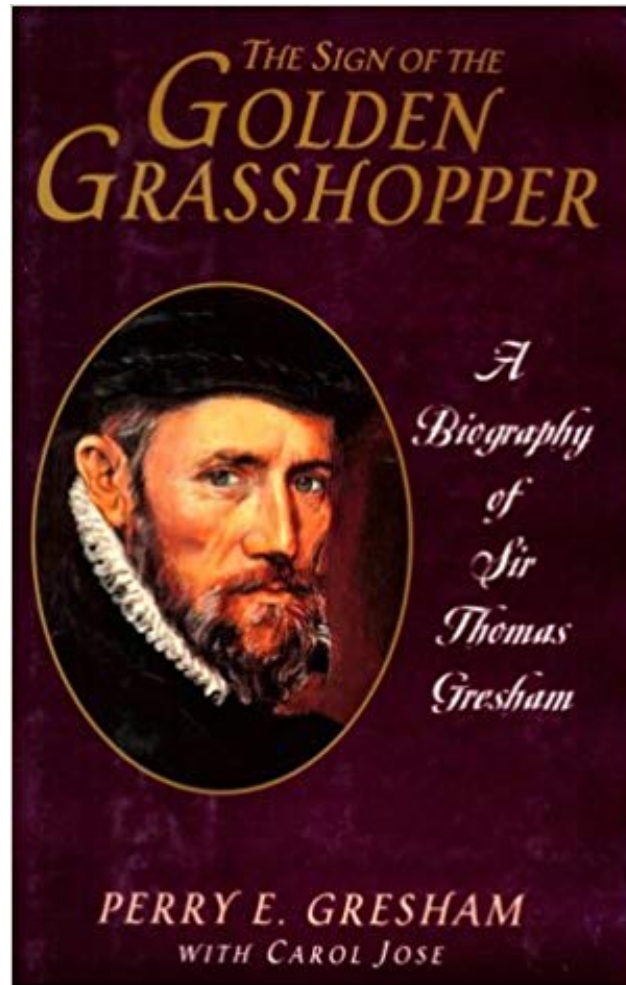


Sir Thomas Gresham 1519-1597



Gresham's Grasshopper



Chromosome races in *Podisma*

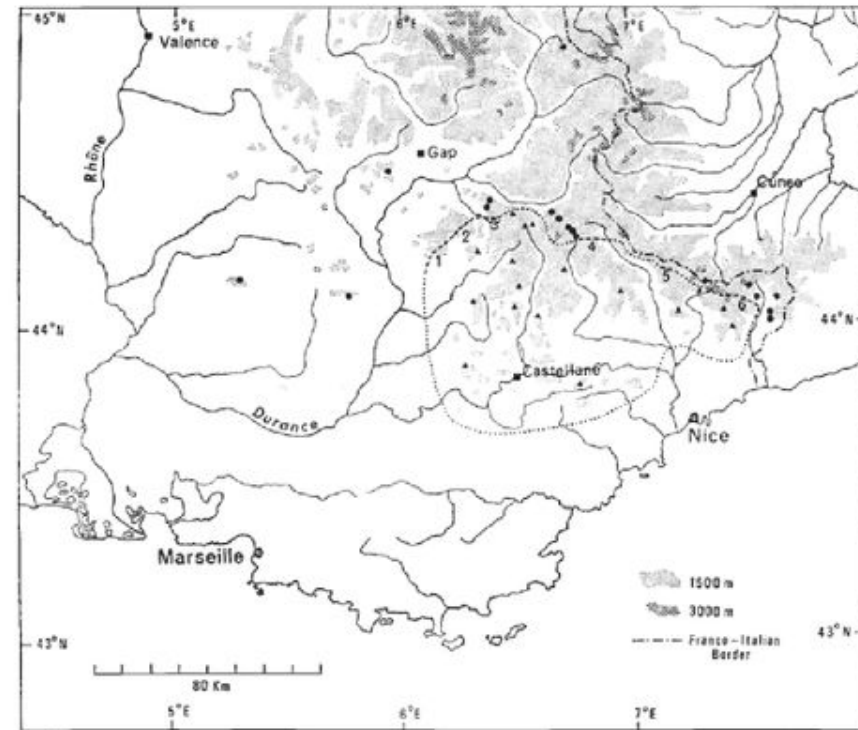


FIG. 8.—A map of the Southern European Alps showing the distribution of the XO (circles) and neoXY (triangles) races of *Podisma pedestris* in this region. Where the neoXY distribution line is more heavily dashed, the juxtaposition of the two races is accurately determined.

London in Sir Thomas Gresham's Era



London from space



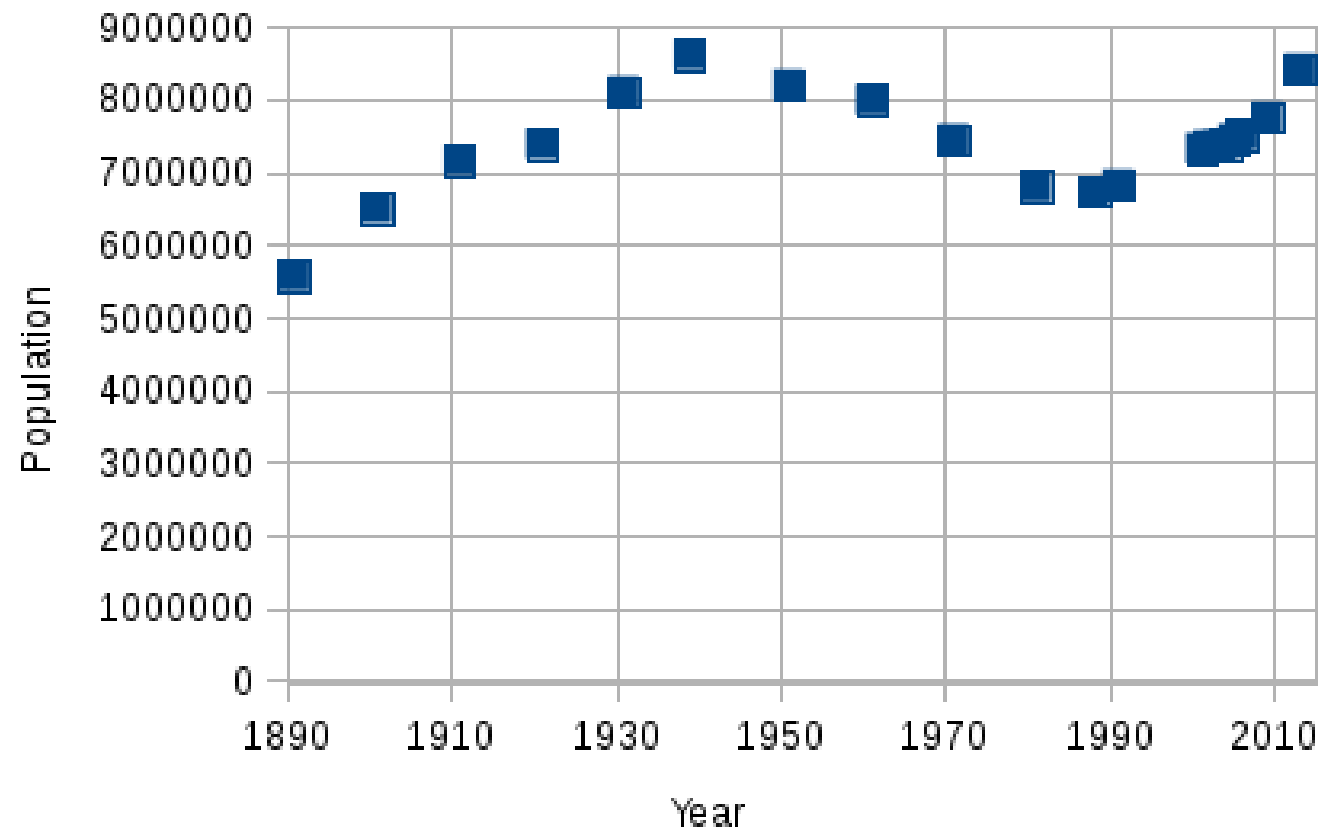
It's big!



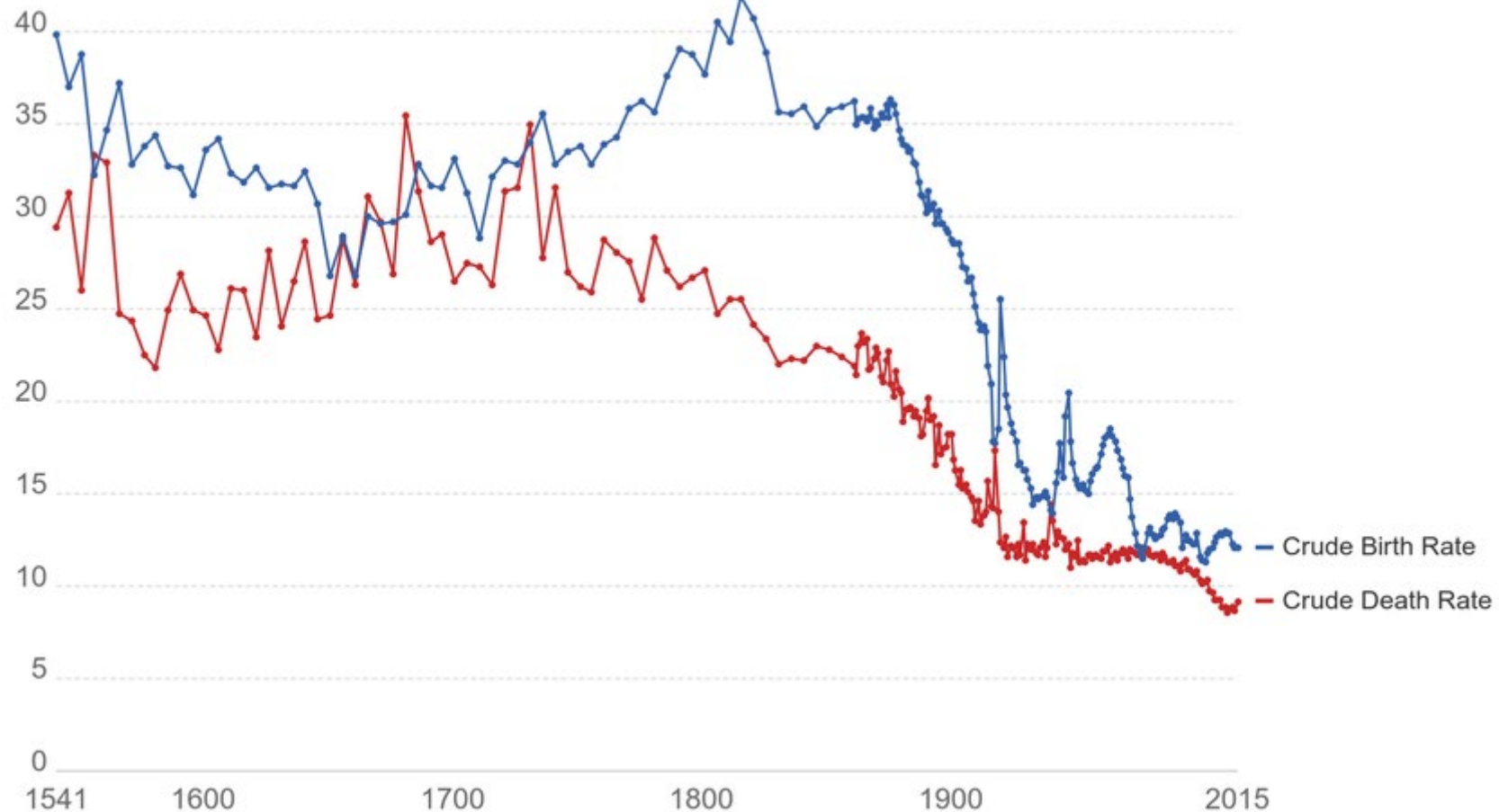
And getting bigger

2035	10,556,486	0.63%	328,435
2030	10,228,051	0.78%	387,309
2025	9,840,742	1.13%	536,726
2020	9,304,016	1.39%	127,486
<u>2019</u>	<u>9,176,530</u>	<u>1.45%</u>	<u>515,149</u>
2015	8,661,381	1.49%	616,948
2010	8,044,433	1.41%	543,216
2005	7,501,217	0.62%	228,398
2000	7,272,819	0.68%	243,311
1995	7,029,508	0.68%	235,108
1990	6,794,400	0.16%	53,446
1985	6,740,954	-0.03%	-10,242
1980	6,751,196	-1.07%	-373,187
1975	7,124,383	-1.05%	-385,022
1970	7,509,405	-0.93%	-359,101
1965	7,868,506	-0.81%	-327,263
1960	8,195,769	-0.20%	-82,138
1955	8,277,907	-0.20%	

At last London population reaches 1939 level



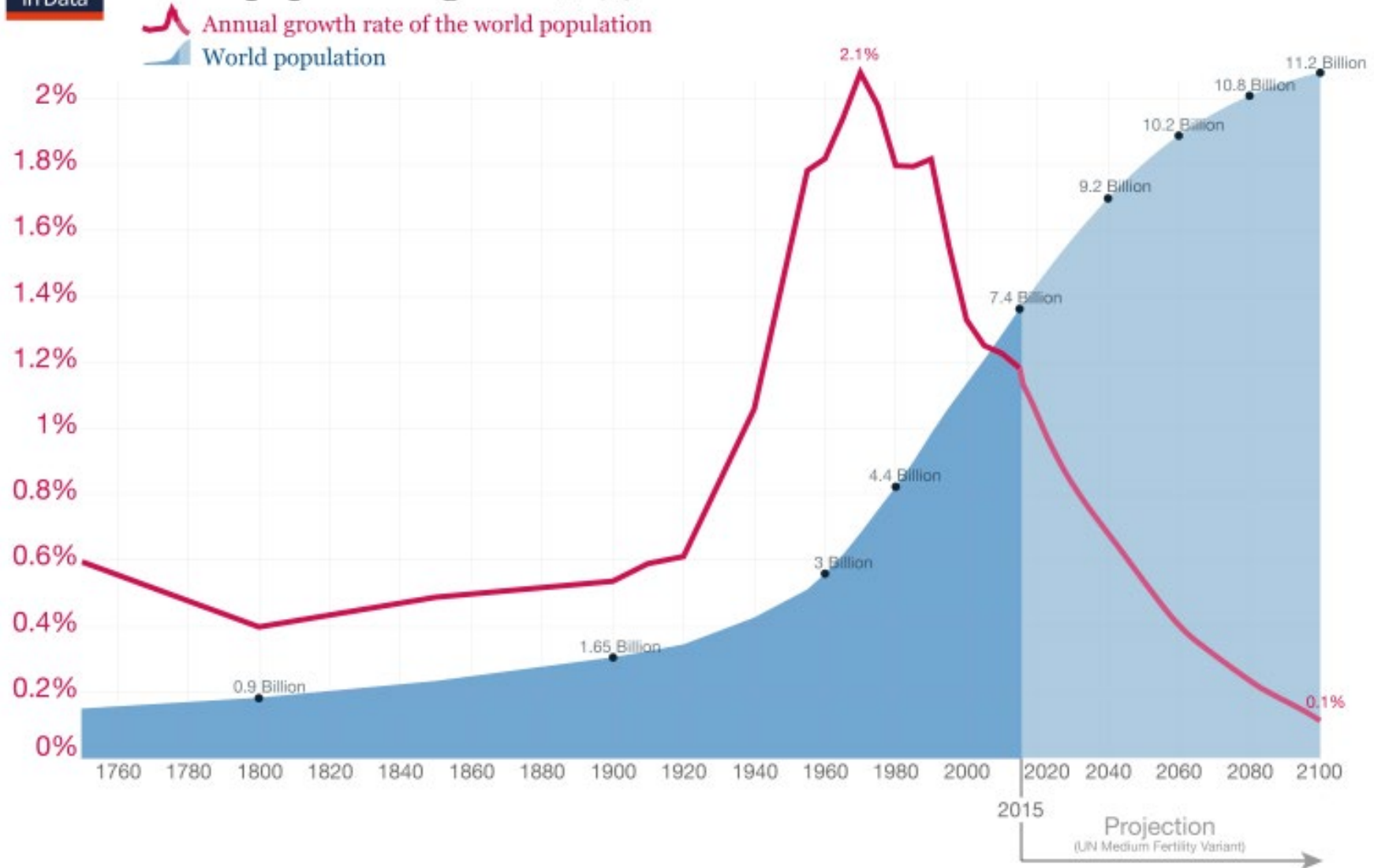
Patterns of birth and death from Thomas Gresham to today



The Anthropocene – in the past 100 years

- Human pop increase from 1.8 billion to 7.6 billion.
- Fish numbers down by 60% and all wild vertebrates down by 80%
- 10% of soil organic matter now depleted
- Temperature up by 0.9 degrees.
- Sea level rise by 0.2metres
- Oceans 25% more acid
- Extensive pollution by mercury, salt, smoke and more

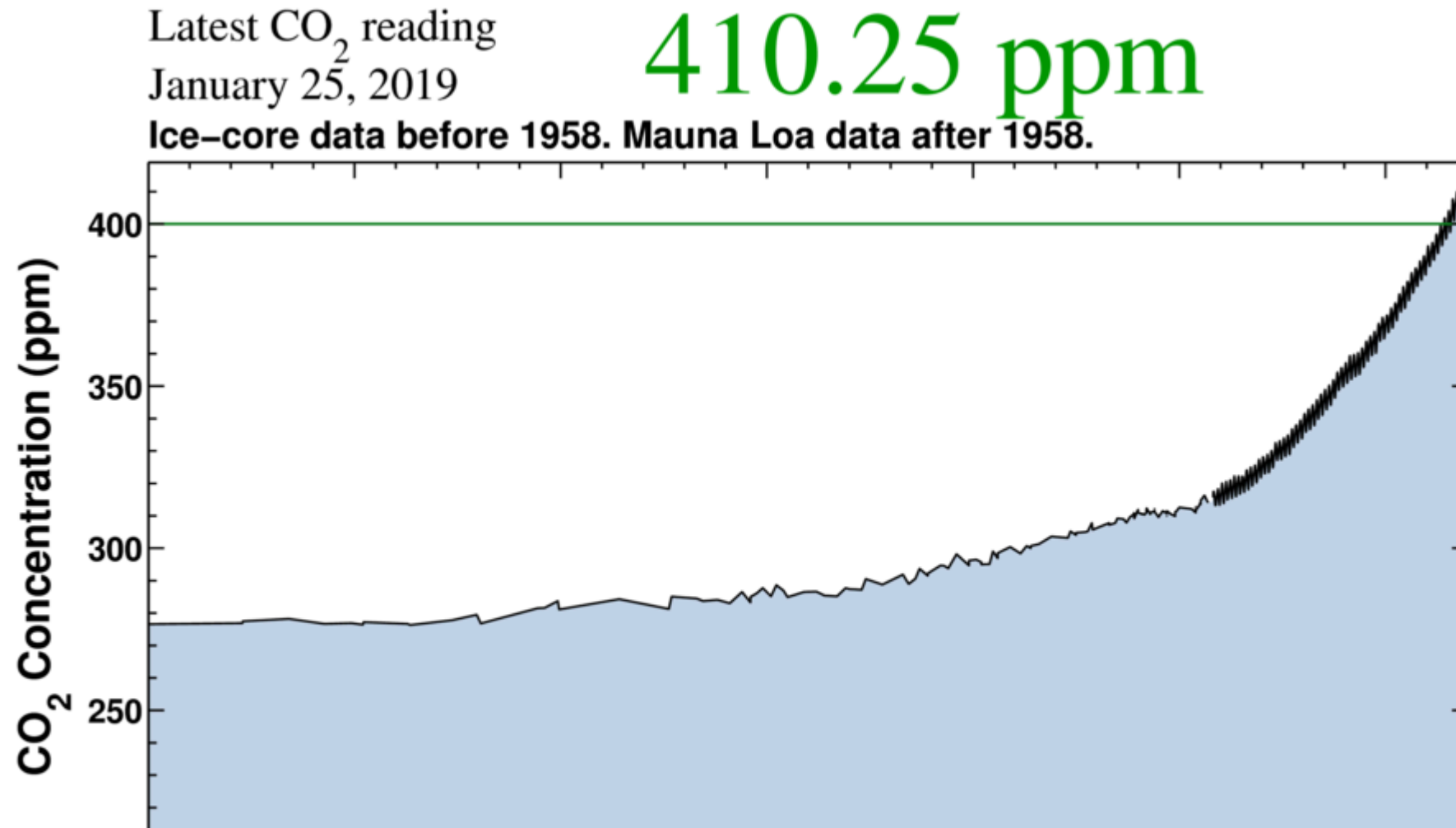
World population growth, 1750-2100



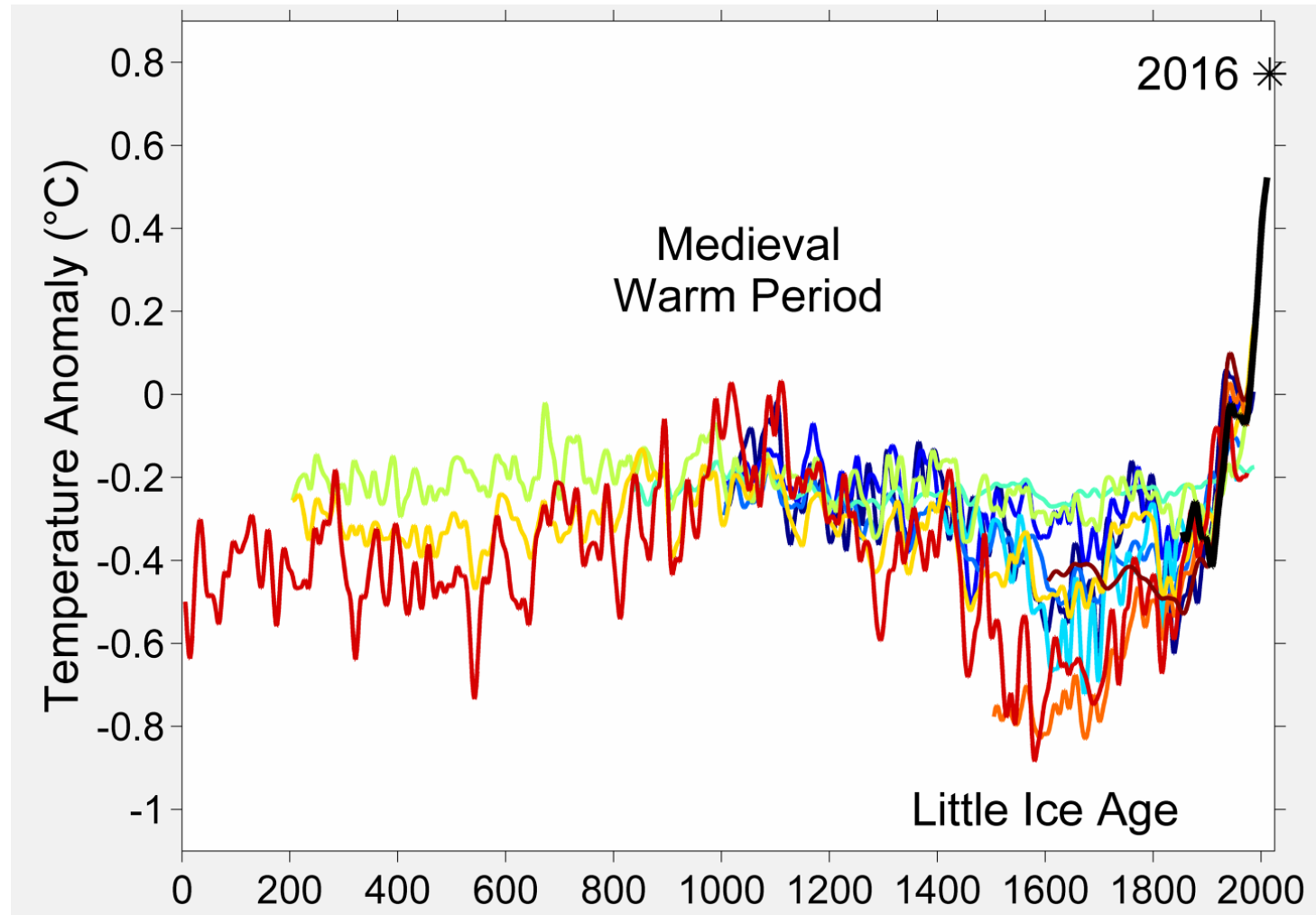
Data sources: Up to 2015 OurWorldInData series based on UN and HYDE. Projections for 2015 to 2100: UN Population Division (2015) – Medium Variant. The data visualization is taken from [OurWorldInData.org](https://ourworldindata.org). There you find the raw data and more visualizations on this topic.

Licensed under CC-BY-SA by the author Max Roser.

Carbon Dioxide over 300 years



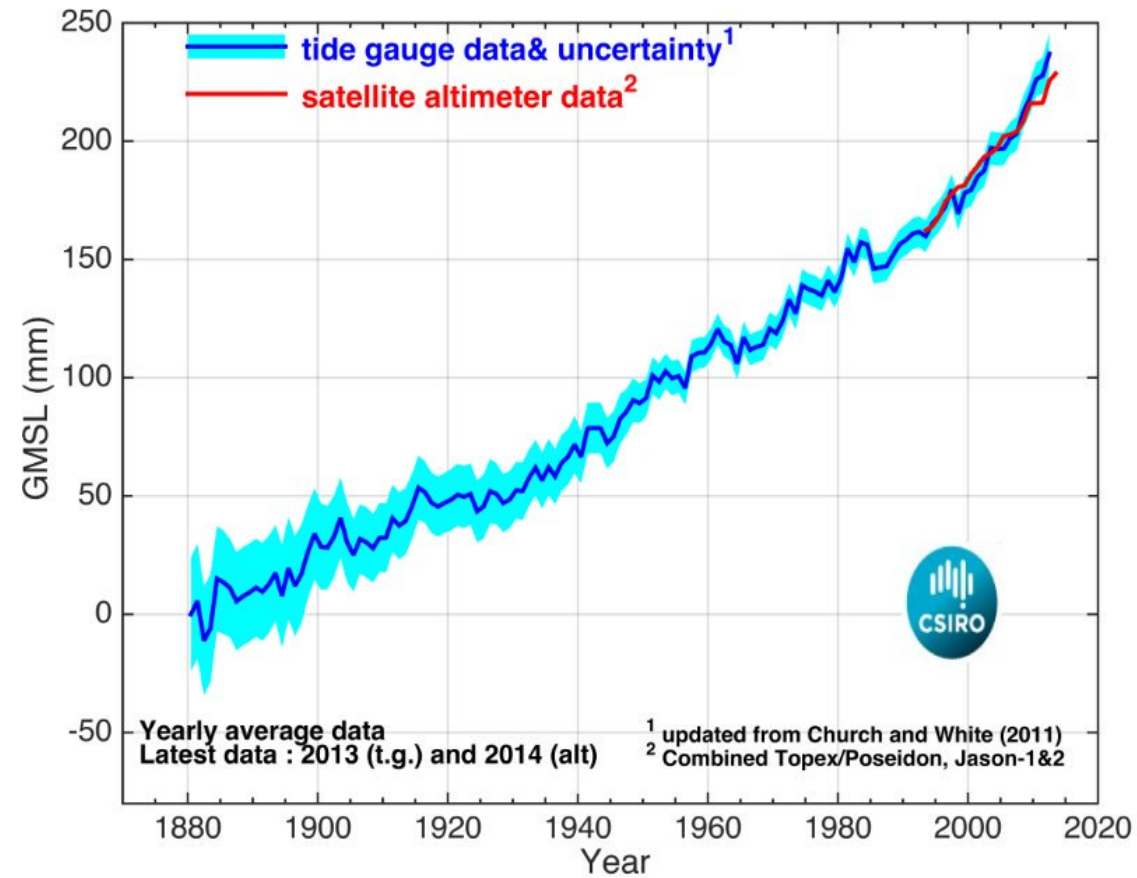
Global temperature over two thousand years



Loss of ice from the Mer de Glace (France) since 1990



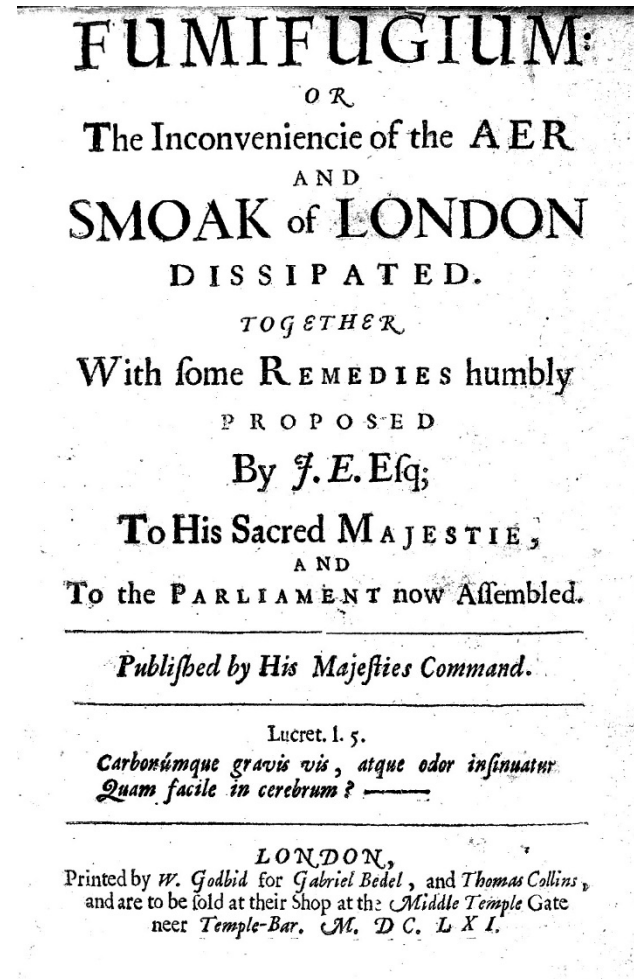
The seas are rising



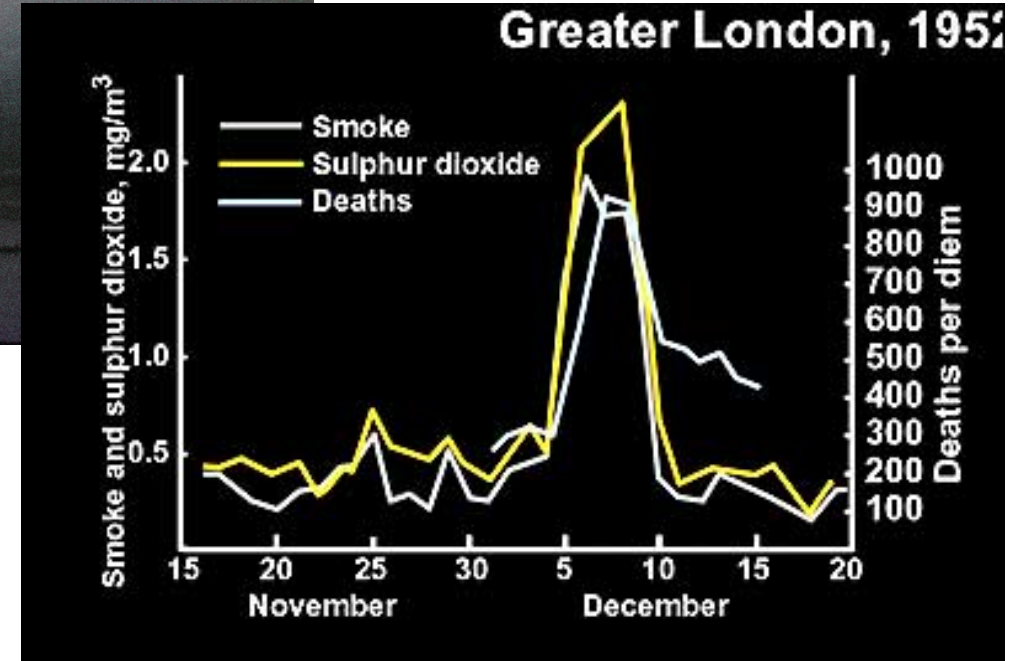
5m loss of soil from Fenlands drained lake bed in 150 yrs



John Evelyn 1661 – London's air pollution problem



Bankside Power Station on a smoggy day (now the Tate Modern)

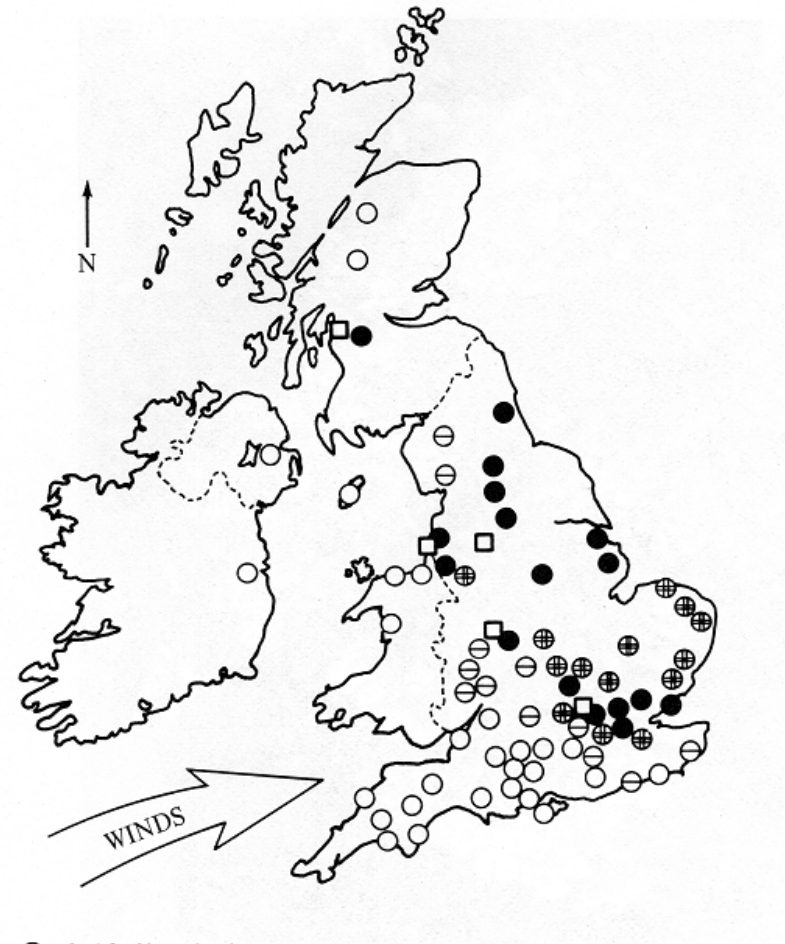


The 1950s, when life was black



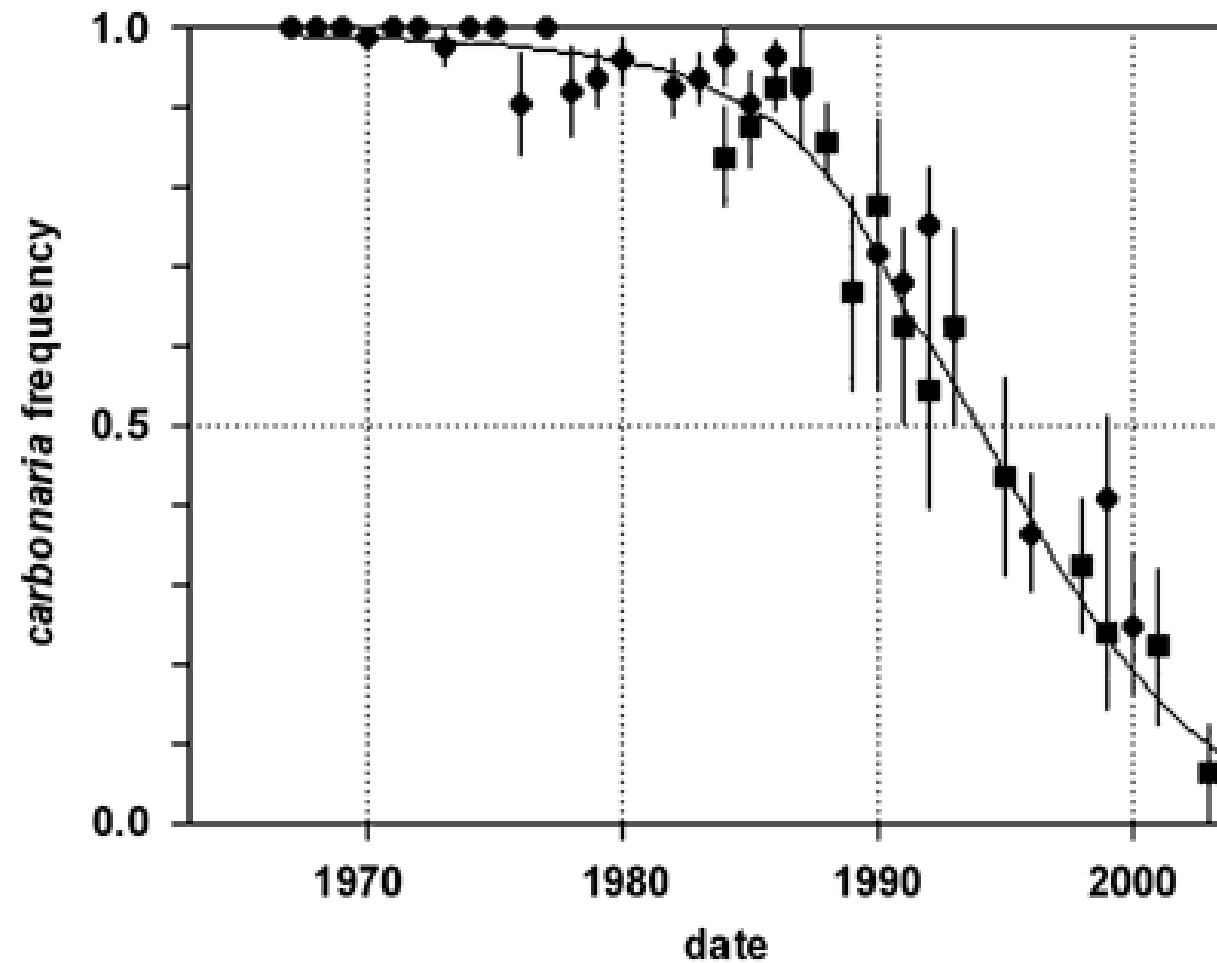


Frequency of melanics in the 1950s

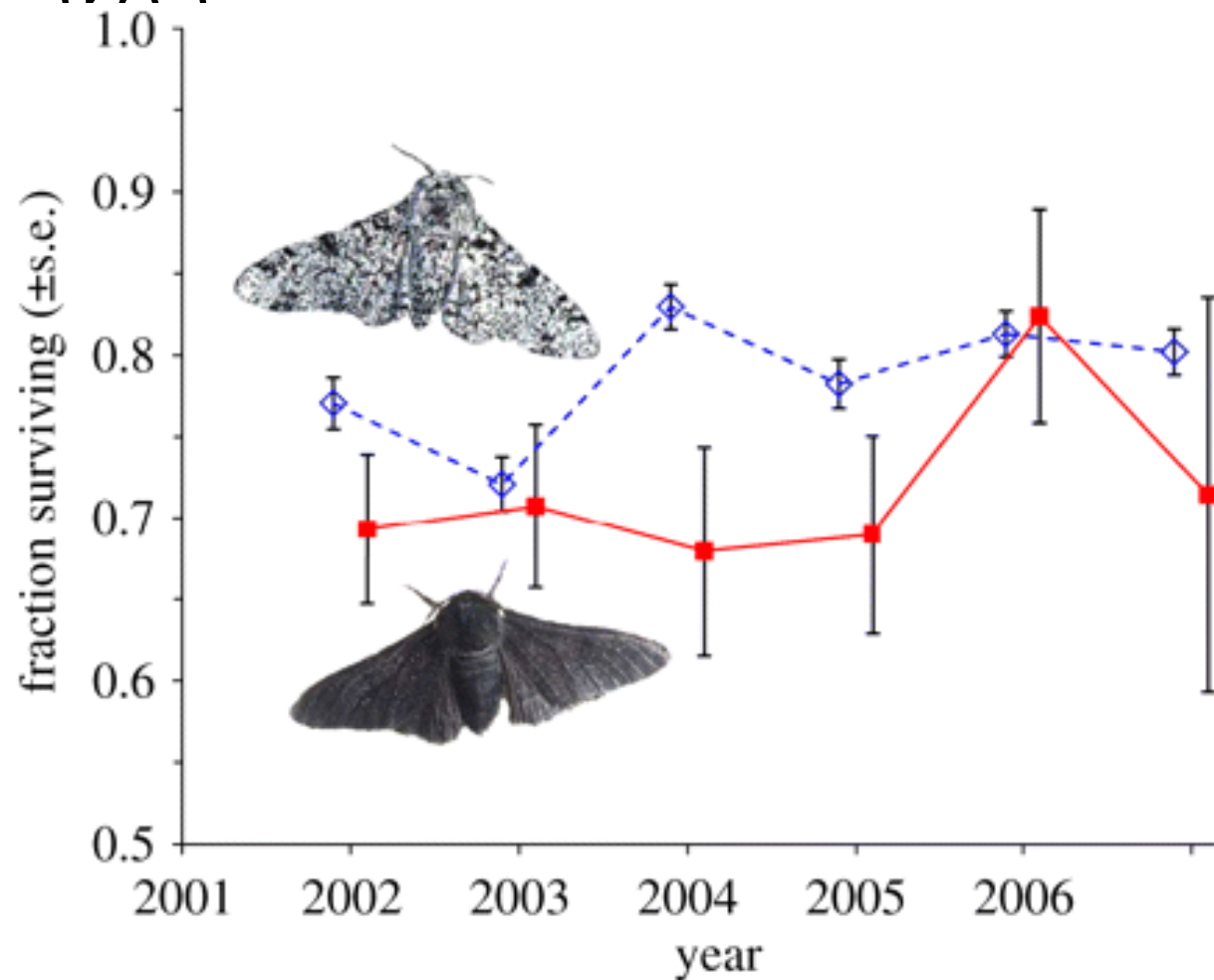


- 0-30 % melanics
- ⊖ 30-60 % melanics
- ⊕ 60-80 % melanics
- 80-100% melanics
- Major industrial center

Decrease in Peppered Moth melanics after smoke control



Survival after release near Cambridge: melanics have 10% lower survival than non-melanics in this low-smoke area





EXPRESS

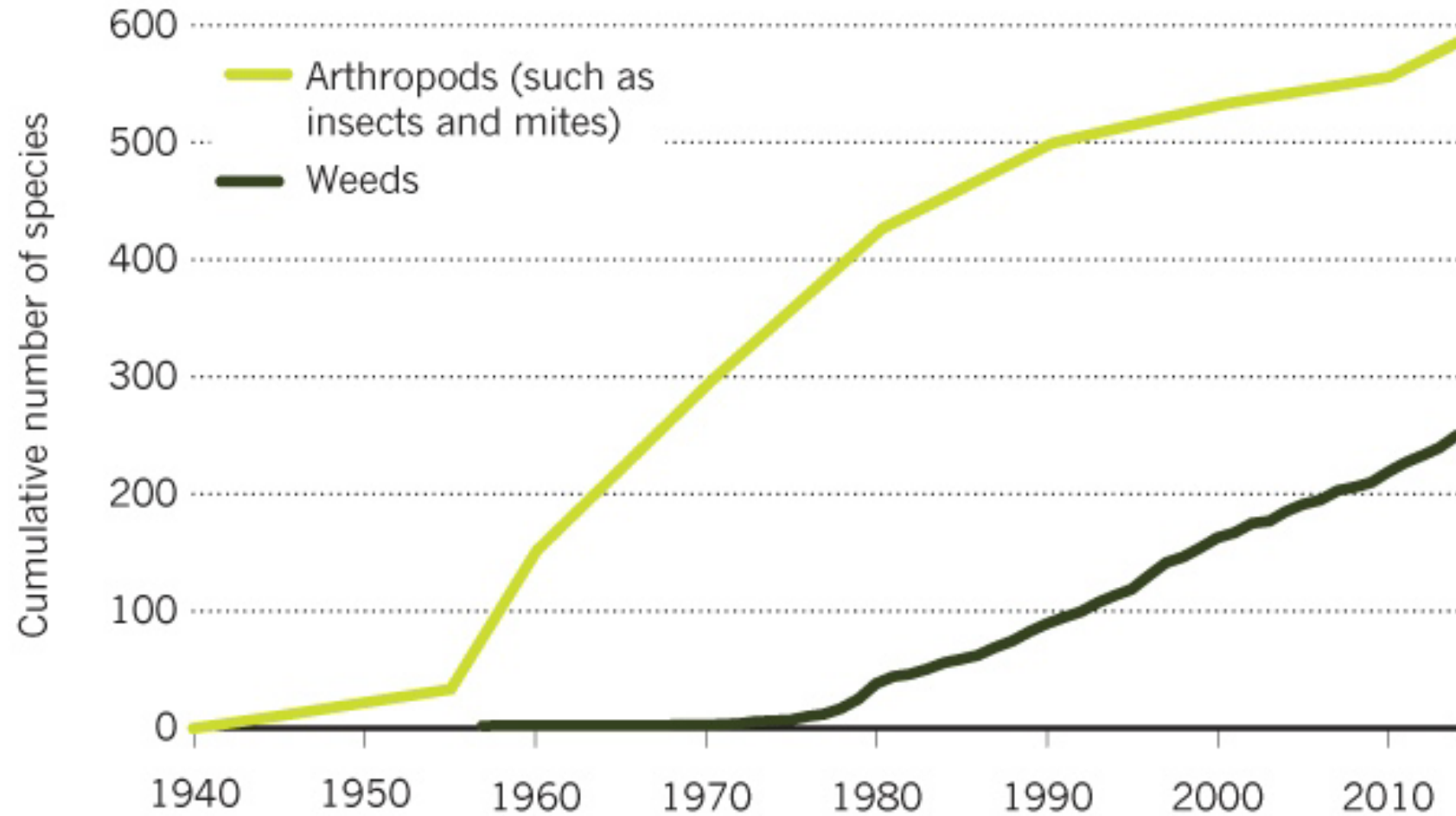
Home of
the Daily and
Sunday Express

BEDBUG WARNING: Blood-sucking 'SUPER' insects 'becoming RESISTANT to insecticides' BLOOD-sucking 'super' bedbugs are increasingly becoming resistant to insecticides seen as the last chemical defence against the pest, a new study warned.

PUBLISHED: 16:46, Mon, Apr 10, 2017 |

UPDATED: 17:02, Mon, Apr 10, 2017

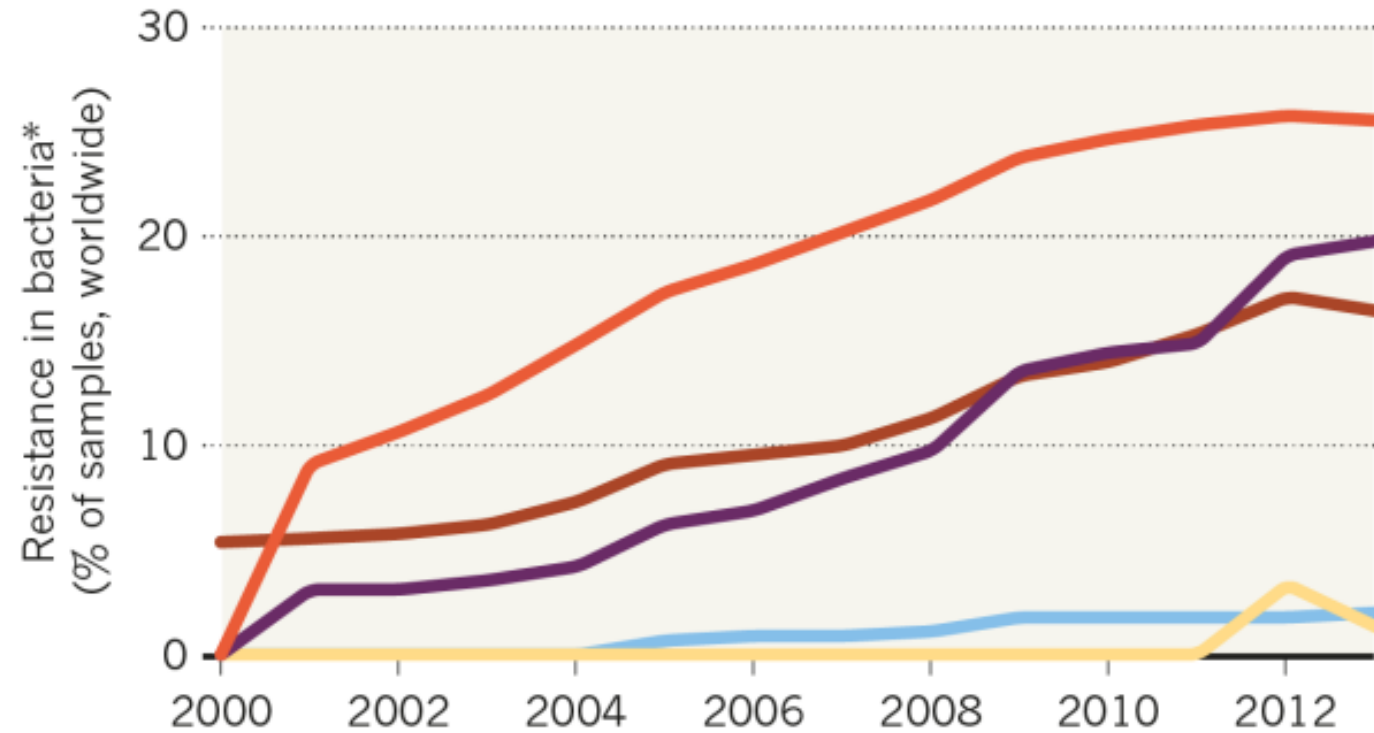
Rise of resistance since the 1940s



THE SPREAD OF ANTIBIOTIC RESISTANCE

An increasing proportion of bacteria display resistance to common antibiotics.

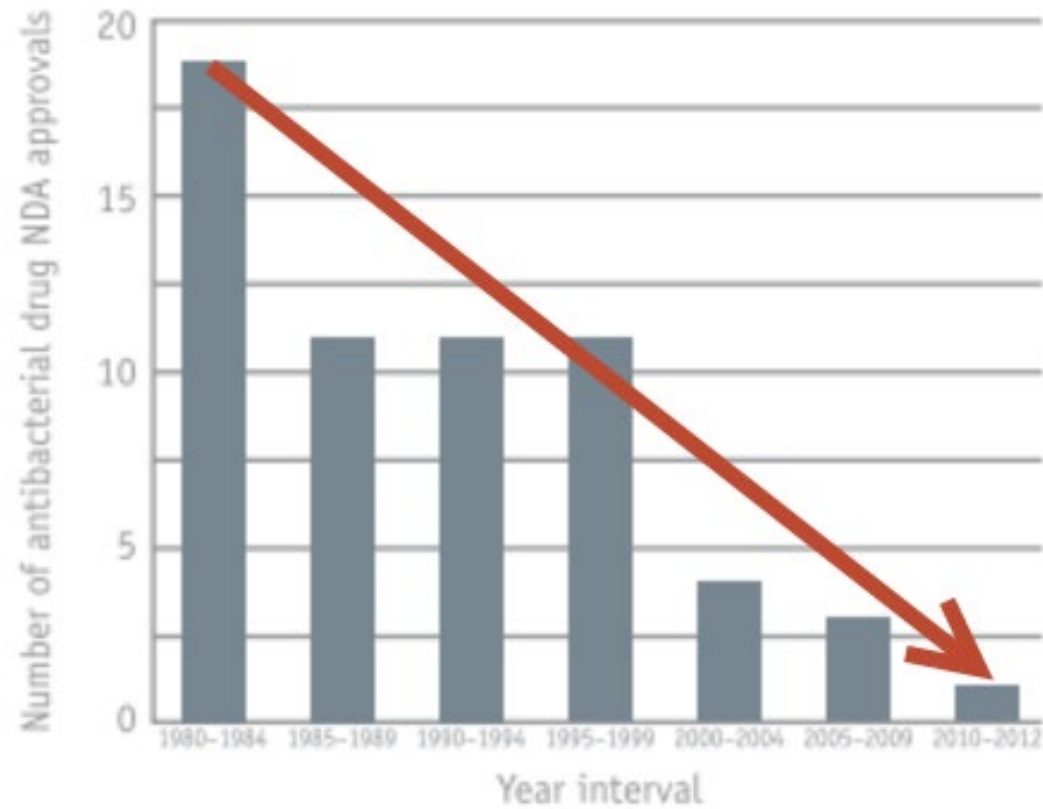
Fluoroquinolones Cephalosporins (3rd gen) Aminoglycosides
Carbapenems Polymyxins



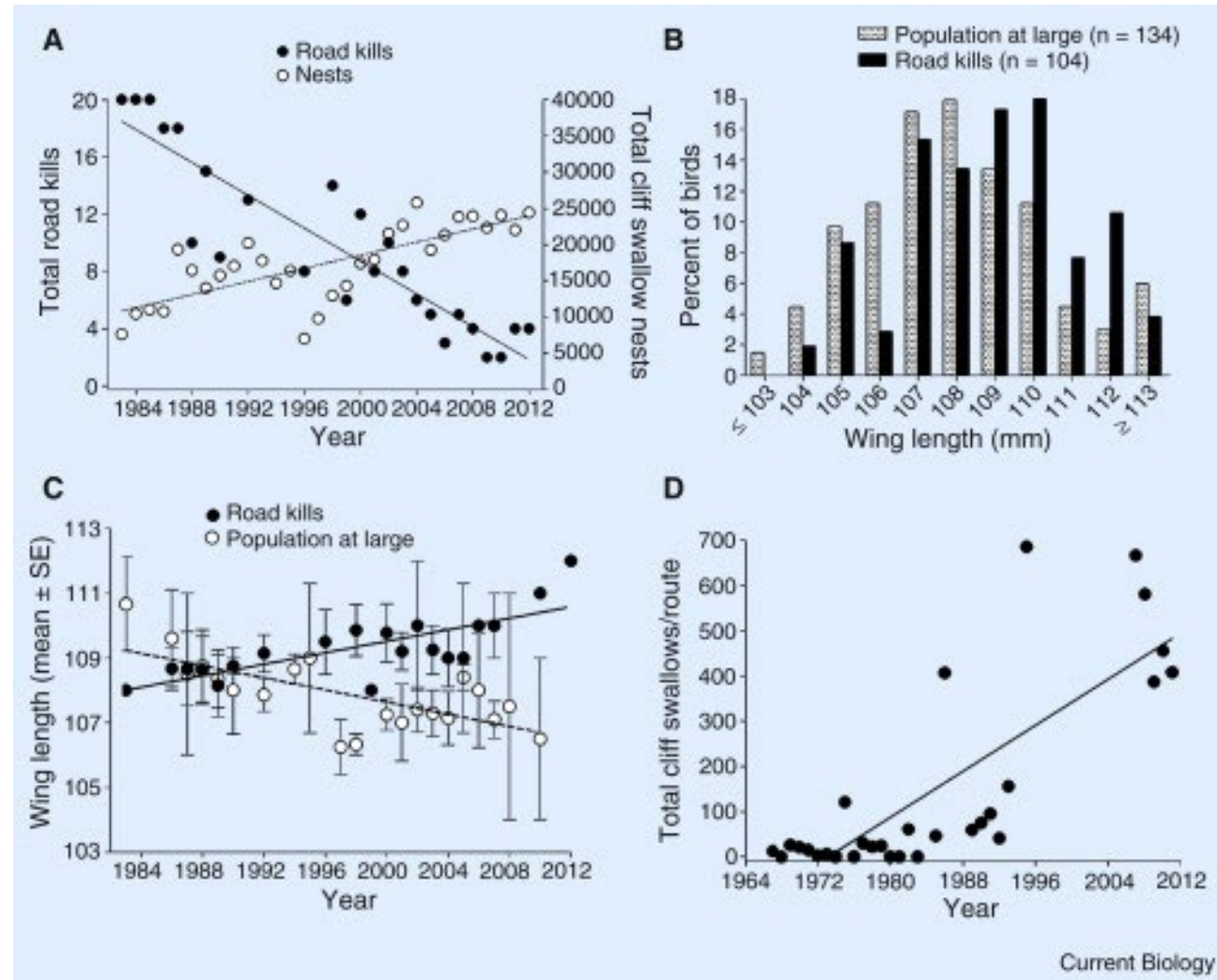
*Enterobacteriaceae, including *Escherichia coli*, *Klebsellia pneumonia*, *Enterobacter* and *Salmonella*

©nature

New antibiotic drug applications for approval 1980-2012



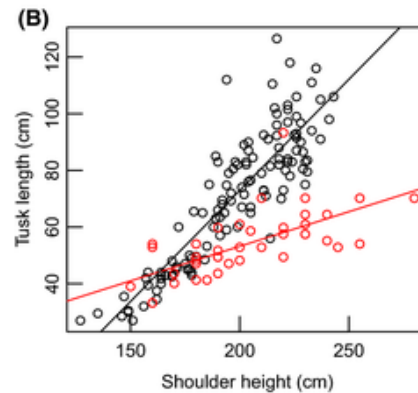
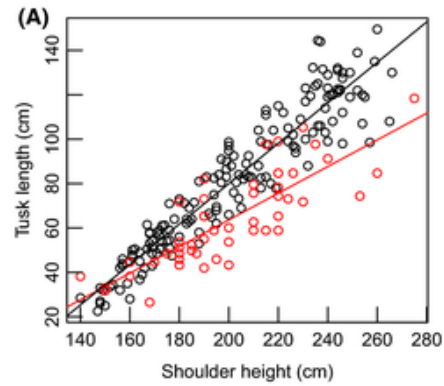
Cliff swifts killed by cars 1980-2012; survivors have shorter wings; wing length decreased by 5%



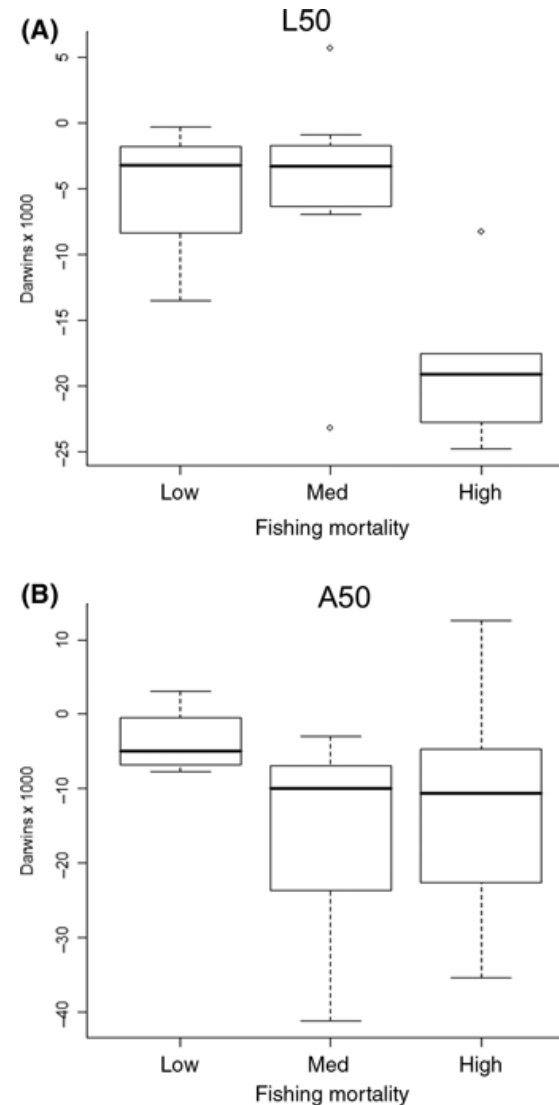
Culex molestus: the London Underground mosquito



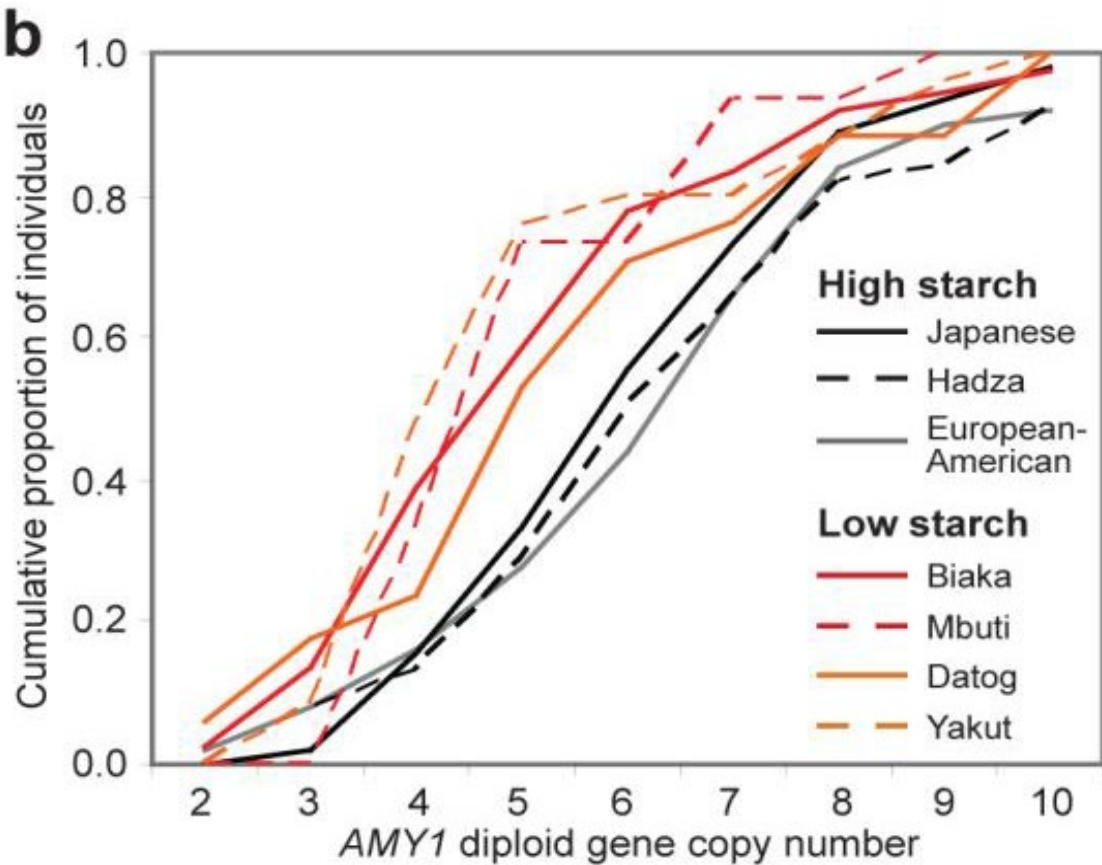
Decline in tusk length in males (A) and females (B) in 1960s (black) and 2005-13 (red). Hunters killed tuskers; evolution responded



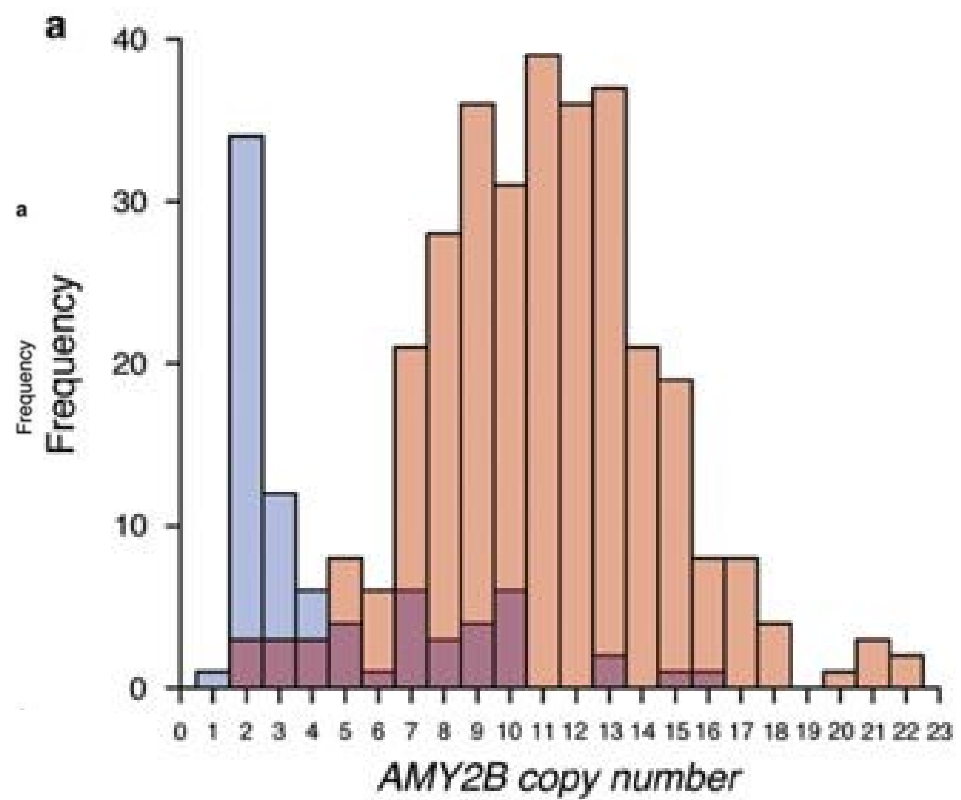
Effects of overfishing on length (top) and age (bottom) at maturity in 150 fisheries; evolve to be smaller and faster-developing



Man the domesticated; more copies of starch-digesting genes in farmers



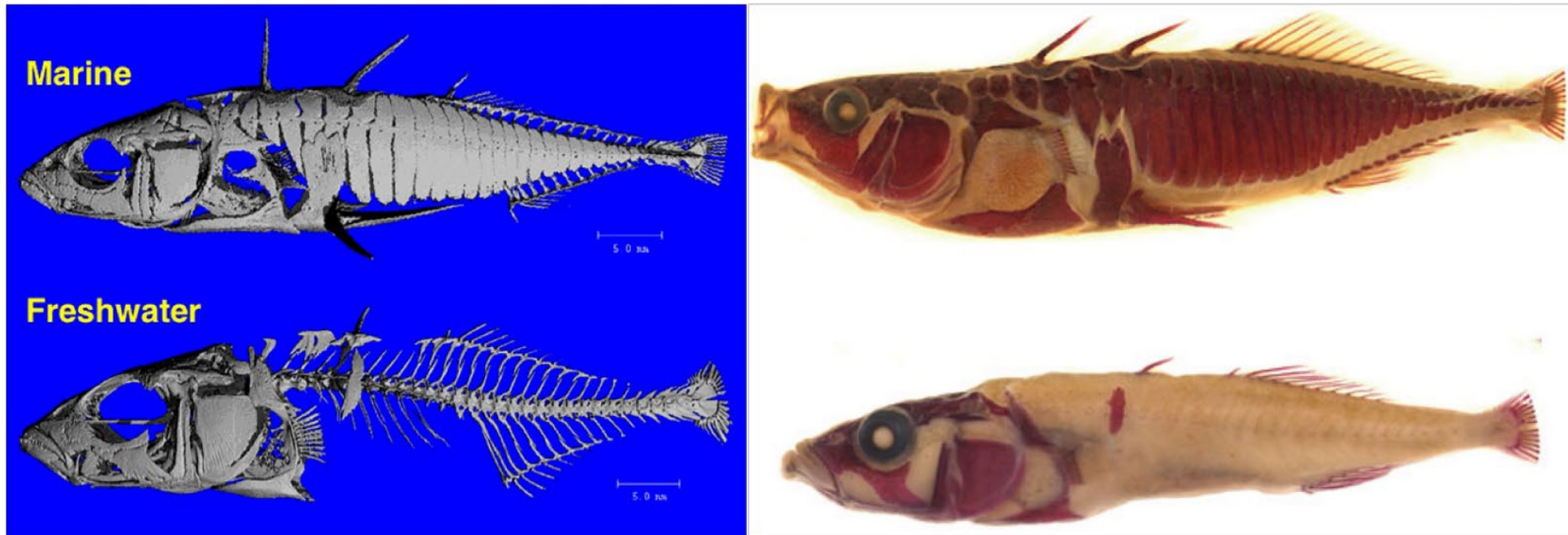
Man the domesticator; number of copies of starch-digesting enzyme gene in dog breeds from farming (brown) and non-farming areas (blue)



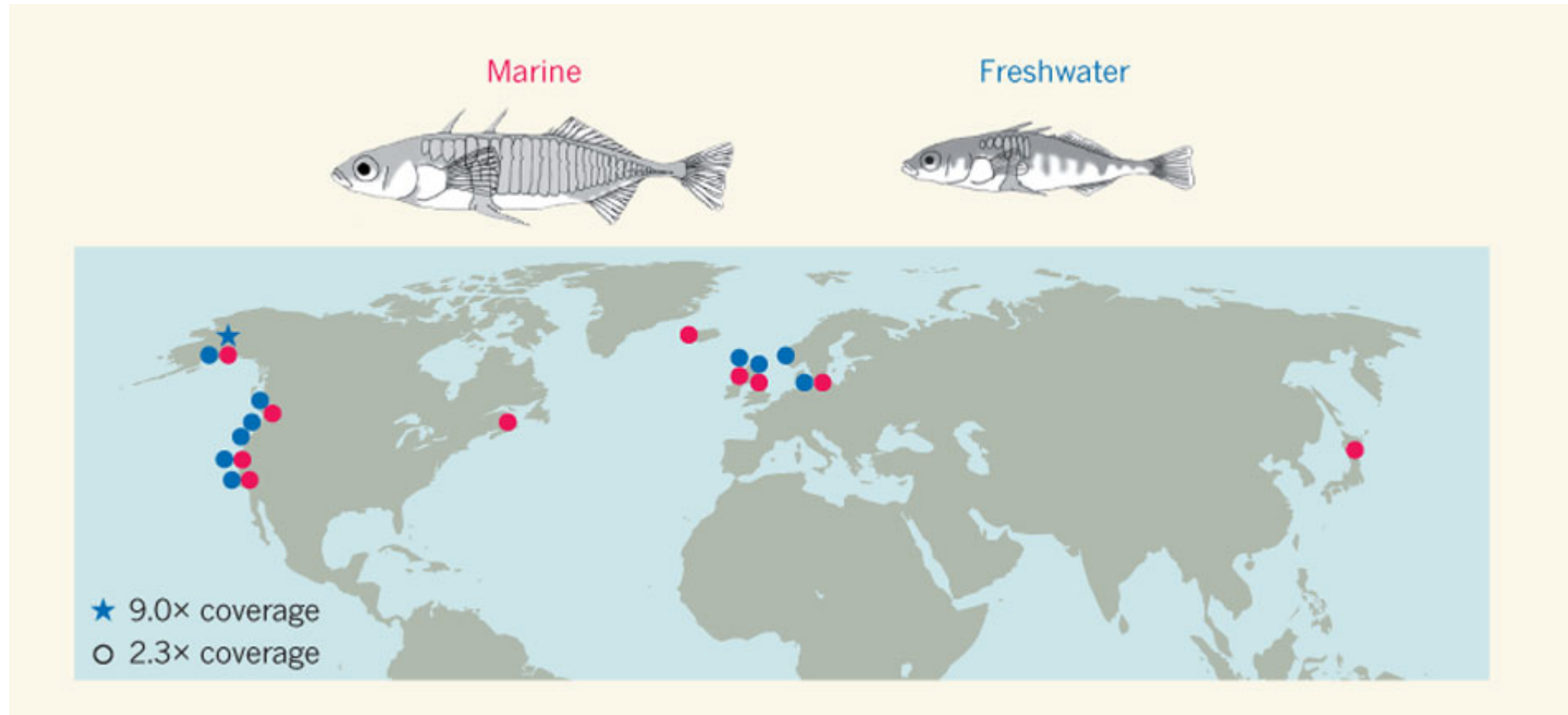
Dim dogs: Numbers of cortical neurones (millions)

• Whales	10 500
• Elephants	11 000
• Horses	1200
• Dogs	160
• Gorillas	4300
• Chimps	6200

Marine and freshwater sticklebacks



Repeated evolution of freshwater sticklebacks from marine



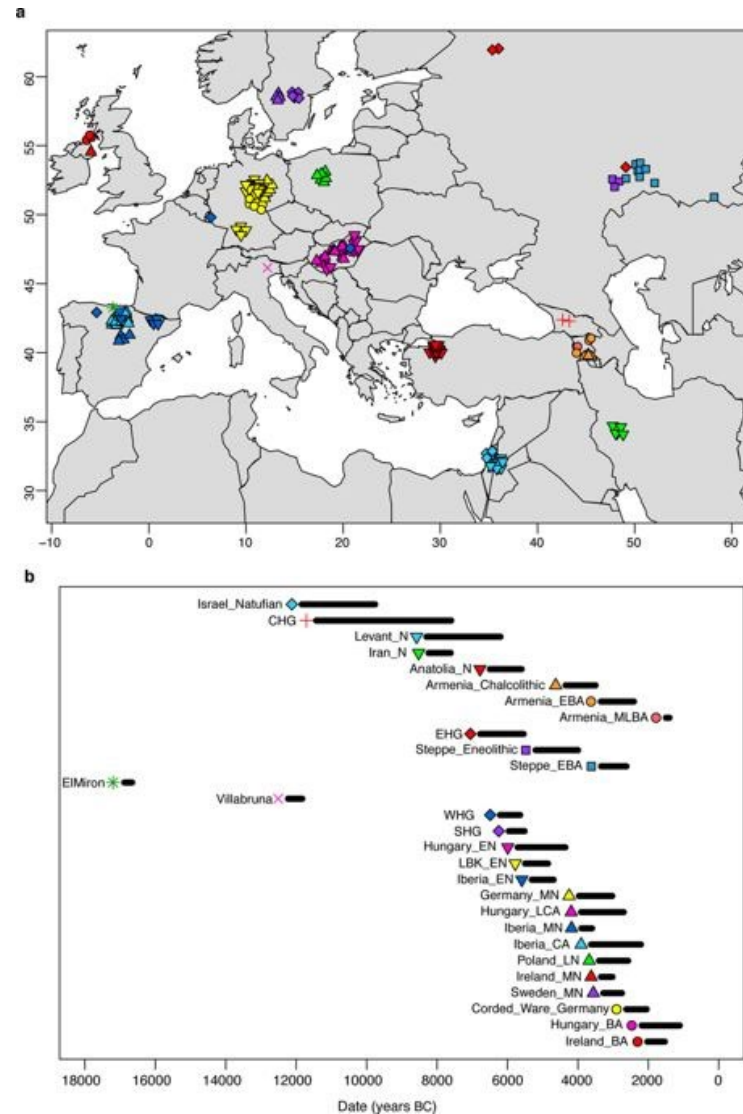
The Gibraltar Neanderthal (discovered c1840)



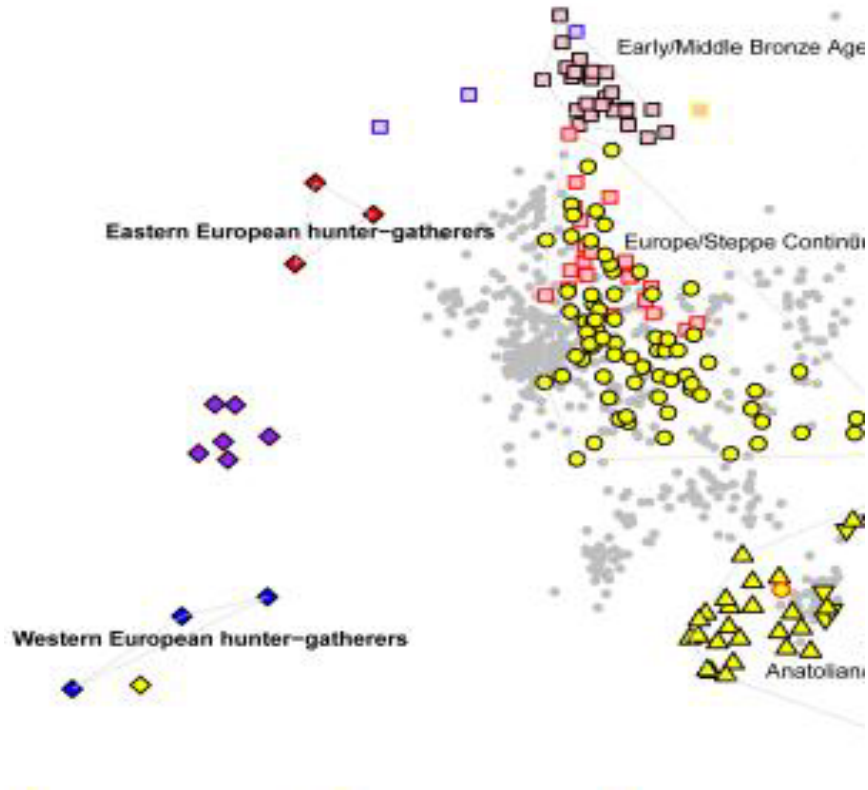
Man the Migrator: Cheddar Man c 10 000 years ago; reconstructed from ancient DNA



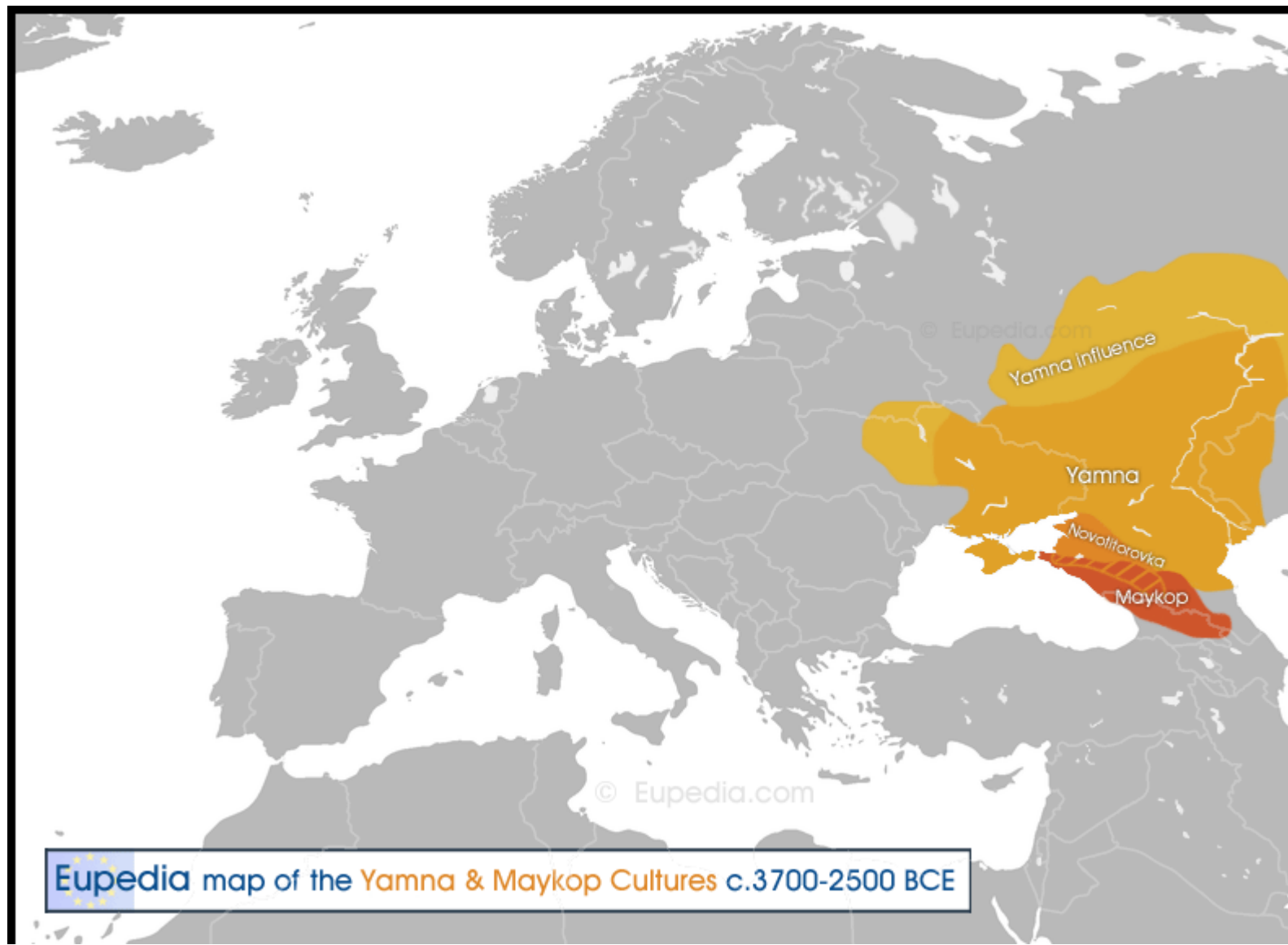
Ancient DNA sites from 20000 to 2000 yrs ago



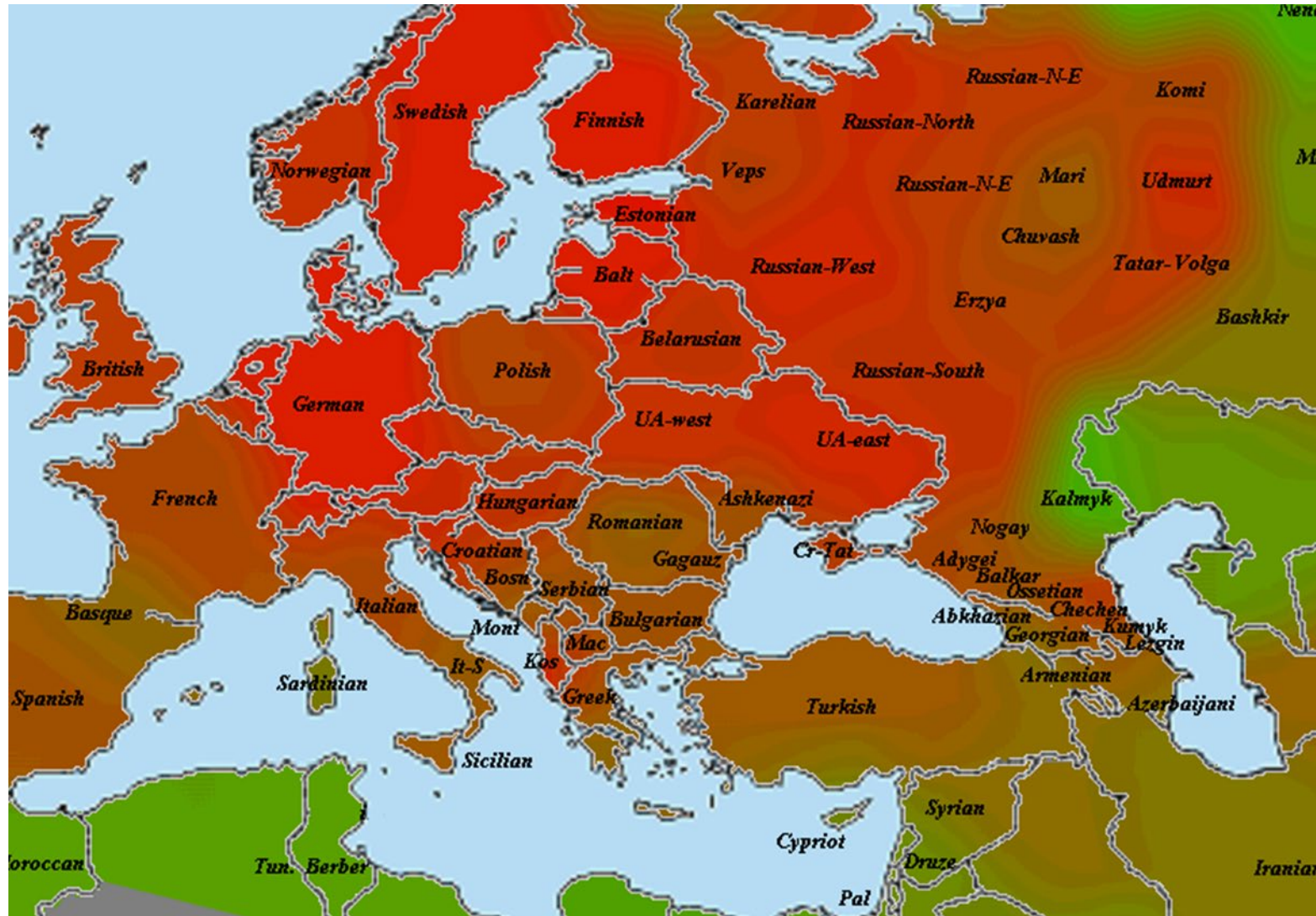
Genetic similarities of c5000-yr old Europeans compared with moderns (grey dots). Almost no modern Europeans share ancestry with local hunter-gatherers



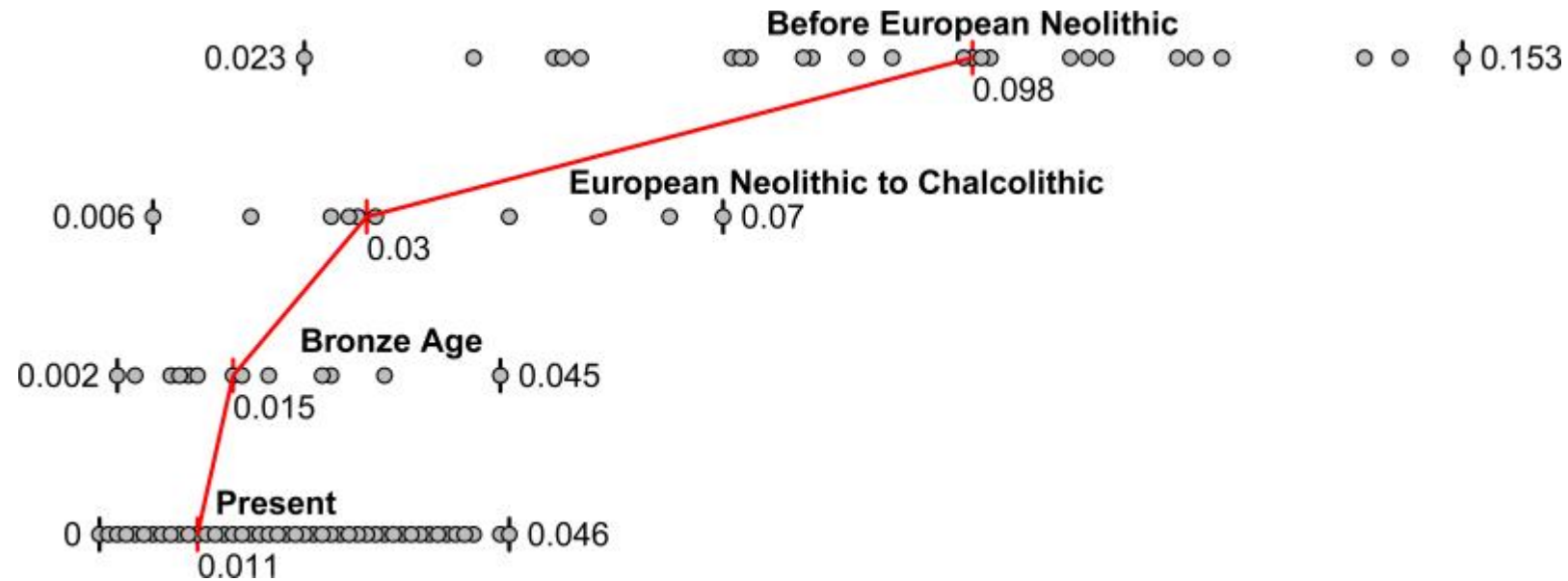
The Yamnaya homeland



Yamnaya gene proportion (red) in modern Europe



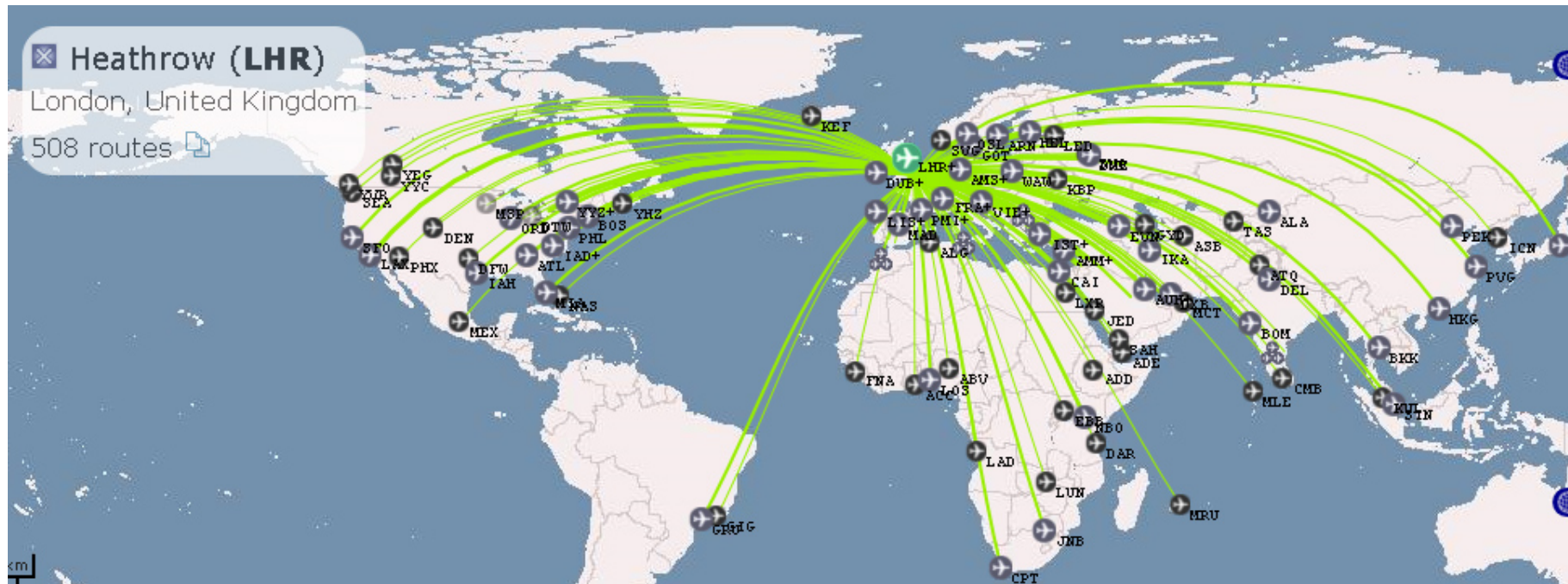
Reduced divergence among European populations 9ky, 6ky, 3ky, and today; a takeover by the Yamnaya horse-riders



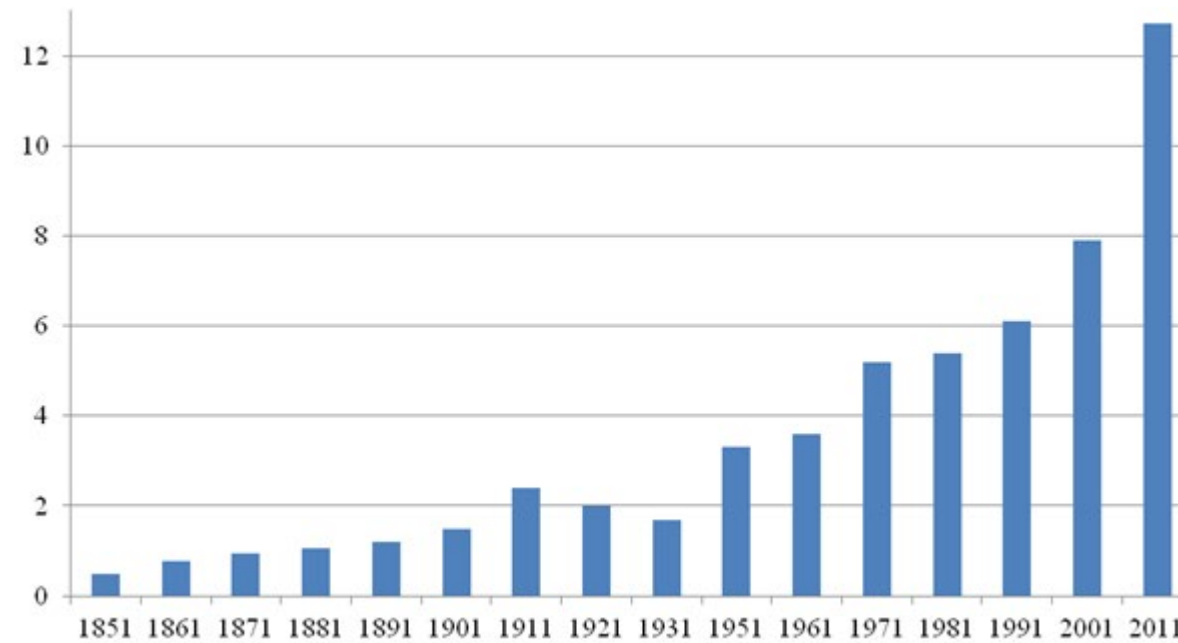
Dramatic shift in British genes at c 2450 BC – almost complete replacement by Yamnaya genes from the steppes



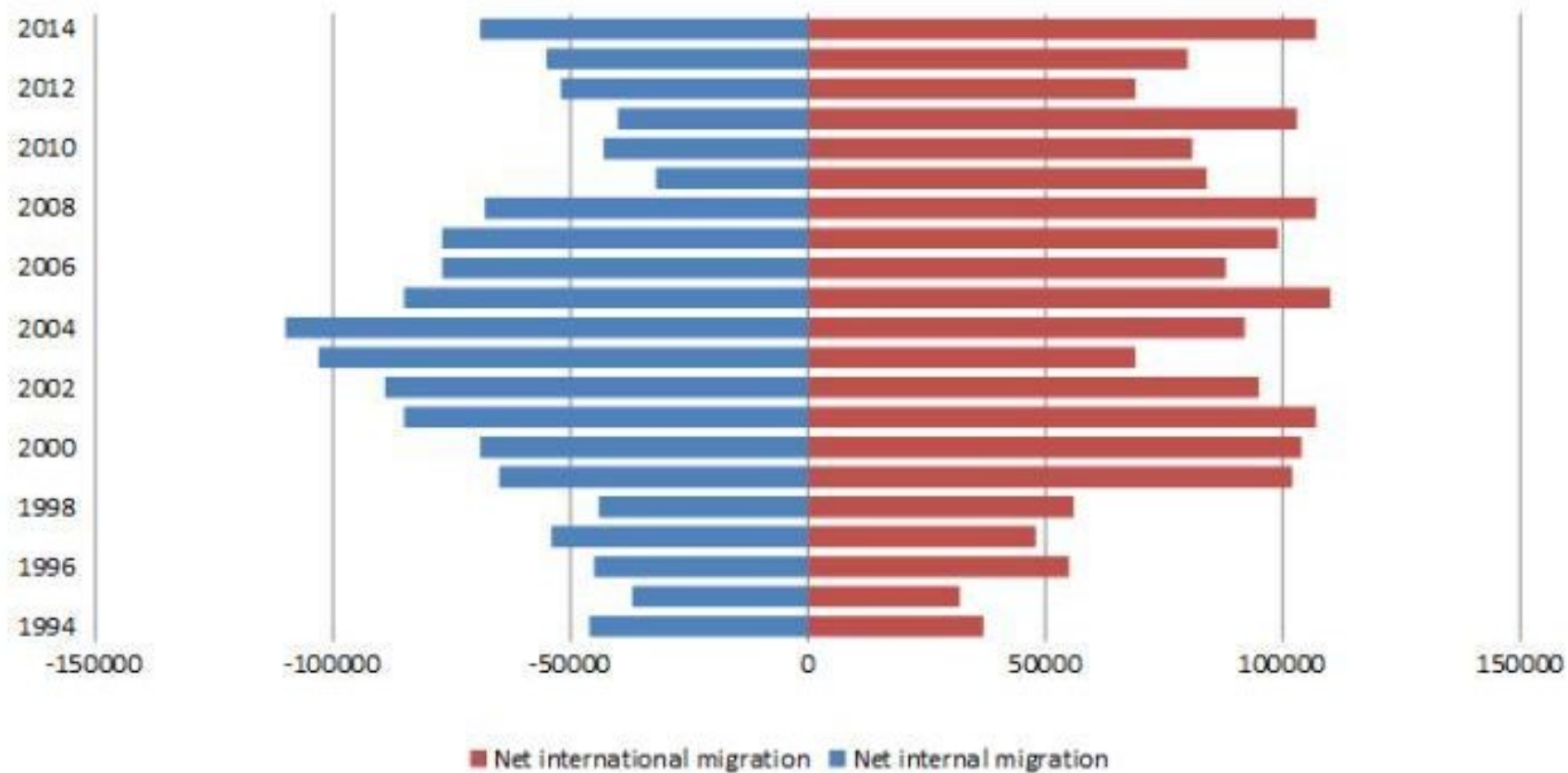
Genes and the 747 – direct flights from Heathrow



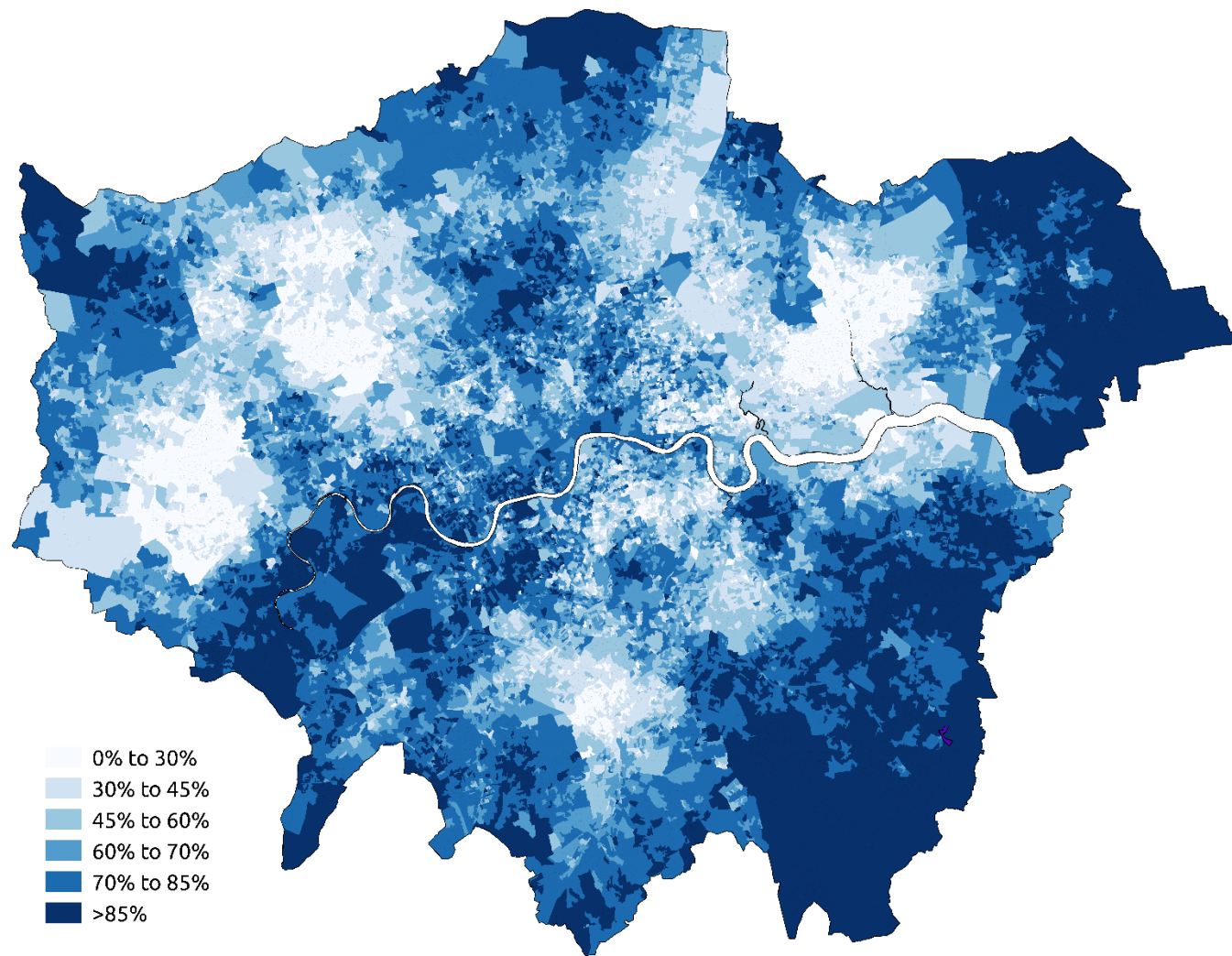
Proportion of foreign-born in England and Wales, 1851-2011



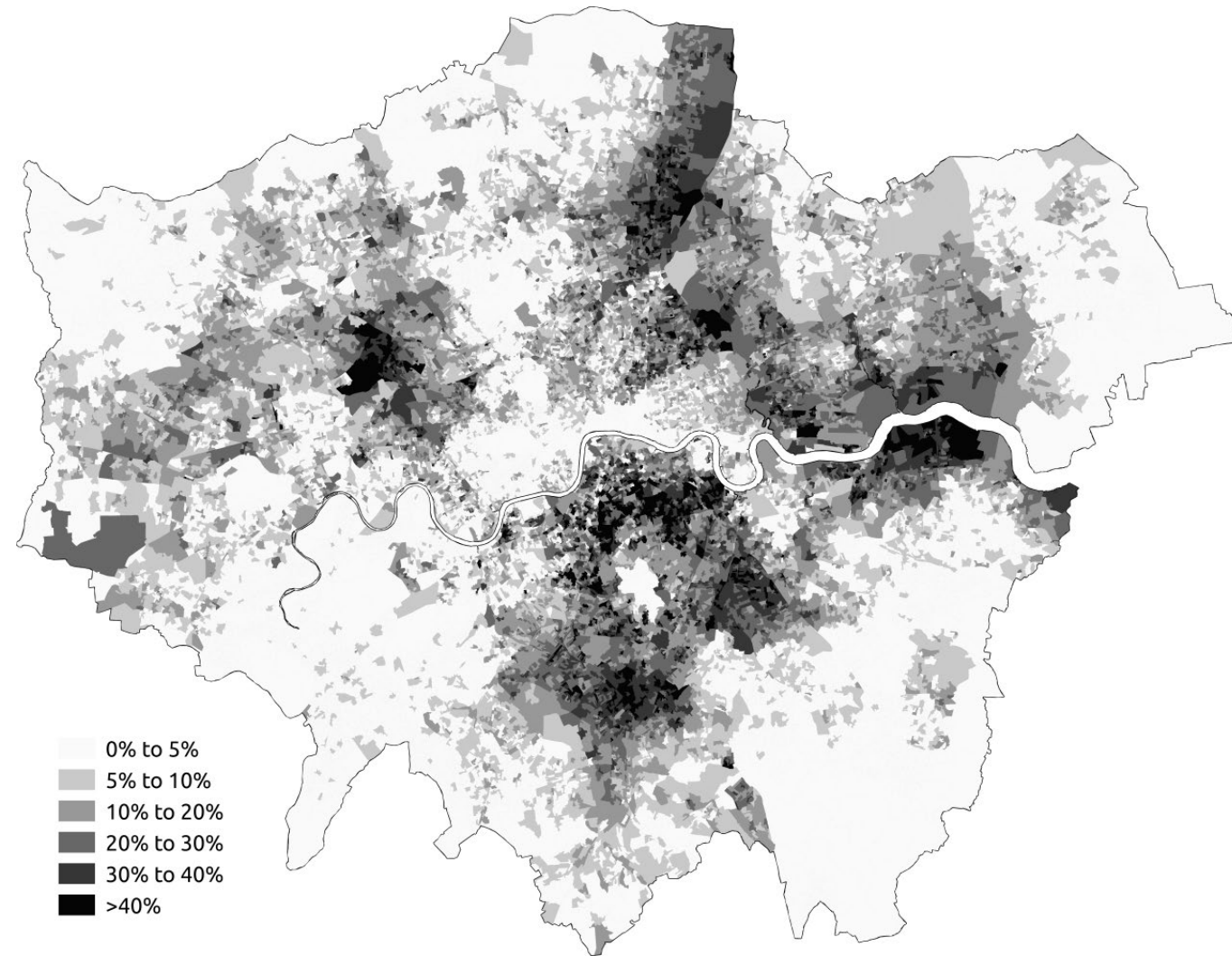
Changing London's identity : Net Internal (blue; within UK) and international migration (red) into and out of London 1994-2014



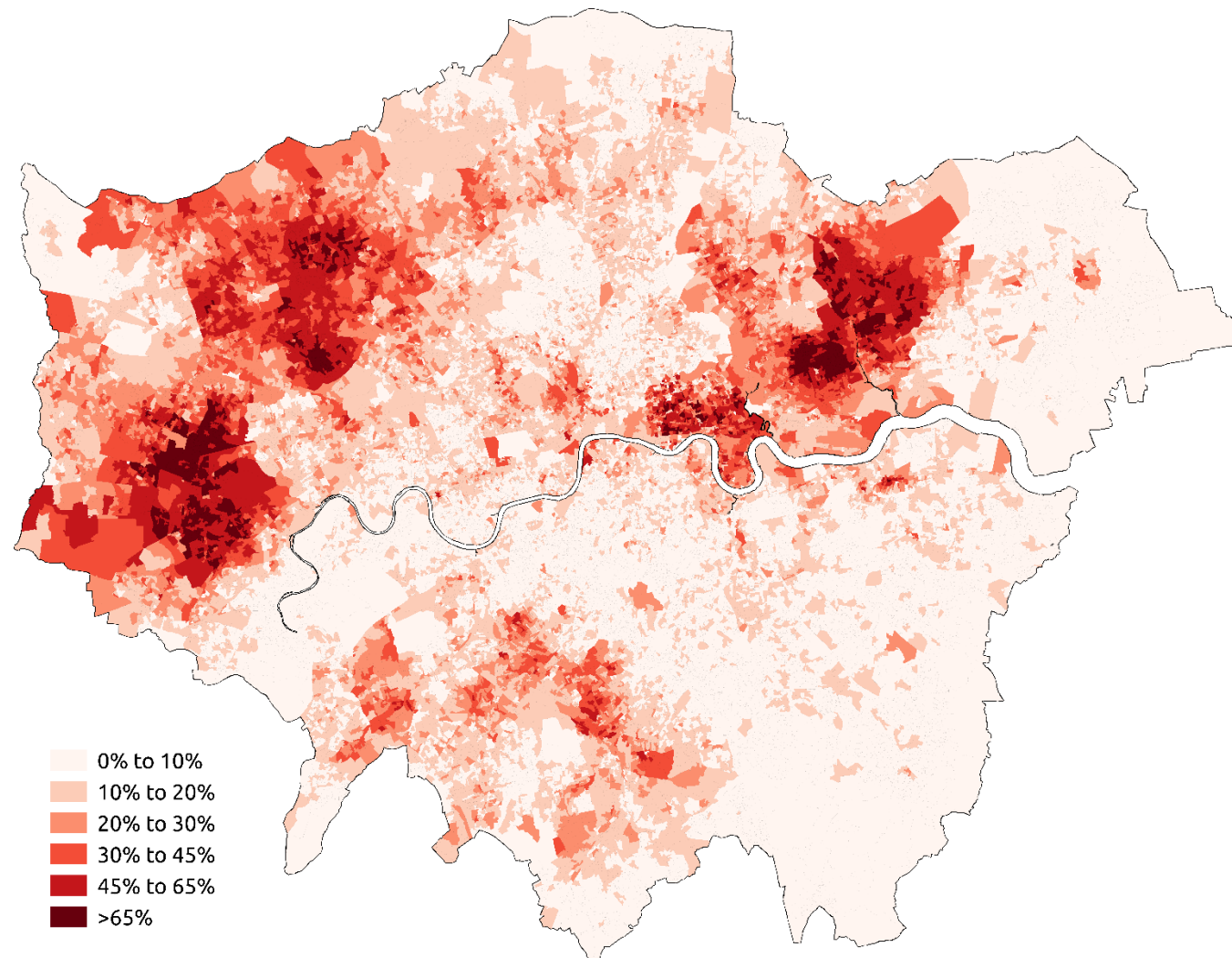
White Londoners as a proportion of total



Proportion of African and Afro-Caribbean Londoners



Proportion of Asian Londoners



William Hogarth, *Noon*, 1736



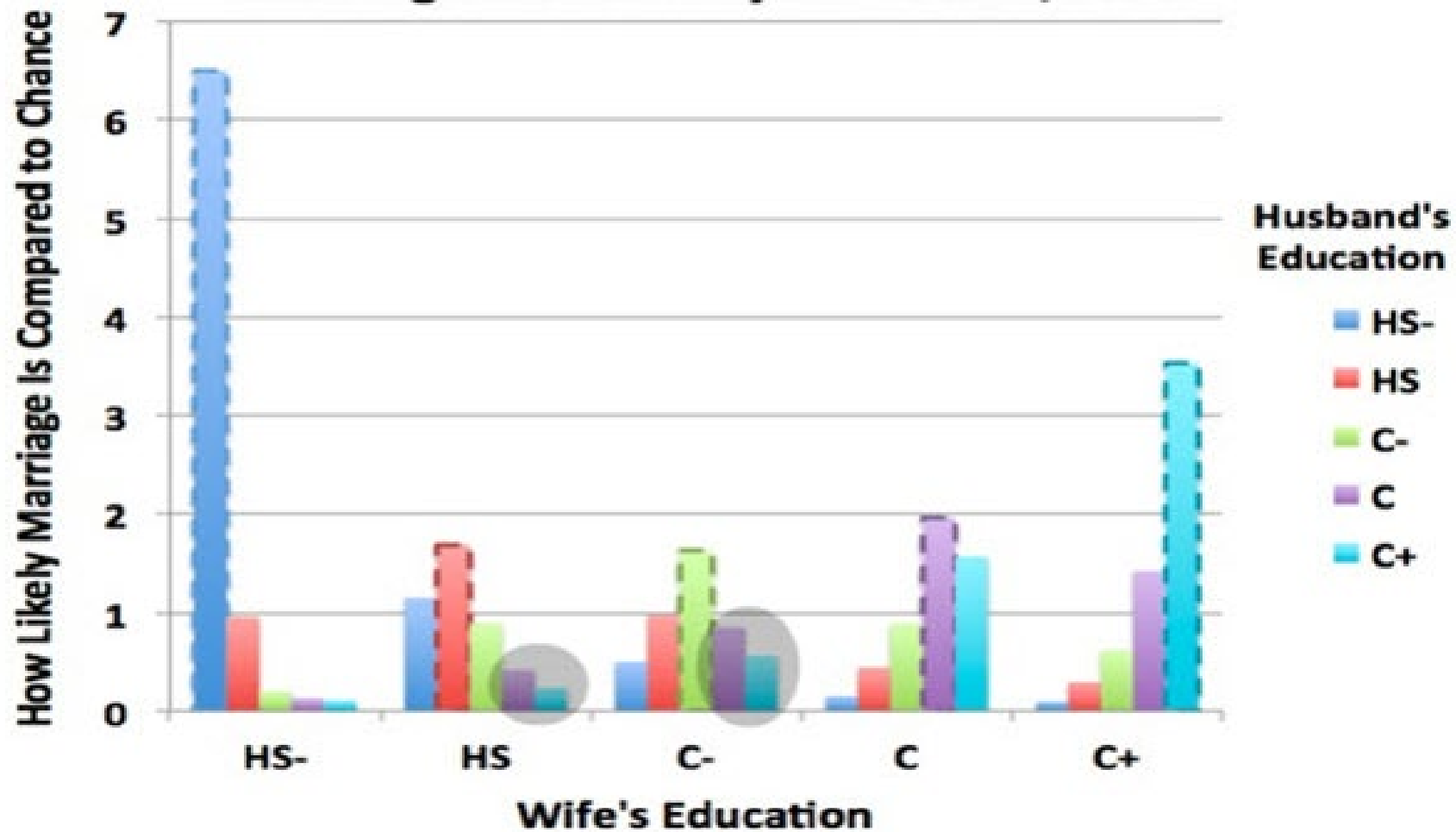
Olaudah Equiano and his plaque

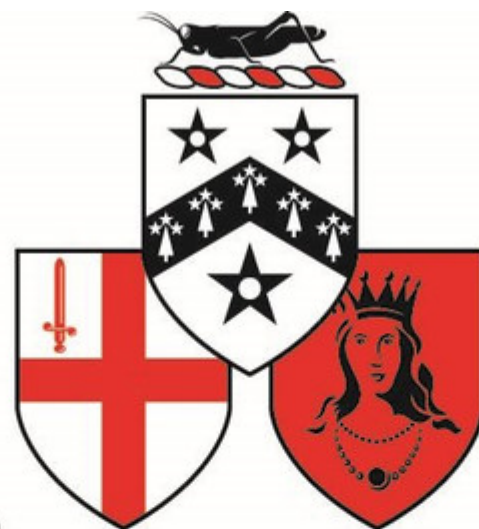


Francis Barber and a modern descendant



Mate choice by education level (US). Less than high school, high school only, less than college, graduate, postgraduate. Vertical axis – increase in chance of mating with person of same education





GRESHAM COLLEGE

Founded 1597

