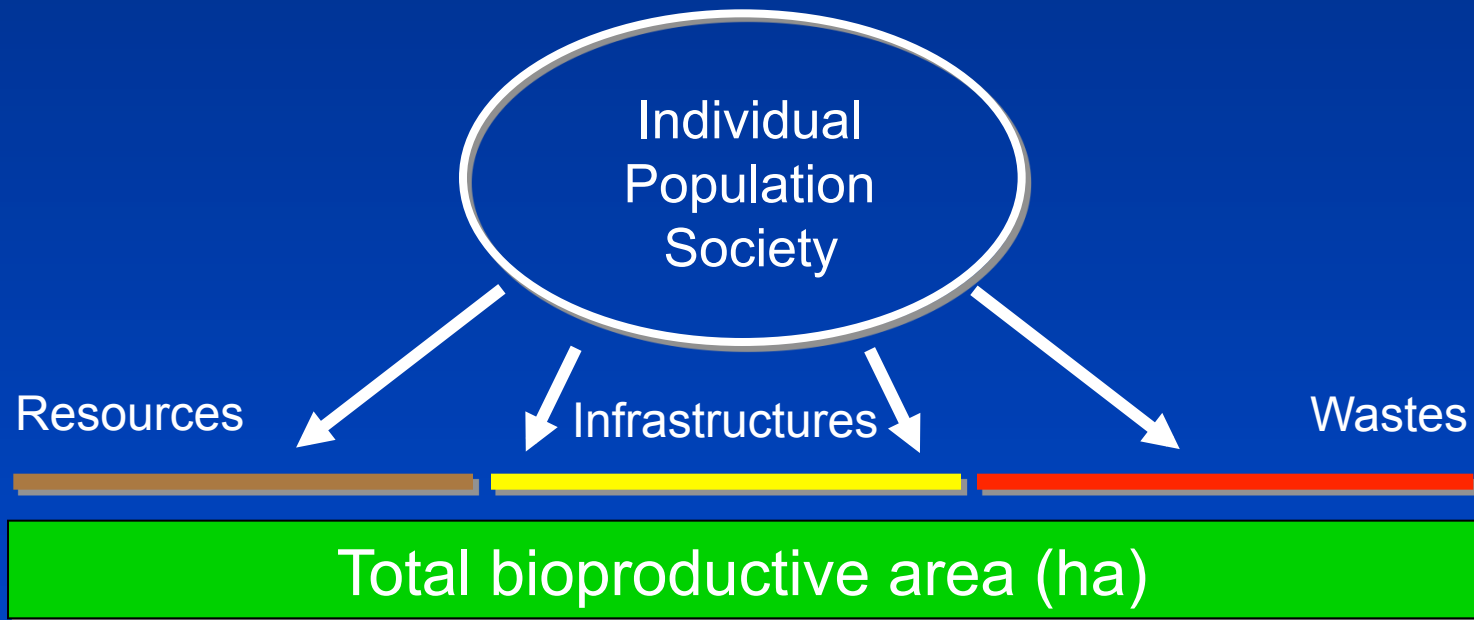
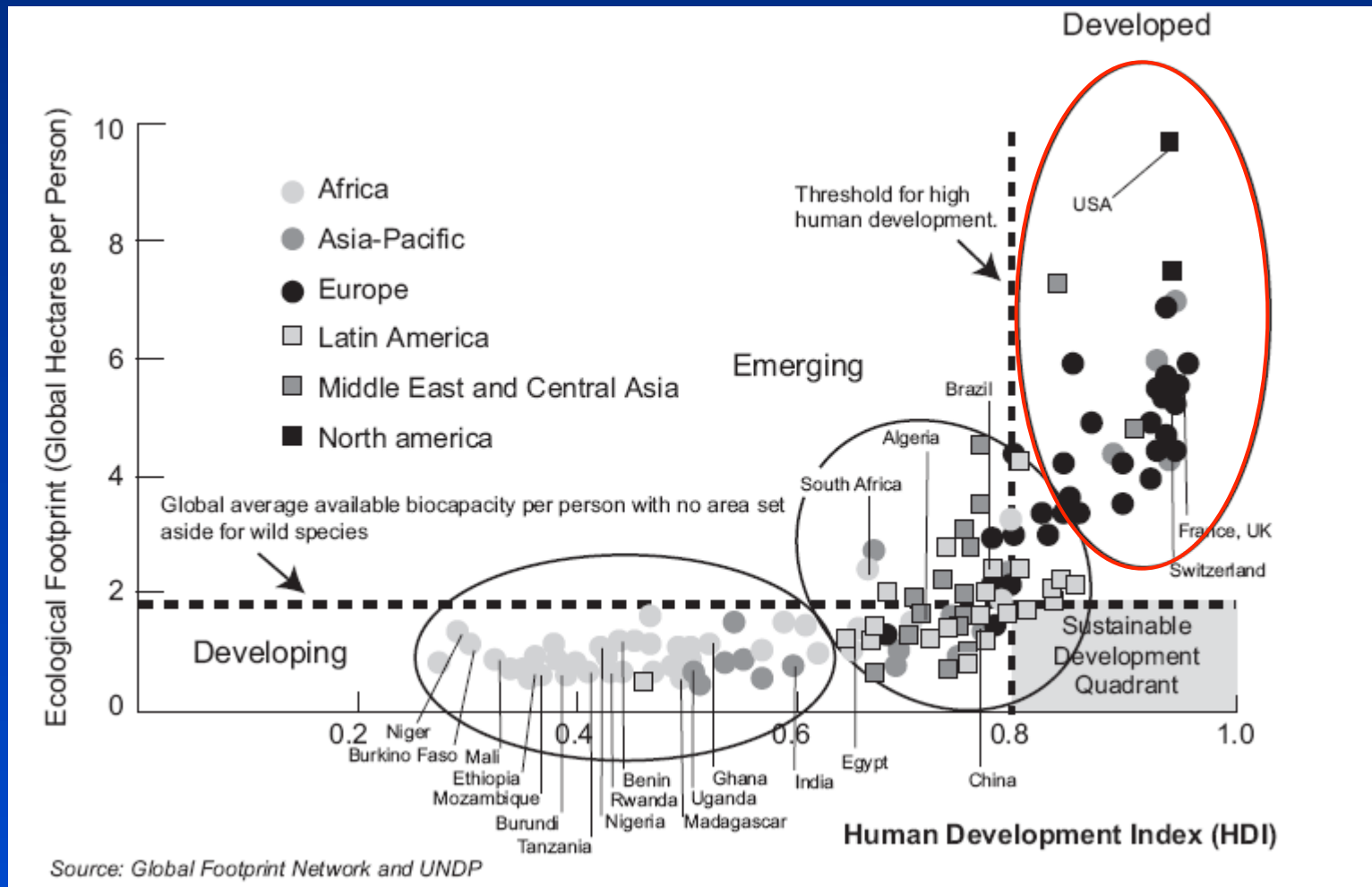


Ecological footprint

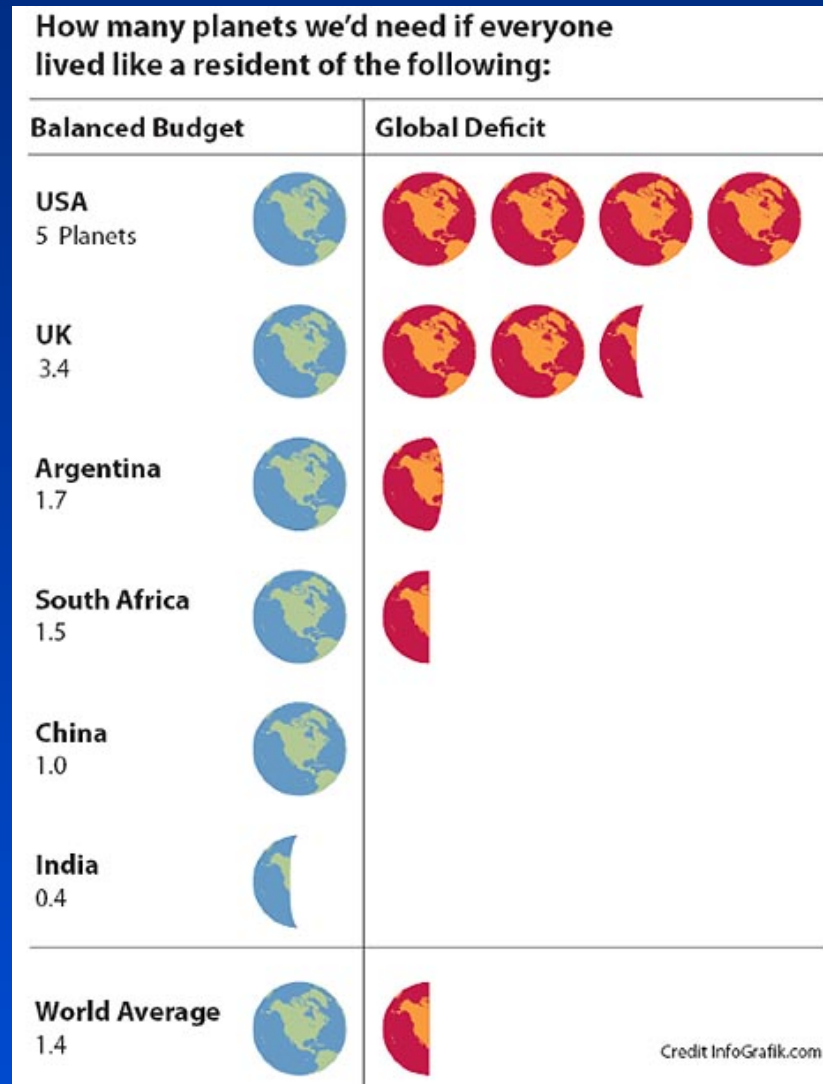
Mathis Wackernagel & William Rees (1990)



Ecological footprint contemporary dimensions



The ecological “debt”



Anthropocene



Crutzen, P. J. & Stoermer, E. F. The Anthropocene. IGBP Global Change Newsl. 41, 17–18 (2000)

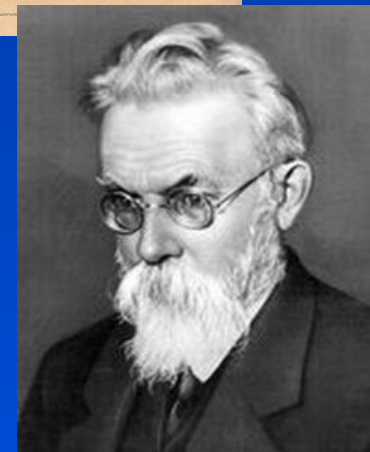
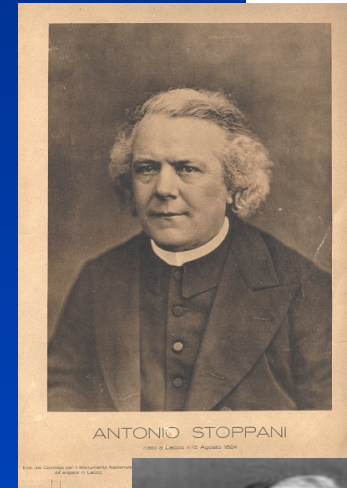
“Considering these and many other major and still growing impacts of human activities on earth [...] it seems to us more than appropriate to emphasize the central role of mankind in geology and ecology by proposing to use the term “anthropocene” for the current geological epoch.” [...]

Anthropocene: the precursors

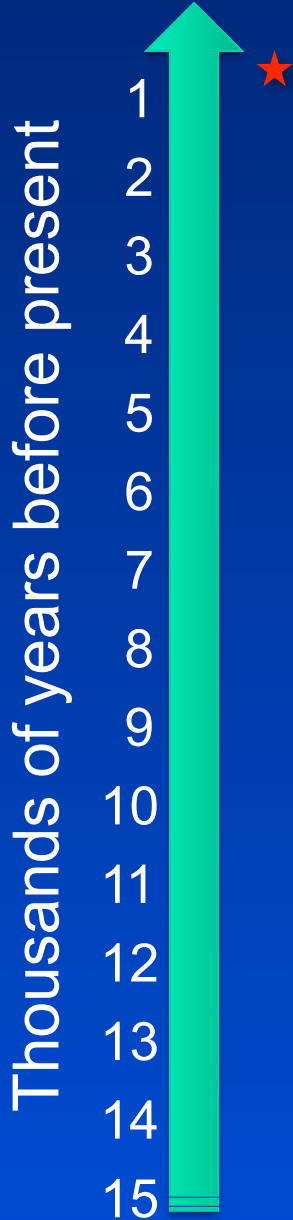
1864 – George P. Marsh
Man and Nature

1873 – Antonio Stoppani
Era Antropozoica
man as “a new telluric force”

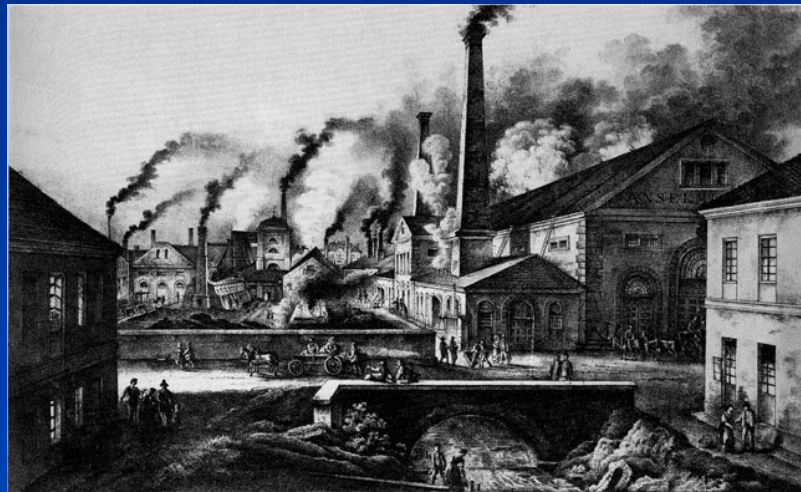
1926 – Victor I. Vernadsky
Biogeochemistry & Biosphere



The original proposal



AD 1750 – The Industrial revolution
and the beginning of global atmospheric change
Crutzen & Stoermer 2000



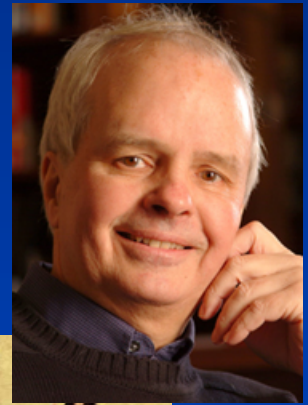
“To assign a more specific date to the onset of the anthropocene seems somewhat arbitrary, but we propose the latter part of the 18th century, although we are aware that alternative proposals can be made (some may even want to include the entire Holocene)”

The Neolithic onset



“The hypothesis advanced here is that the Anthropocene actually began thousands of years ago as a result of discovery of agriculture and subsequent technological innovations and population growth” William F. Ruddiman 2000

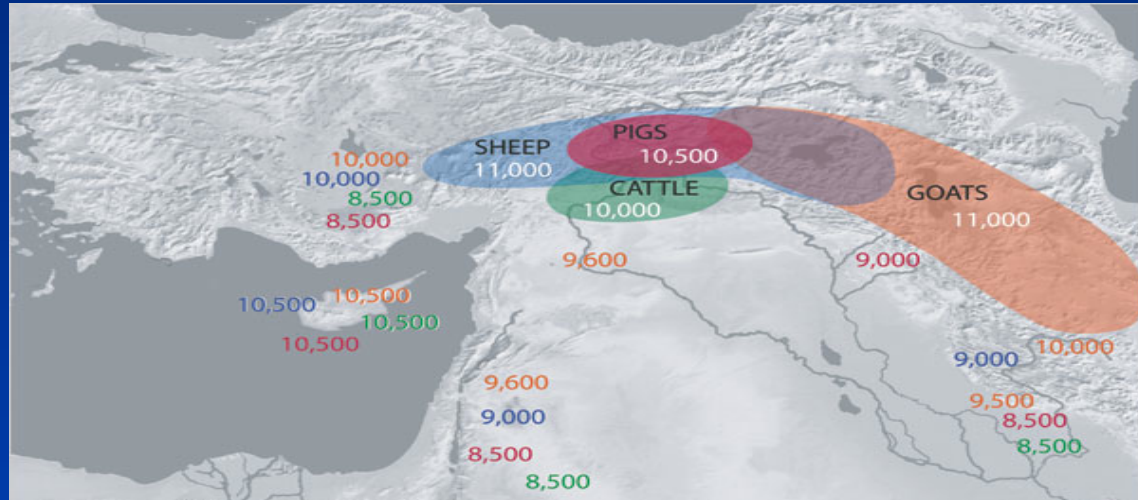
5-8 Ky BP - The Neolithic revolution and the first evidence of atmospheric change



The Neolithic onset in SW Asia

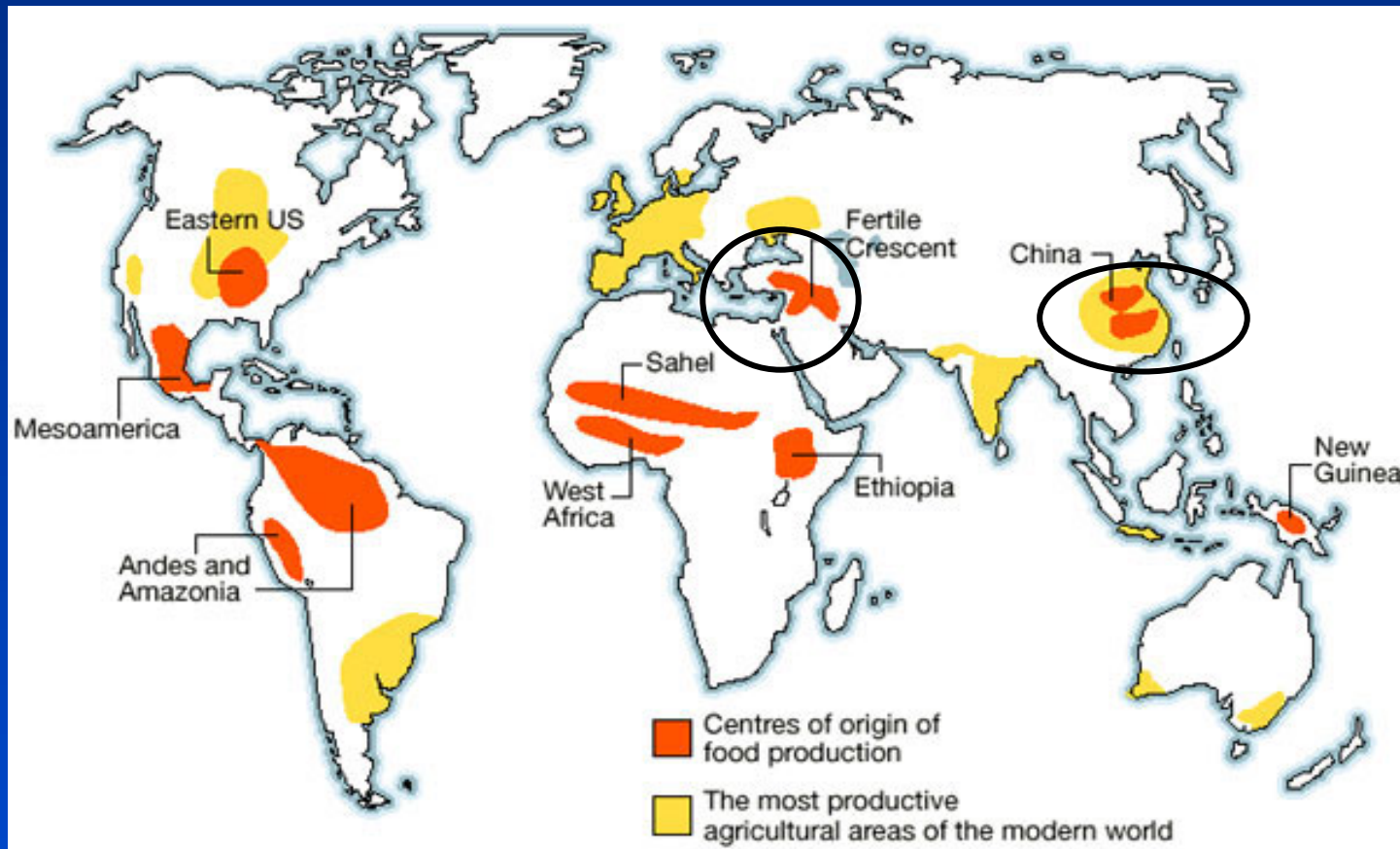
Thousands of years before present

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15



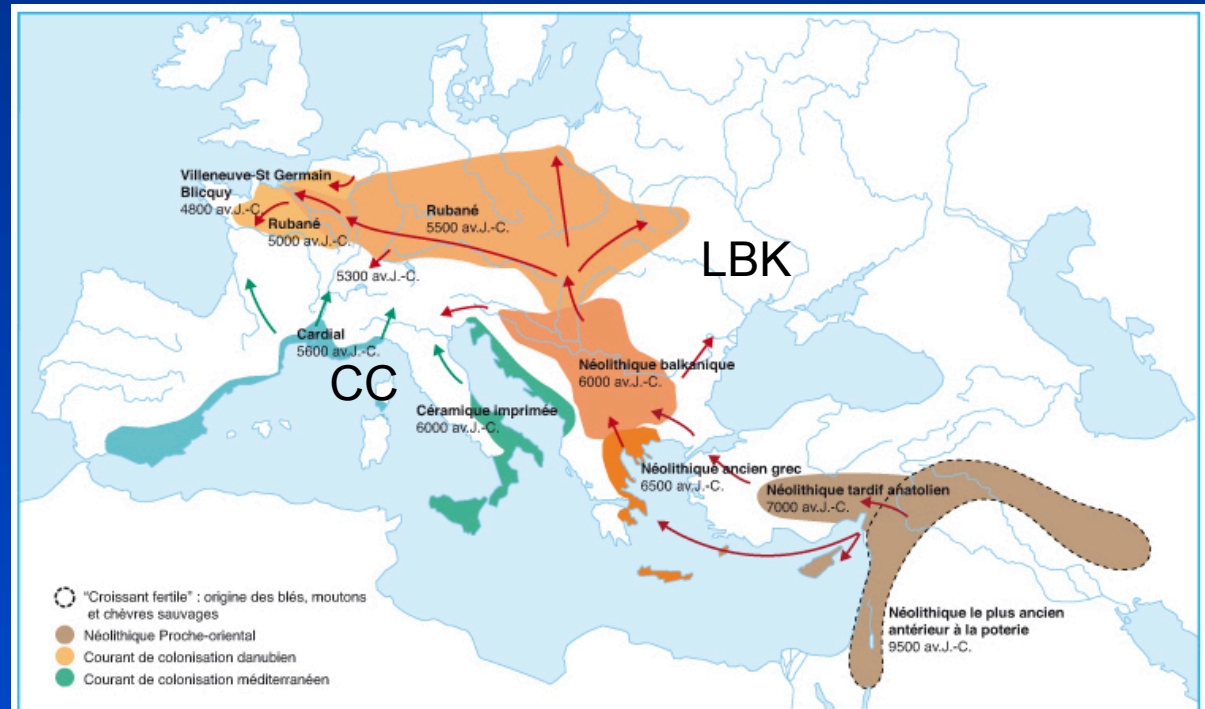
11-9 Ky BP – Initial domestication of plants and animals in SW Asia
“Emergence of significant niche construction”

Original “core areas” of Neolithic transition



Neolithic diffusion in Europe

LBK: Linienbandkeramik; CC: Ceramica Cardiale



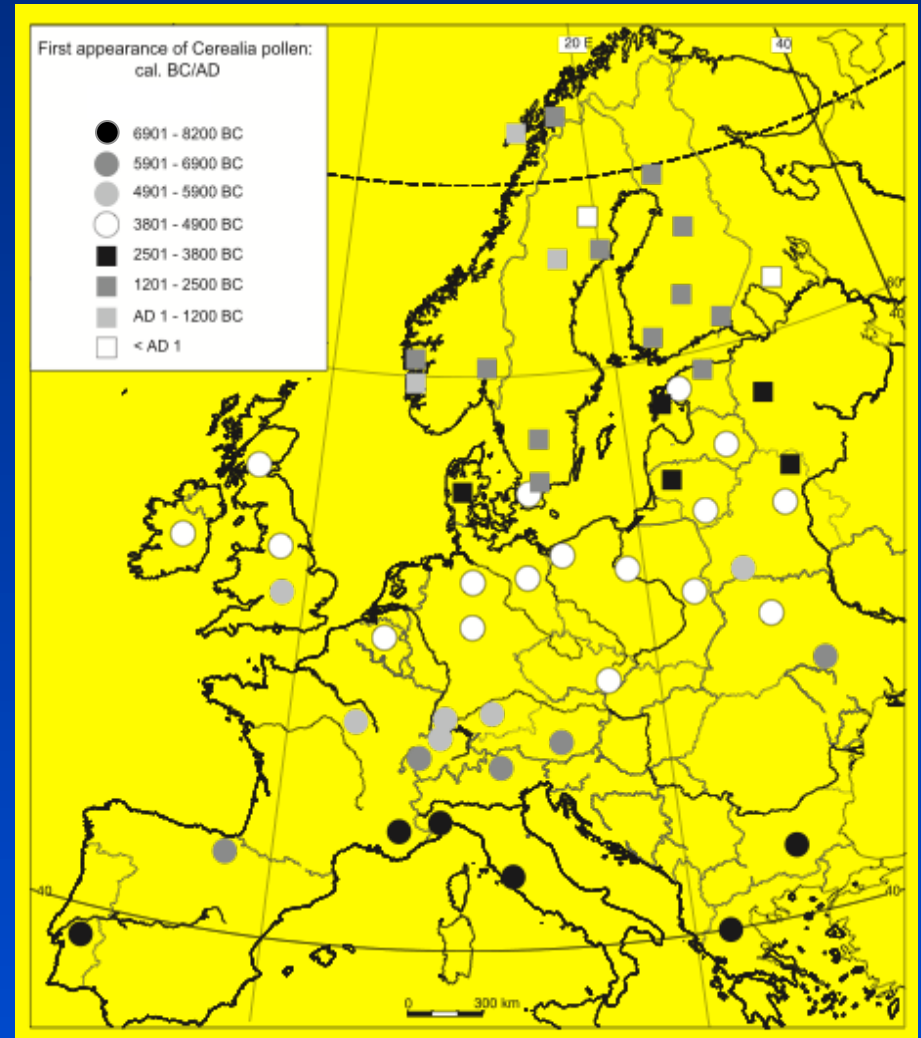
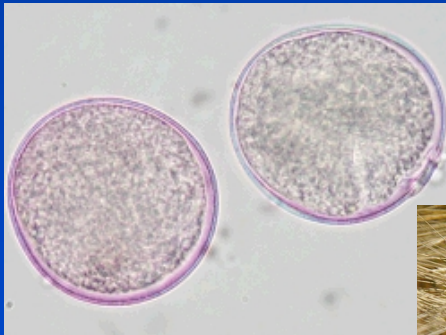
Carte de la diffusion du Rubané ou Céramique linéaire en Europe

Weath & barley diffusion in Europe

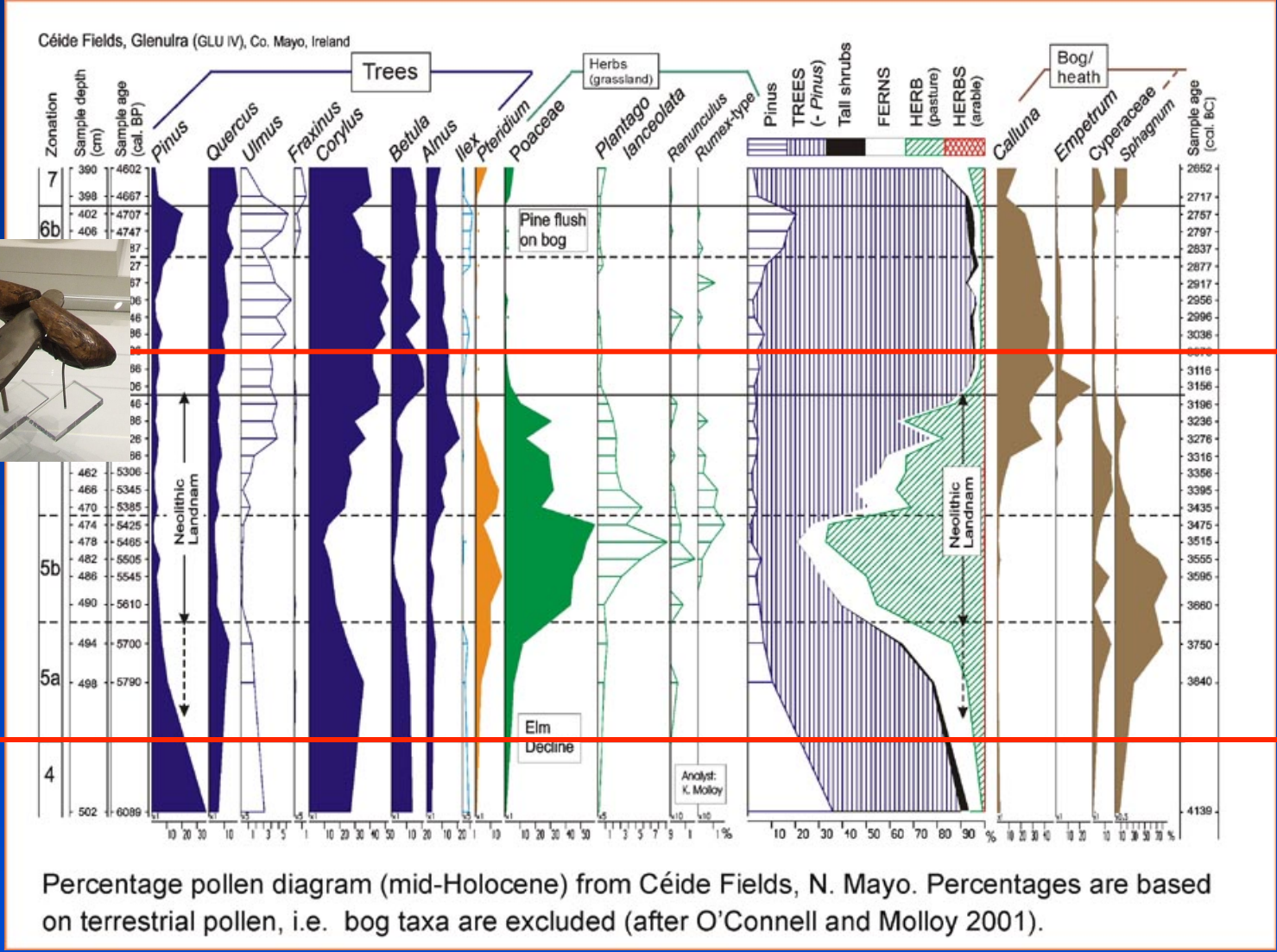
Triticum aestivum



Hordeum vulgare

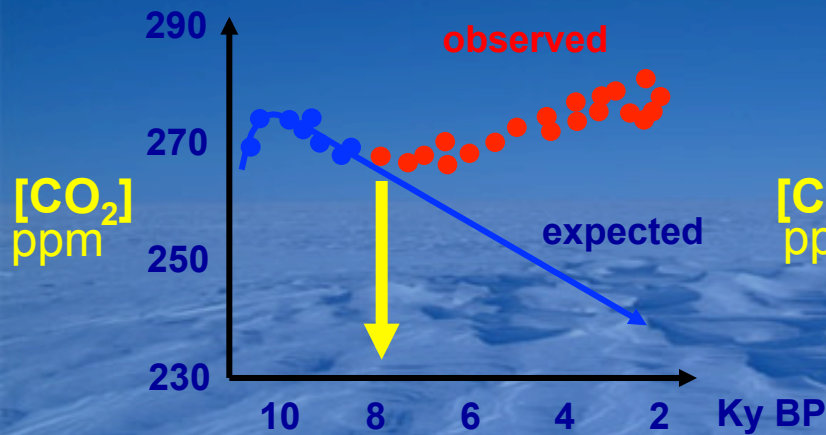


“Landnám” forest clearing in neolithic Ireland

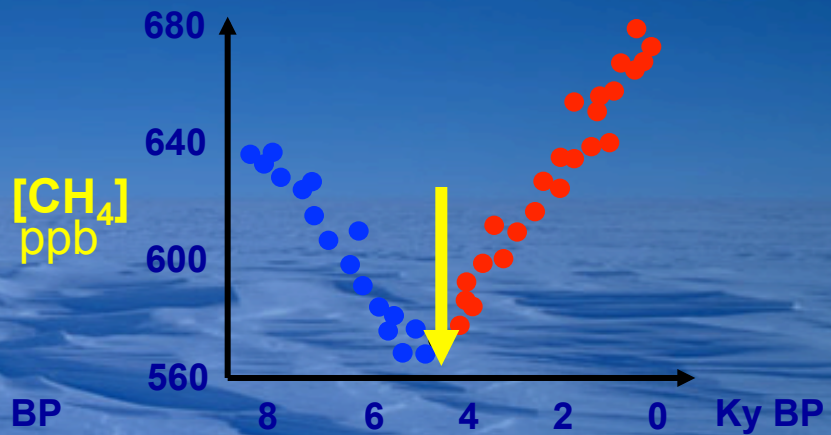


Percentage pollen diagram (mid-Holocene) from Céide Fields, N. Mayo. Percentages are based on terrestrial pollen, i.e. bog taxa are excluded (after O'Connell and Molloy 2001).

The first global signature ?



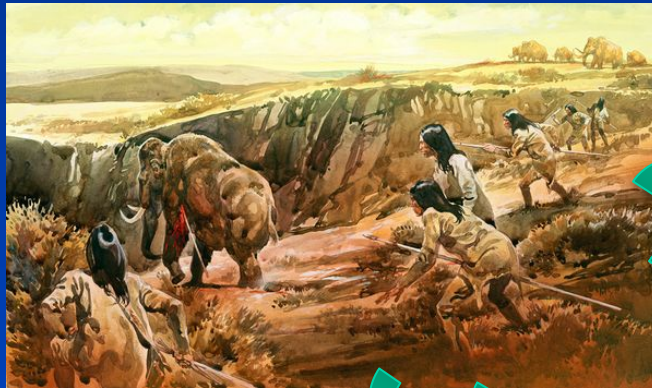
Diffusion of farming
from SW Asia
(Near East Neolithic)



Diffusion of farming
from East Asia
(China Neolithic)

Beyond the Neolithic border

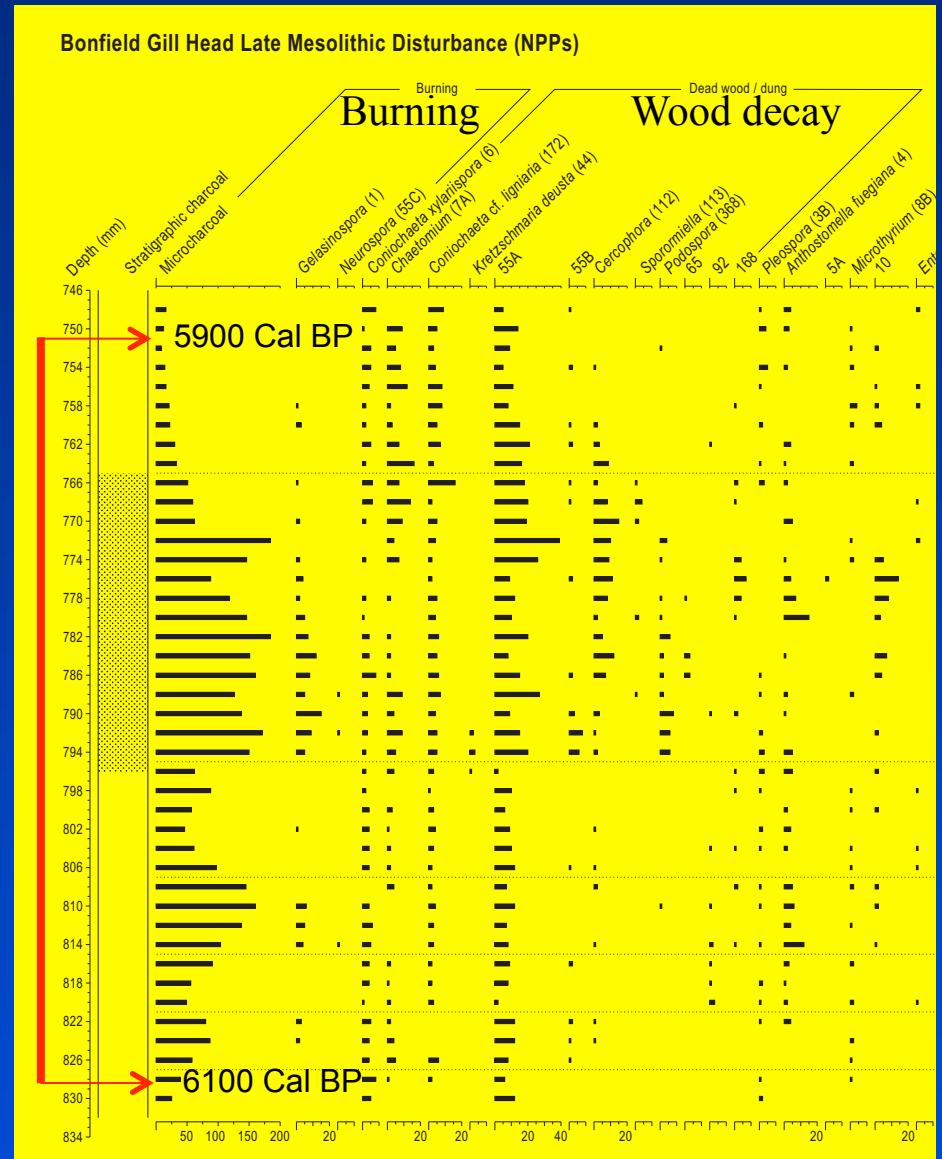
Between Palaeolithic hunting-gathering and fully-fledged Neolithic agricultural economy there is a long and diverse “no-man land” full of “experiments” for deploying new forms of control of ecosystem productivity: the Mesolithic



Mesolithic



The Mesolithic slash & burn in NW Europe



The Paleolithic forest-firing



Sedimentary & palinological evidence for the active use of fire for clearing the forest at Niah Cave (Sarawak) 45 Ky BP

Paleolithic footprints



100 on 150 genera of “great” animals (>44 kg)
 Went extinct between the last part of Pleistocene
 And the beginning of Holocene

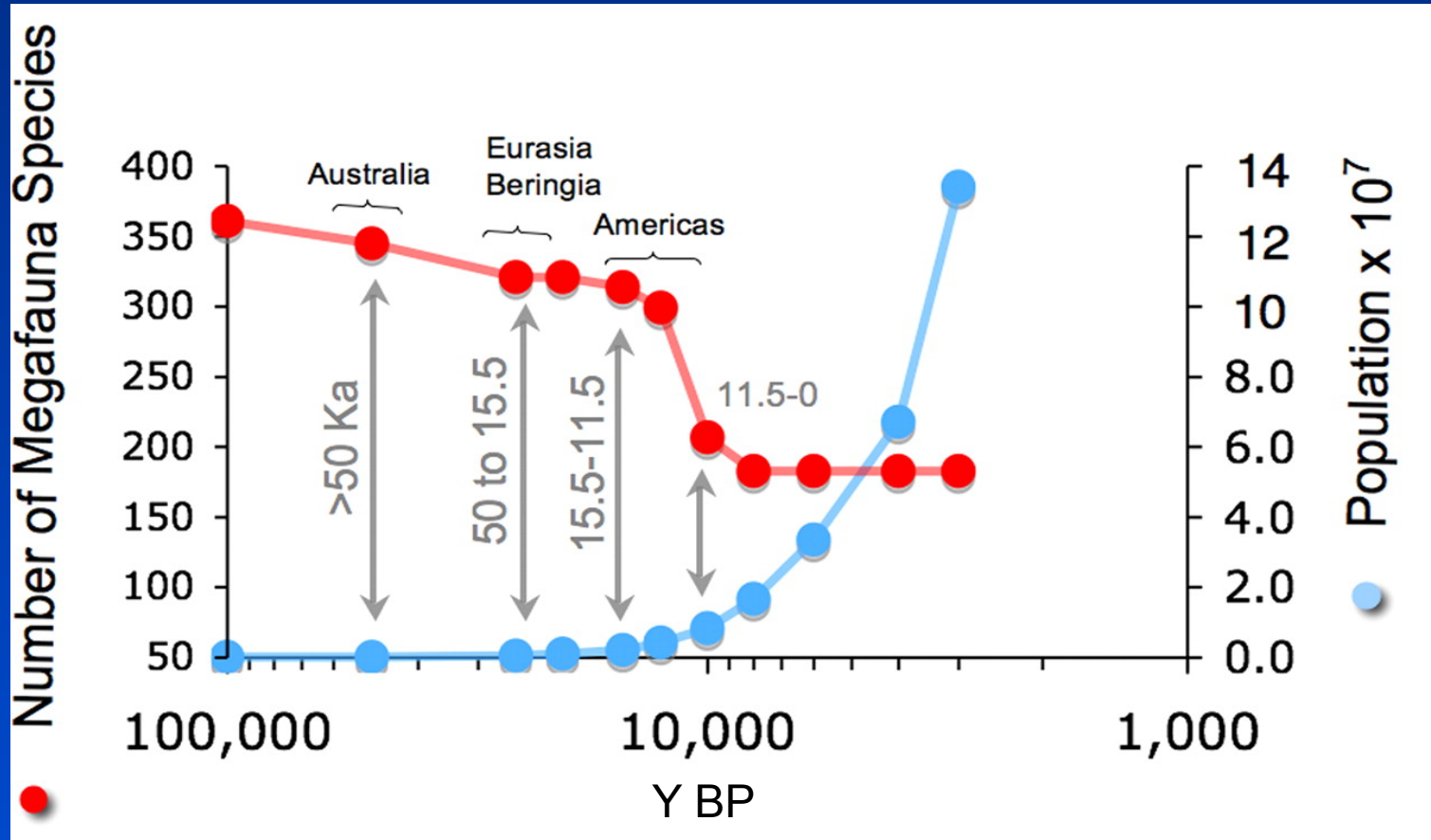
			Ky before present
• Africa		21%	>100
• Eurasia		35 %	48-25 / 20-10
• N America		72%	15-11
• S America		83%	15-8
• Australia		86%	50-40



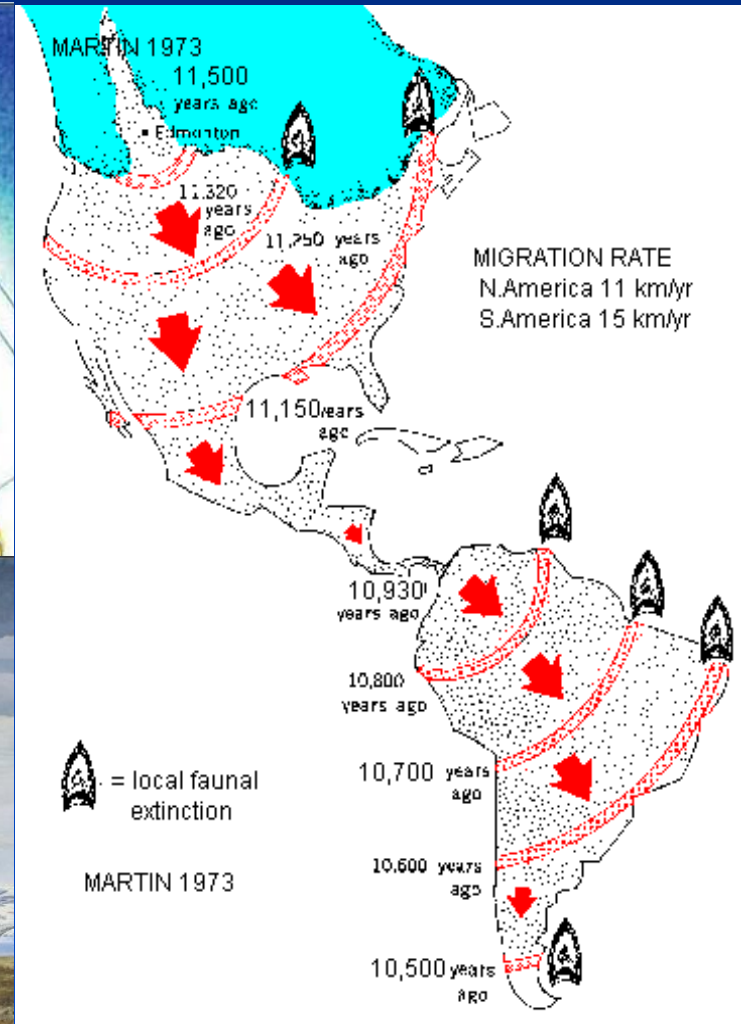
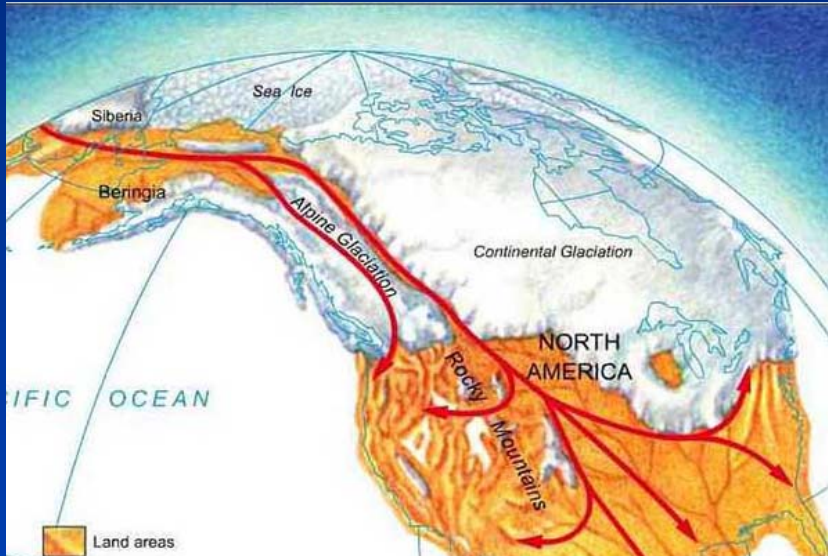
Geographic expansion
Homo sapiens

120-15 Ka PdP

Megafauna extinction vs human population

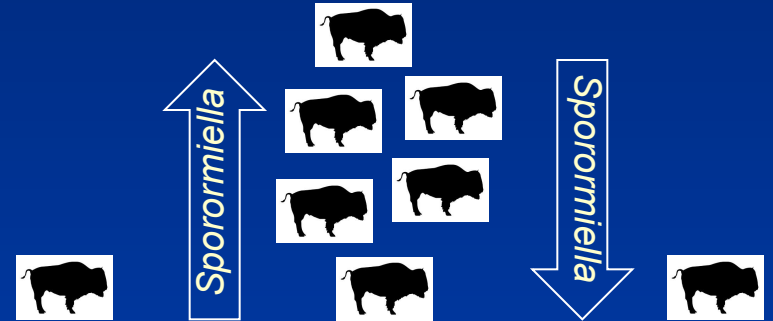
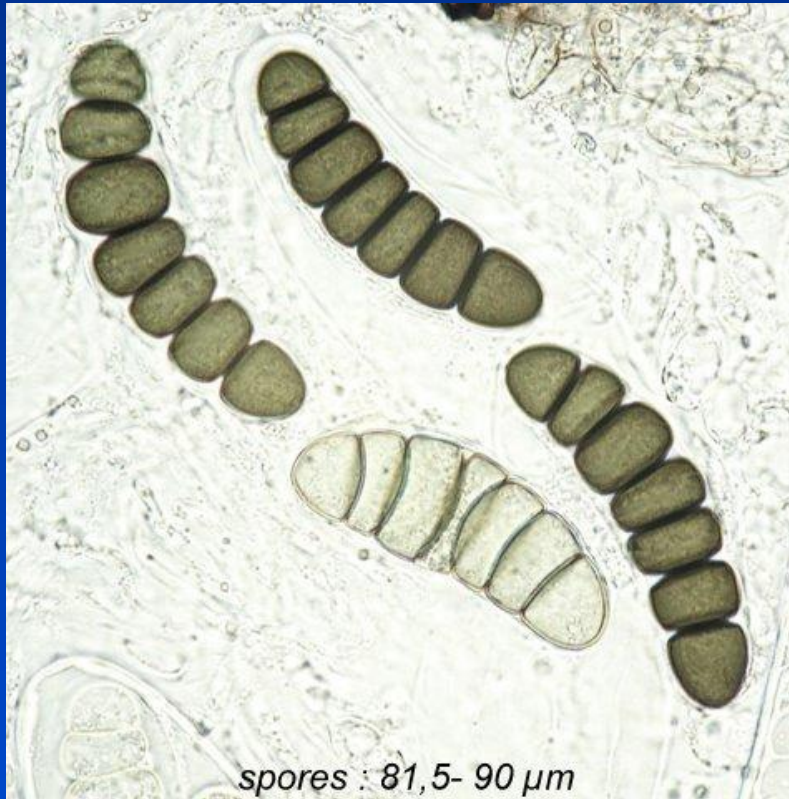


America Megafauna Overkill (Paul S. Martin)

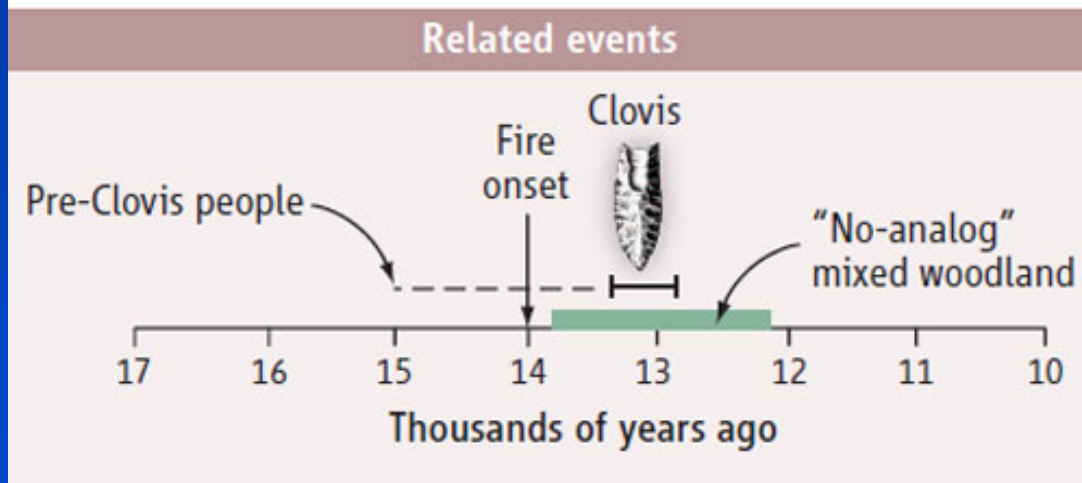
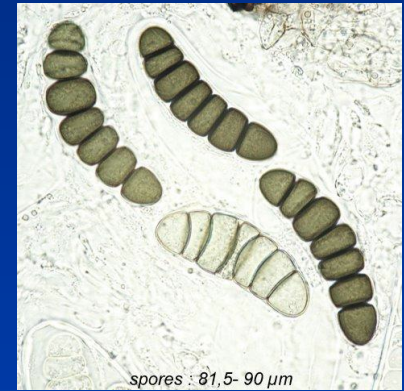
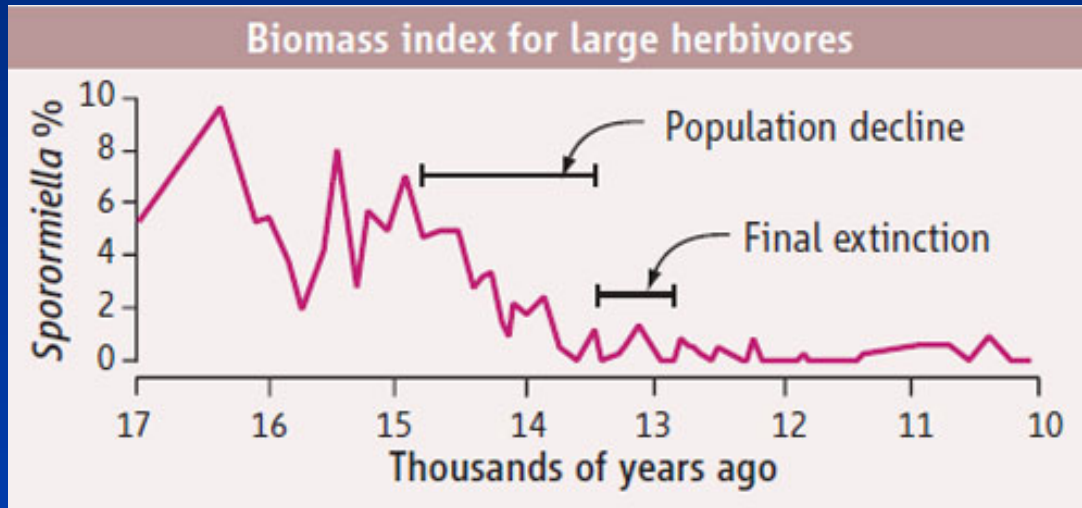


Density of herbivor mammals (and birds)

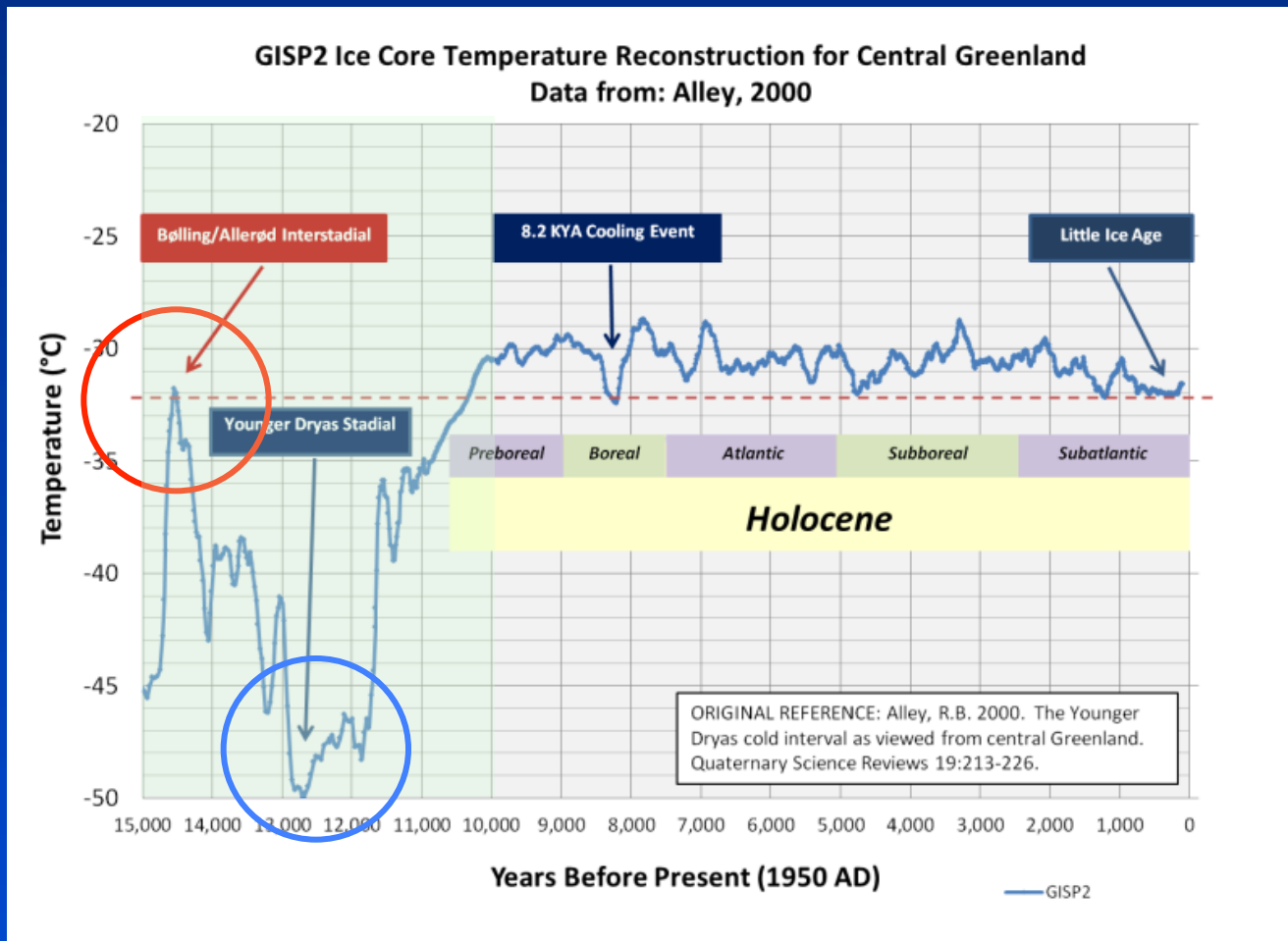
The Sporormiella proxy



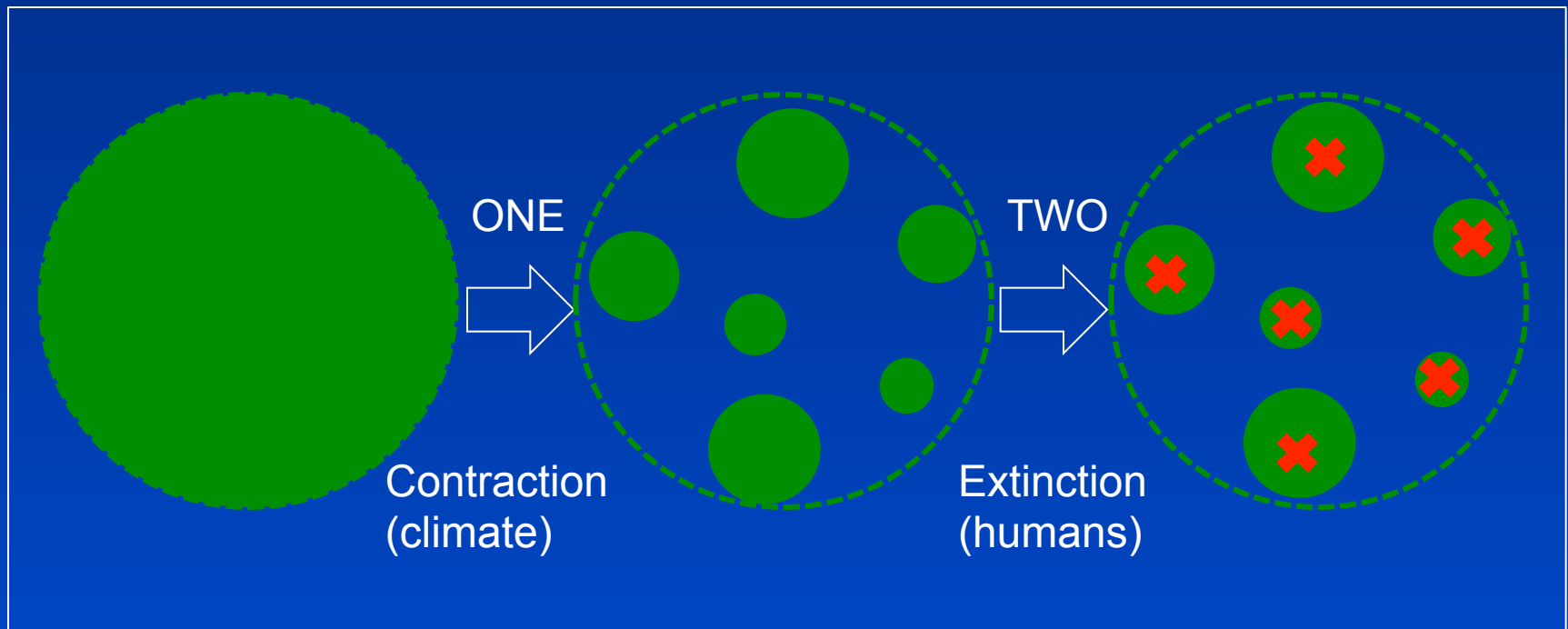
The Clovis megafauna collapse



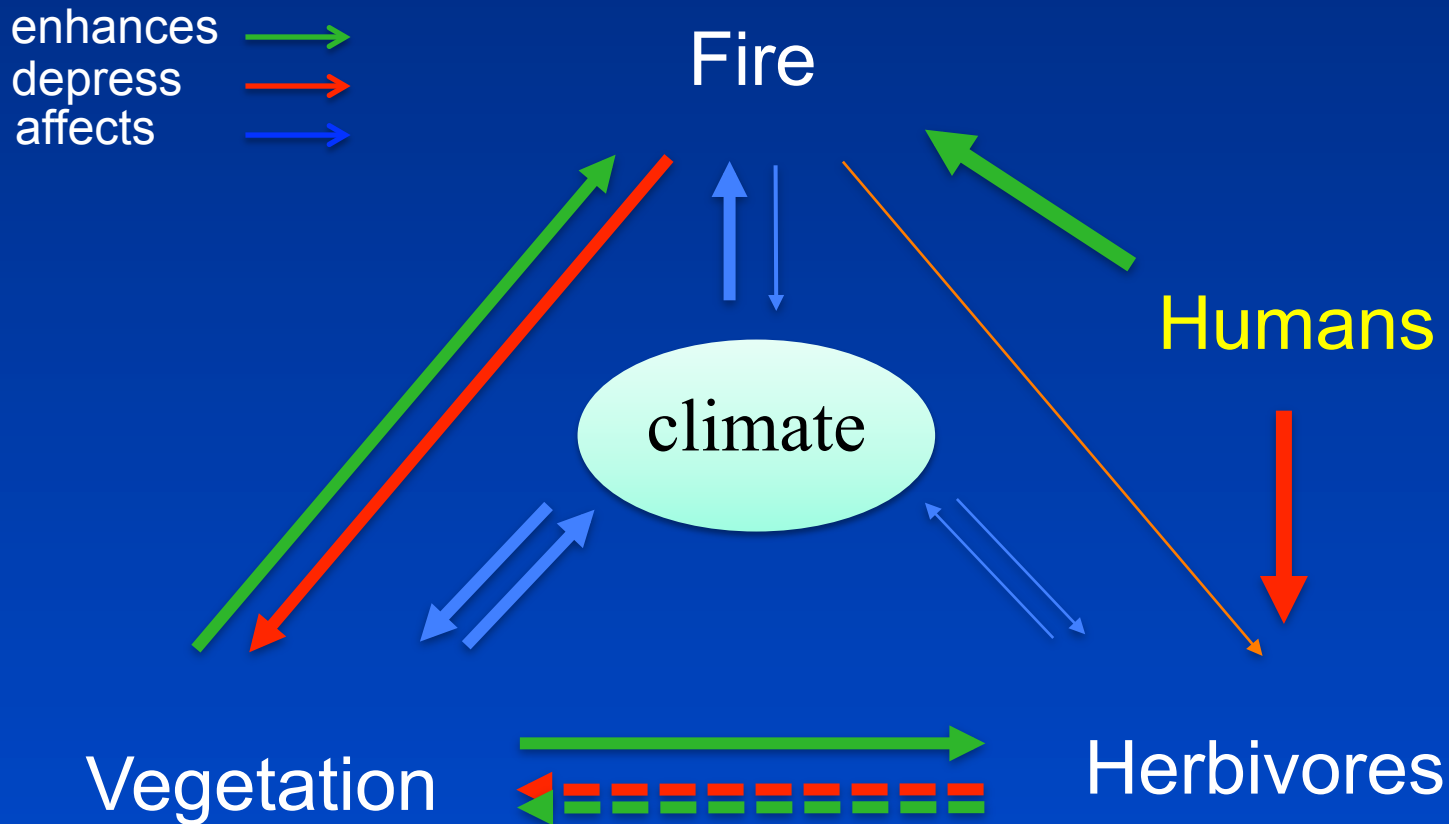
The Pleistocene – Holocene transition



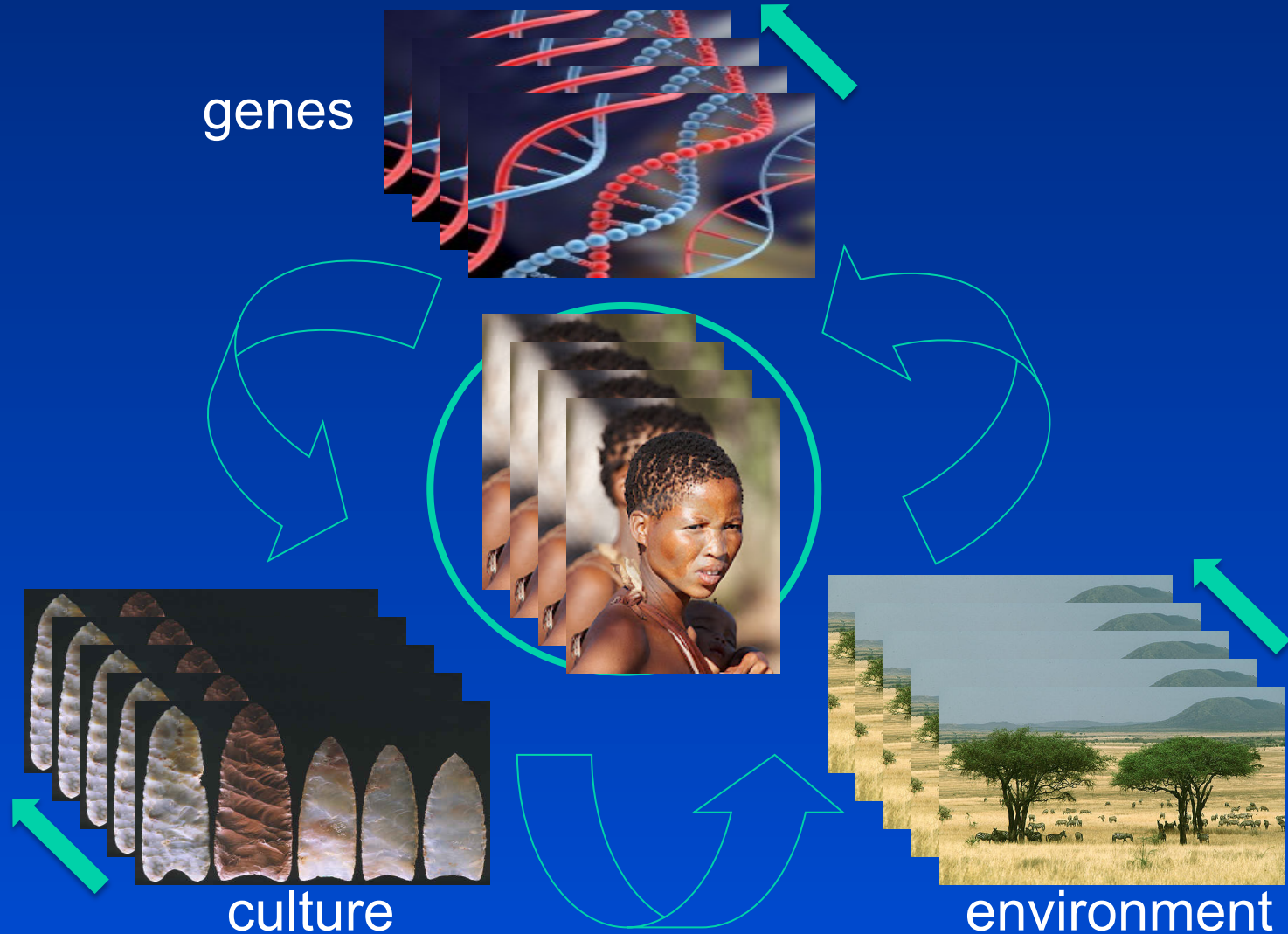
The climate-humans causation of megafauna extinction at the Pleistocene-Holocene transition



The LQME putative effects

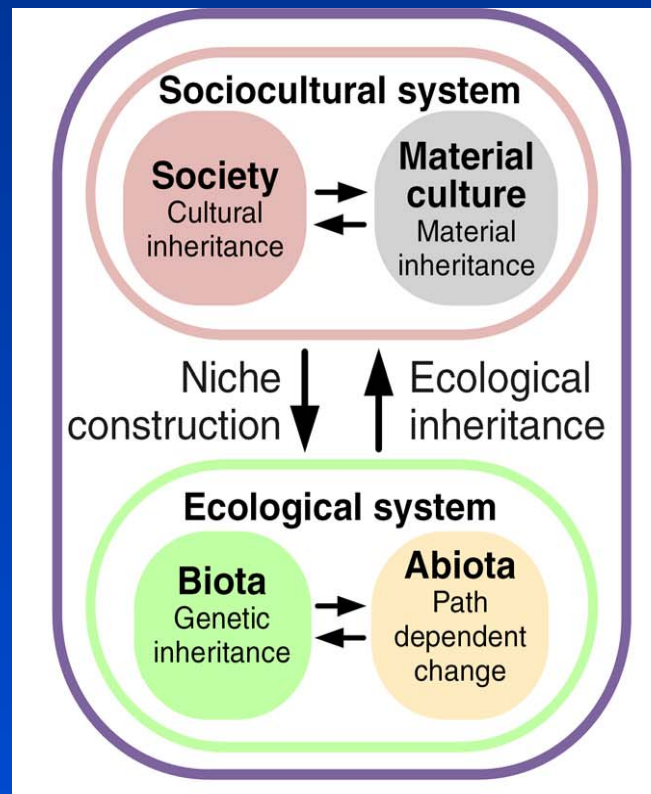


The pre-Neolithic Niche Construction



Coevolution of Sociocultural and Ecological systems

Ellis' anthroecosystem



The long history of human niche construction

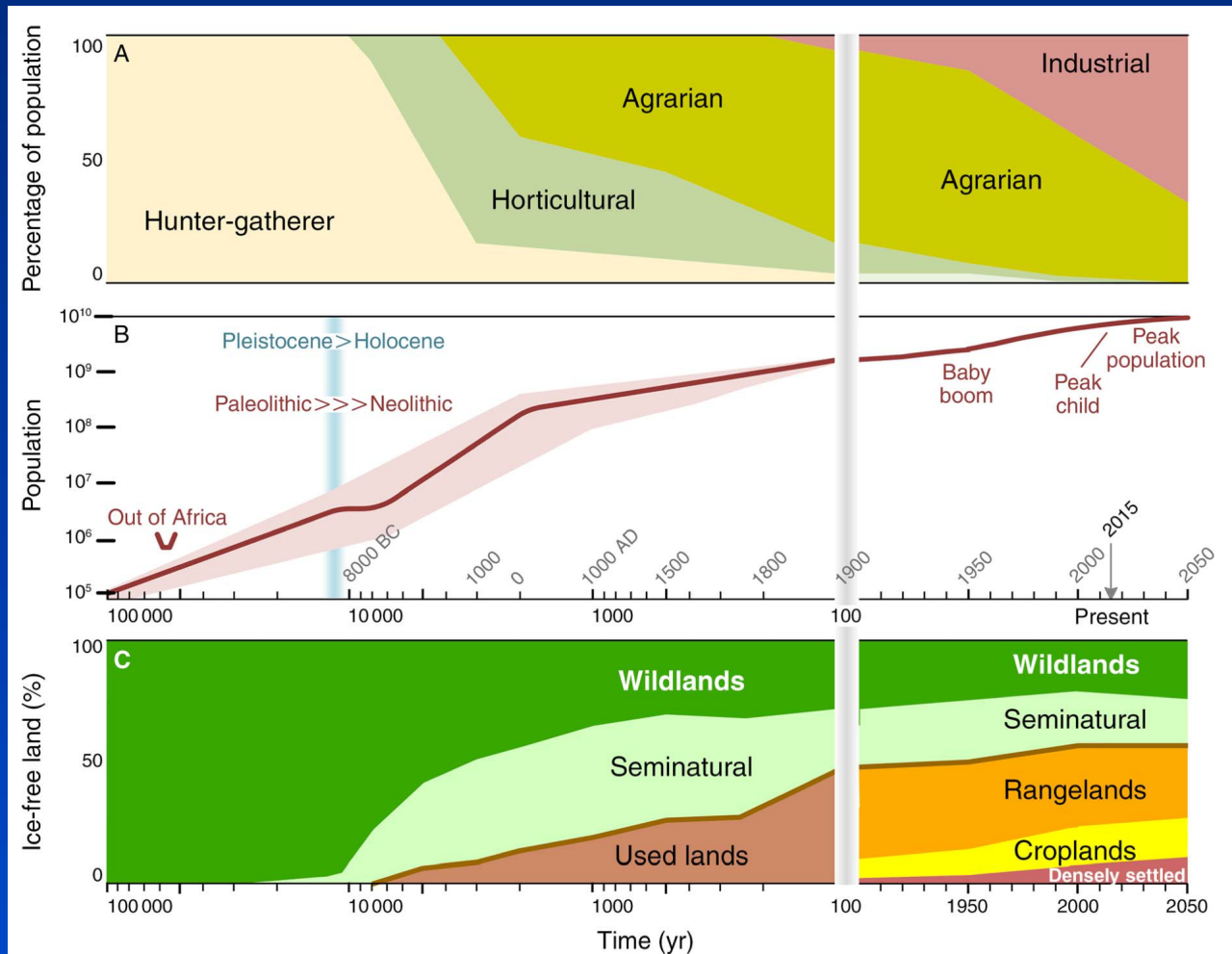
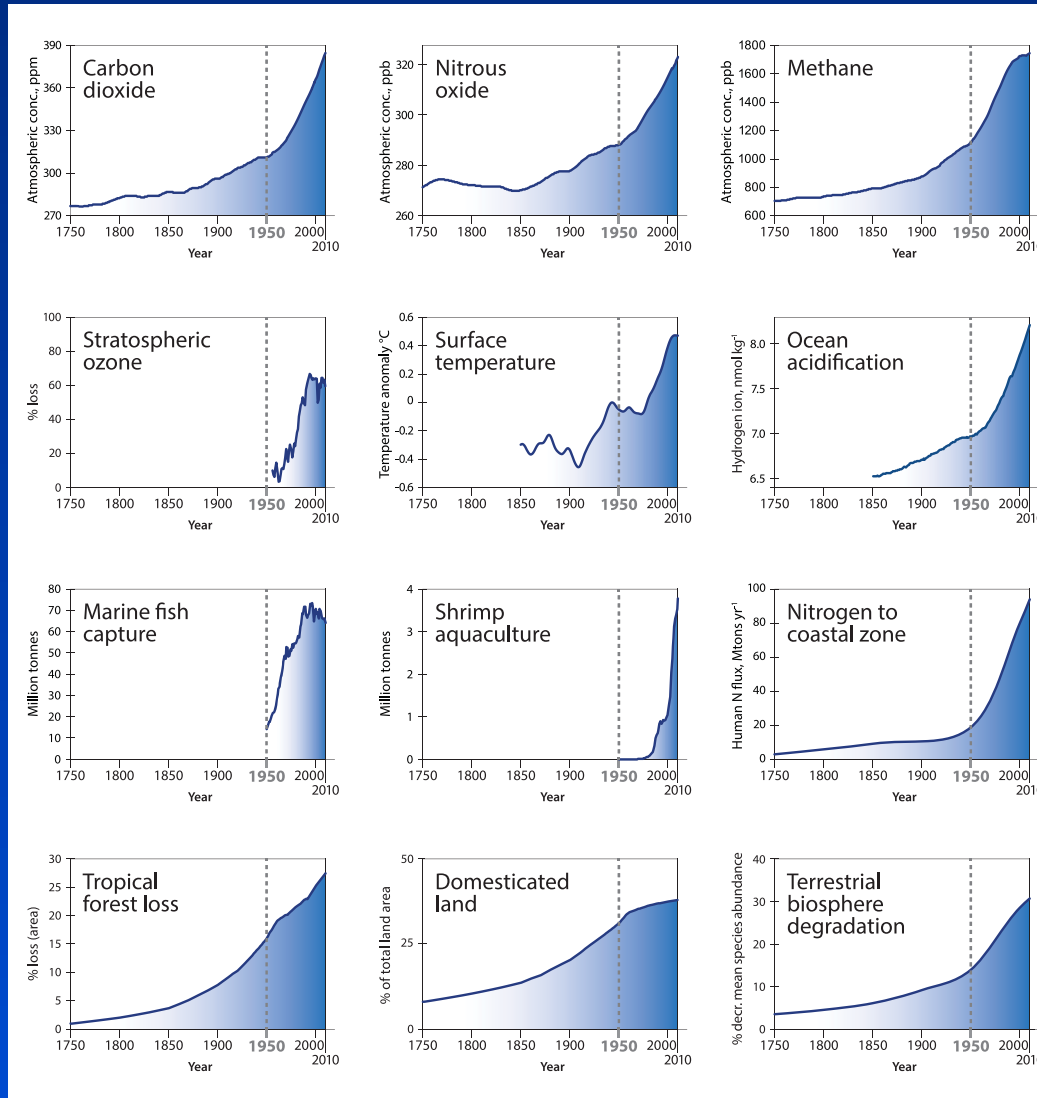


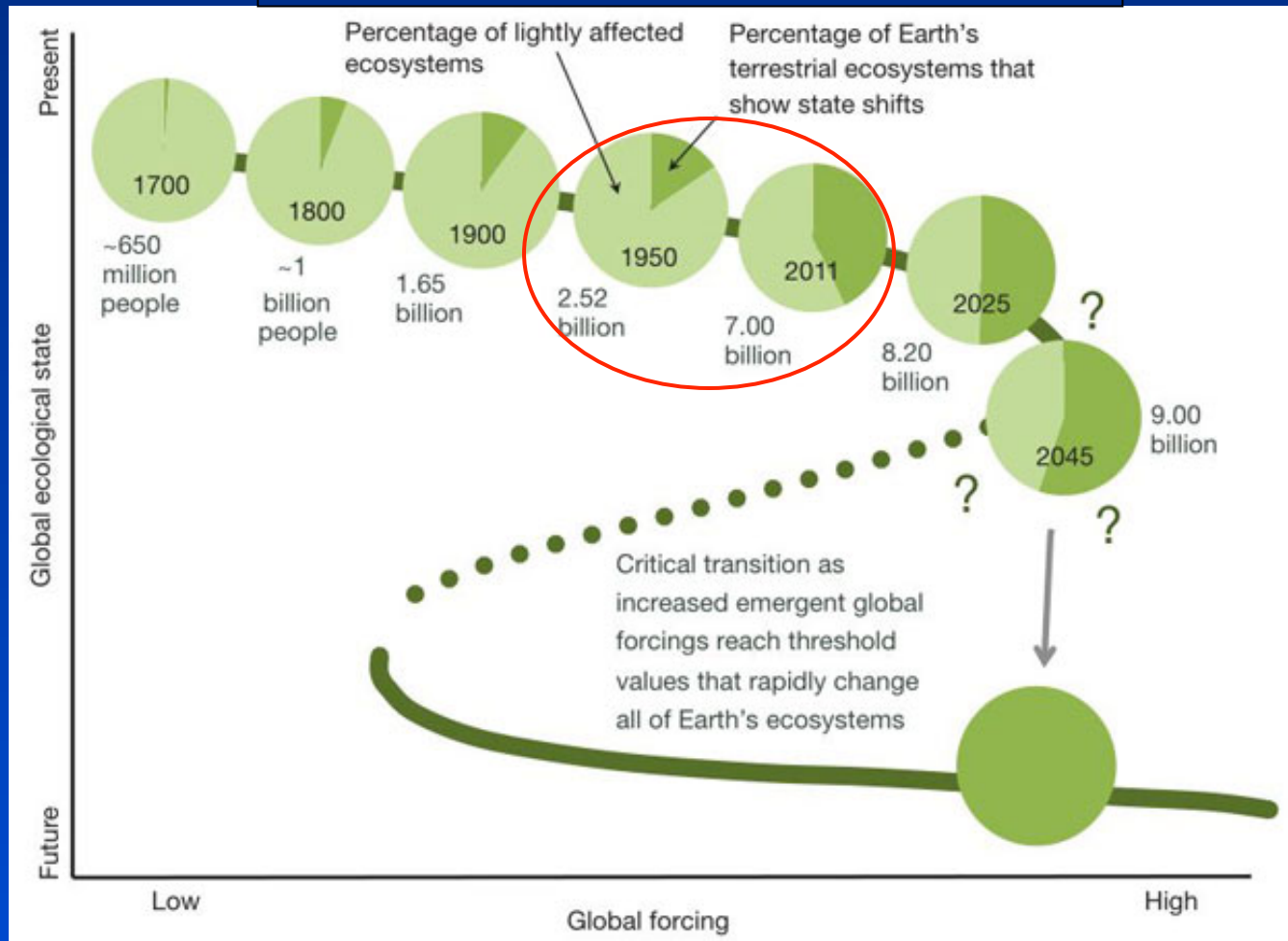
FIG. 4. Long-term global changes in (A) major categories of sociocultural systems (based on Nolan and Lenski [2010]), (B) human populations based on U.S. Census Bureau 2013, *available online*: http://www.census.gov/population/international/data/worldpop/table_history.php, and (C) anthropogenic transformation of the terrestrial biosphere (based on Ellis et al. [2013b]). Multiple arrows indicate that Paleolithic to Neolithic transitions are regional, not global. Time scale prior to 1900 is logarithmic years BP, after 1900 is linear calendar years.

The Great Acceleration (after WWII)



Approaching a State Shift in Earth's Biosphere

Barnosky A.D. et al. Nature 2012



The Anthropocene future

Steffen, Broadgate, Deutsch, Gaffney and Ludwig

The trajectory of the Anthropocene: The Great Acceleration

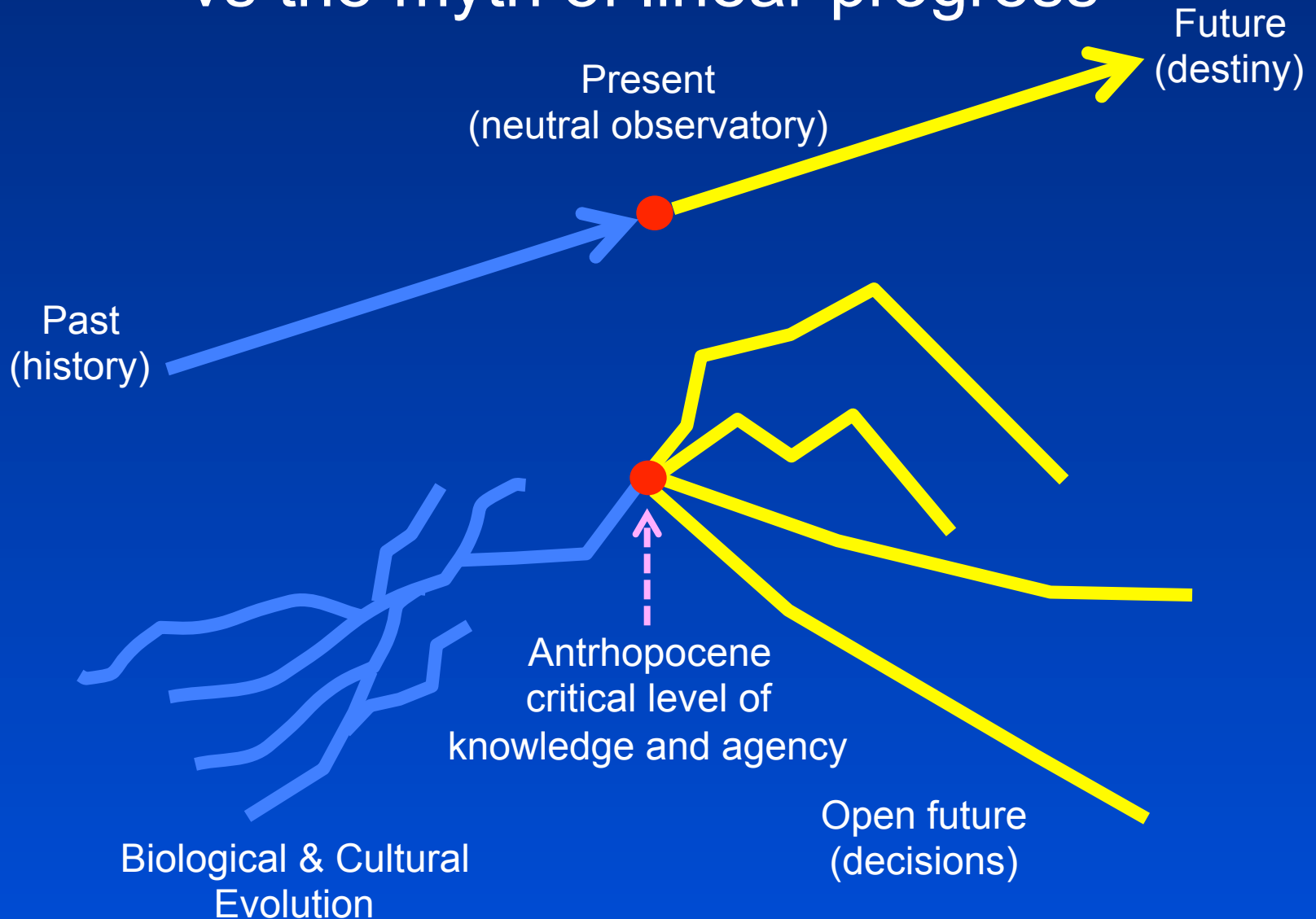
The Anthropocene Review 2015, Vol. 2(1) 81–98

Will the next 50 years bring the **Great Decoupling**
or the **Great Collapse**?

The latest 10 years of the Great Acceleration
graphs show signs of both but cannot distinguish
between these scenarios, or other possibilities.
But 100 years on from the advent of the Great
Acceleration, in 2050, we'll almost certainly know
the answer.



The “open” future vs the myth of linear progress



Critical level of
Knowledge & Agency

means also

Critical (unprecedented) level of

RESPONSIBILITY

Responsibility vs forecasting



With the Anthropocene
the future of the Earth System
is not simply a matter of FORECASTING
but of RESPONSIBILITY

Some key questions

- ✓ Who is in charge (i.e. who has the right-duty) to take the decisions

Single persons, society, states, sovranational political institutions, multinational companies (not mutually exclusive categories)

- ✓ Which goals and priorities in the “planning of the future”
 - Demographic survival of the human kind:
(how much and which human kind)
 - Structural and functional integrity of natural ecosystems
 - Conservation of single species because of all living organisms, not only humans, have their own rights



Ethic in the Antropocene

The future (of the global anthroecosystem) is not a purely scientific problem but a moral matter

However, science (e.g. ecology, anthropology) has the strategic responsibility to inform the society on the state of affairs and the consequence of individual and collective actions

