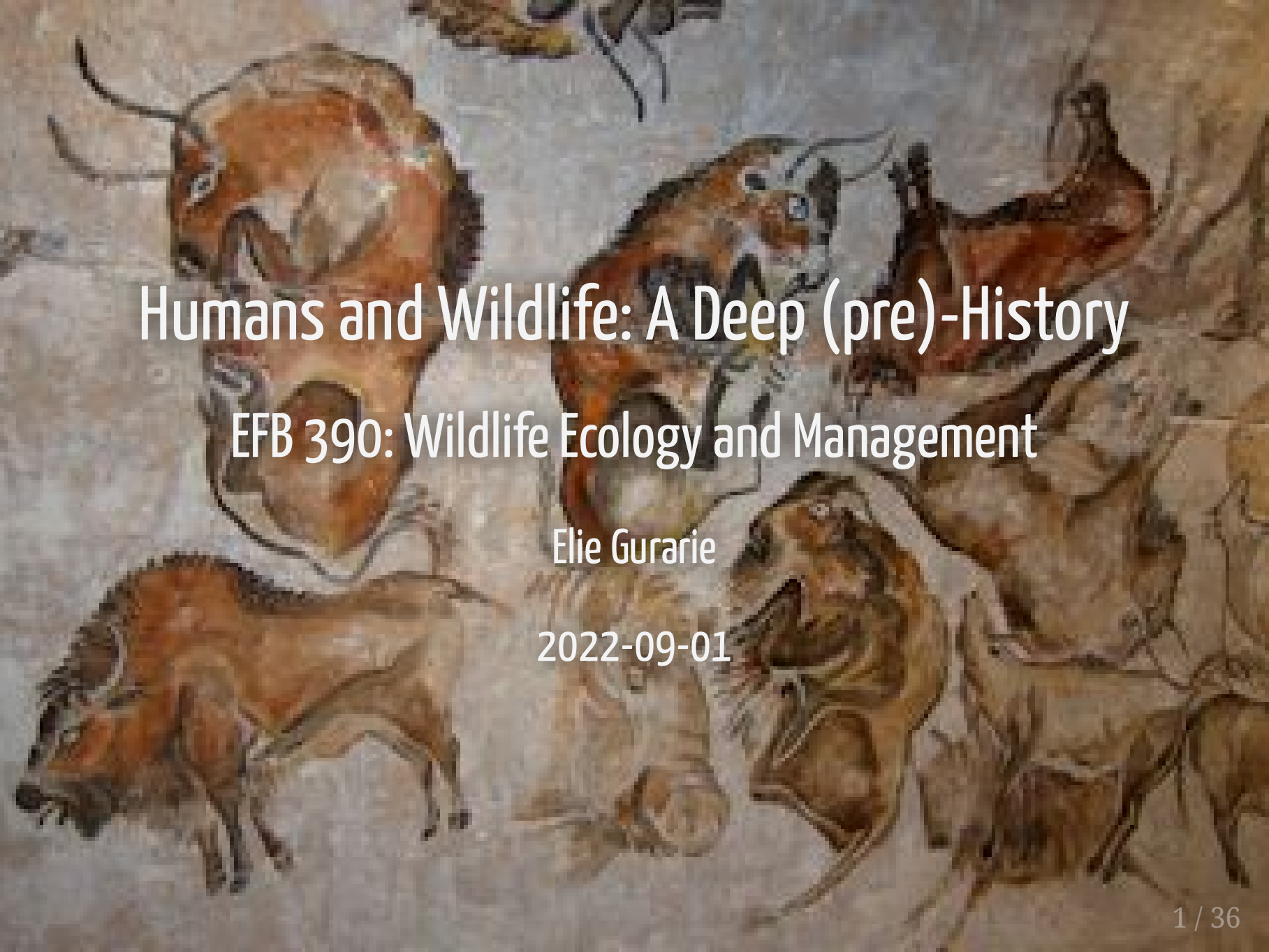


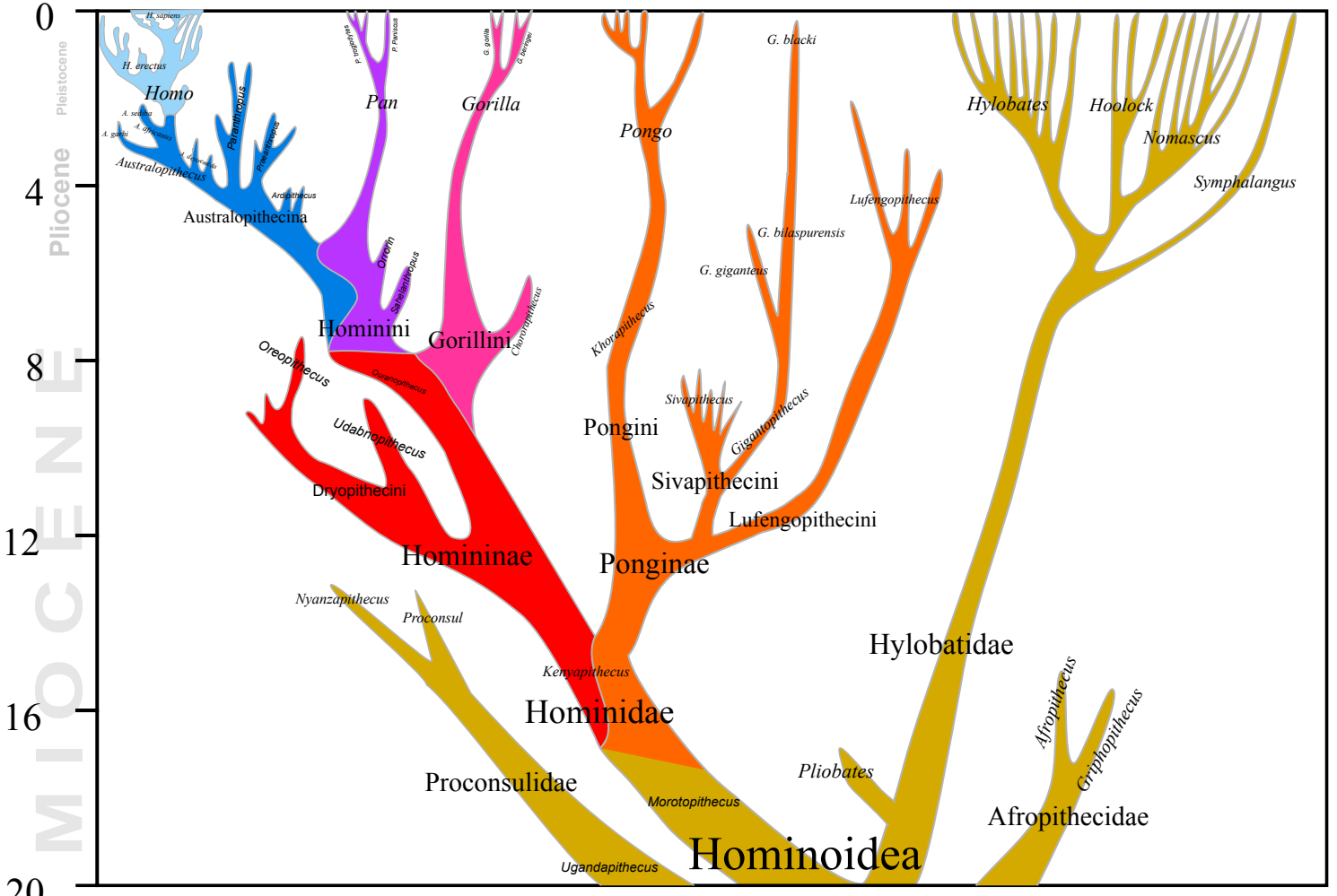
Humans and Wildlife: A Deep (pre)-History

EFB 390: Wildlife Ecology and Management

Elie Gurarie

2022-09-01

Hominoidea


0
4
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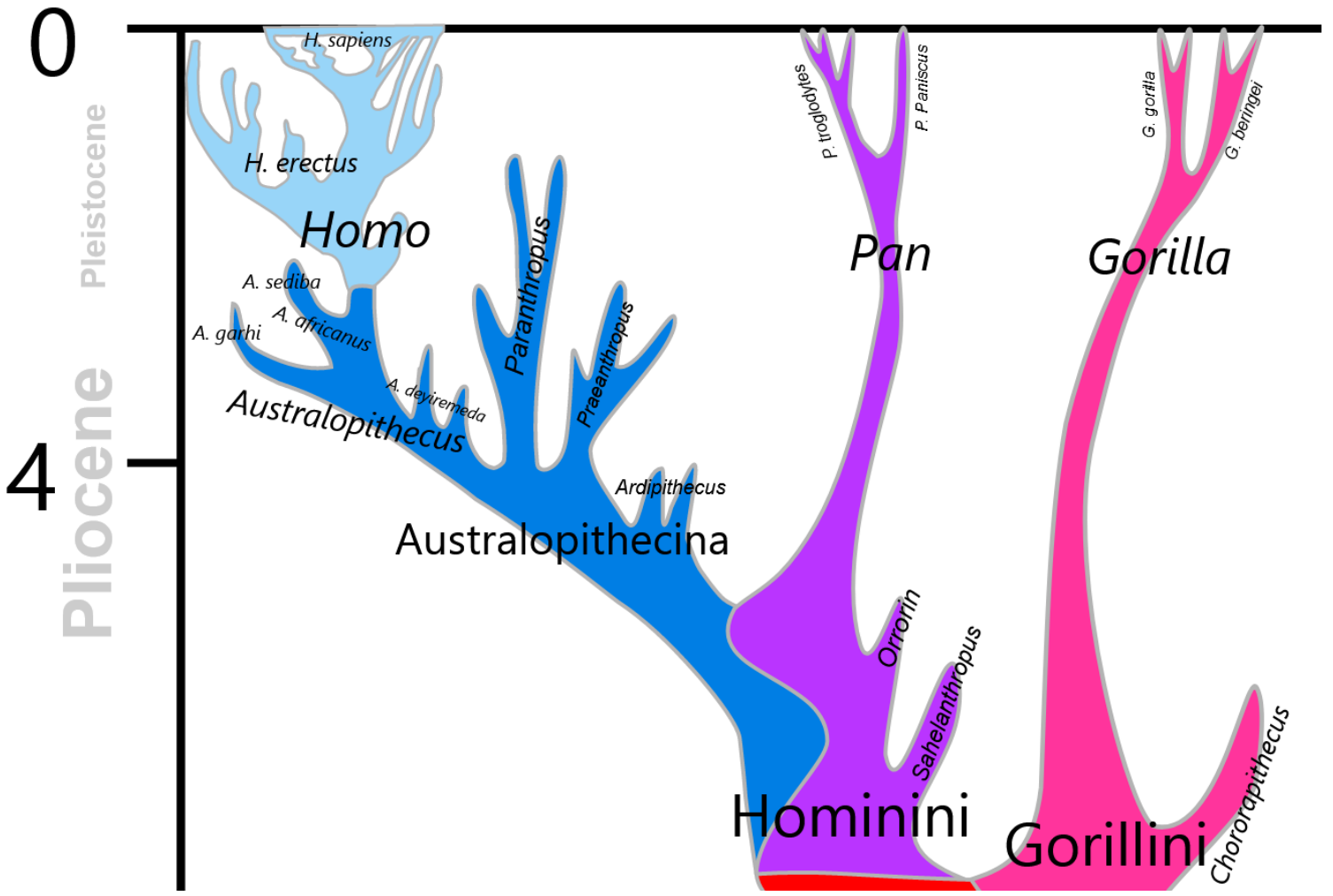
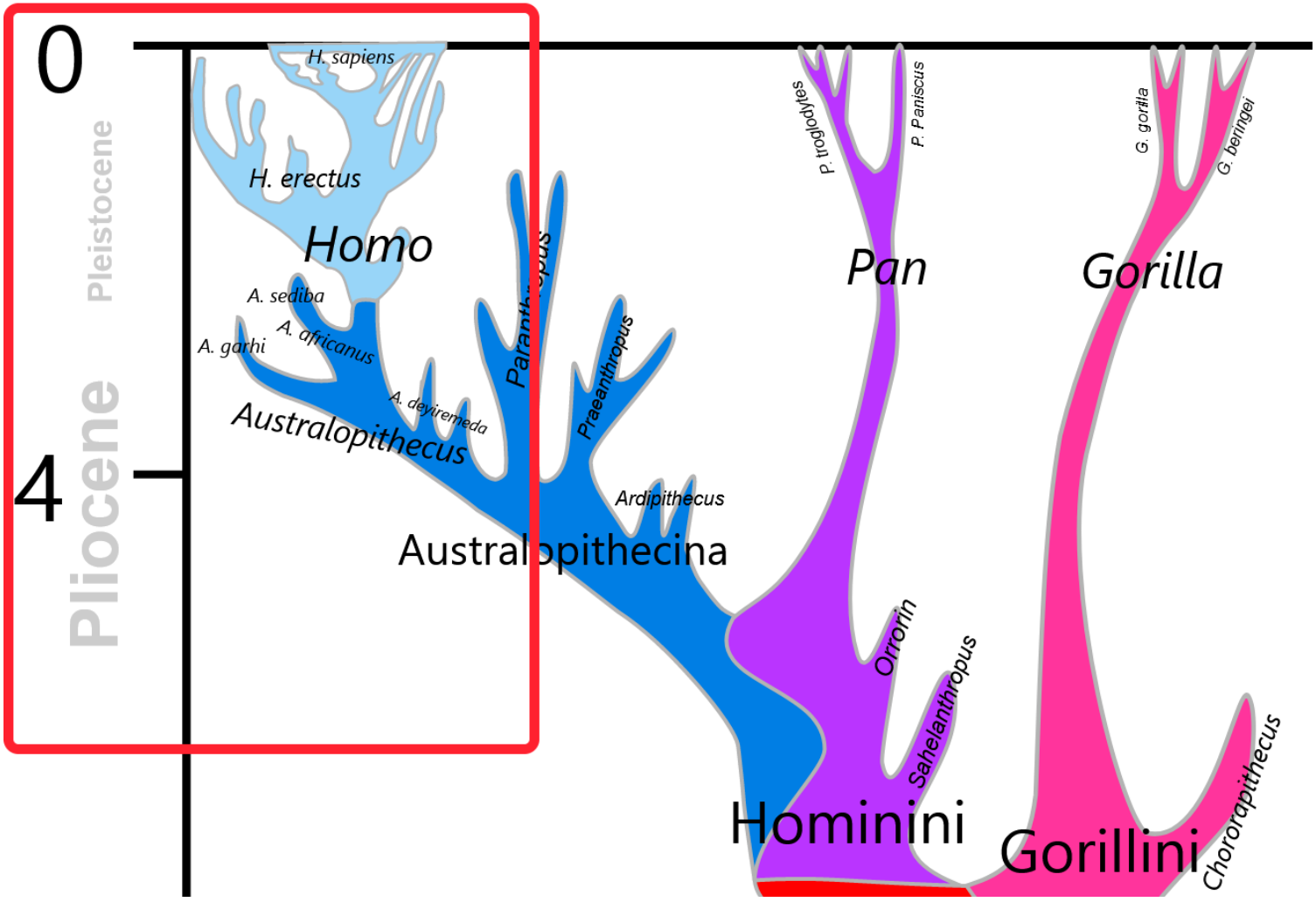
Pleistocene
Pliocene
MIOCENE
H. sapiens
H. erectus
Homo
A. sediba
A. garhi
A. afarensis
A. africanus
Australopithecus
Paranthropus
Praeanthropus
Ardipithecus
Australopithecina
P. troglodytes
P. paniscus
Pan
G. gorilla
G. beringei
Gorilla
Orrorin
Sahelanthropus
Hominini
Gorillini
Chororapithecus
Oreopithecus
Ouranopithecus
Udabnopithecus
Dryopithecini
Homininae
Nyanzapithecus
Proconsul
Kenyapithecus
Hominidae
Proconsulidae
Ugandapithecus
Morotopithecus
Hominoidea
Pongo
Khoratpithecus
Sivapithecus
Pongini
G. blacki
G. bilaspurensis
G. giganteus
Gigantopithecus
Sivapithecini
Lufengopithecus
Lufengopithecini
Ponginae
Hylobates
Hoolock
Nomascus
Symphalangus
Hylobatidae
Pliobates
Afropithecus
Griphopithecus
Afropithecidae

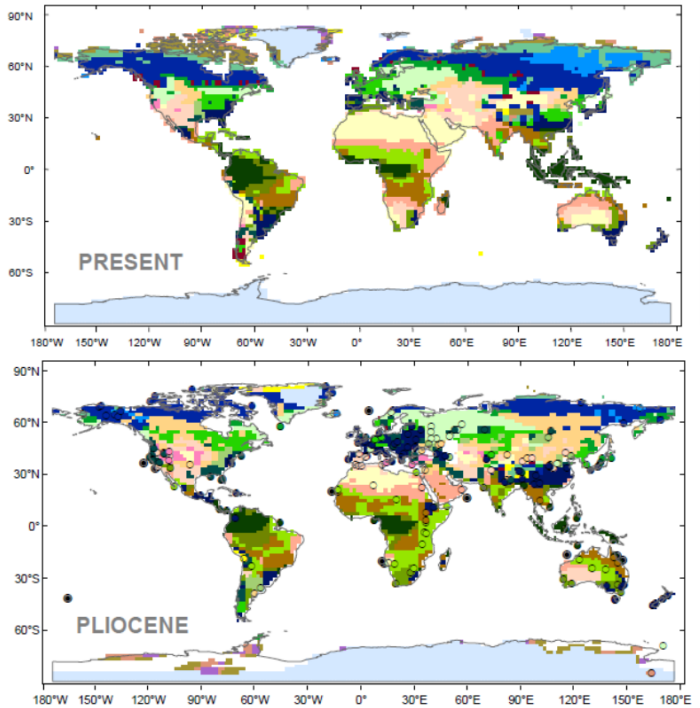
Zoom in on Hominini

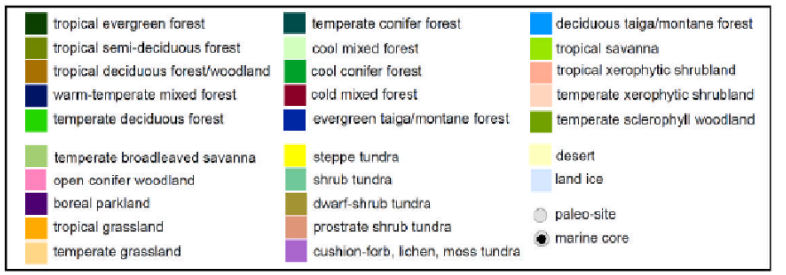


Note the Pliocene-Pleistocene transition



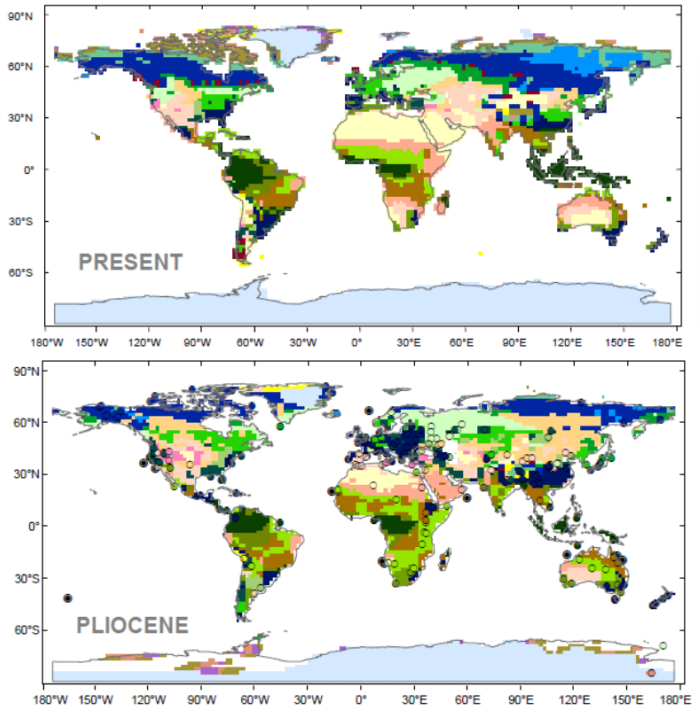
The Pliocene (5.3-2.6 mya) was warm ...

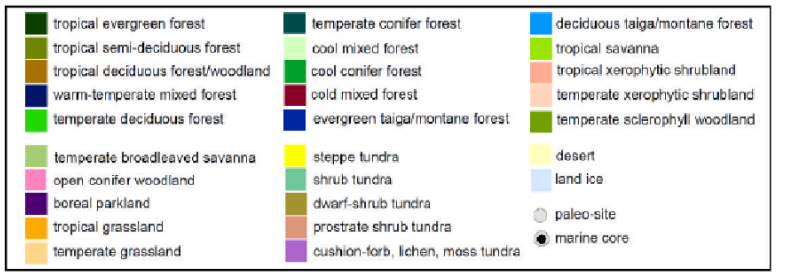




(Salzmann et al. 2011)

… about 2-4°C warmer …





Is this our future?

PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY A

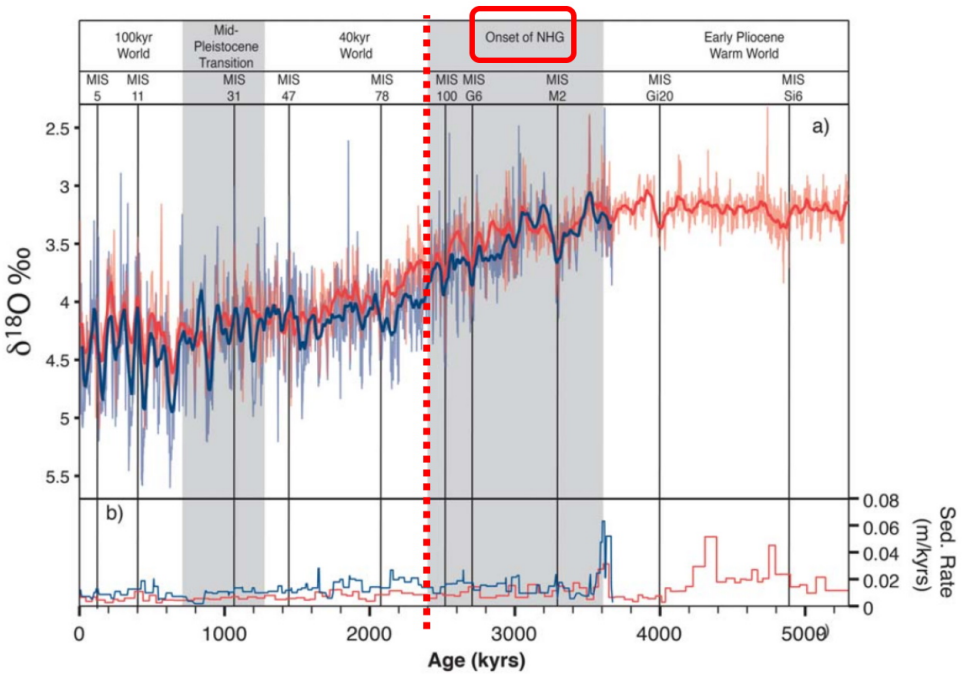
Phil. Trans. R. Soc. A (2009) **367**, 189–204
doi:10.1098/rsta.2008.0200
Published online 14 October 2008

The past is a guide to the future? Comparing Middle Pliocene vegetation with predicted biome distributions for the twenty-first century

By U. Salzmann[1,*], A. M. Haywood[2] and D. J. Lunt[3,1]

(Salzmann et al. 2011, 2009)

… but cooling



Local and regional trends in Plio-Pleistocene $\delta^{18}O$ records from benthic foraminifera

David B. Bell[1], Simon J. A. Jung[1], Dick Kroon[1], Lucas J. Lourens[2], and David A. Hodell[3]

Note: Backwards time axis!

What is $\delta^{18}O$?

What are benthic foraminifera?

NHG = Northern Hemispheric Glaciation

Bell et al. 2014

Leading to Pleistocene (~2.58 mya — 11.7 kya)

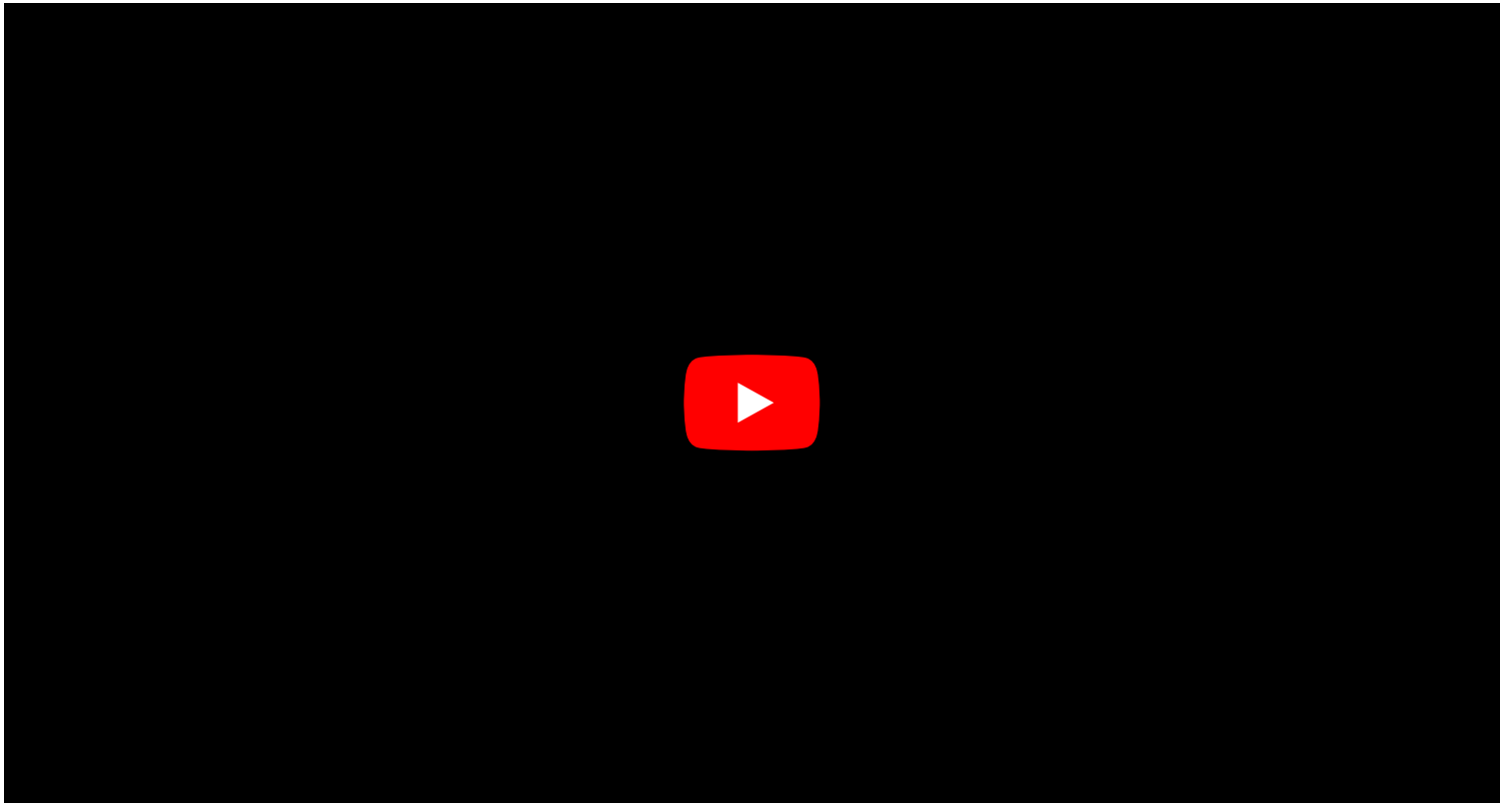
Pulses of major expansion of glaciation (*Ice Ages*) and retreats

Nomenclature near-fail: *Pliocene* means "new age", *Pleistocene* means the "newest age", *Holocene* means "entirely new" ... which, really!?

painting: Mauricio Antón

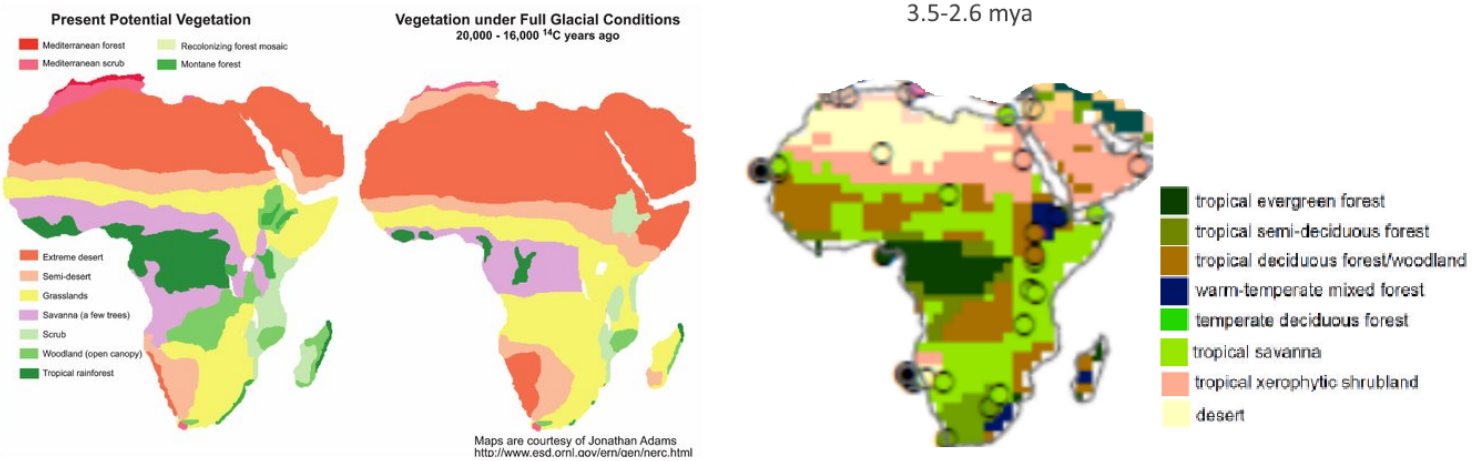
Pleistocene famously the age of mammalian giants

Brief intro to one biome: The Mammoth Steppe



What does this mean for hominids?

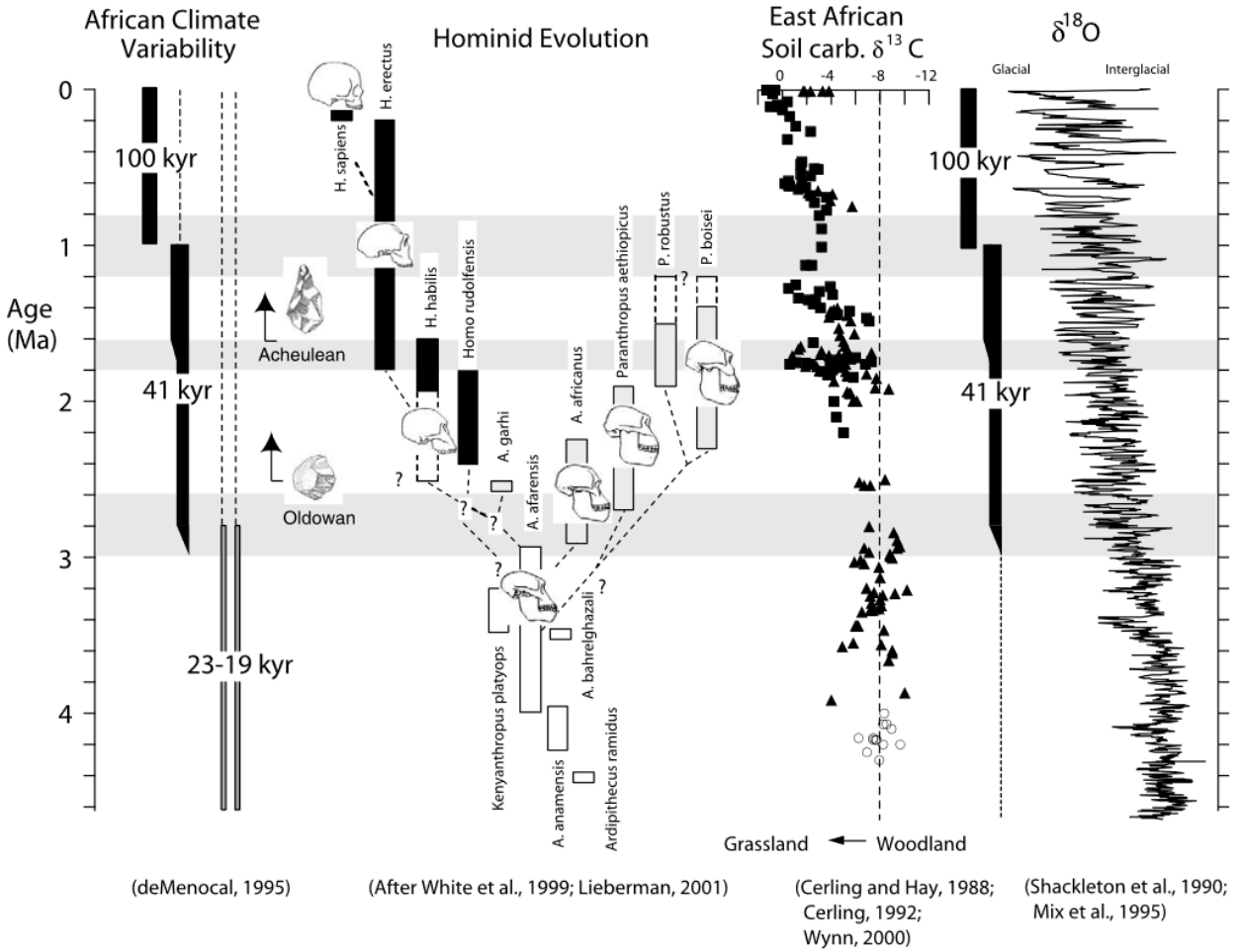
Today | Pleistocene | (late) Pliocene



time

- **Africa** becomes LESS forested more steppe / savannah / grassland.
- **Explosion** of large herbivore (grazing) populations

Cooling -> Grasslands -> Herbivore Speciation -> Hominid divergence



(deMenoca 2004)

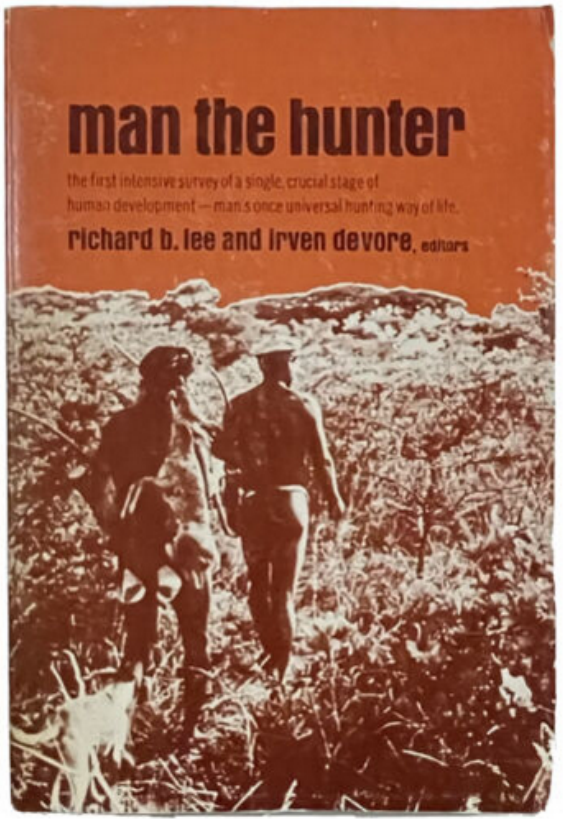
Ever since Darwin ...

the main idea has been:

1. hominid ancestors abandoned trees ...
2. became bipedal ...
3. used free hands to make tools ...
4. which they used to **hunt** ...
5. which stimulated language / cooperation / civilization, etc.

corrolaries

1. males hunt (and are stronger/smarter/etc.)
2. females gather



Darwin 1871

Alternative more nuanced hypothesis … *scavenging*

During Pliocene - Pleistocene transition, increased seasonality in precipitation lead to vegetative food-source bottlenecks.

Food diversification turned *Paranthropus* to exploit seeds, roots, sedges … *Homo* turned to meat carcasses left behind by large carnivores.

Evidence includes:

- (1) the fact that most early tools are **butchering** tools not **hunting** tools.
- (2) Predators of large herbivores almost always leave plenty to scavenge.
- (3) Scavenging is **easier**, even without fancy tools.

Consequence: Cooperation and communication and rapid divergence from other early hominids.

Pobiner 2014

Either way ... eventually humans became VERY good hunters

including (apparently) plenty of females

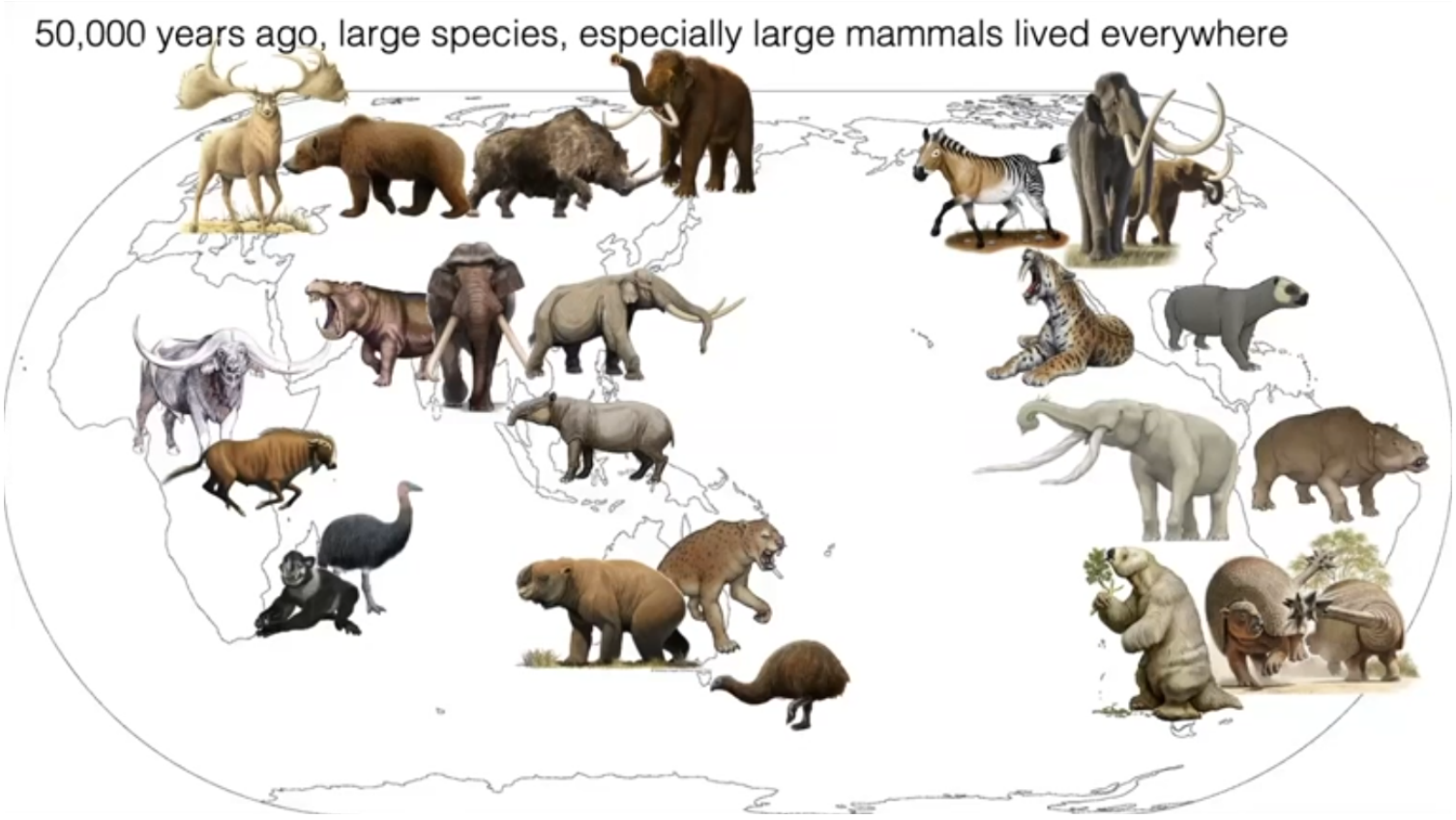
SCIENCE ADVANCES | RESEARCH ARTICLE

ANTHROPOLOGY

Female hunters of the early Americas

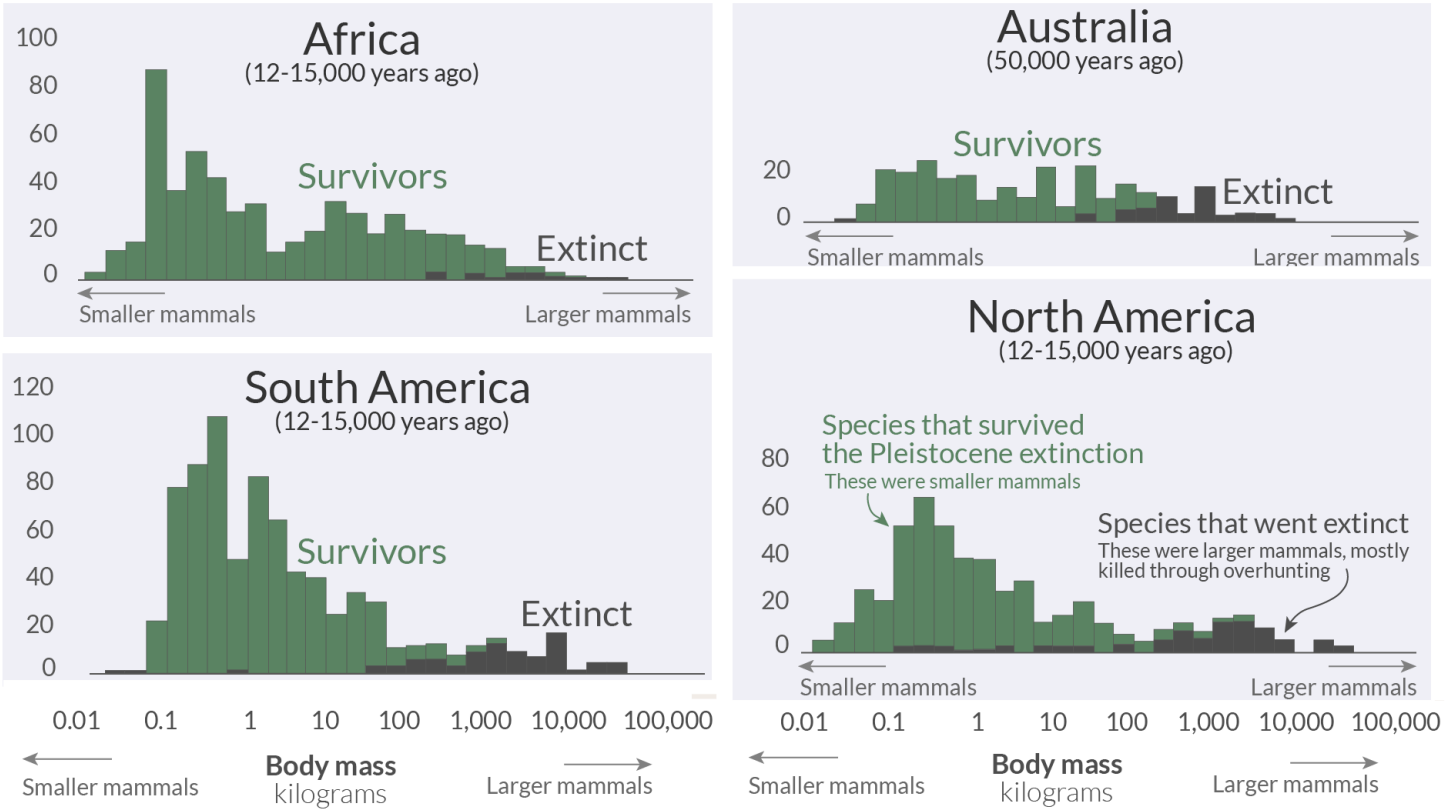
Randall Haas[1,2]*, James Watson[3,4], Tammy Buonasera[1,5], John Southon[6], Jennifer C. Chen[7], Sarah Noe[8], Kevin Smith[1], Carlos Viviano Llave[2], Jelmer Eerkens[1], Glendon Parker[5]

Extinct megafauna (>100 kg)

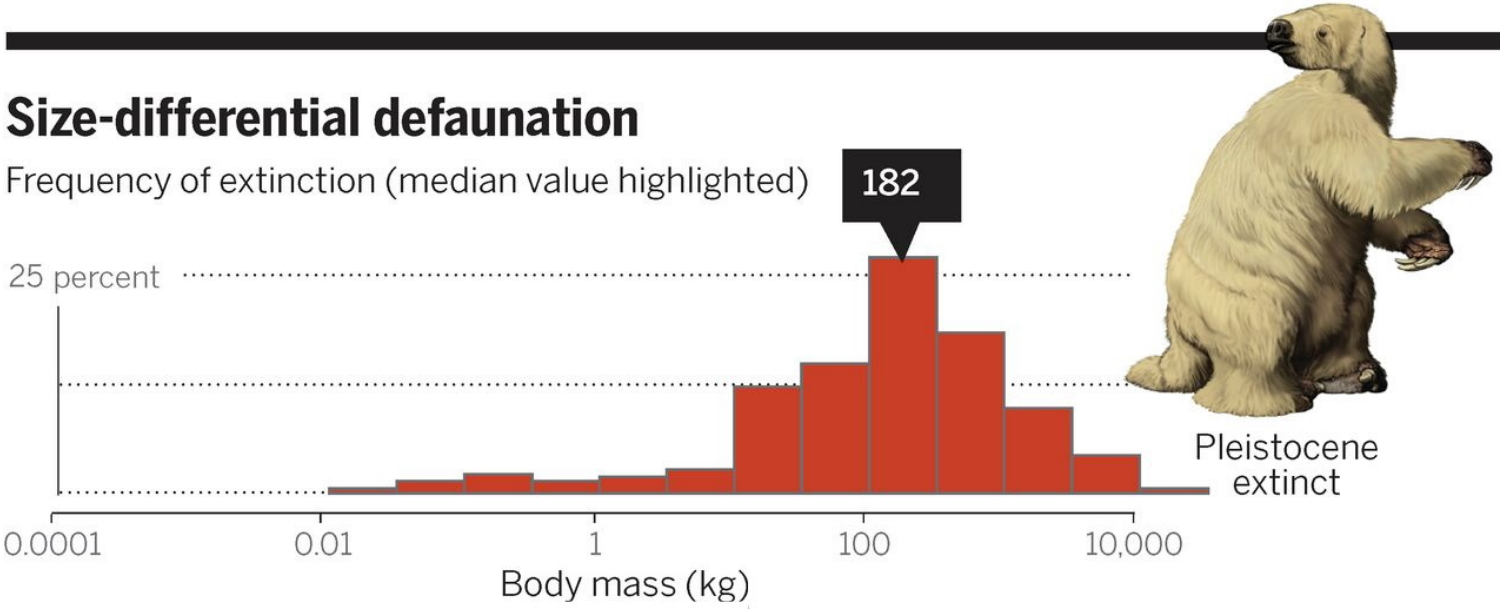


And most of the megafauna goes extinct

note the size bias!

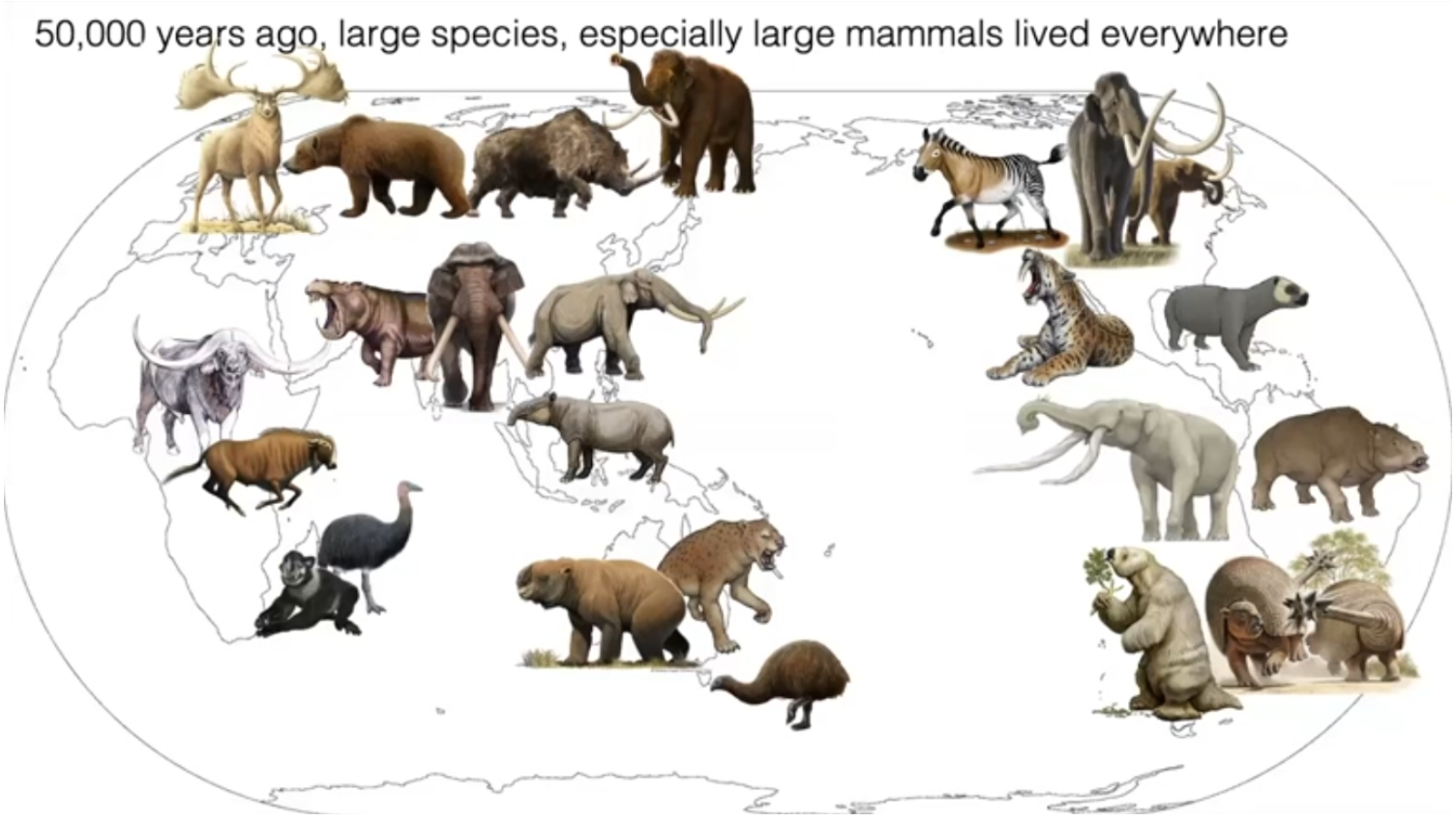


And most of the megafauna goes extinct

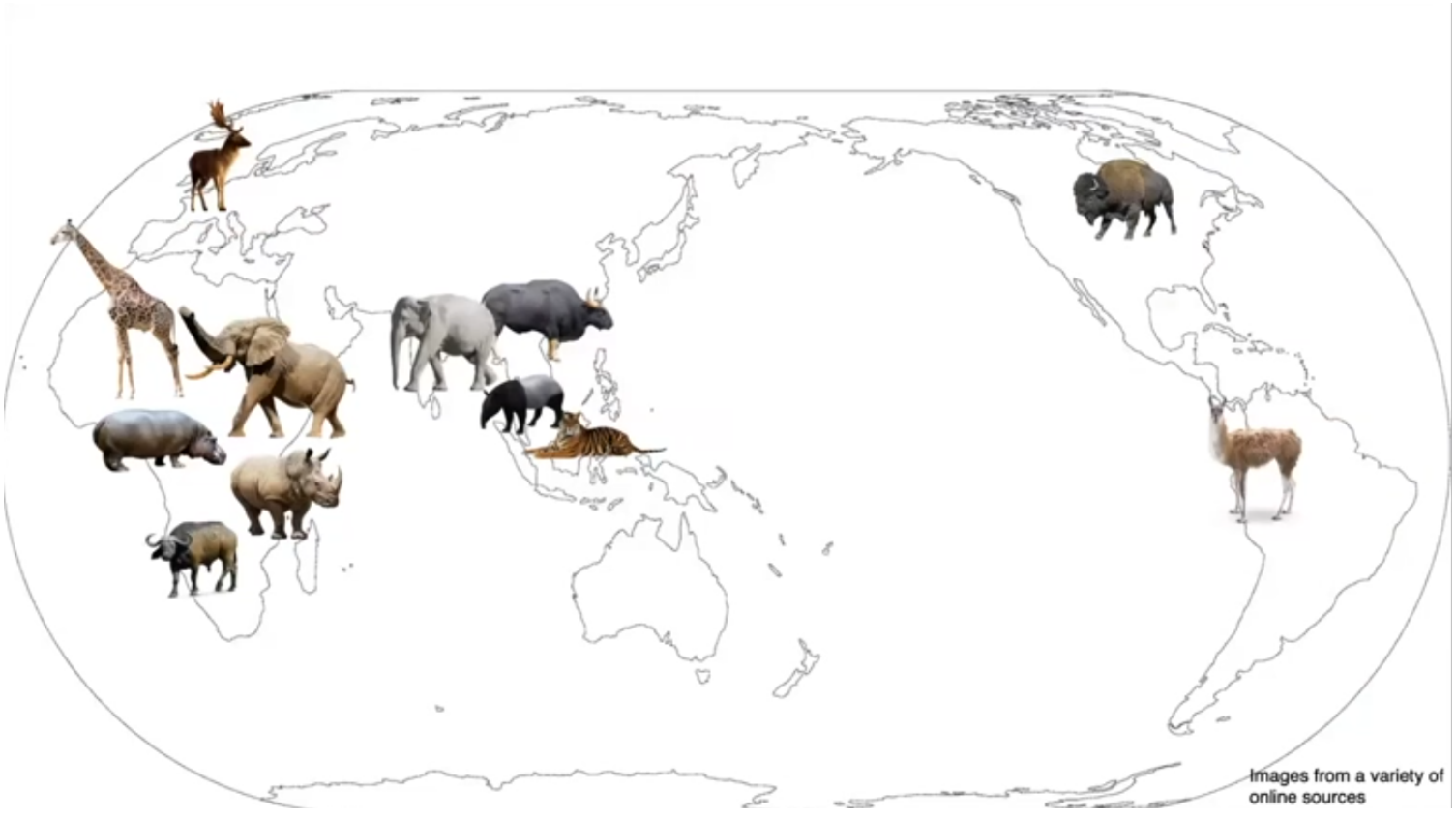


Dirzo et al. 2014

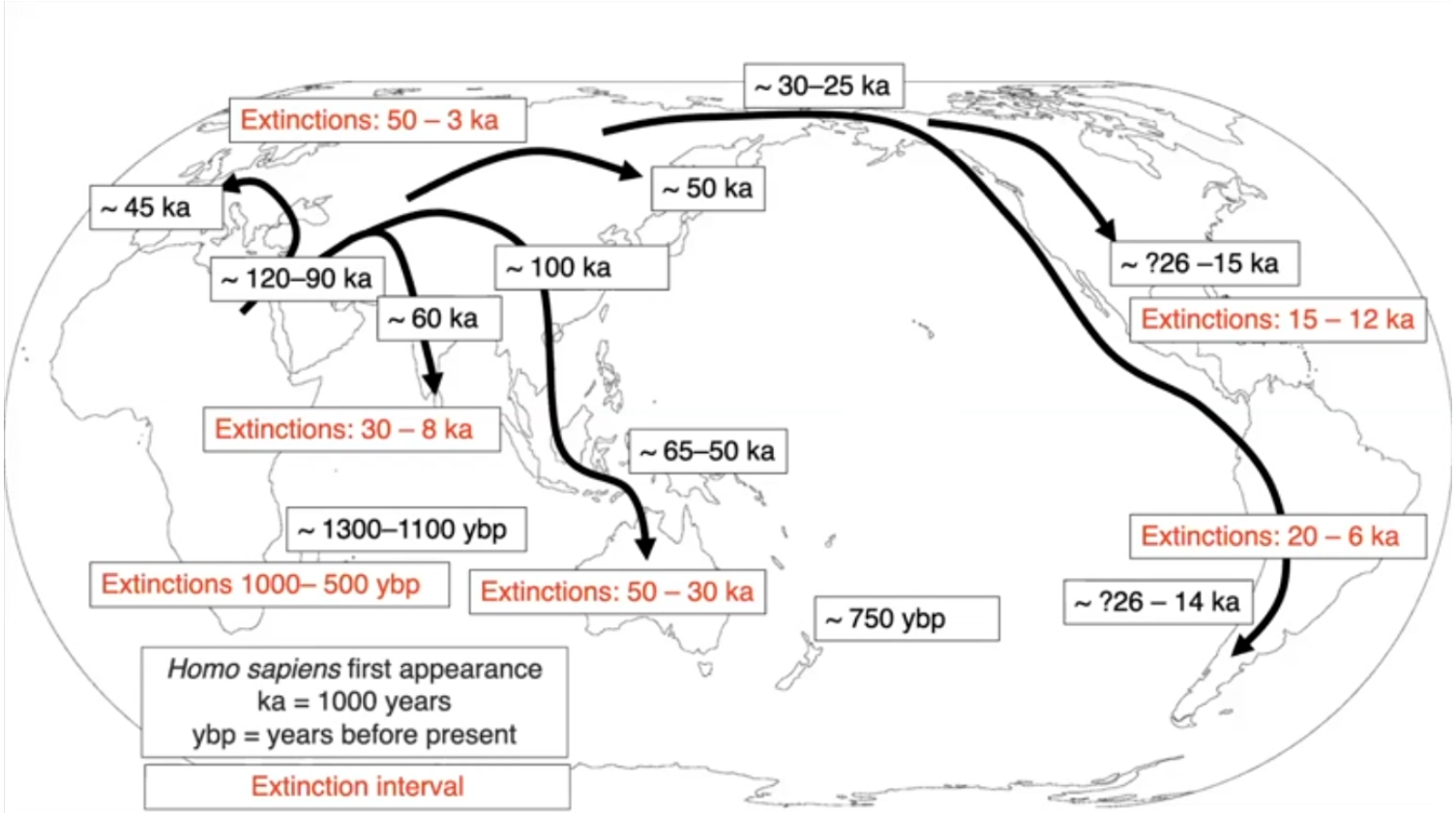
Compare location of extinct megafauna



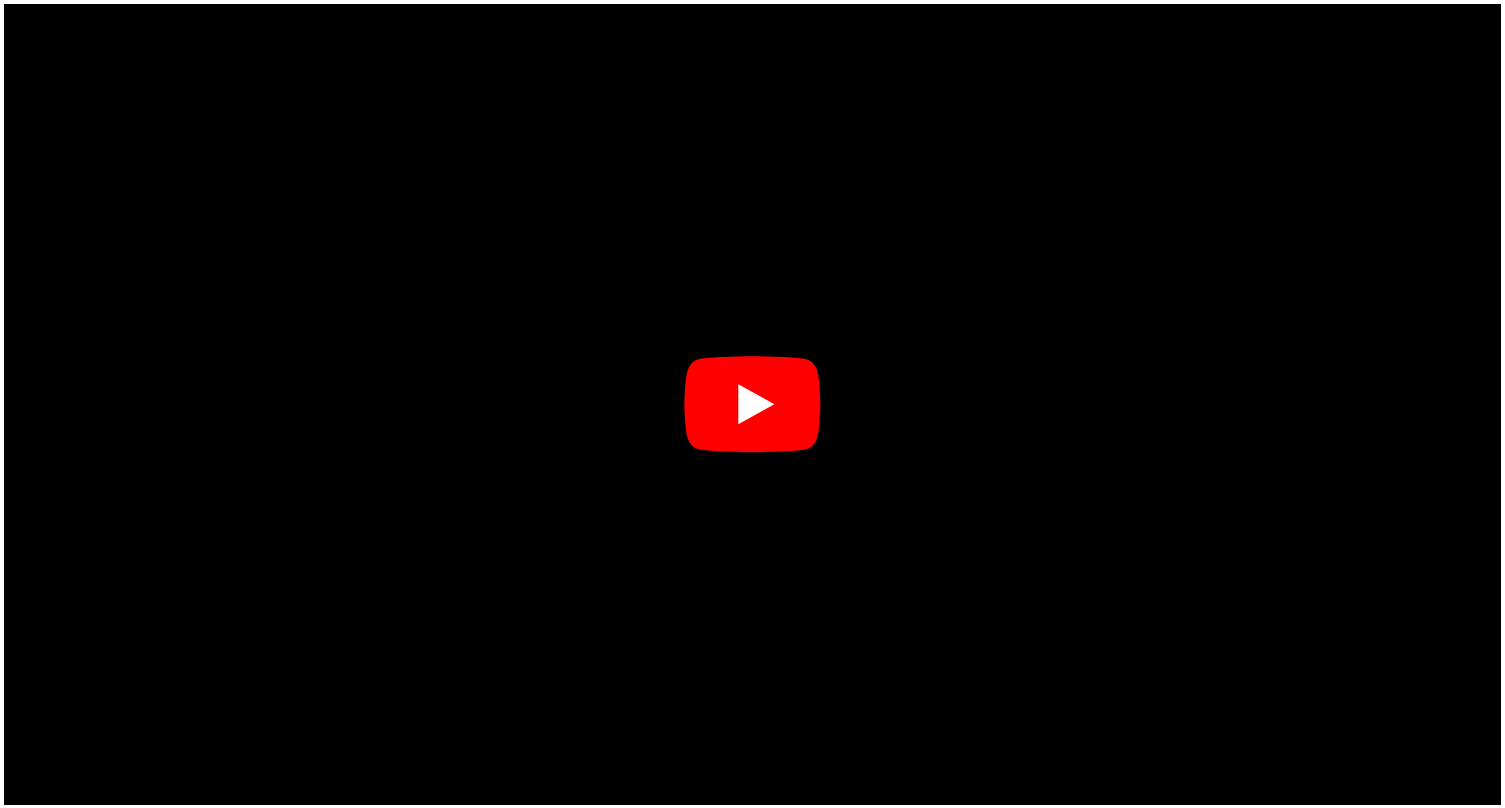
To extant megafauna



Global human dispersal ... followed by extinctions

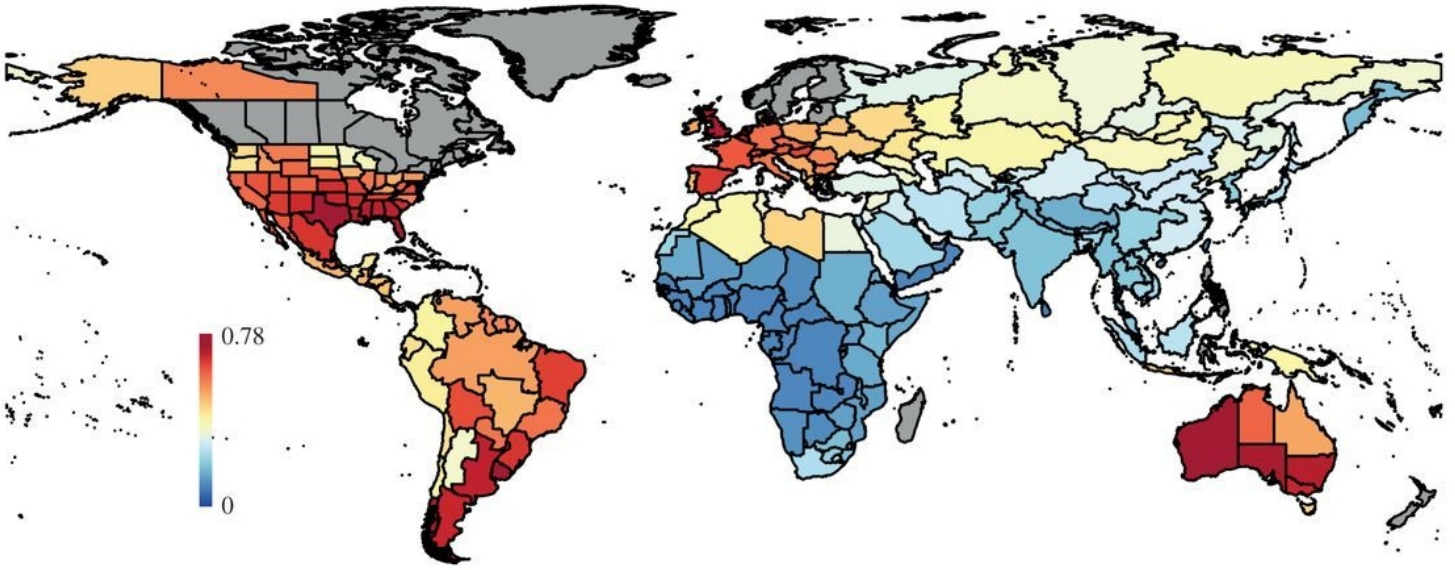


Was it humans or climate?



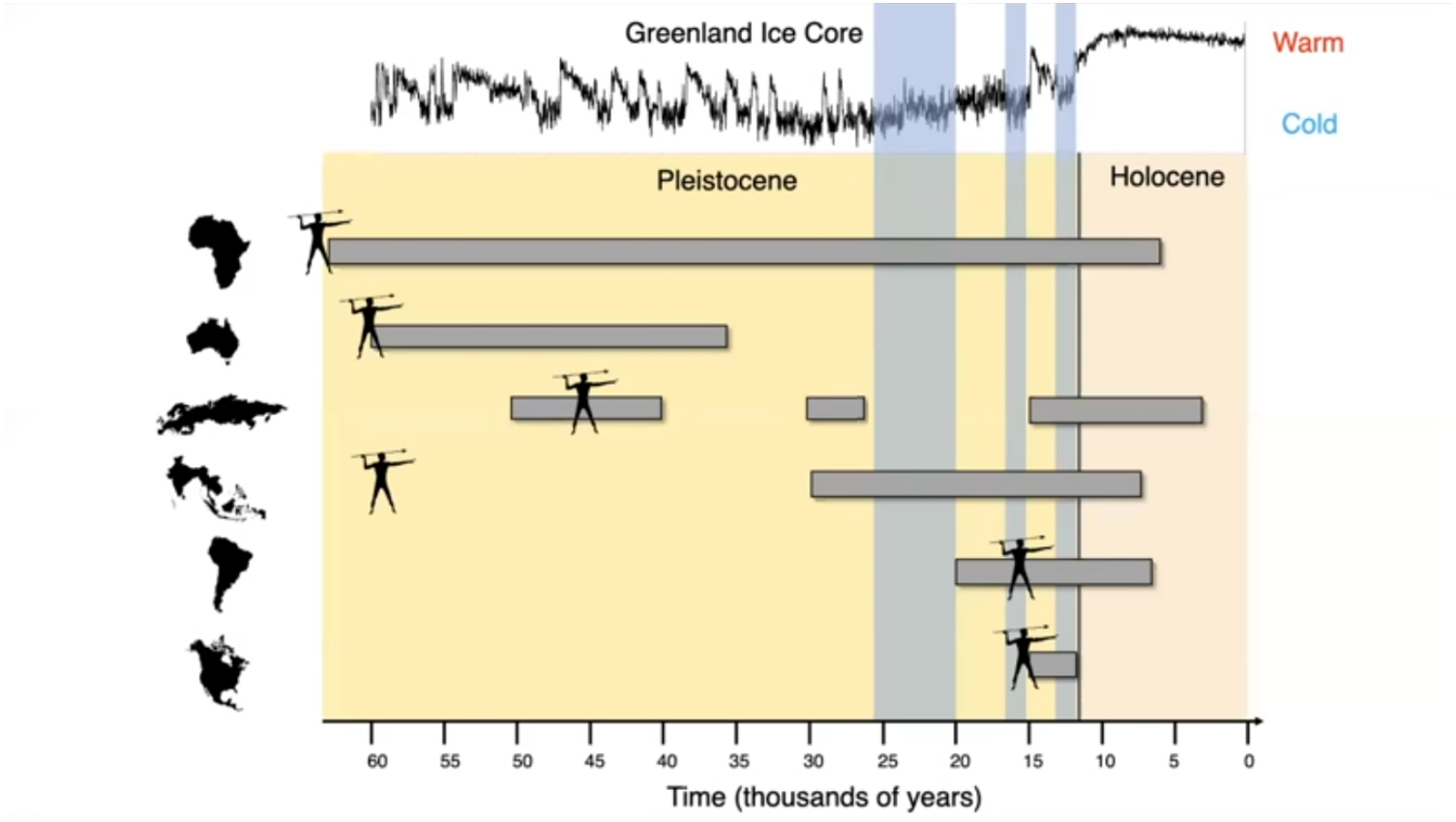
(start at 2:46)

Longer co-existence -> relatively less extinction



region	extinction (genera)
- **Subsaharan Africa:**	4.5% (2 / 44)
- **Indian Subcontinent:**	13.8% (4 / 29)
- **Europe:**	30.4% (7 / 23)
- **North America:**	73.3% (33 / 45)
- **South America:**	79.3% (46 / 58)
- **Australia and New Guinea:**	93.8% (15 / 16)

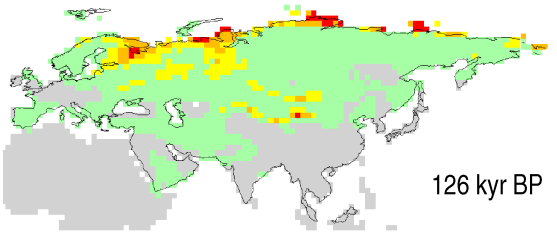
Climate and/or humans?

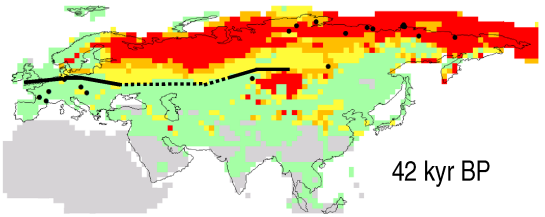


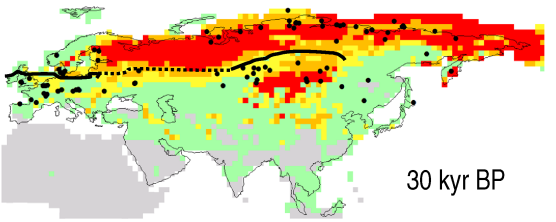
(kind of a smoking … spear?)

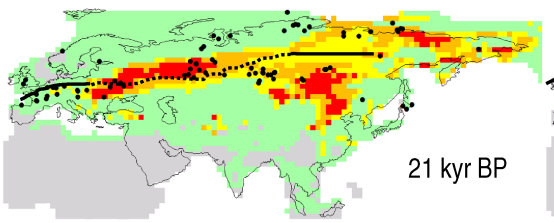
Does climate play *some* role?

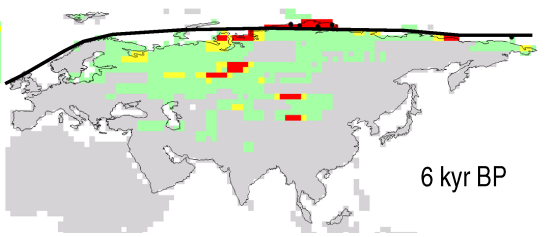
warm period ...
mammoth survives











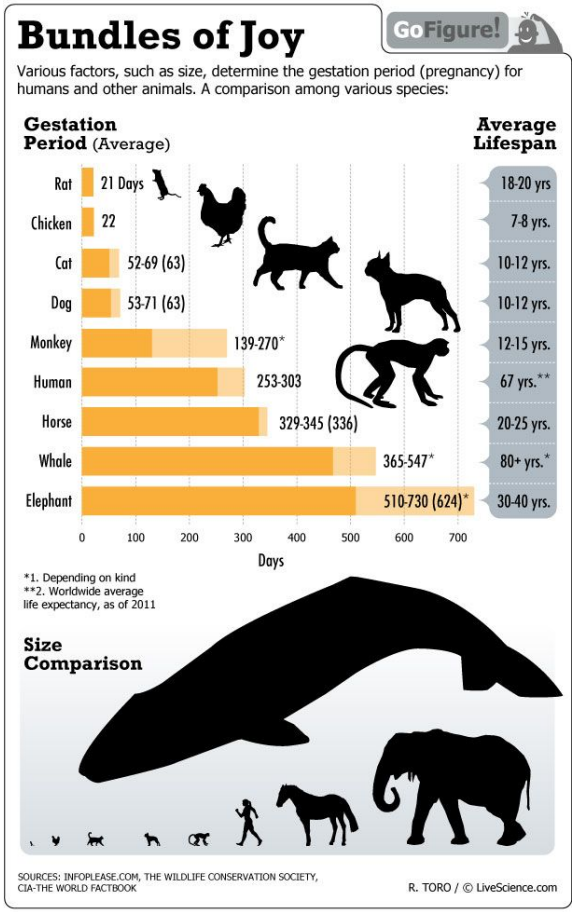
warm period ...
mammoth goes
extinct

Woolly Mammoth (*Mammuthus primigeneris*) habitat fragmentation ... leads to higher **risk** when human X-factor arrives.

Does size play a role?

- Long gestation time
- Long inter-birth intervals
- Small litters
- Delayed age to maturity

Also leads to higher **risk** of extinction once human X-factor arrivess.



Take-aways ...

Hominids **are** animals, and have obviously always interacted ecologically with other animals.

Climate-driven changes in vegetative ecology led to a major shift in diets towards meat and marrow, and major consequences for hominid evolution. (With debate was it **hunting** or **scavenging**)

In combination with **climate change** and **reproductive biology/physiology**, even small numbers of humans can cause major extinctions. (with debate as to the relative importance of **hunting** vs. **climate change**)

On places with long histories of co-evolution (esp. Africa) historic humans were able to coexist with highly diverse megafauna.

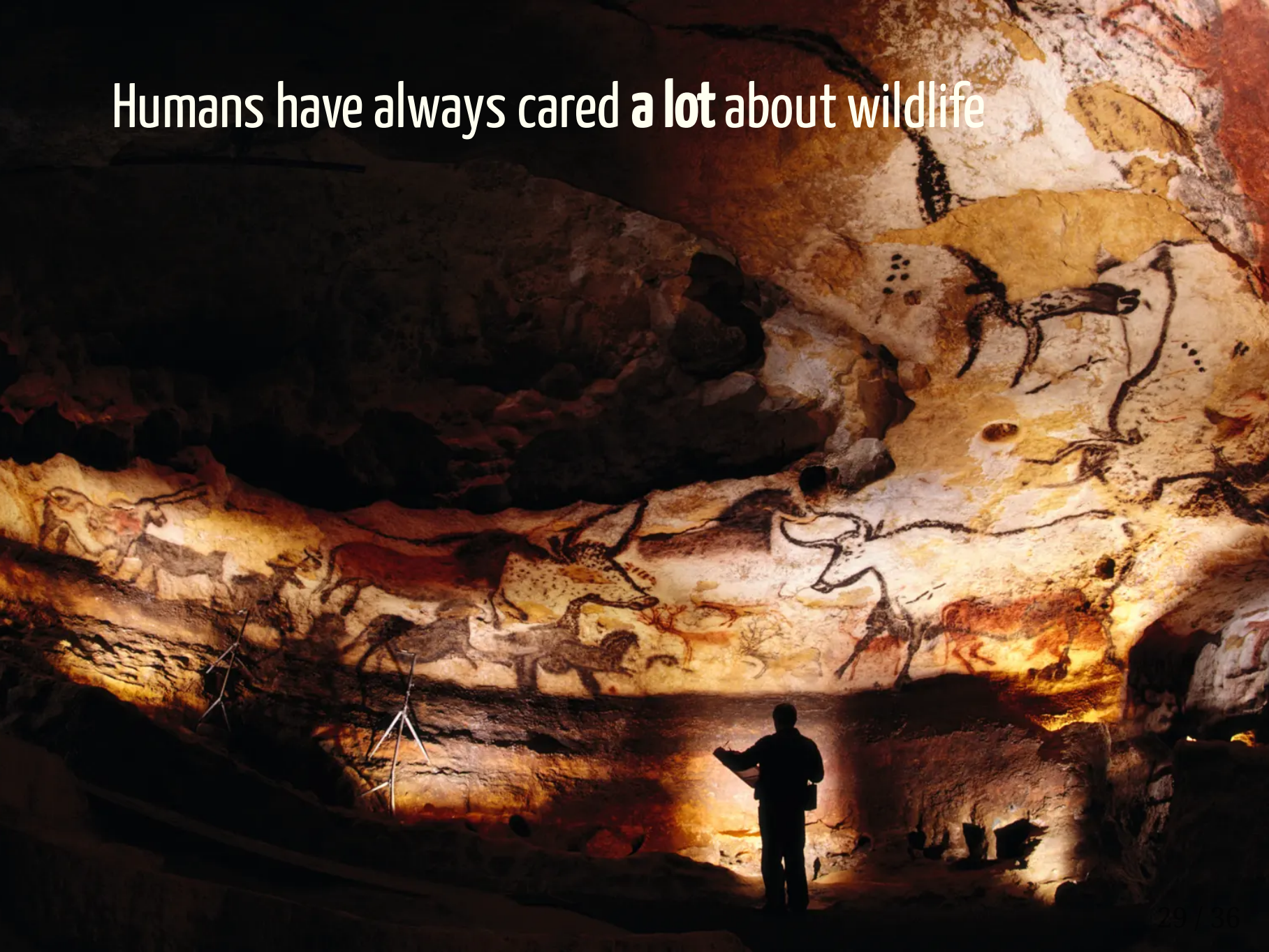
Take-aways re. science

Paleontology (paleoecology, paleaoclimatology, etc.) requires:

- HIGHLY patchy, incomplete and hard to obtain and interpret data (esp. **fossil remains**)
- fancy **technology**, esp. for dating, reconstructing climate and, increasingly, DNA sequencing.
- sophisticated **modeling** of (global) climate & vegetation
- understanding of climatology, biogeochemical cycles, global ecology, basic ecology, human and animal behavior (for **modern analogues**).
- Lots and lots of guesswork, argument building, and debate!

In the end - obviously - there is **lots** we'll never know, but it is **impressive** the stories that can be inferred!

Humans have always cared **a lot** about wildlife



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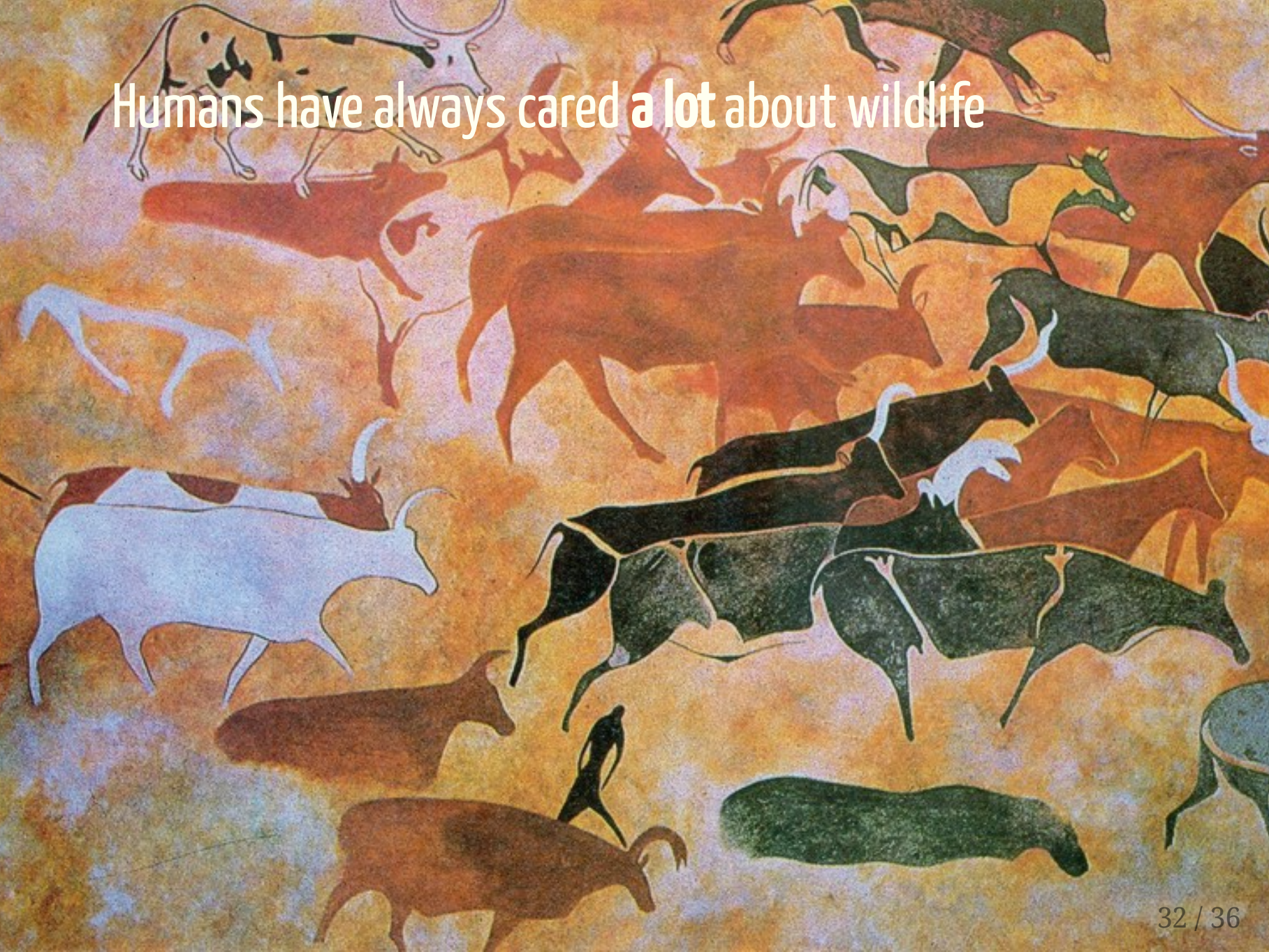
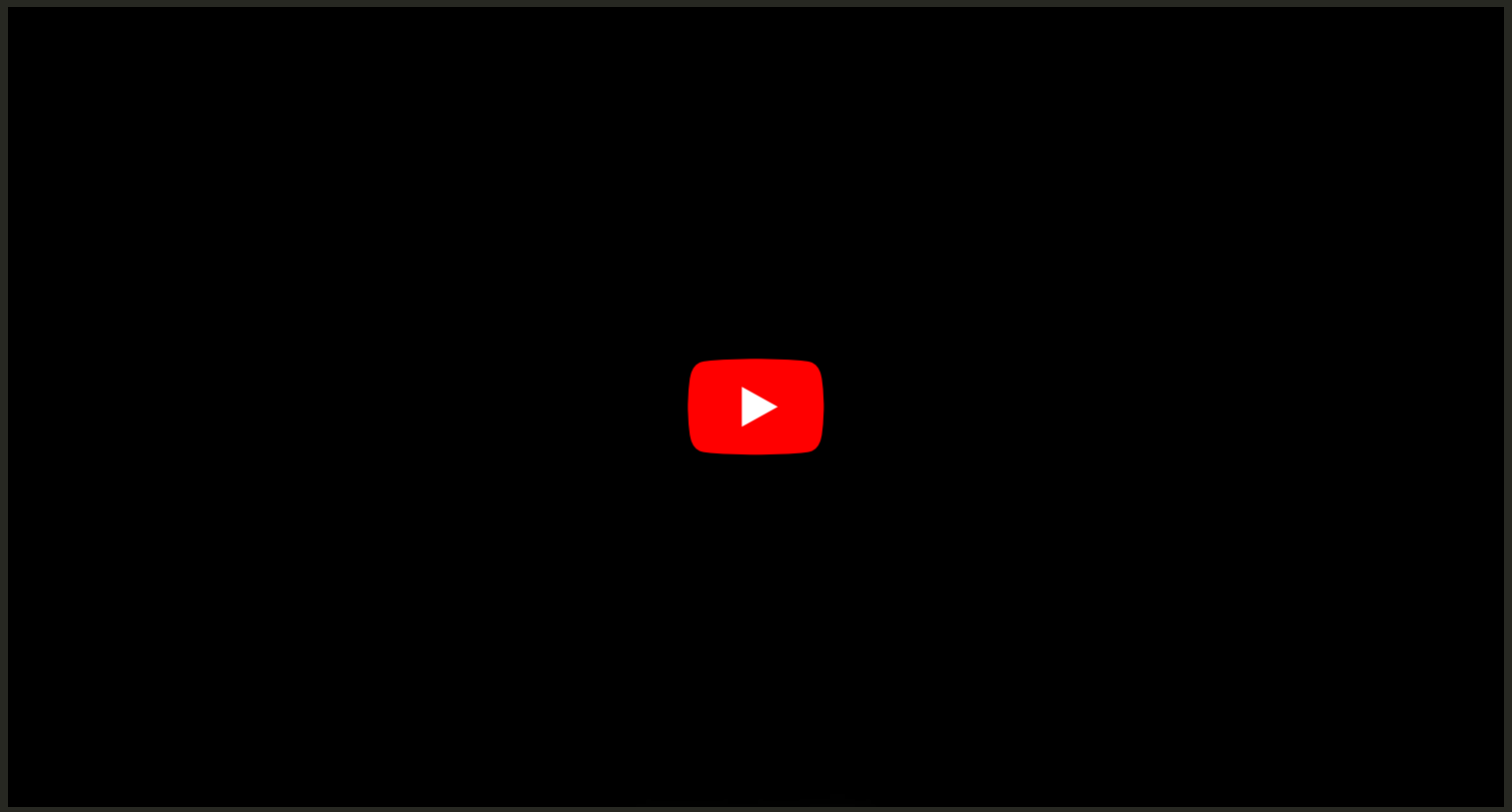

Humans have always cared **a lot** about wildlife

Humans have always cared **a lot** about wildlife

Much higher-level question ...

Can we leverage our paleo-ecological knowledge to mitigate climate change?



Start at 8:39

References I

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References II

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