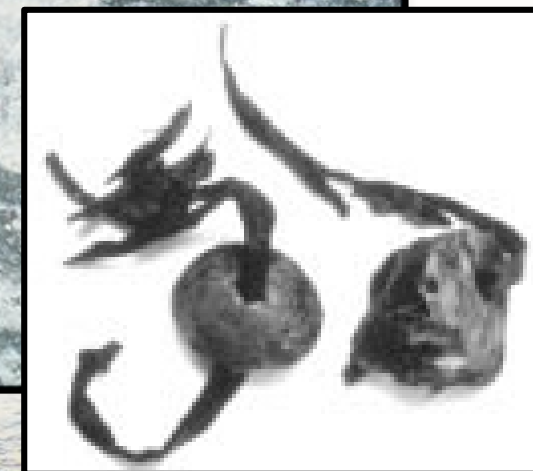


The boomerang effect

Environmental exposure to pharmaceuticals



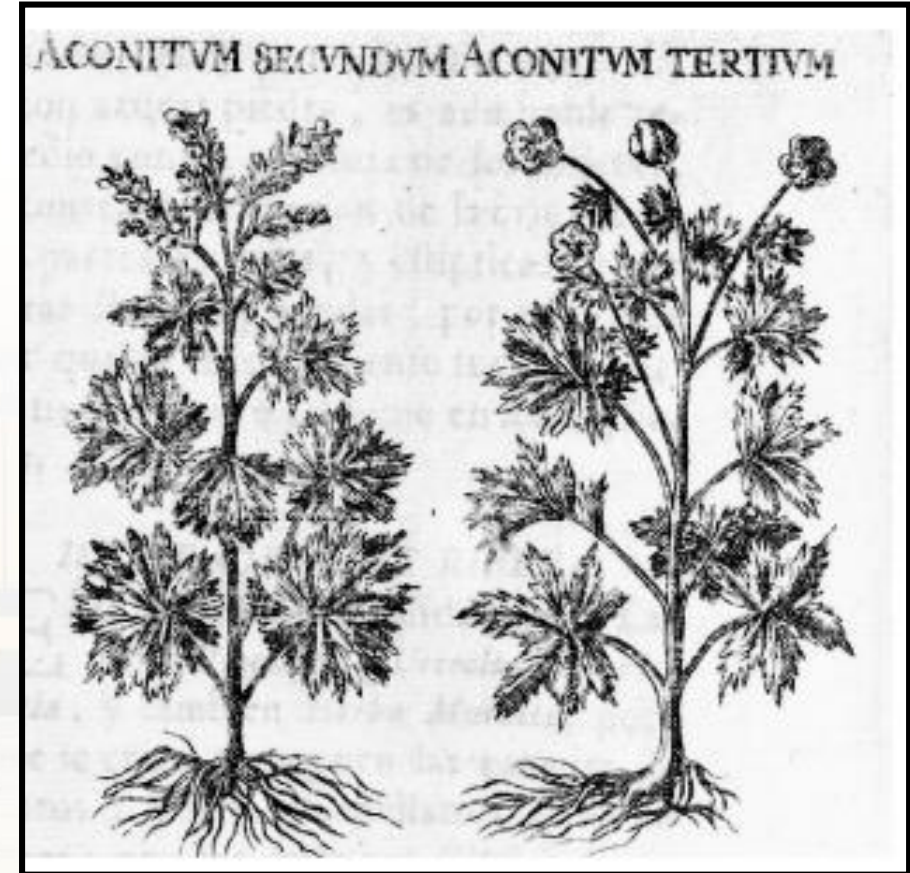
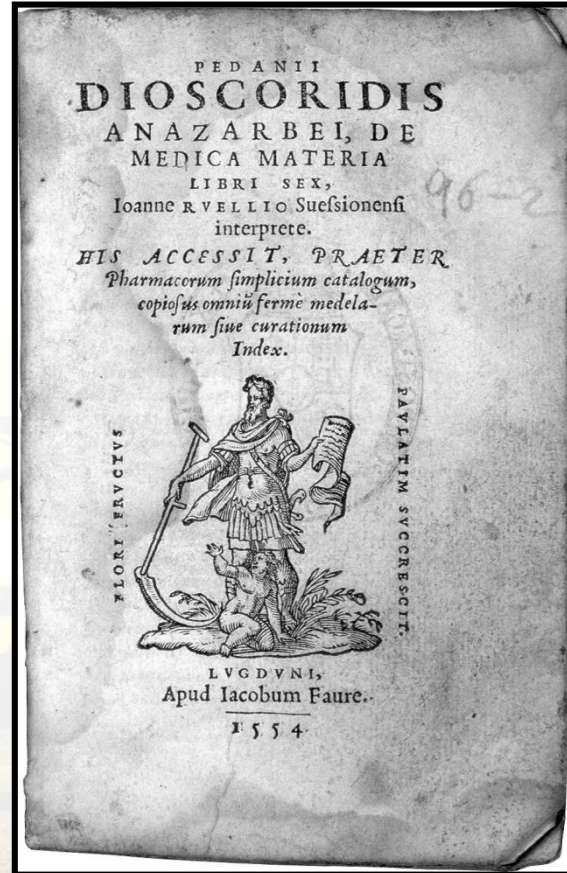
Capasso, 1998

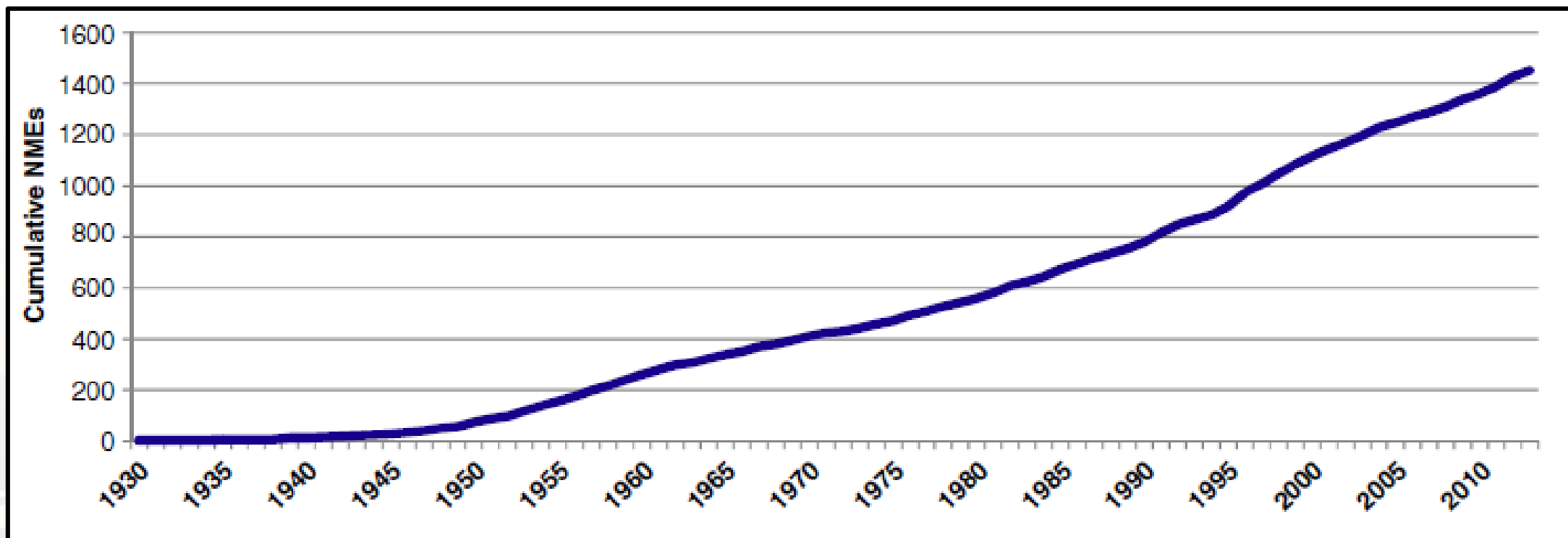
Ebers papyrus - Egyptians



Raviña, 2011

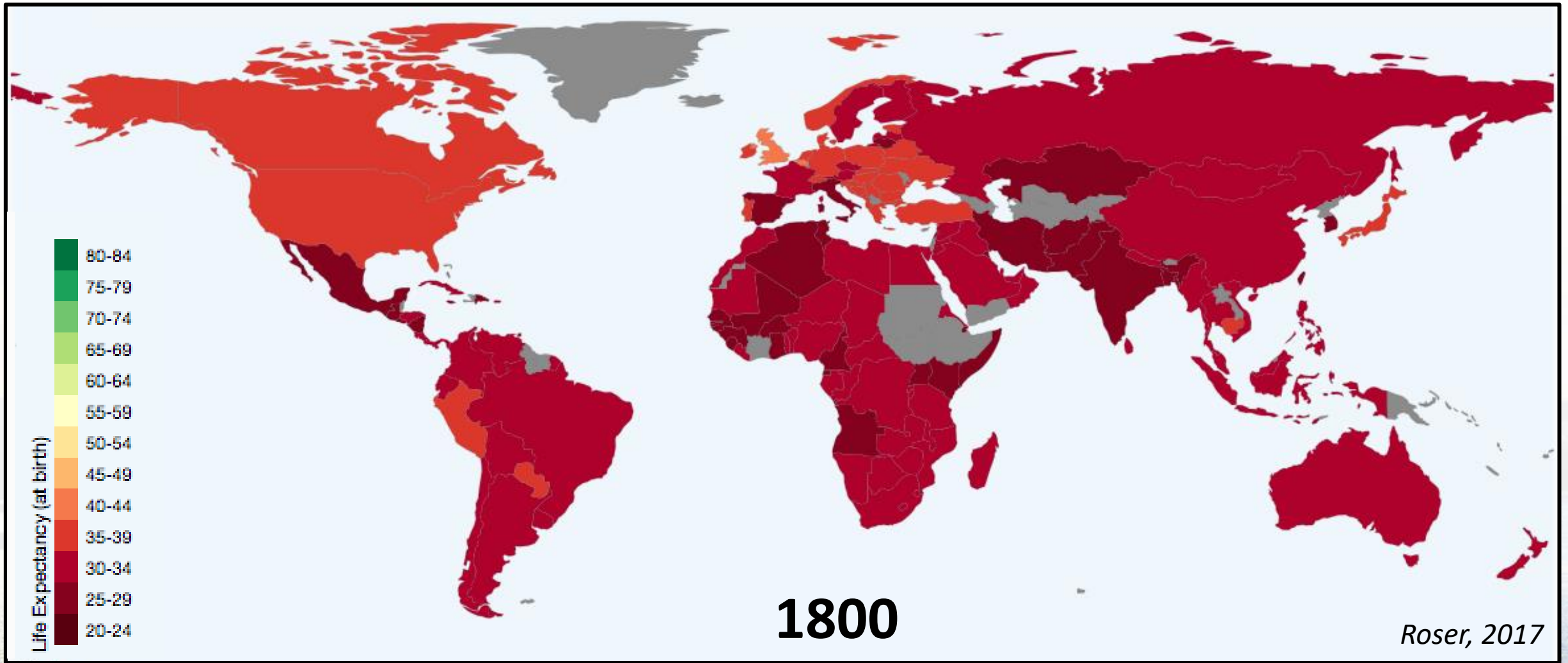
Dioscoridis - Romans

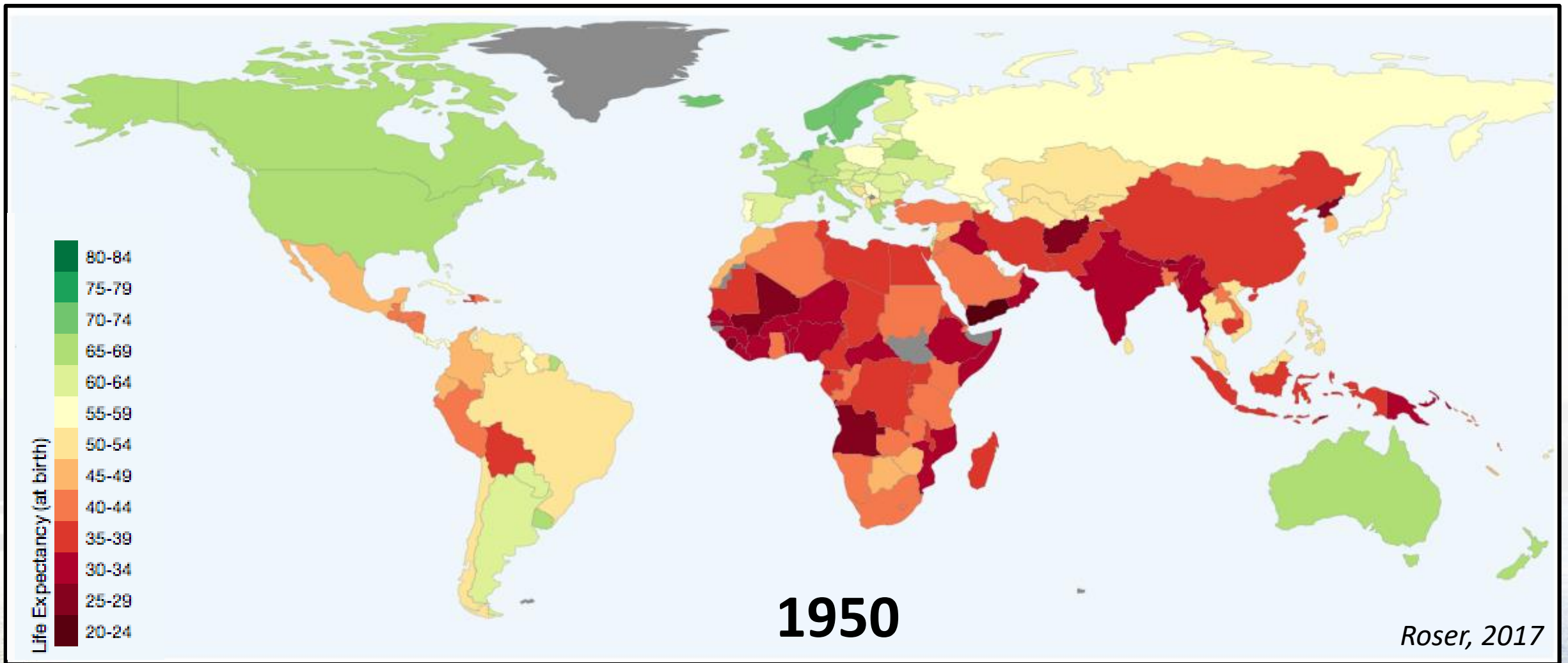


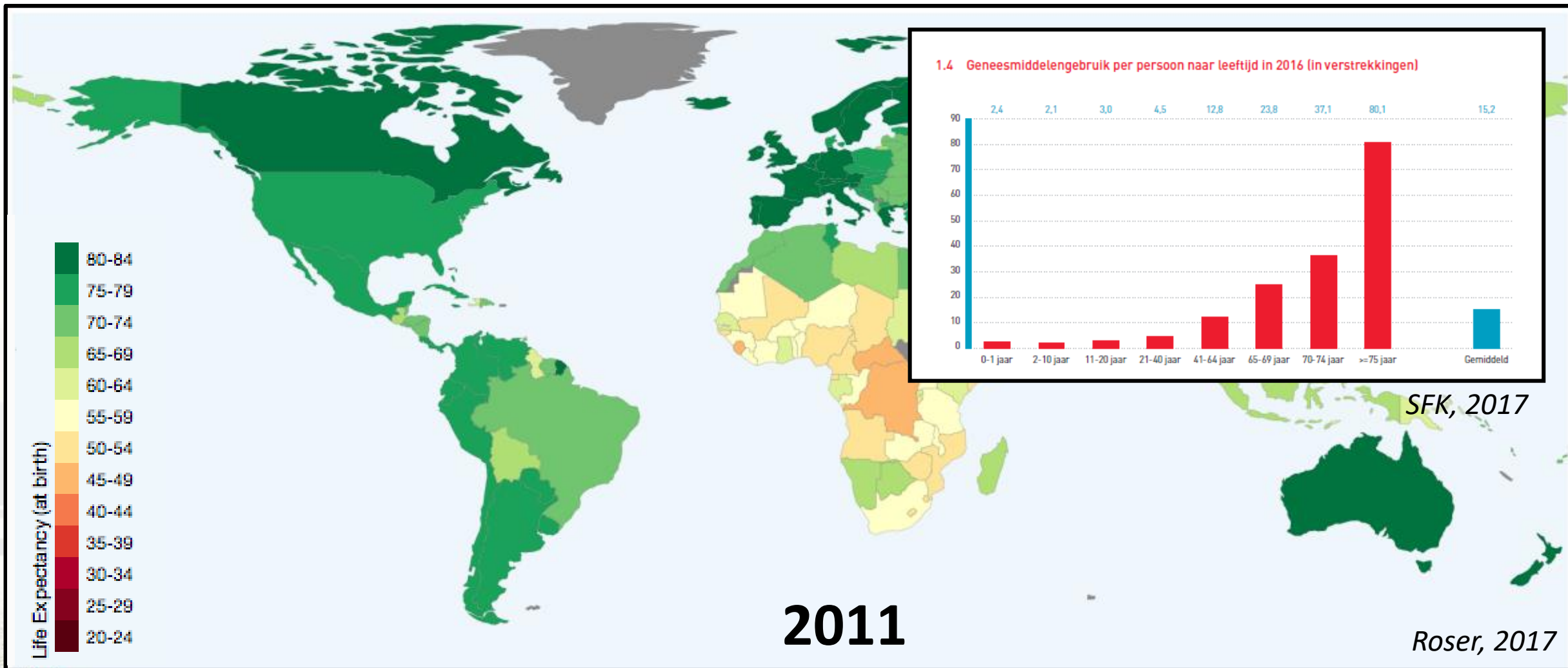


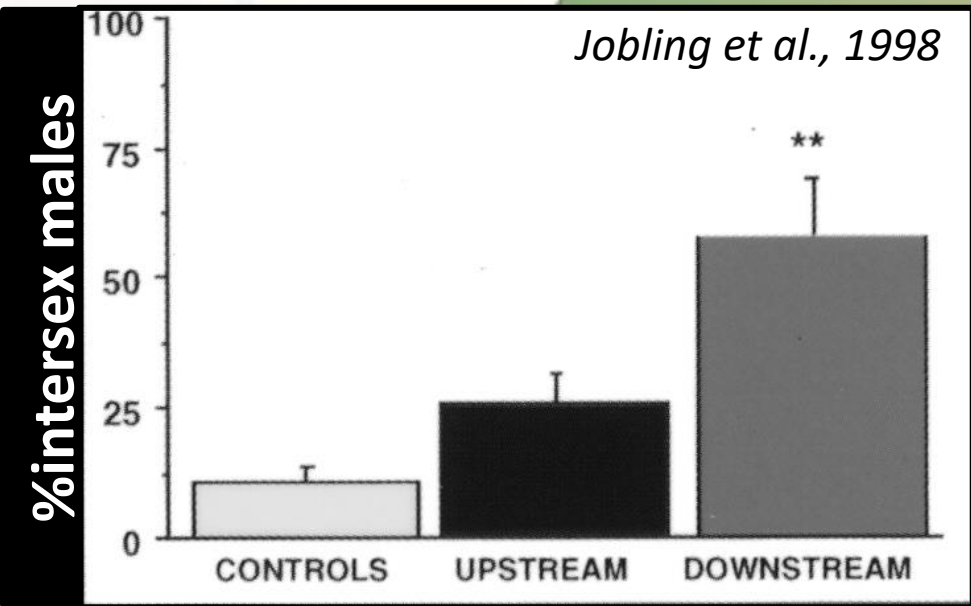
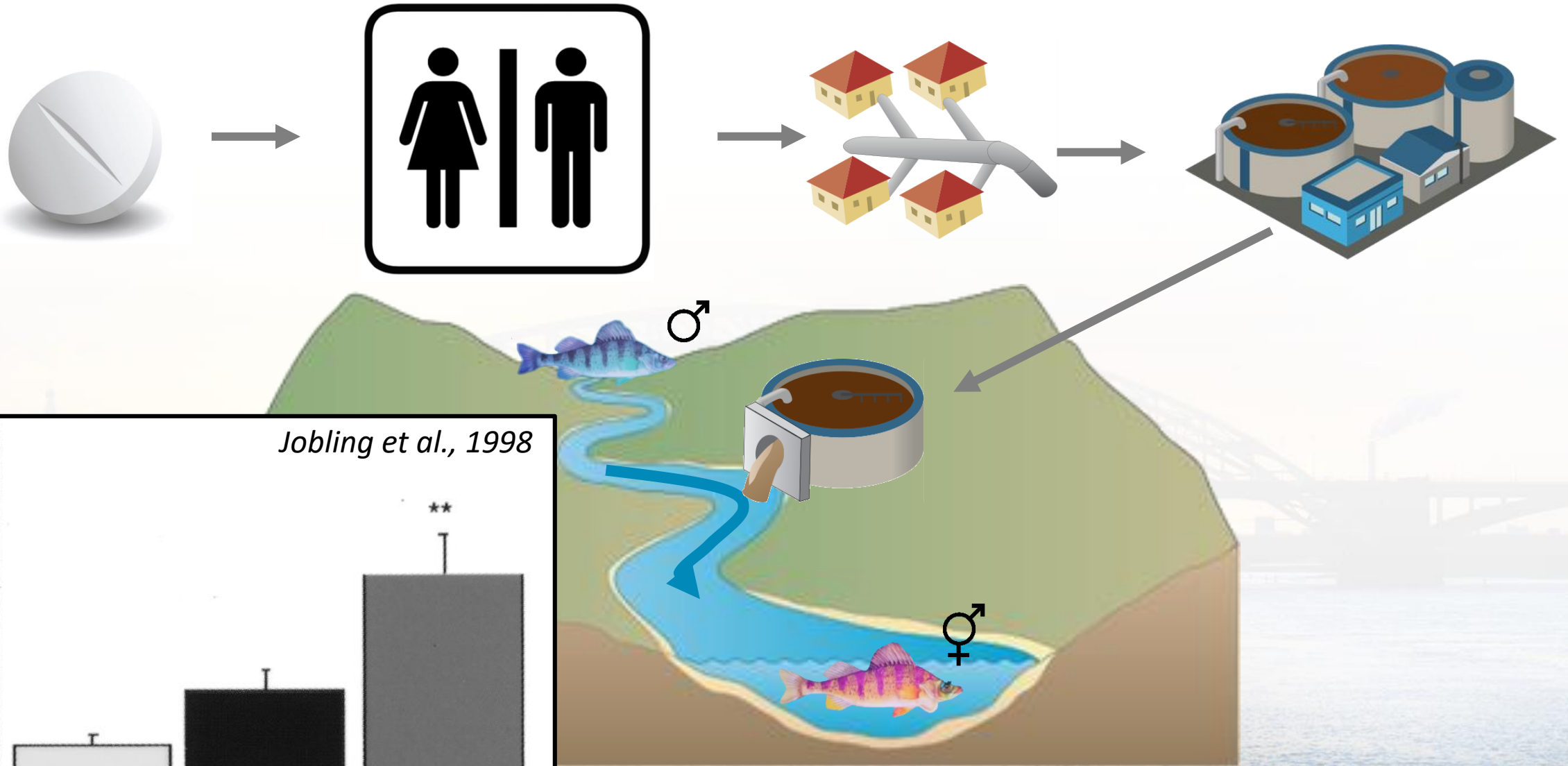
NME: New Molecular Entity

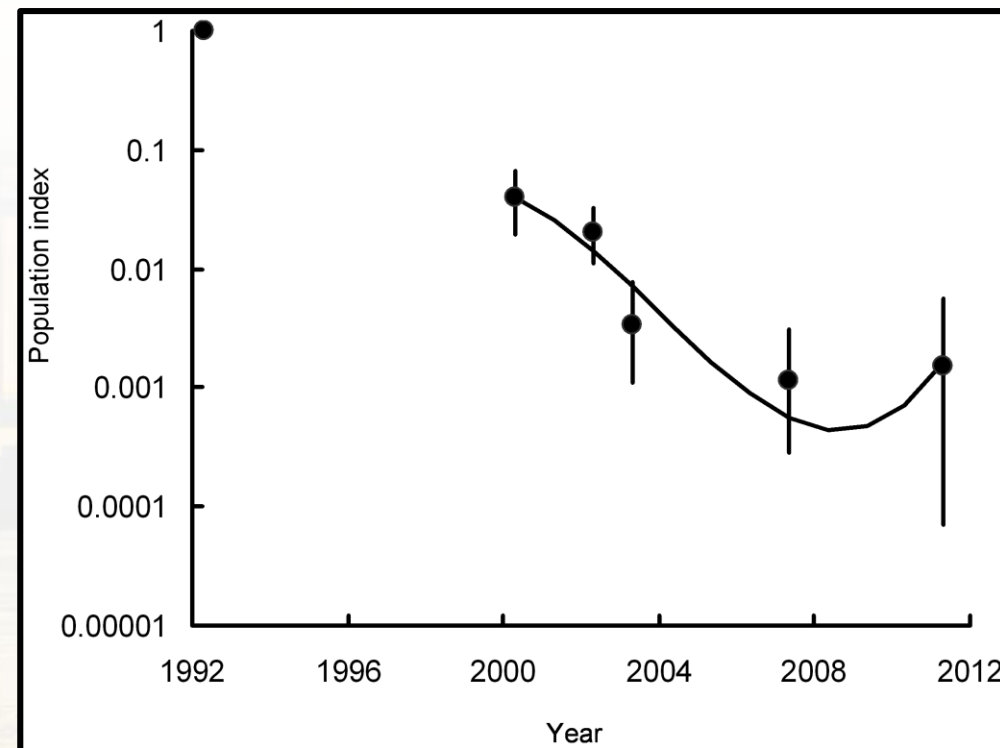
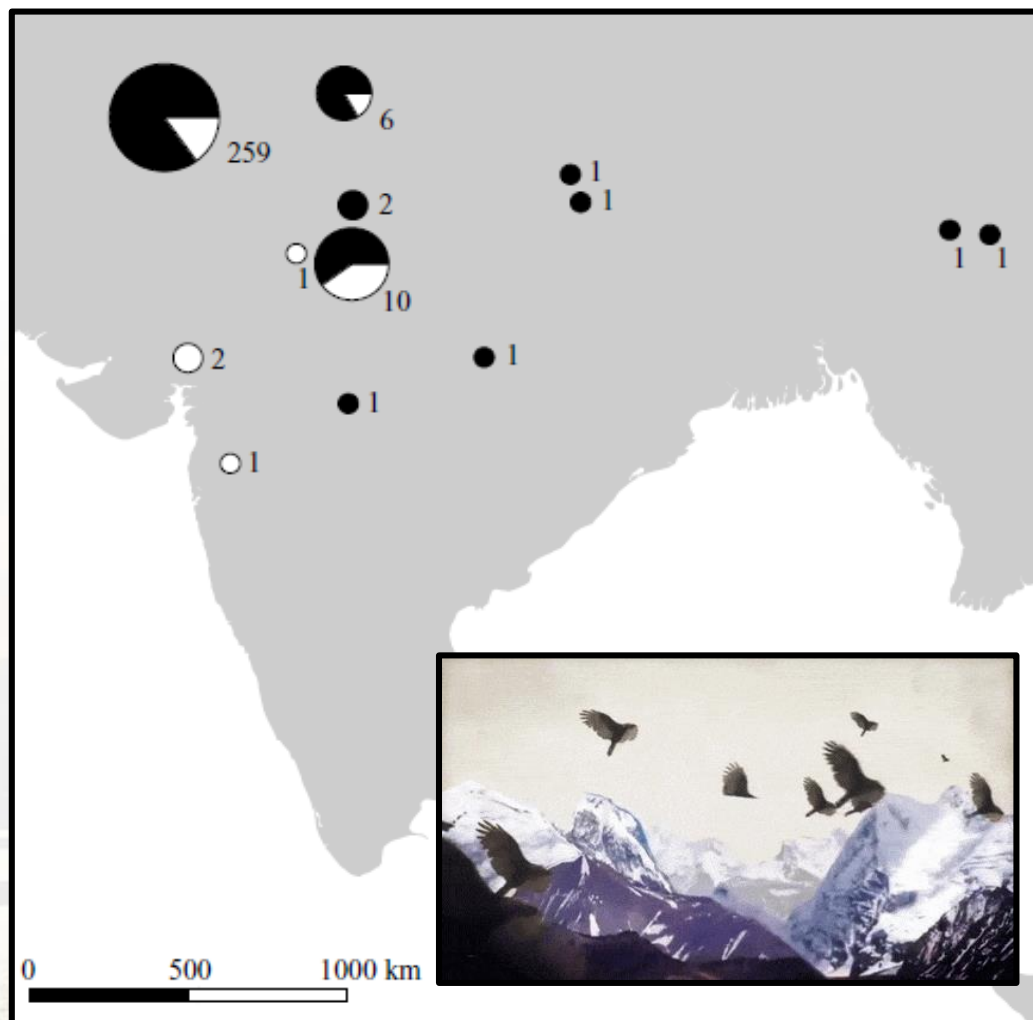
Kinch et al., 2014

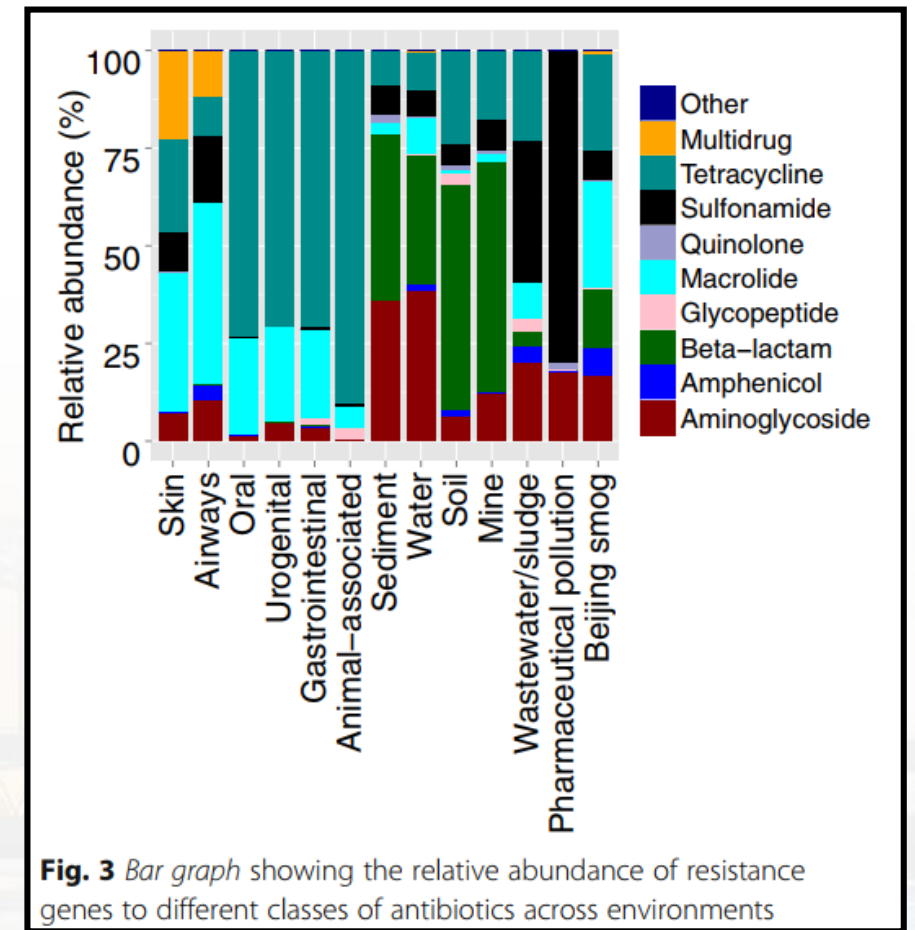
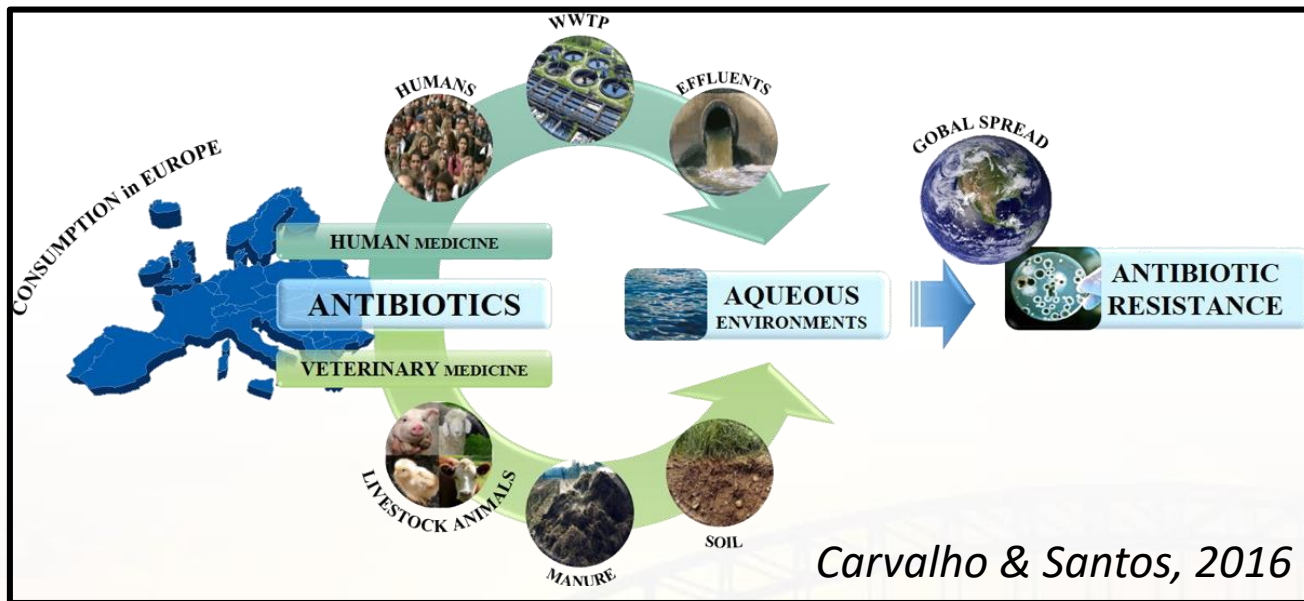




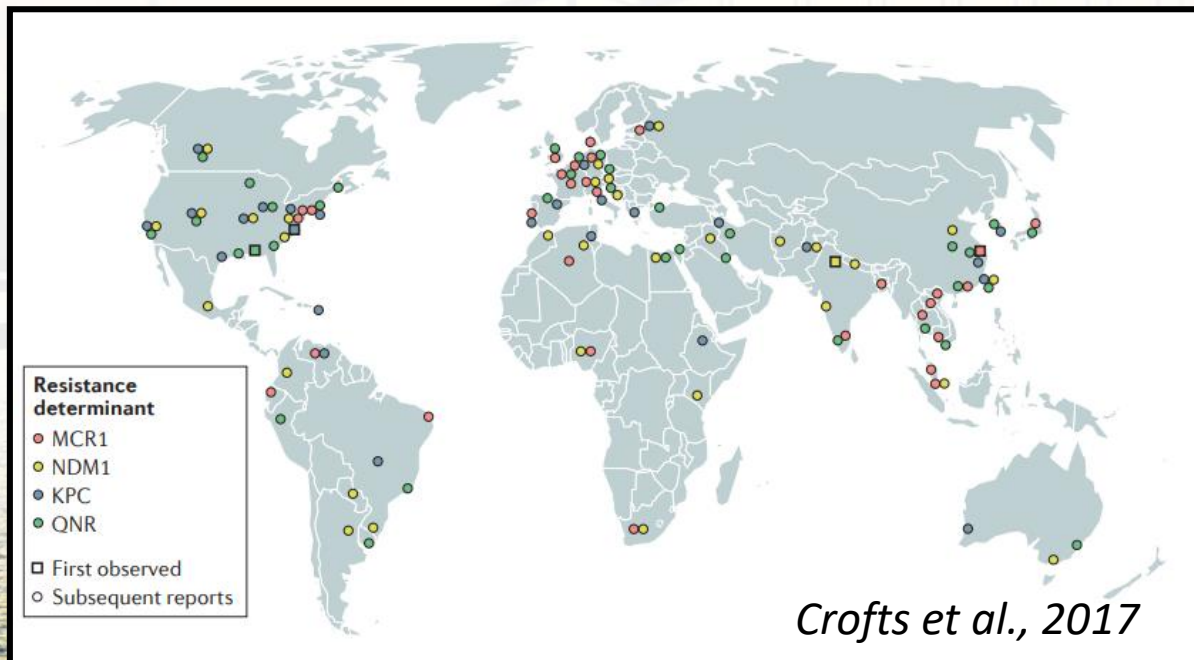








Pal et al., 2016



Endocrine effects

Low concentrations of non-hormonal pharmaceuticals can have hormonal effects

Ass. Prof. Dr. Majorie van Duursen (IRAS, Utrecht University, The Netherlands)

Bacterial resistance

Low sub-Minimal Inhibitory concentrations of antibiotics generate new types of resistance

Ass. Prof. Dr. Linus Sandegren (Medical Biochemistry and Microbiology, Uppsala University, Sweden)

Genetic effects

The potential association of psychoactive pharmaceuticals at environmental concentrations with neurological disorders

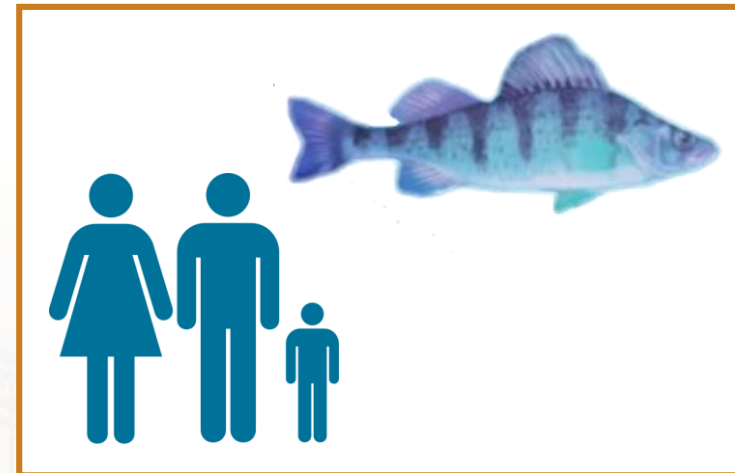
Dr. Gaurav Kaushik (University of Wisconsin-Madison, USA)



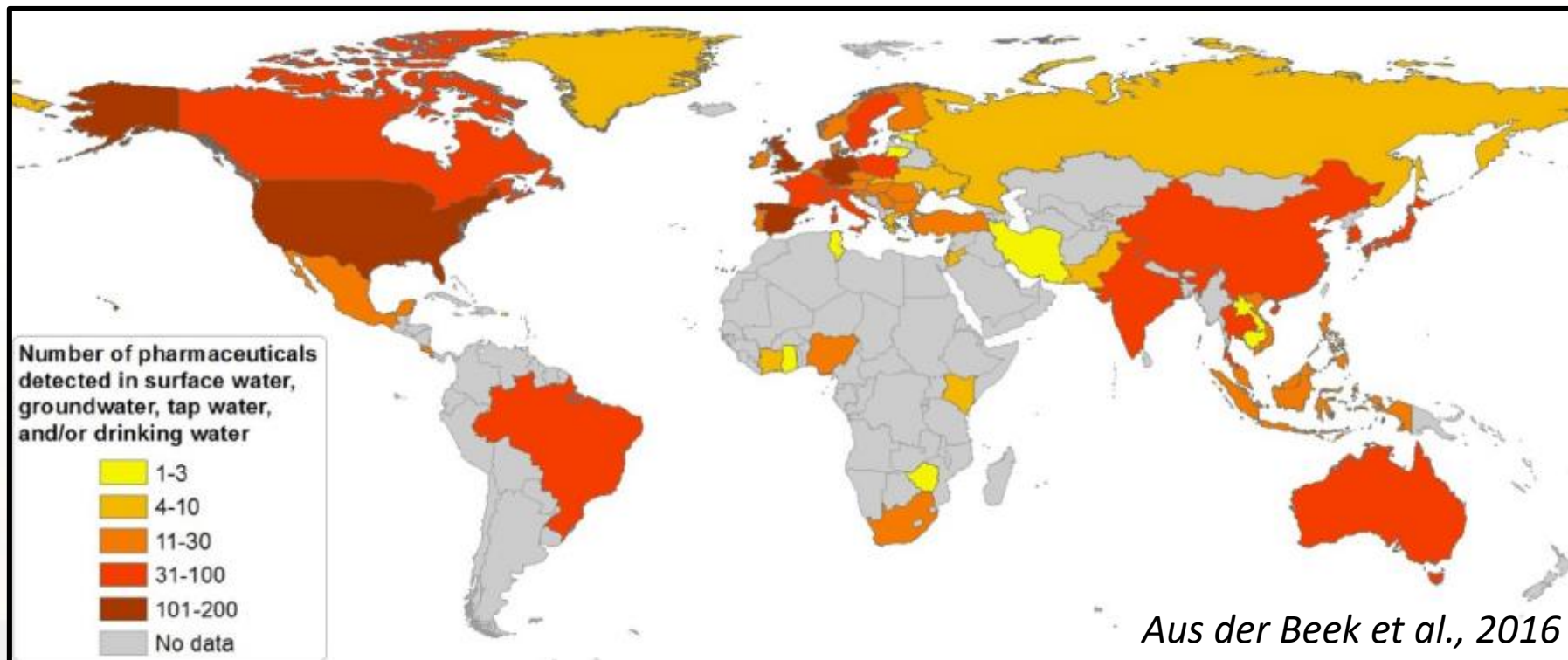
What?



Where?

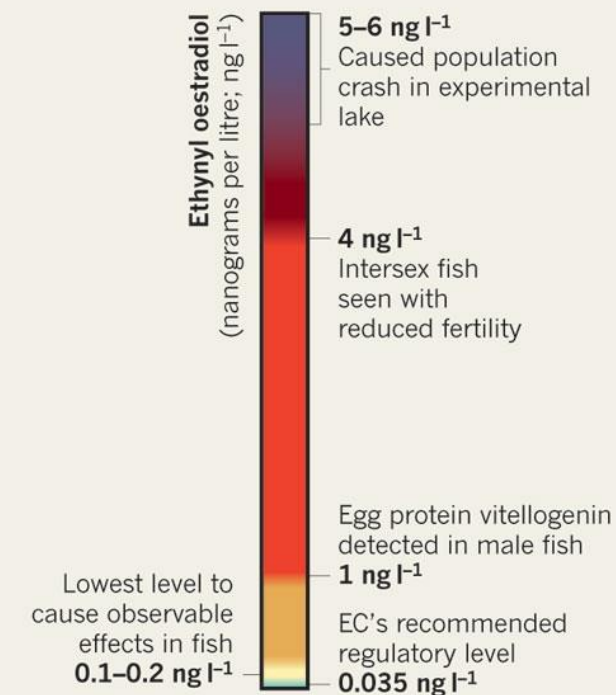


Who?



RAGING HORMONES

The European Commission (EC) has proposed limiting the levels of the contraceptive hormone ethynyl oestradiol in surface water.



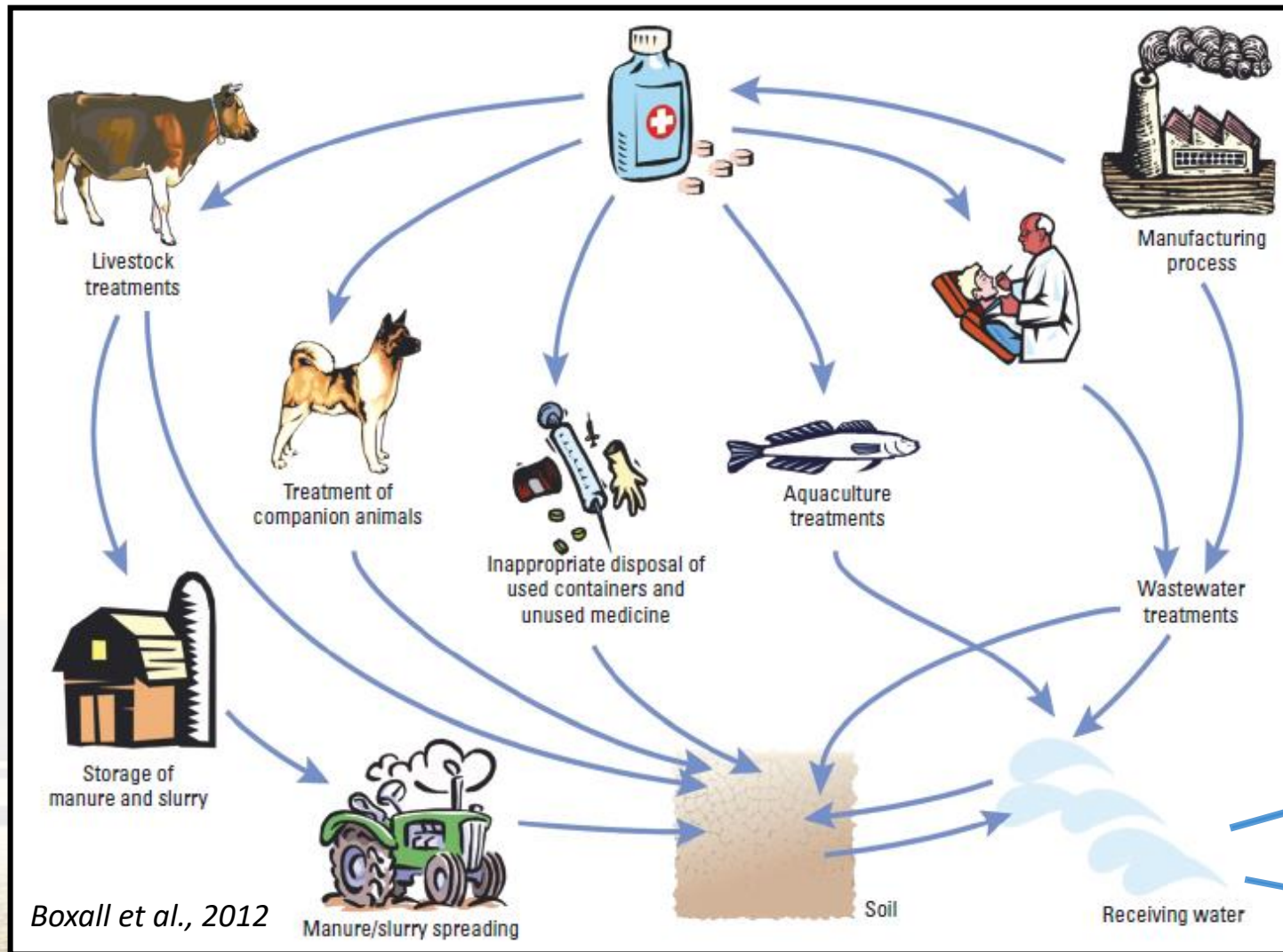
Gilbert, 2012

Rijksinstituut voor Volksgezondheid en Milieu
Ministerie van Volksgezondheid, Welzijn en Sport

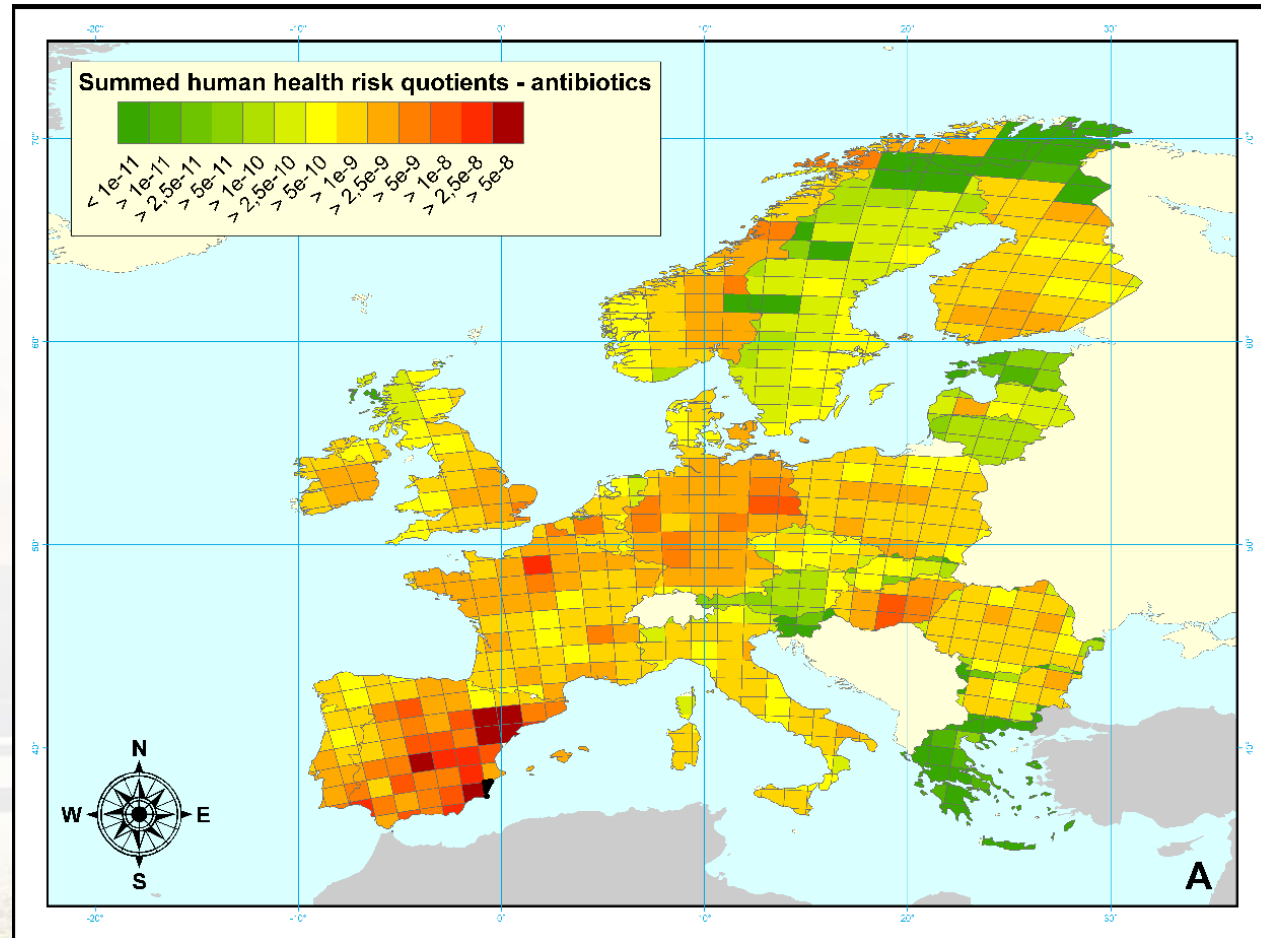
Geneesmiddelen en waterkwaliteit

RIVM Briefrapport 2016-0111
C.T.A. Moermond et al.

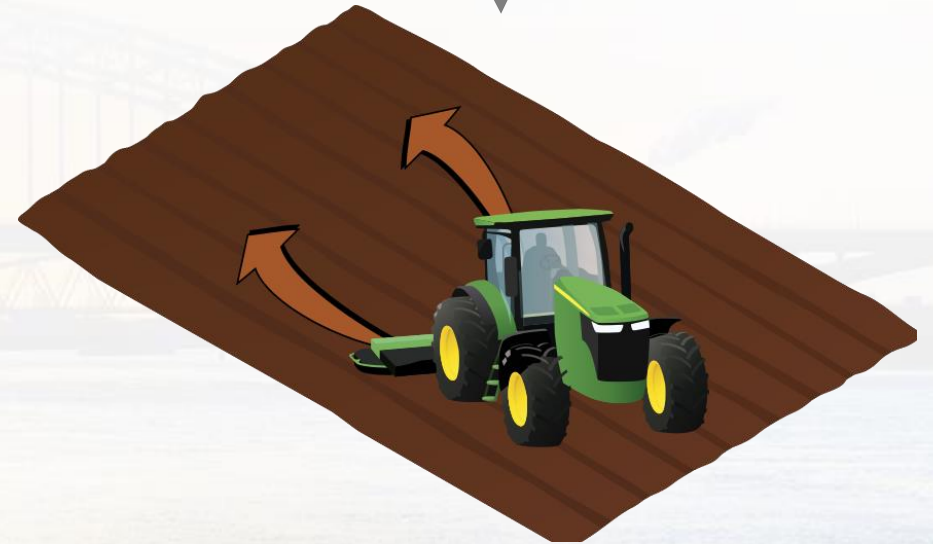
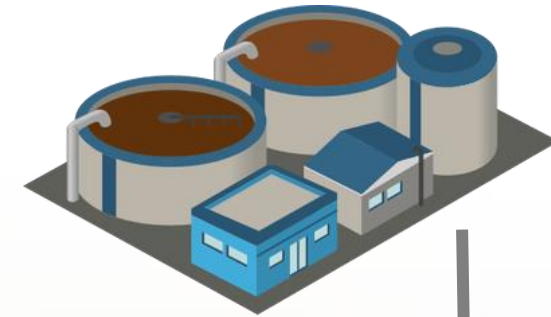
Moermond et al., 2016



Human health



Oldenkamp et al., 2013

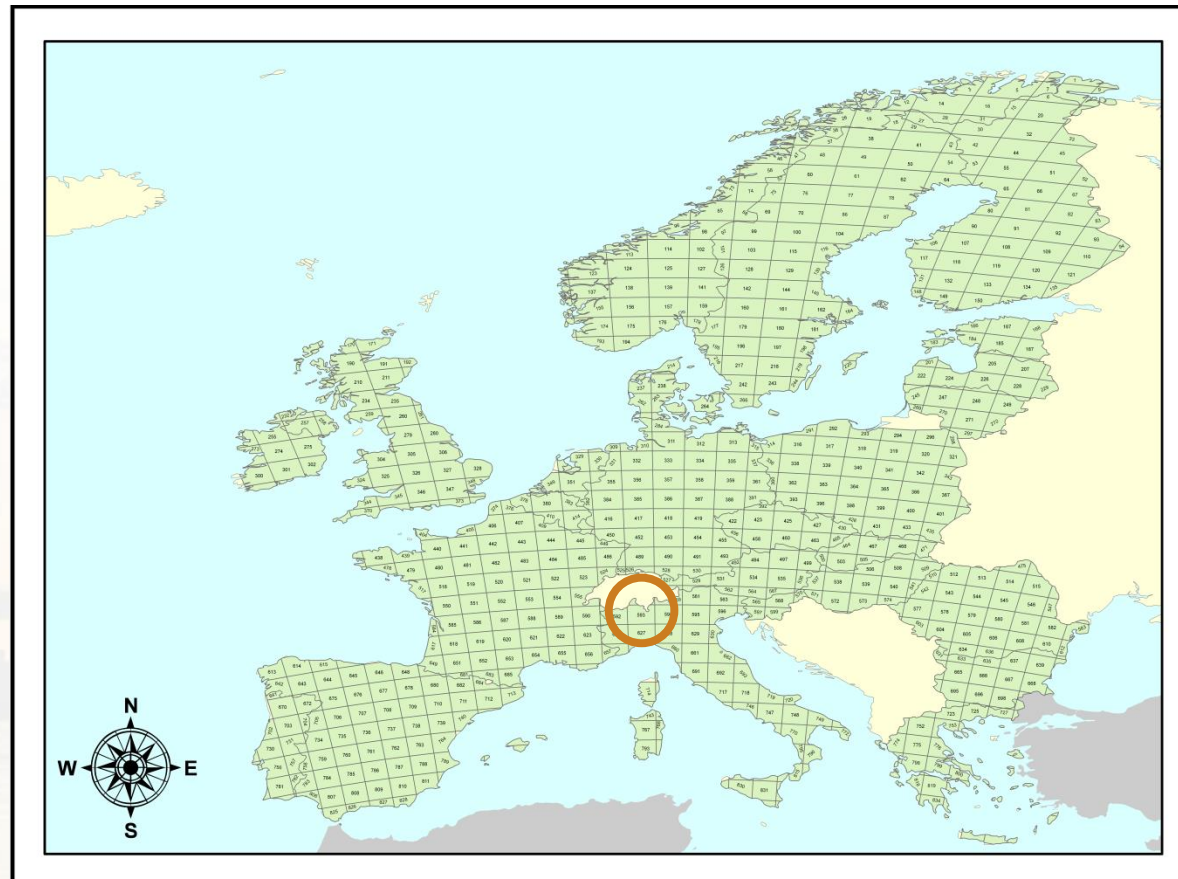
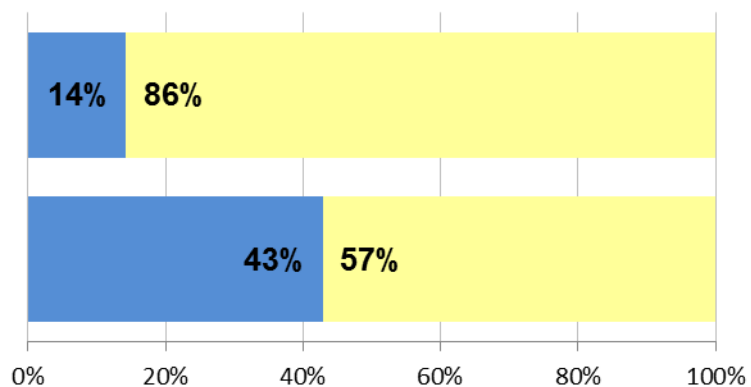
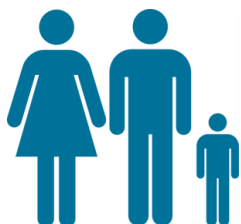




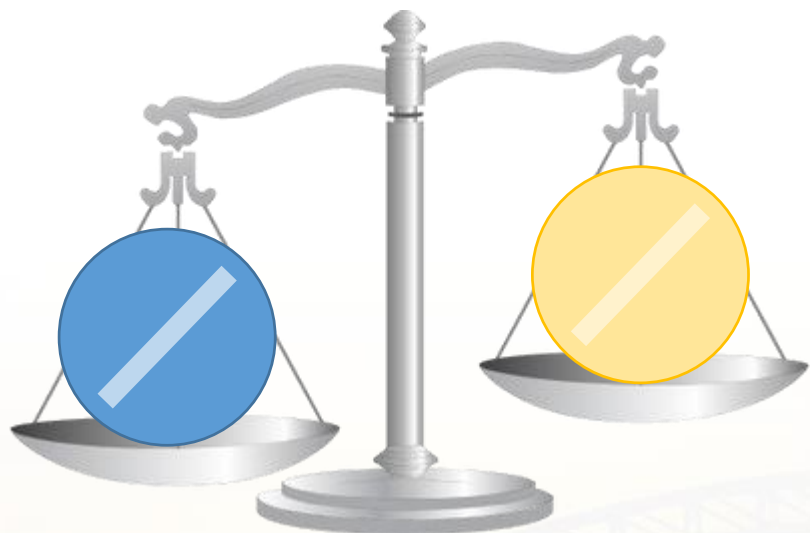
Ciprofloxacin

Levofloxacin

North Italy



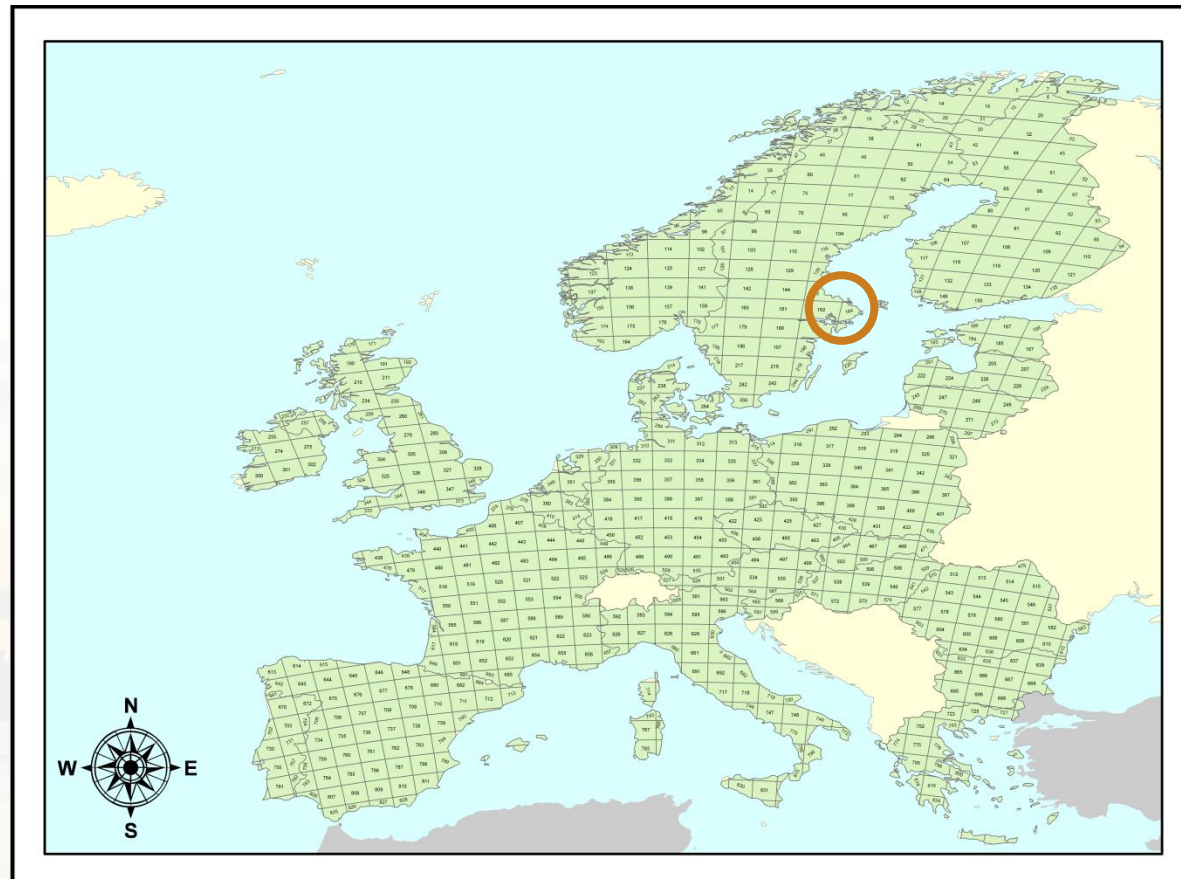
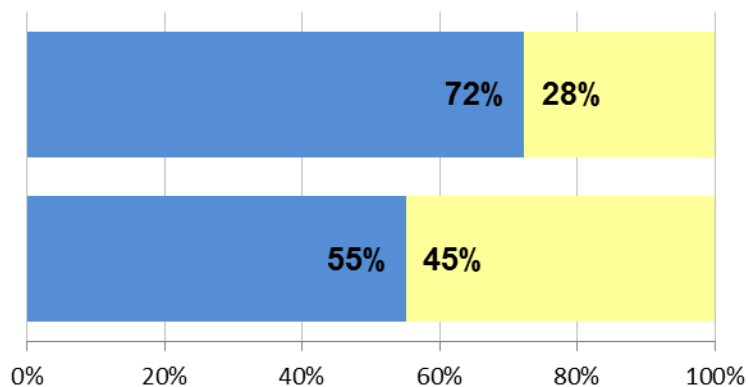
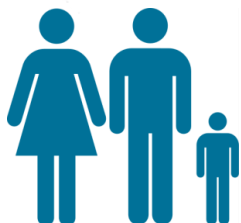
Oldenkamp et al., 2014



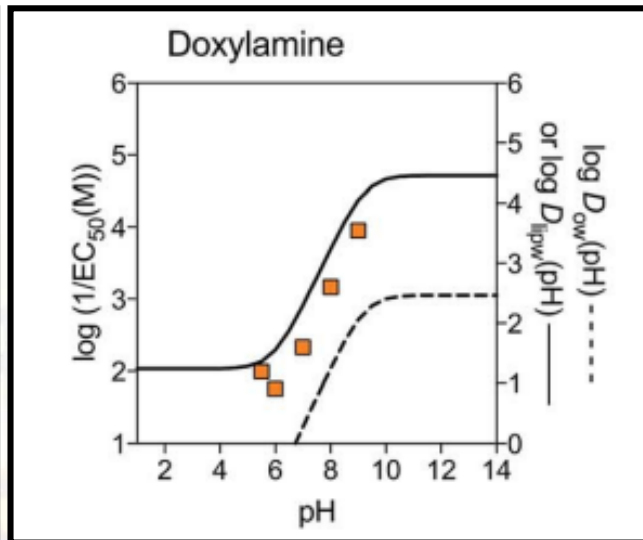
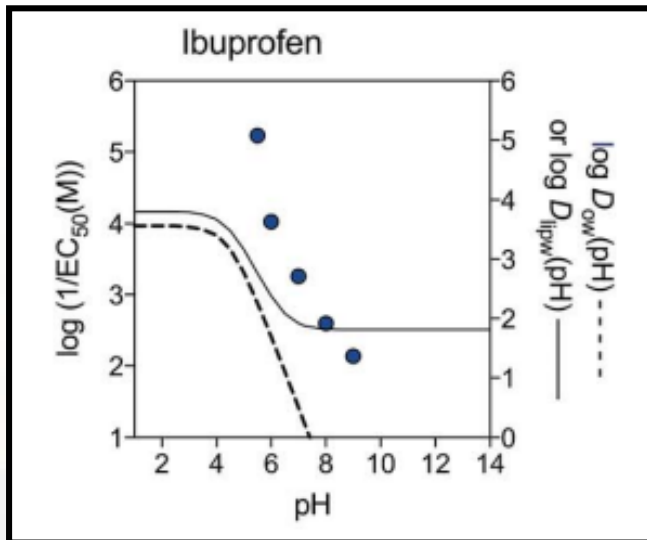
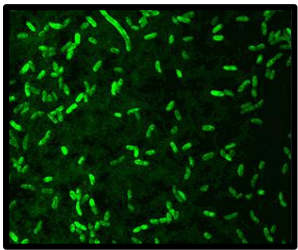
Ciprofloxacin

Levofloxacin

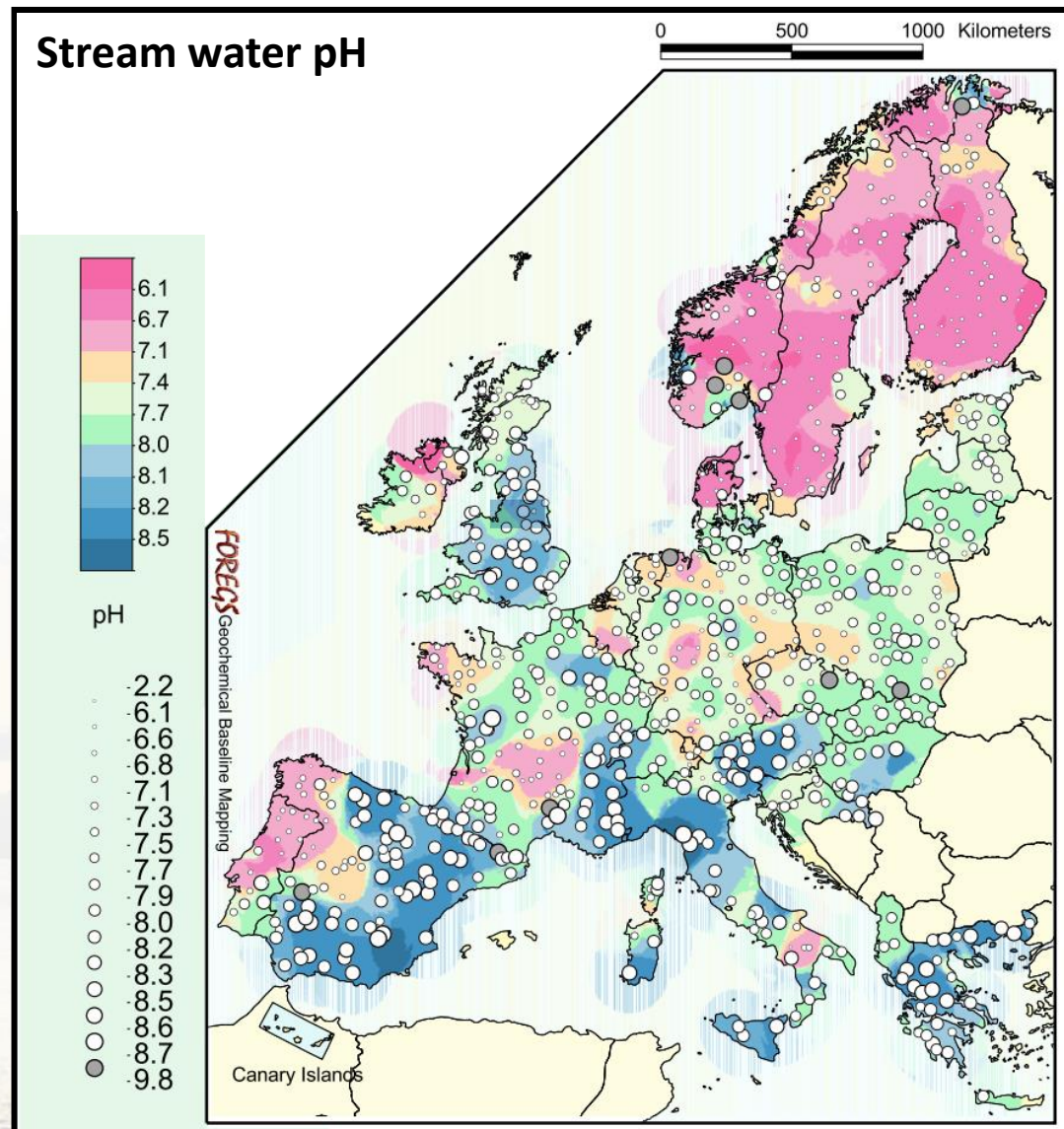
East Sweden



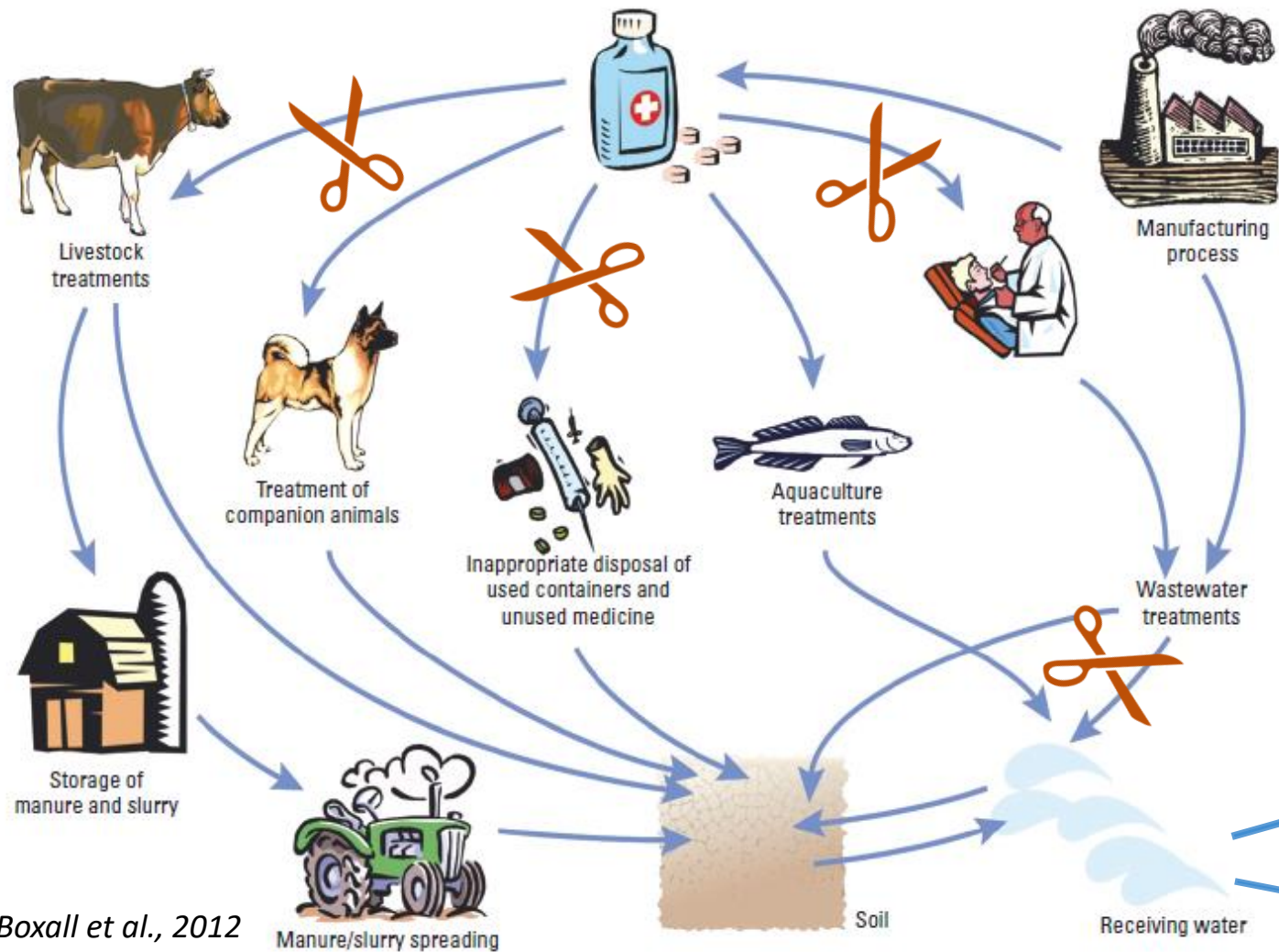
Oldenkamp et al., 2014



Baumer et al., 2017



Salminen et al., 2006



Green molecules
Benign by design also achievable for pharmaceuticals
 Prof. Dr. Klaus Kümmerer (Leuphana Universität Lüneburg, Germany)

Biopharmaceuticals
An endogenous substance to be used as a pharmaceutical
 Prof. Dr. Willem Seinen (Alloksys Life Sciences BV, The Netherlands)

Behavioral aspects
The role of Rational medicine use in Green Pharmacy
 Dr. Dick Bijl (International Society of Drug Bulletins, ISDB)

Pharma wastage
Potentials for and benefits of avoiding pharmaceutical wastage
 Prof. Dr. Toine Egberts (Clinical Pharmacy, Utrecht University, The Netherlands)

de Gelderlander
 Regio Algemeen Sport

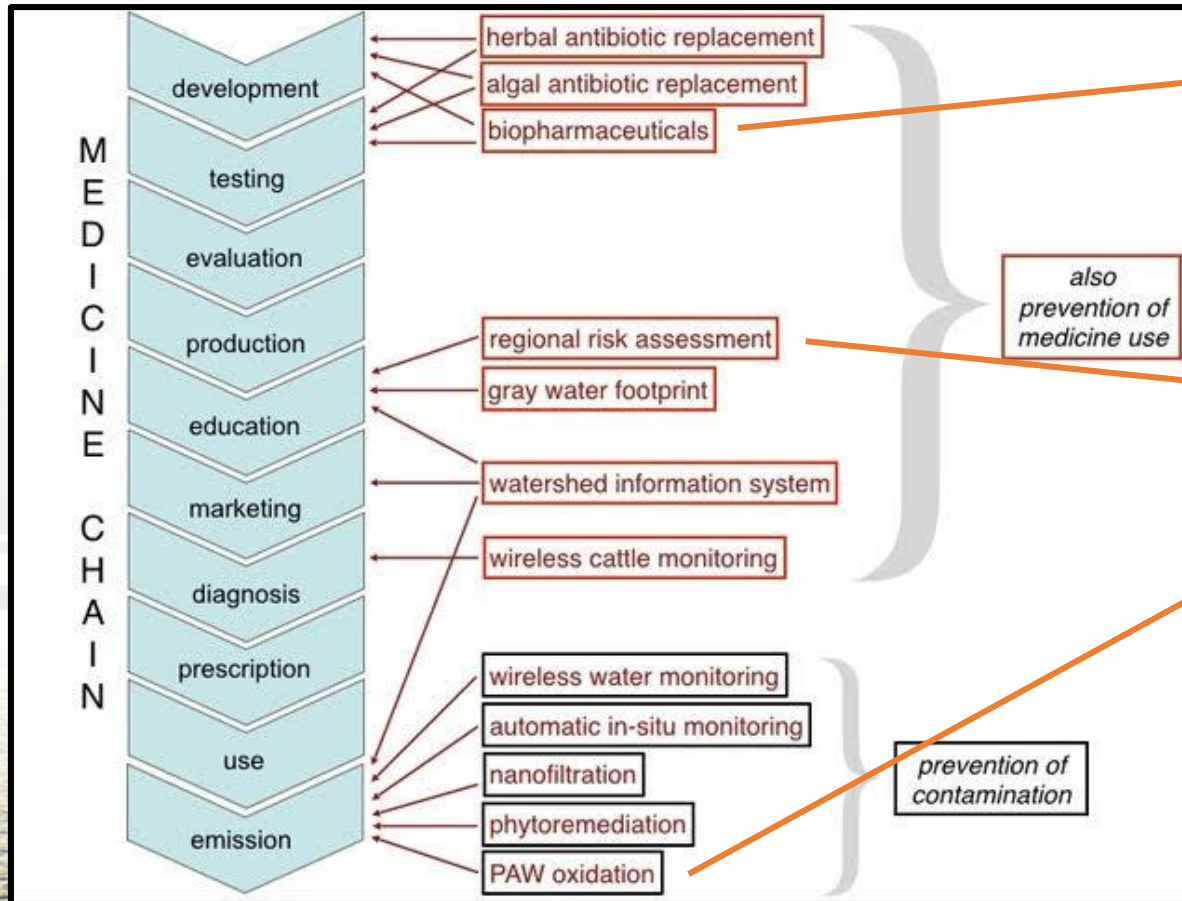
Miljoeneninjectie moet meer medicijnen uit drinkwater halen

ANP/Chris Klomp 19-10-17, 19:15 Laatste update: 19:22

MEDUWA-Vecht(e)

MEDicijnen Uit WATER

MEDizin Unerwünscht im WASSER



Biopharmaceuticals

An endogenous substance to be used as a pharmaceutical

Prof. Dr. Willem Seinen (Alloksys Life Sciences BV, The Netherlands)

Regional risk assessment

Assessment of risks of antibiotics in the environment

Daniel Duarte MSc (Radboud University, Nijmegen, The Netherlands)

PAW oxidation

Oxidation of pharmaceuticals with Plasma Activated Water

Martien Graumans MSc (Radboudumc, Nijmegen, The Netherlands)

