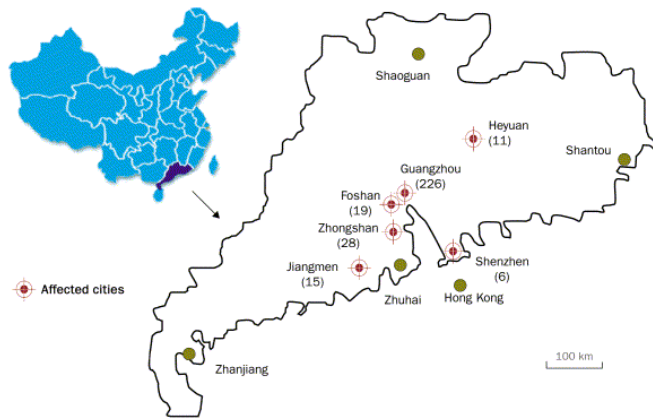
Trafic aérien



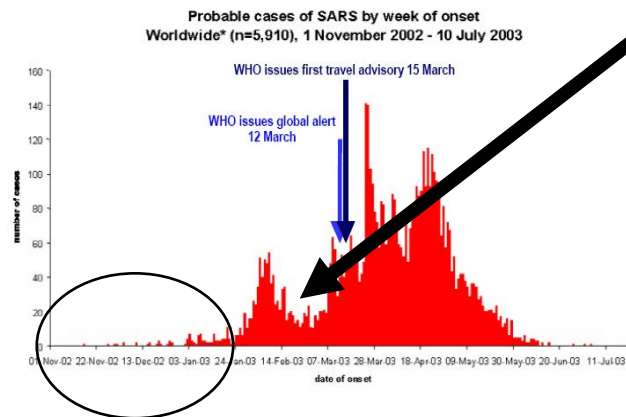
Mégapoles, 2015



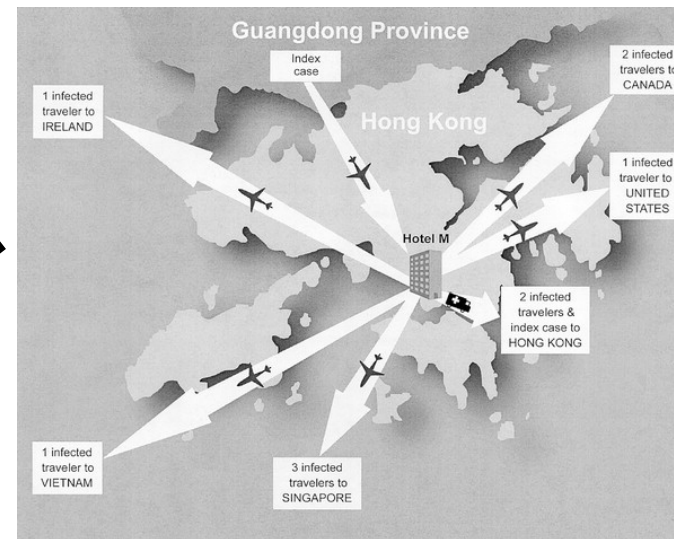
SRAS: prototype de l'épidémie du 21^{ème} siècle



(Zhong, Lancet, 2003)

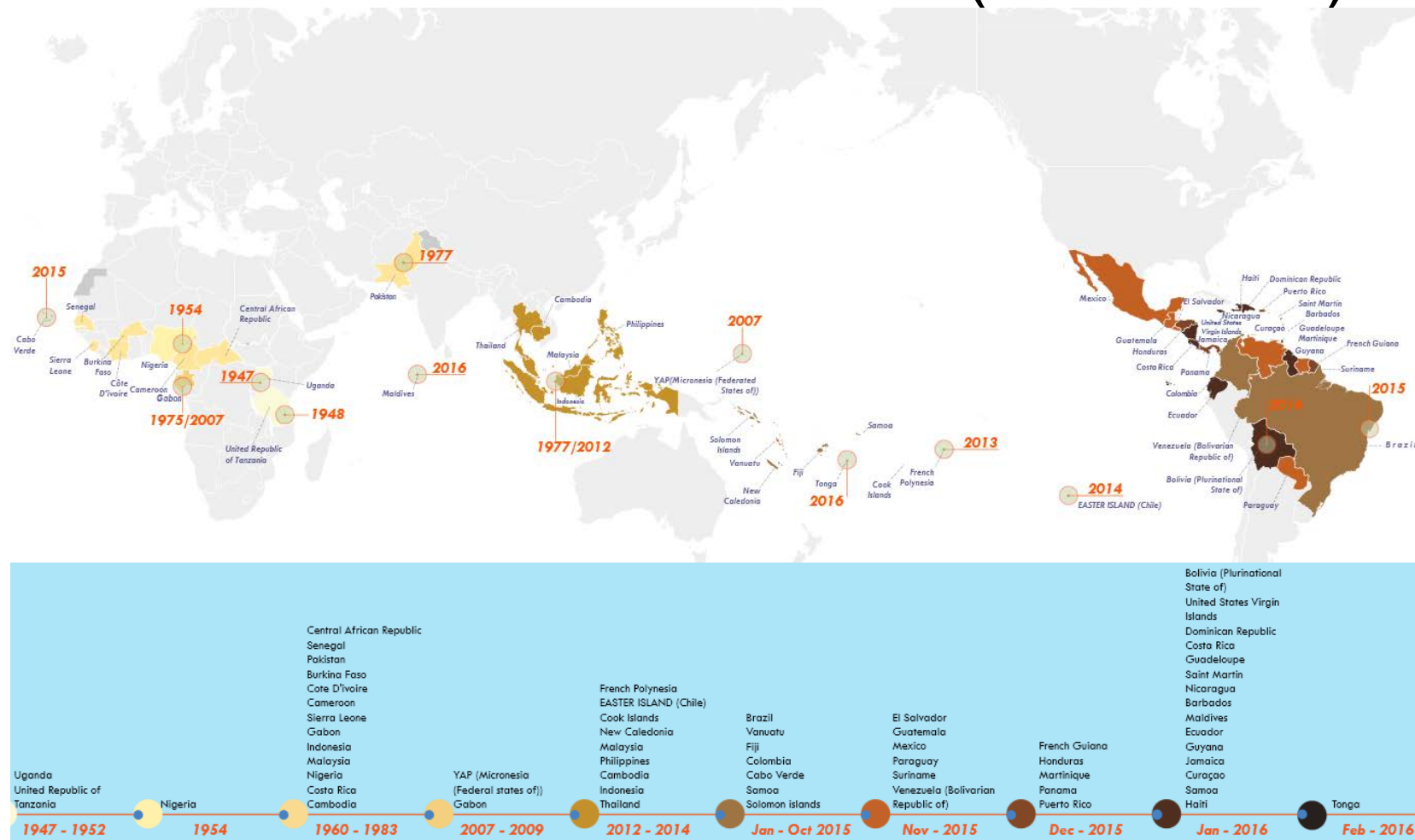


21 février 2003
Hotel Metropole, Hong Kong



(Christian, CID, 2004)

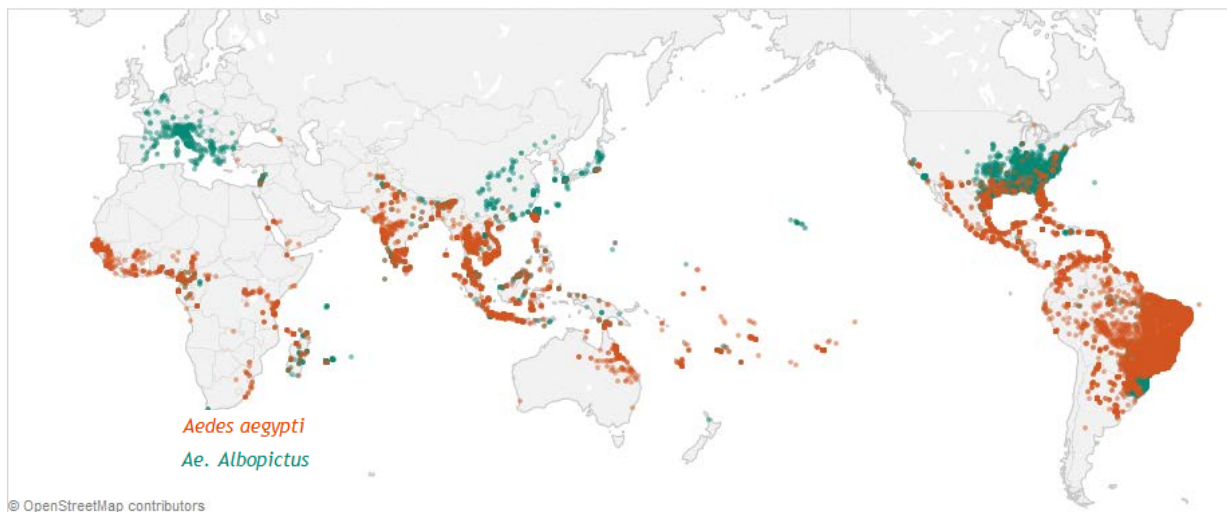
Dissémination du virus Zika (1947-2016)



http://www.who.int/bulletin/online_first/16-171082/en/

Colonisation vectorielle

Aedes aegypti et *Aedes Albopictus*, 2014



Dengue
Chikungunya
Zika
Fièvre jaune

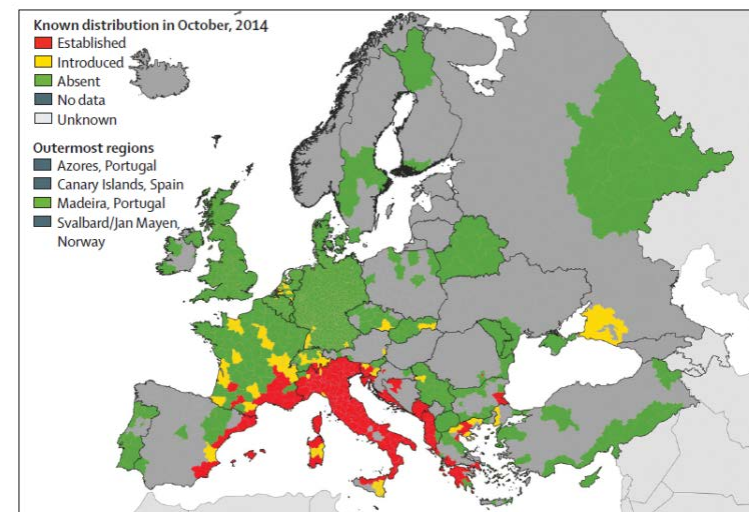
Quelle sera la
prochaine?

<http://healthintelligence.drupalgardens.com/content/visualizing-global-distribution-aedes-aegypti-and-ae-albopictus>

Expansion mondiale d'*Aedes albopictus*



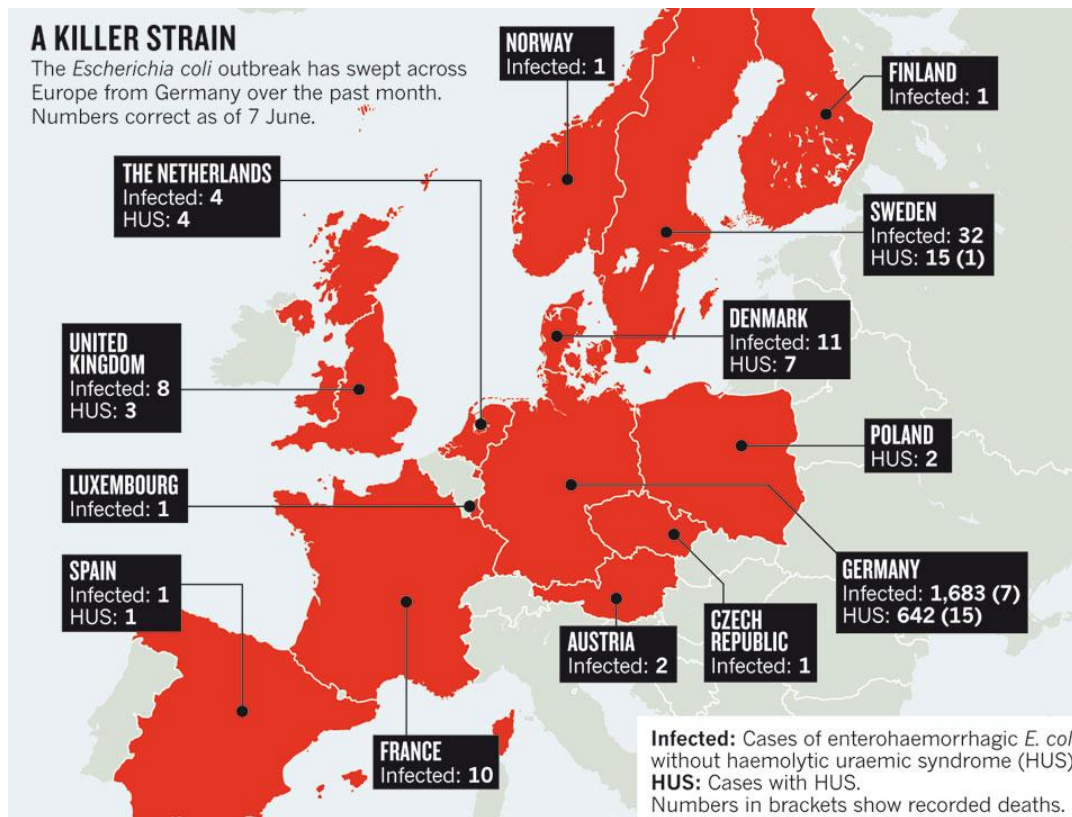
(Waldock *et al.* Pathog Glob Hlth, 2013)



(Source: ECDC-EFSA/Vectornet, 2014)

Commerce mondial des aliments

Escherichia coli O104:H4: du concombre espagnol au fénugrec égyptien (2011)

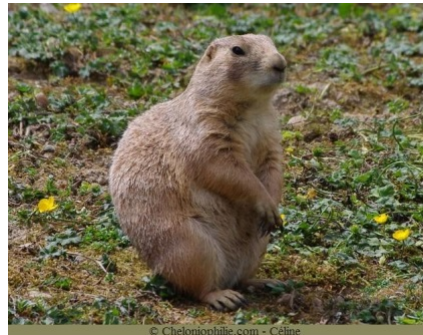


(Nature, 7 juin 2011)

Commerce (illégal) des animaux



Rats de Gambie



Chiens de prairie



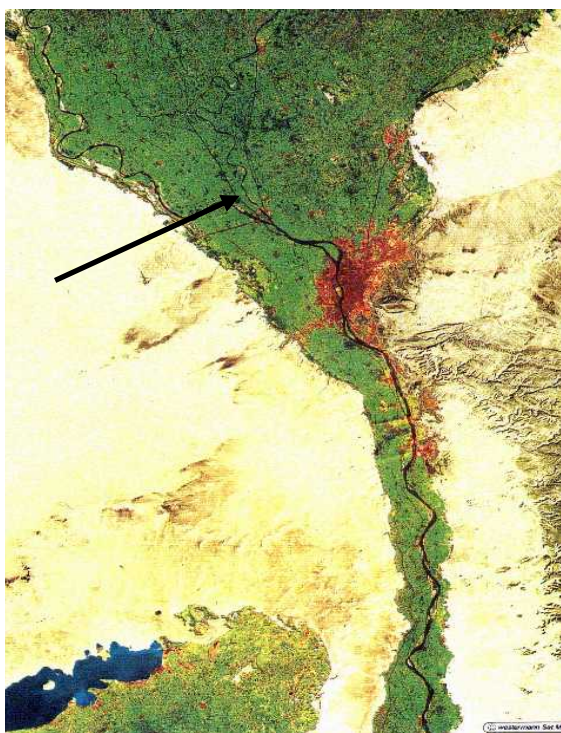
Variole du singe

Epidémie de 2003 aux Etats-Unis:

- Rats de Gambie importés du Ghana
- Contamination de chiens de prairie domestiques
- Entre 30 et 50 cas humains

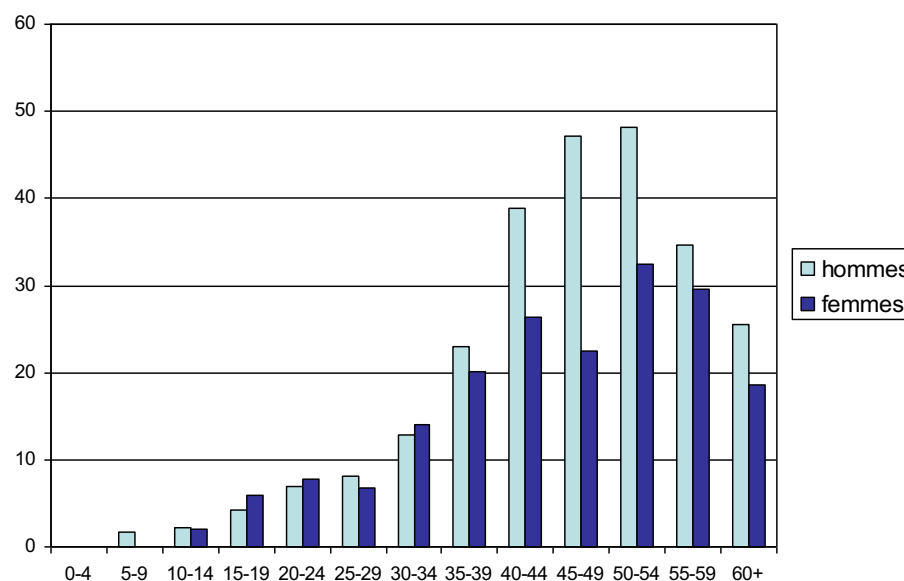


Hépatite C en Egypte: développement des soins médicaux



Village de Zwyat Razin, Egypte, 2002

Proportion infectée par le virus de l'hépatite C (%)



Groupes d'âge

(Arafa, J Hepatol, 2015)

Bio-terrorisme: Sverdlovsk, Oural, 1979

66 décès humains
sur 79 infections



(CDC)

Villages où ont été
recensés des cas
de charbon chez les
animaux.

Meselson, Science, 1994