

Humans and Wildlife: A Deep (pre)-History

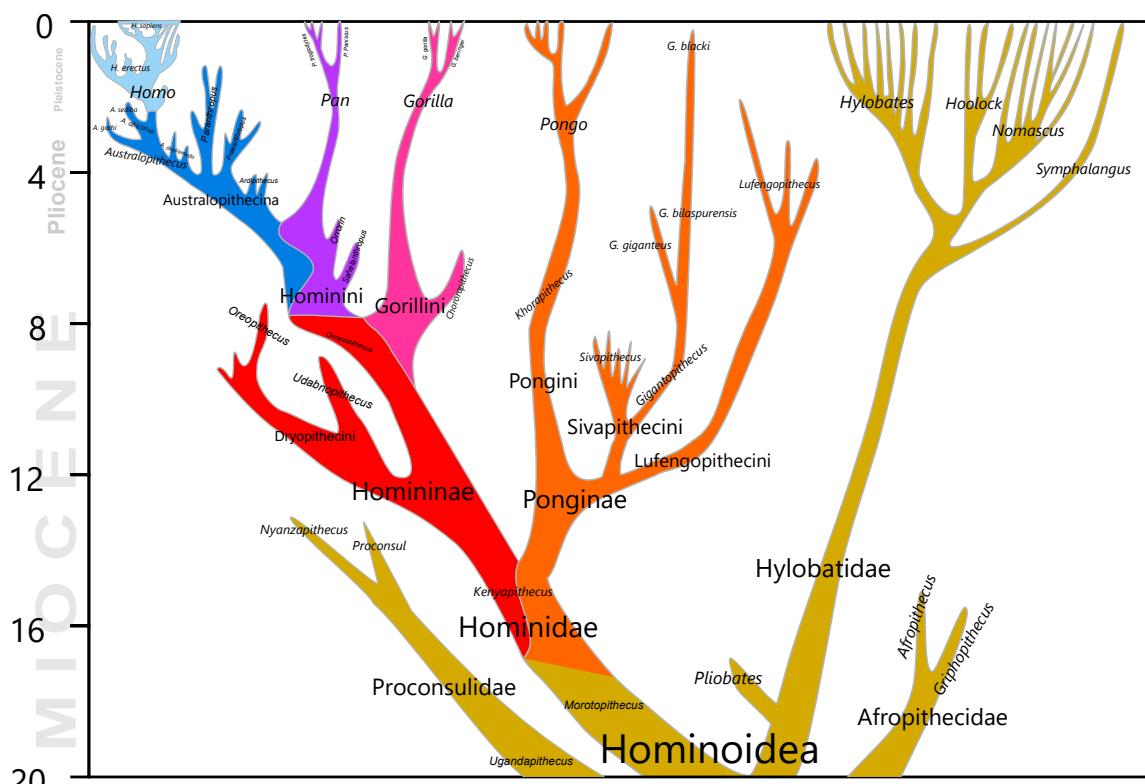
EFB 390: Wildlife Ecology and Management

Dr. Elie Gurarie

2023-09-05

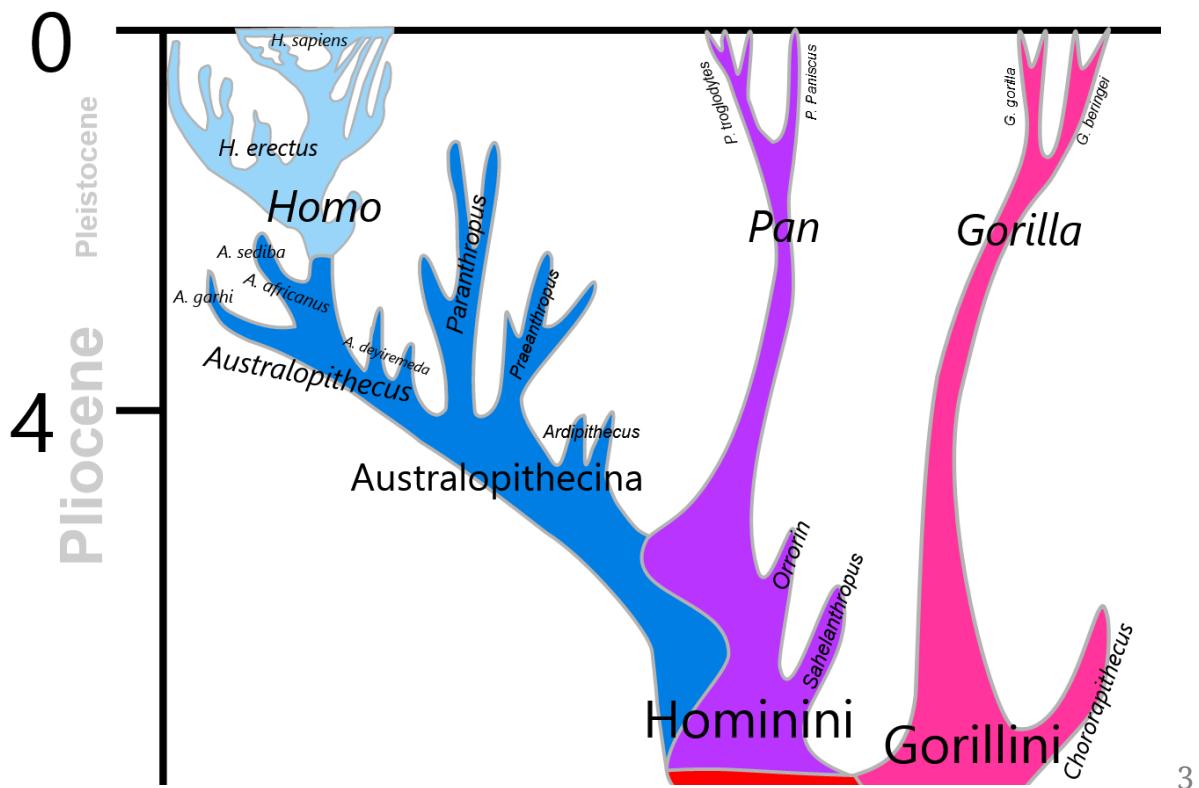
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Hominoidea



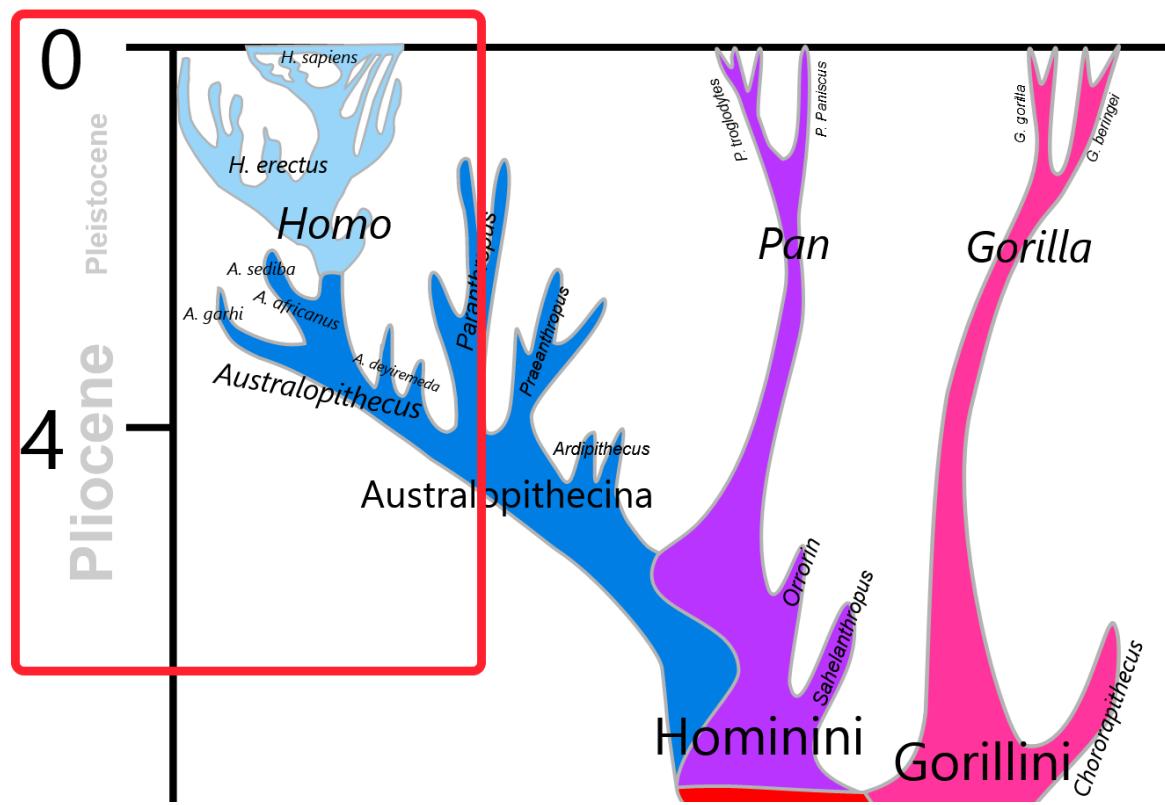
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Zoom in on Hominini



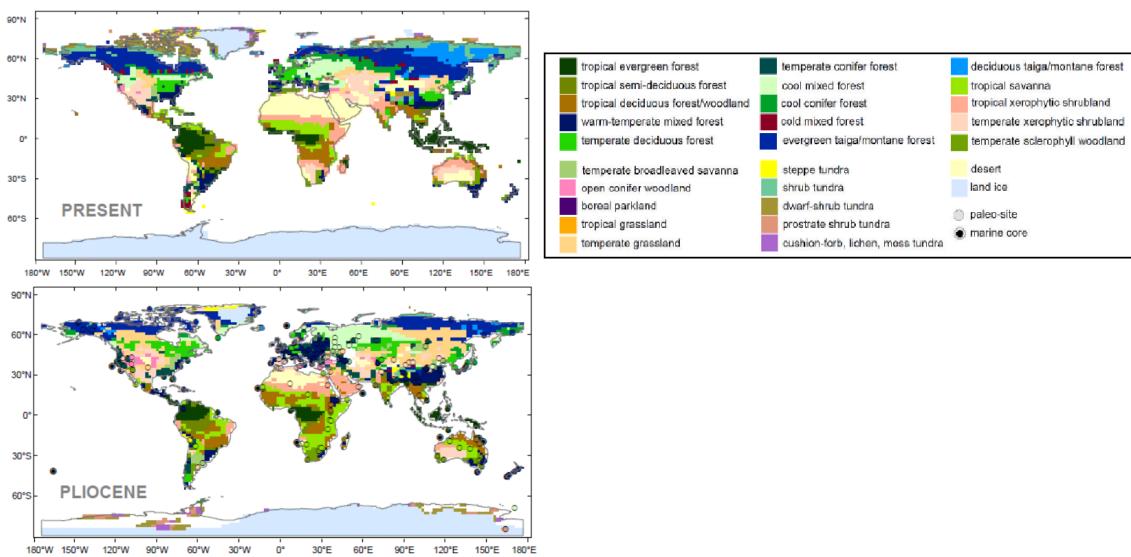
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Note the Pliocene-Pleistocene transition



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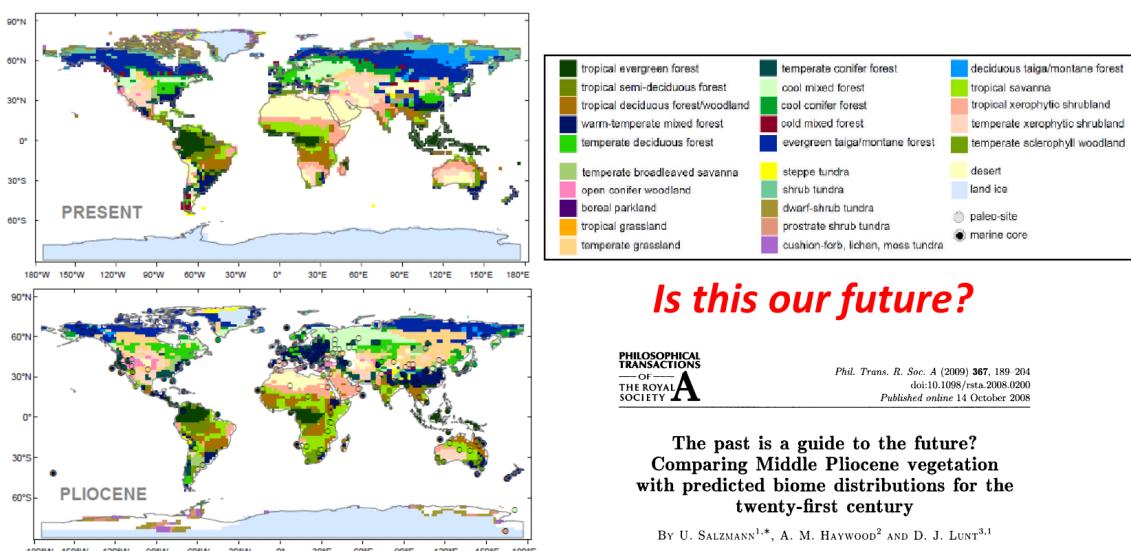
The Pliocene (5.3-2.6 mya) was warm ...



(Salzmann et al. 2011)

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... about 2-4 °C warmer ...



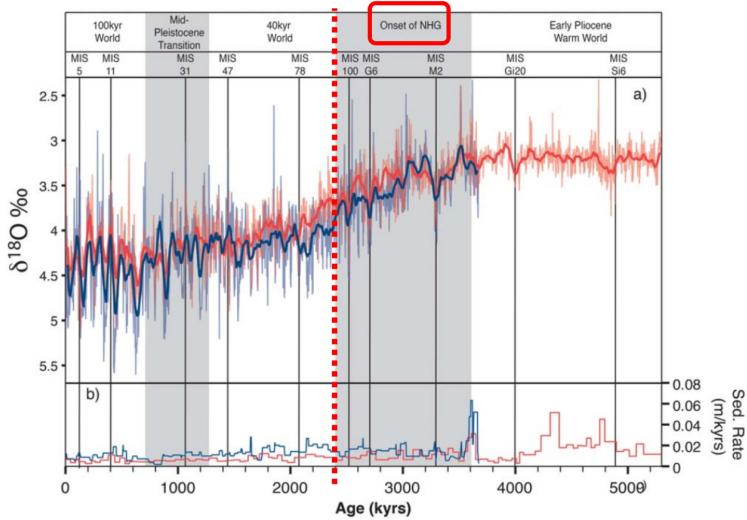
The past is a guide to the future?
Comparing Middle Pliocene vegetation
with predicted biome distributions for the
twenty-first century

BY U. SALZMANN^{1,*}, A. M. HAYWOOD² AND D. J. LUNT^{3,1}

(Salzmann et al. 2011, 2009)

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... but cooling



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

David B. Bell¹, Simon J. A. Jung¹, Dick Kroon¹, Lucas J. Lourens², and David A. Hodell³

Note:

Backwards time axis!

NHG = Northern
Hemispheric
Glaciation

(Bell et al. 2014)

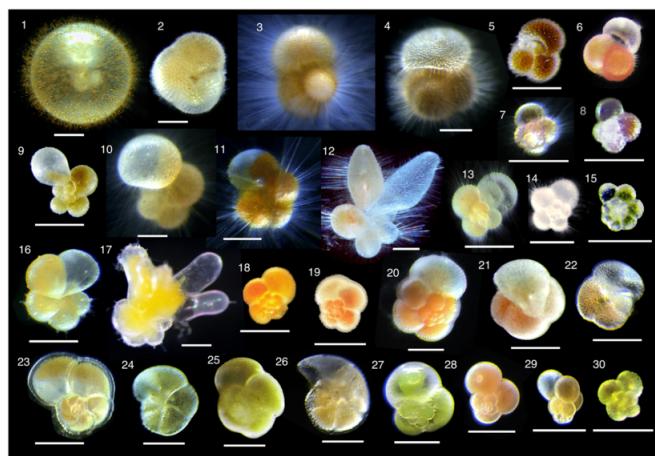
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Leads to some questions ...

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



What are benthic foraminifera?



And how do they tell us what the climate was many mya?

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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

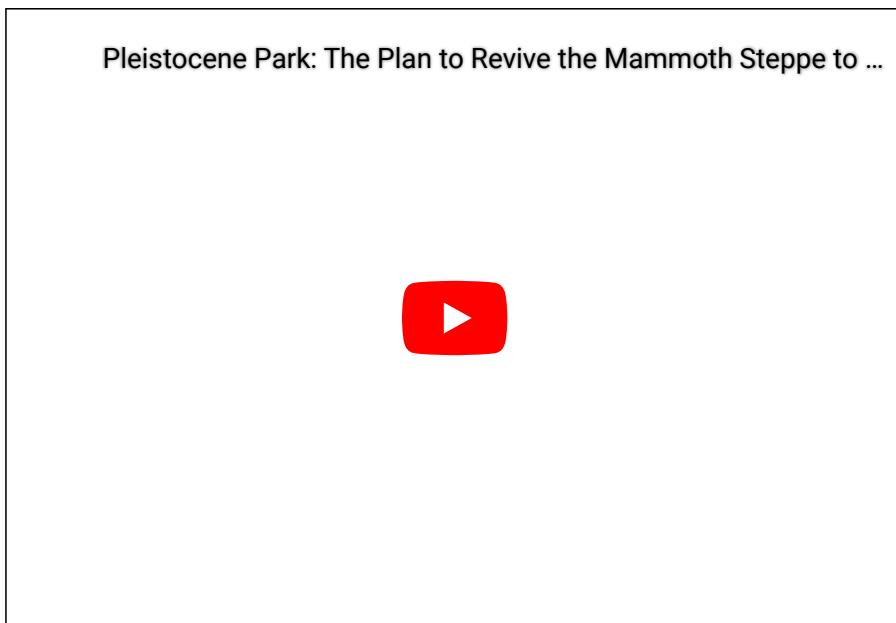
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Pleistocene famously the age of mammalian giants



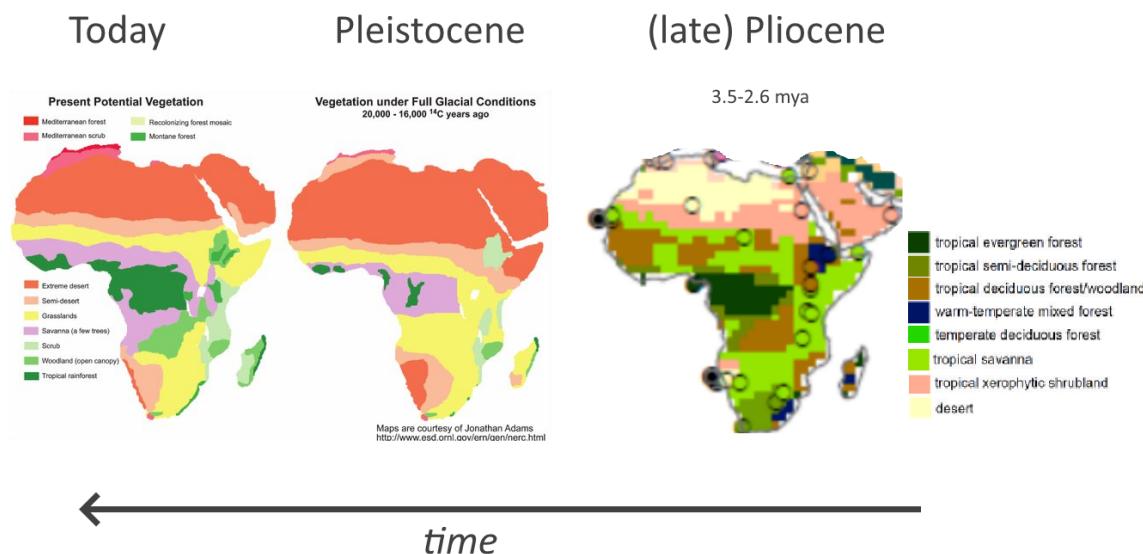
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Brief intro to one biome: The Mammoth Steppe



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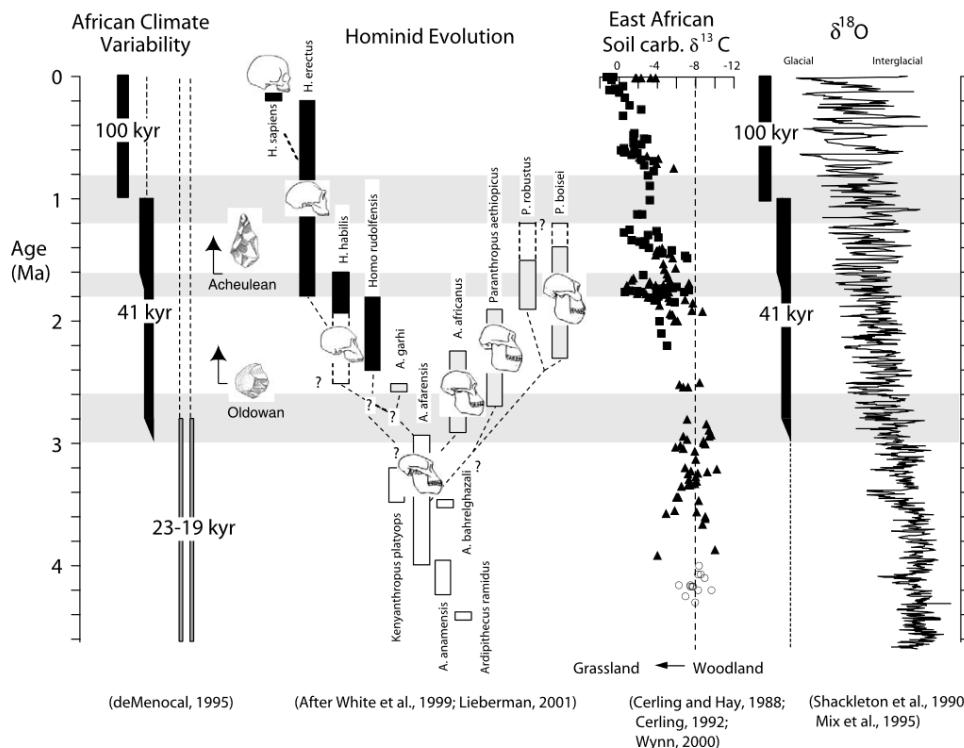
What does this mean for hominids?



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

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



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deMenocal 2004 00003-2)

Ever since Darwin ...

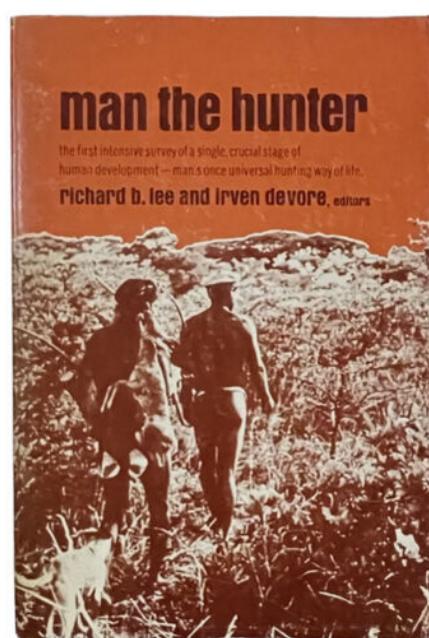
the main idea has been:

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.

corollaries

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

“meat made us human” hypothesis



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 erectus* 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)

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Active research and debates!

RESEARCH ARTICLE | ANTHROPOLOGY |

No sustained increase in zooarchaeological evidence for carnivory after the appearance of *Homo erectus*

W. Andrew Barr , Briana Pobiner , John Rowan , and J. Tyler Faith Authors Info & Affiliations

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January 24, 2022 | 119 (5) e2115540119 | <https://doi.org/10.1073/pnas.2115540119>



(Barr et al. 2022)

Interesting **podcast**, also about how certain beliefs persist in science, and also how results are represented / misrepresented in current information-sphere.

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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 Southon⁶, Jennifer C. Chen⁷, Sarah Noe⁸, Kevin Smith¹, Carlos Viviano Llave², Jelmer Eerkens¹, Glendon Parker⁵

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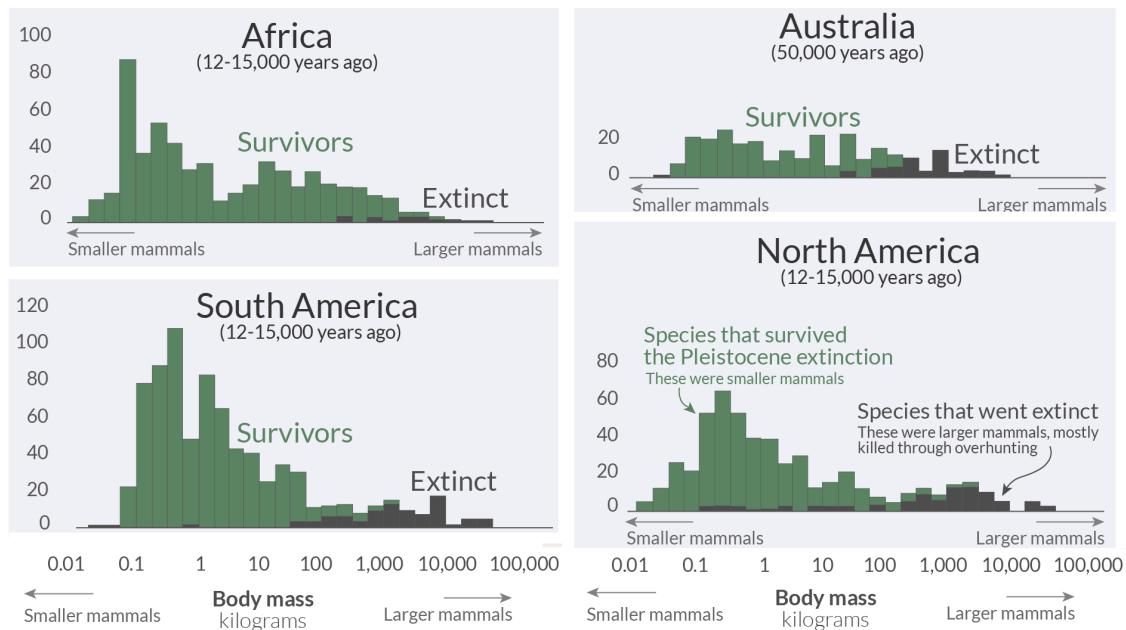
Extinct megafauna (>100 kg)

50,000 years ago, large species, especially large mammals lived everywhere



And most of the megafauna goes extinct

note the size bias!

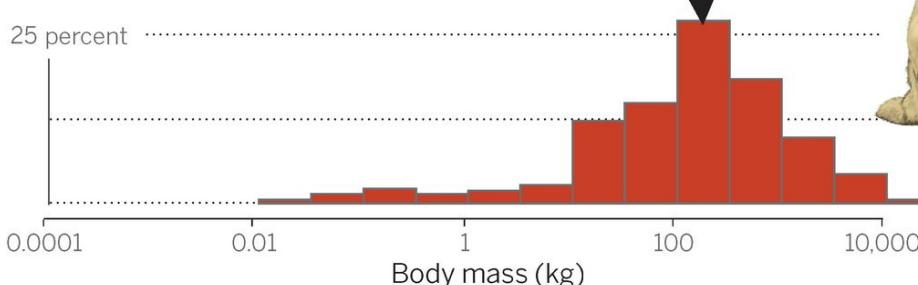


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And most of the megafauna goes extinct

Size-differential defaunation

Frequency of extinction (median value highlighted)



(Dirzo et al. 2014)

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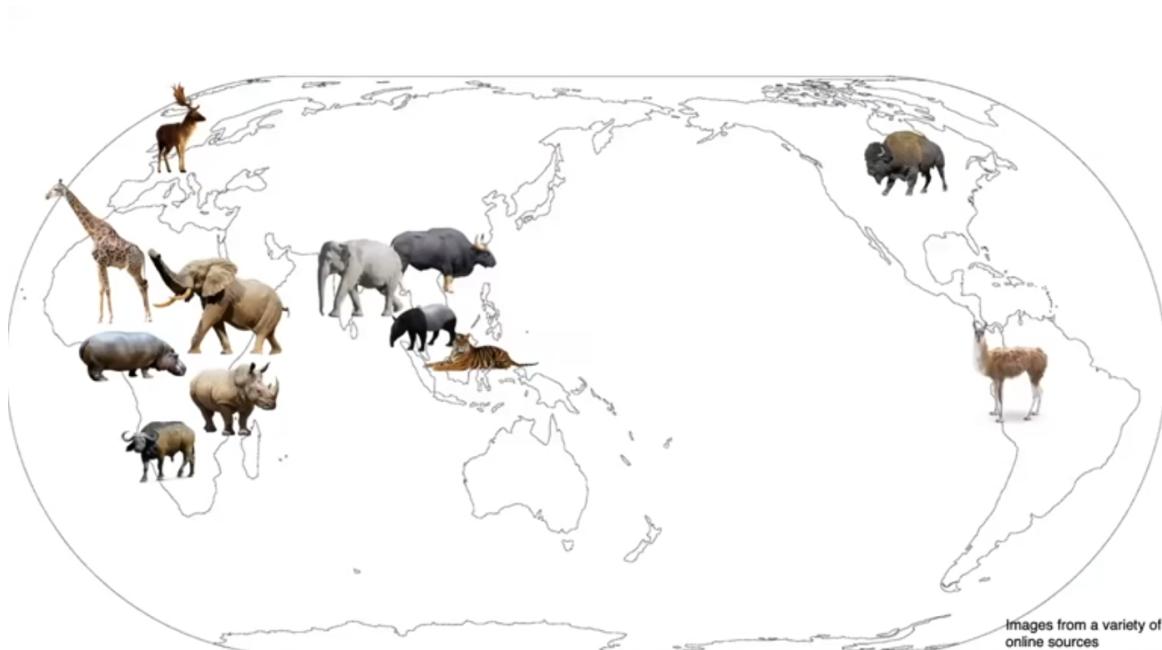
Compare location of extinct megafauna

50,000 years ago, large species, especially large mammals lived everywhere



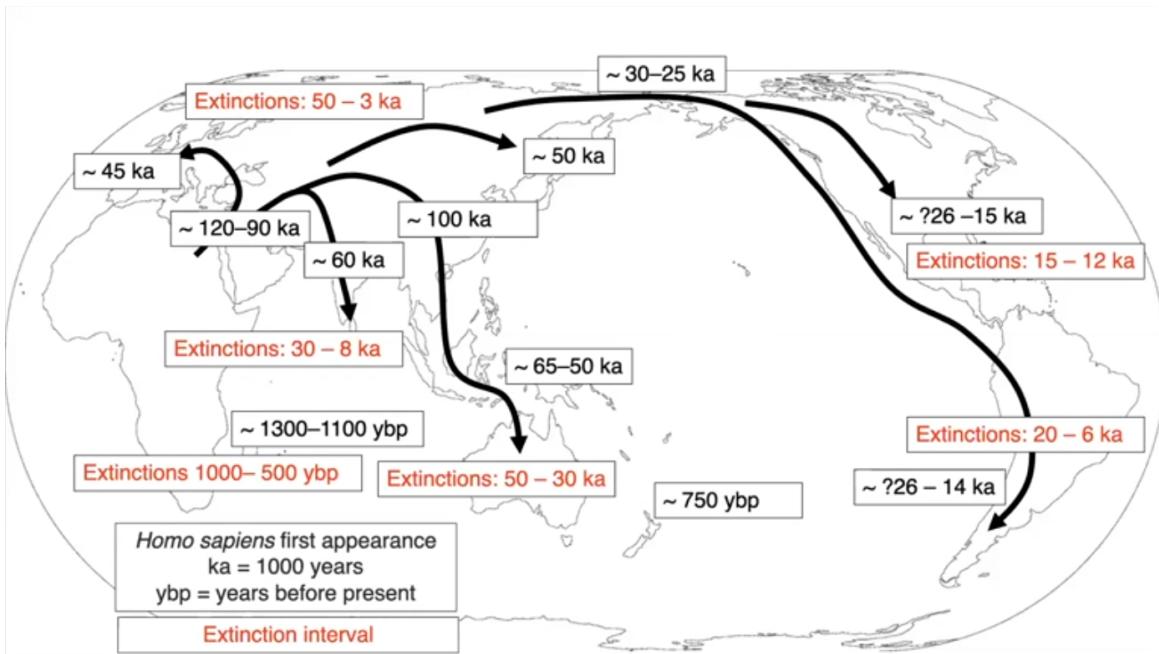
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To extant megafauna



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Global human dispersal ... followed by extinctions



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Was it humans or climate?

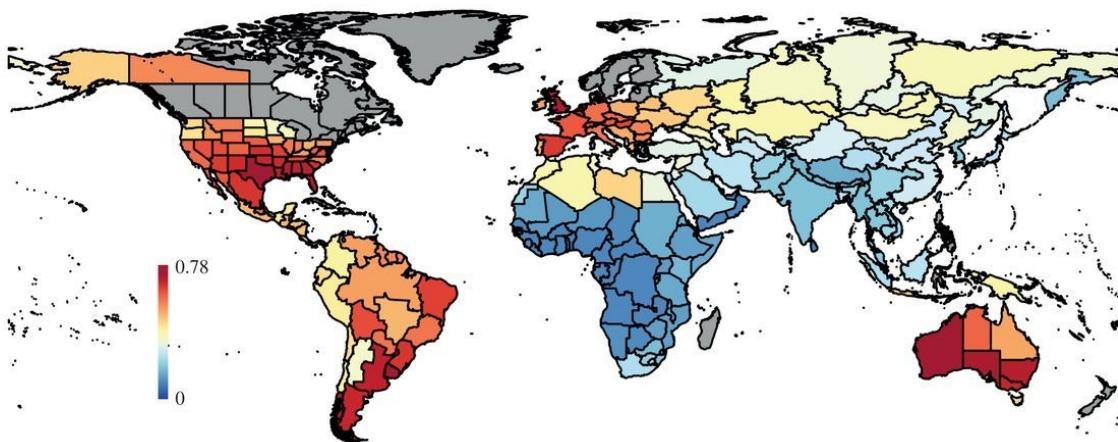
Pleistocene Park: The Plan to Revive the Mammoth Steppe to Fight Climate Change



(start at 2:46)

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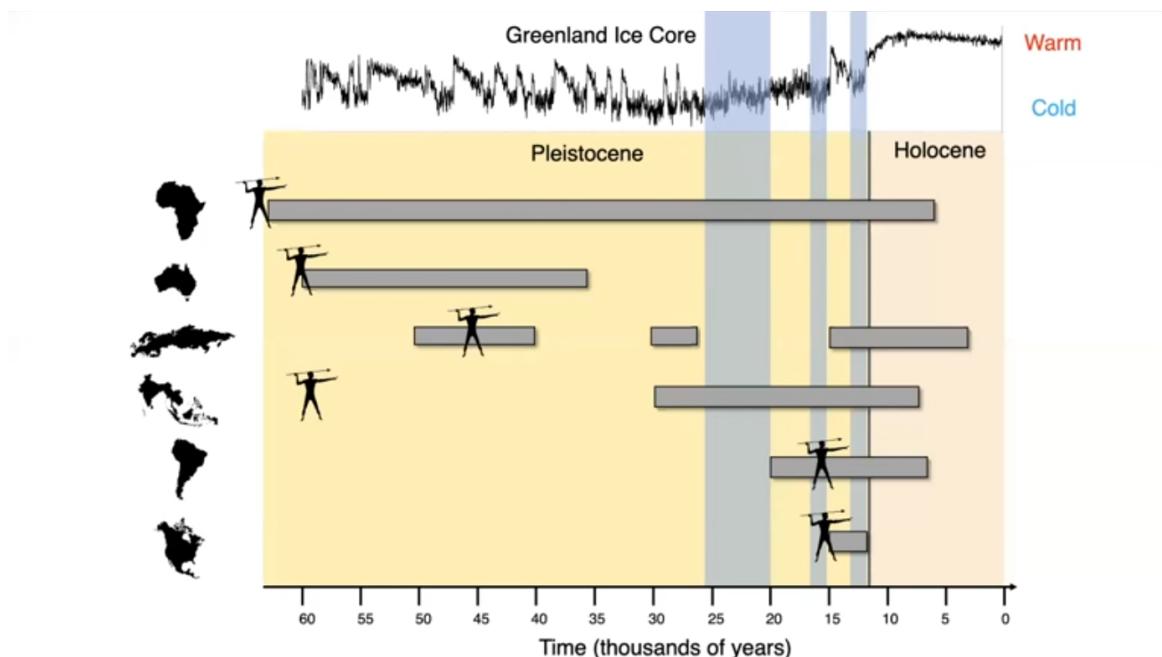
Longer co-existence -> relatively less extinction



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)

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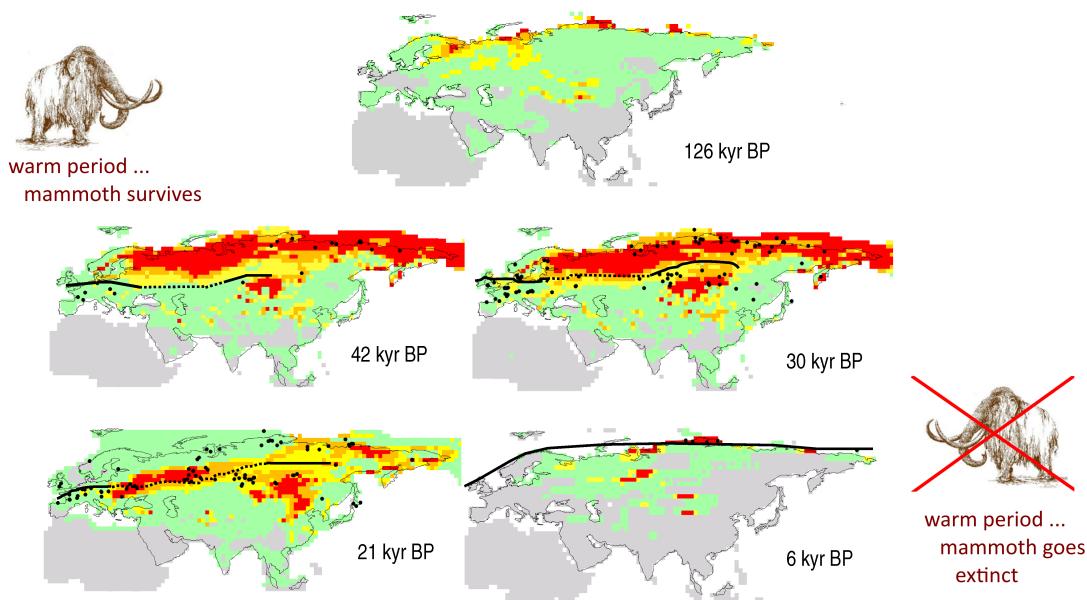
Climate and/or humans?



(kind of a smoking ... spear?)

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Does climate play *some* role?



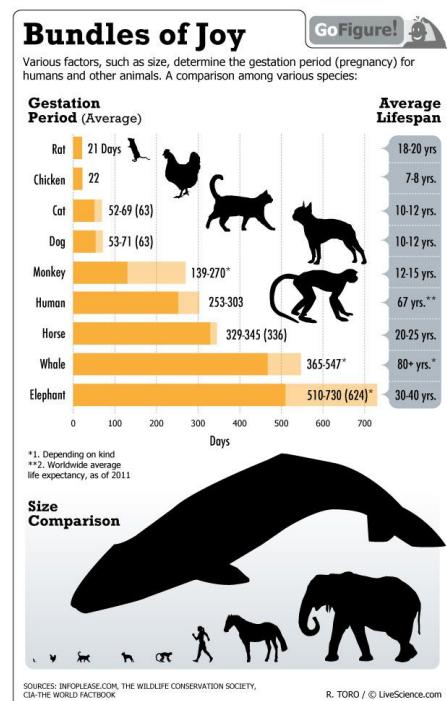
Woolly Mammoth (*Mammuthus primigenius*) habitat fragmentation ... leads to higher **risk** when human X-factor arrives.

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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 arrives.



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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.

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Take-aways re. science

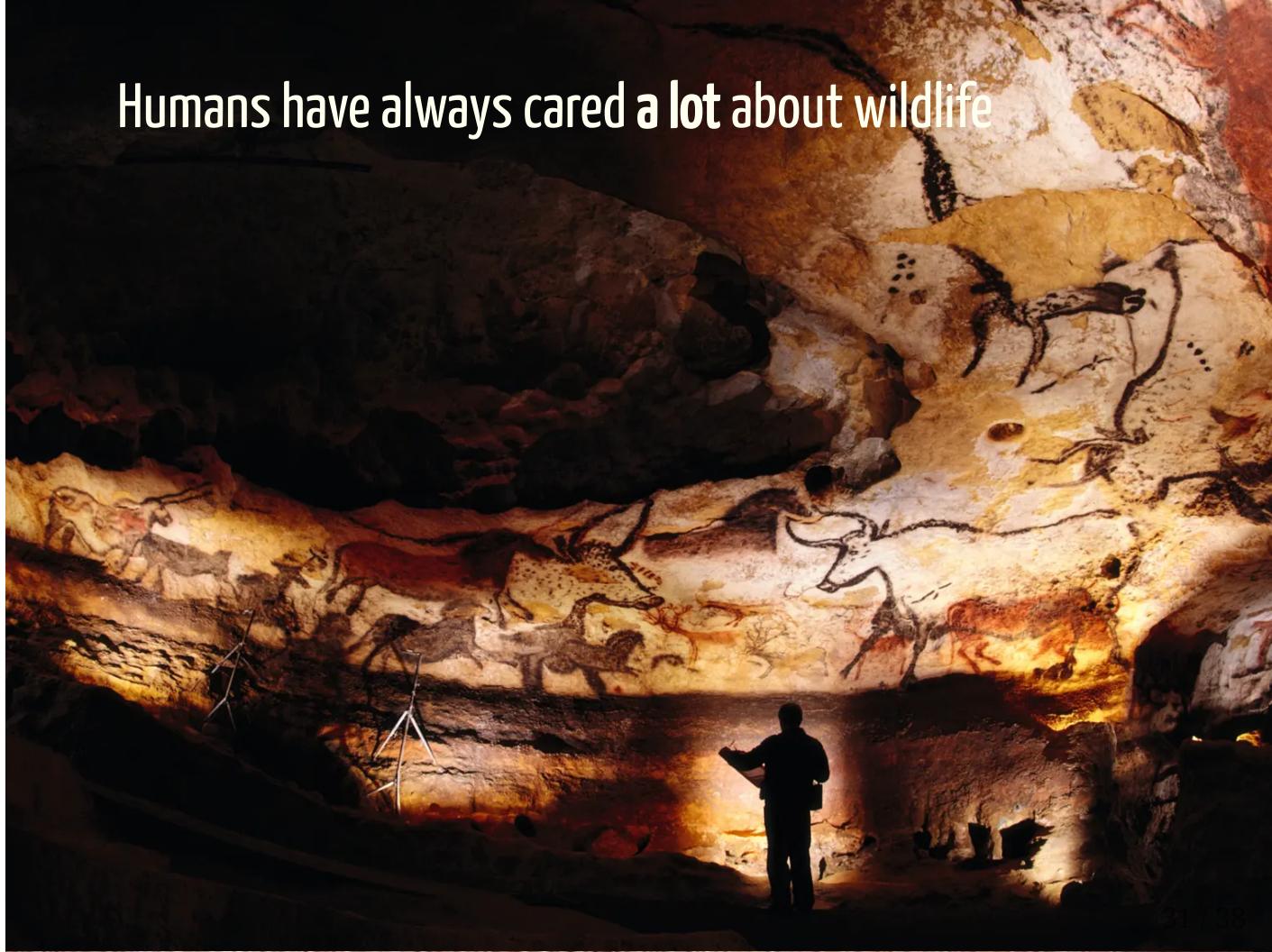
Paleontology (paleoecology, paleoclimatology, etc.) requires:

- 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!

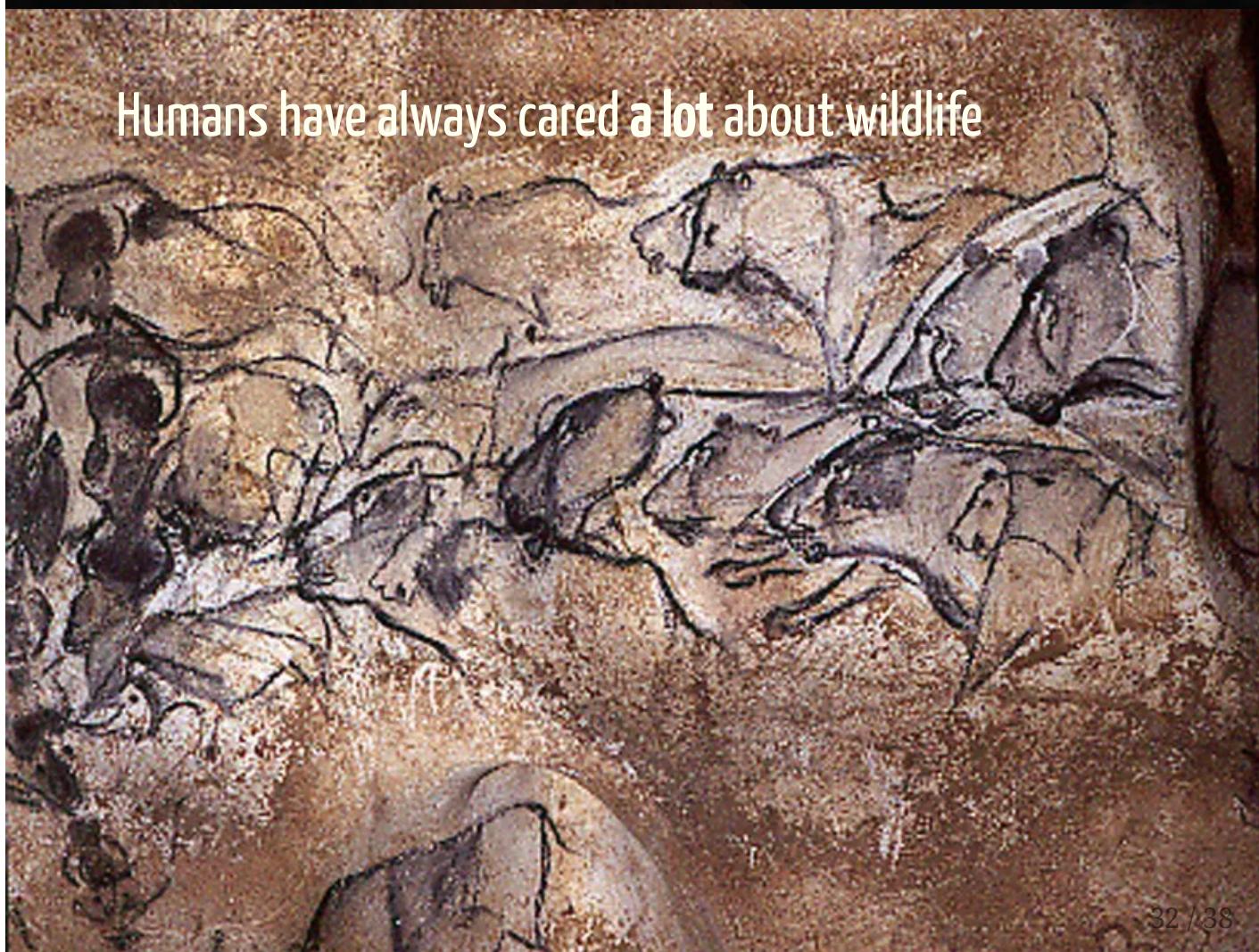
In the end - obviously - there is **lots** we'll never know, but it is **impressive** the stories that can be inferred!

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Humans have always cared a lot about wildlife



Humans have always cared a lot about wildlife



Humans have always cared a lot about wildlife



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Humans have always cared a lot about wildlife



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Humans have always cared a lot about wildlife



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Much higher-level question ...

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

Pleistocene Park: The Plan to Revive the Mammoth Steppe to Fight Climate Change



References I

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