

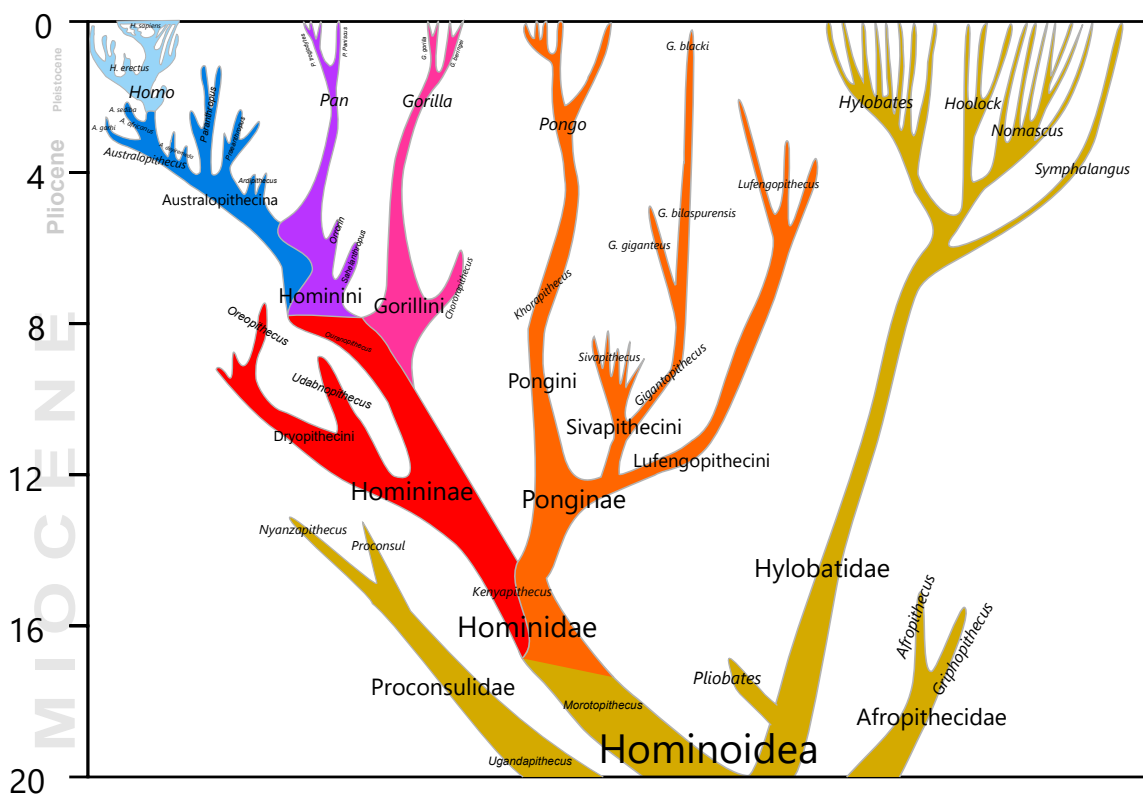
# Humans and Wildlife: A Deep (pre)-History

## EFB 390: Wildlife Ecology and Management

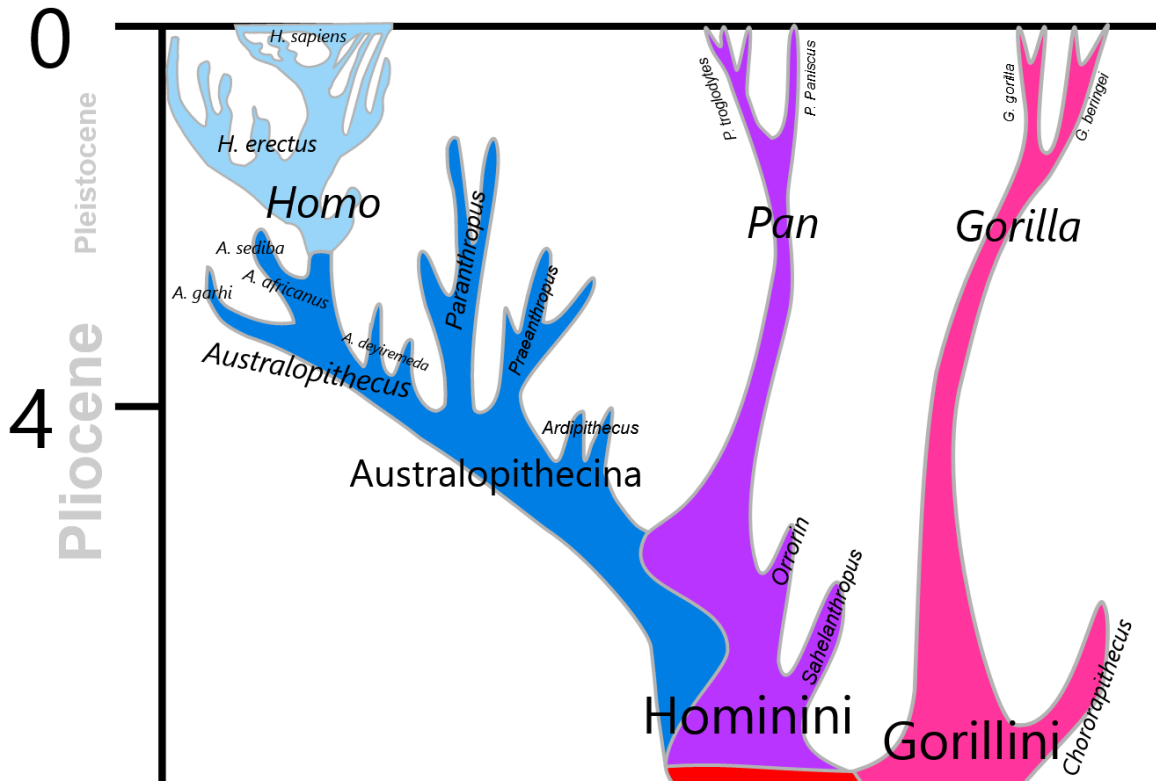
Dr. Elie Gurarie

2023-09-05

# Hominoidea

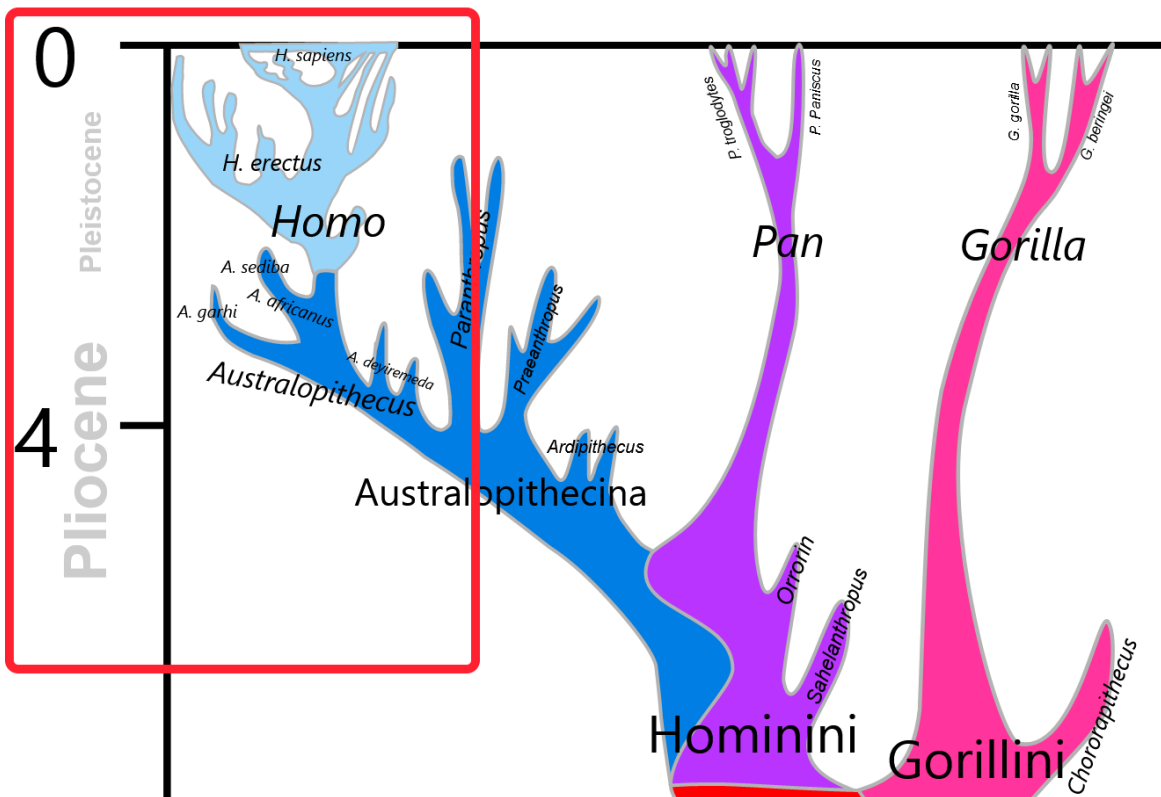


# Zoom in on Hominini



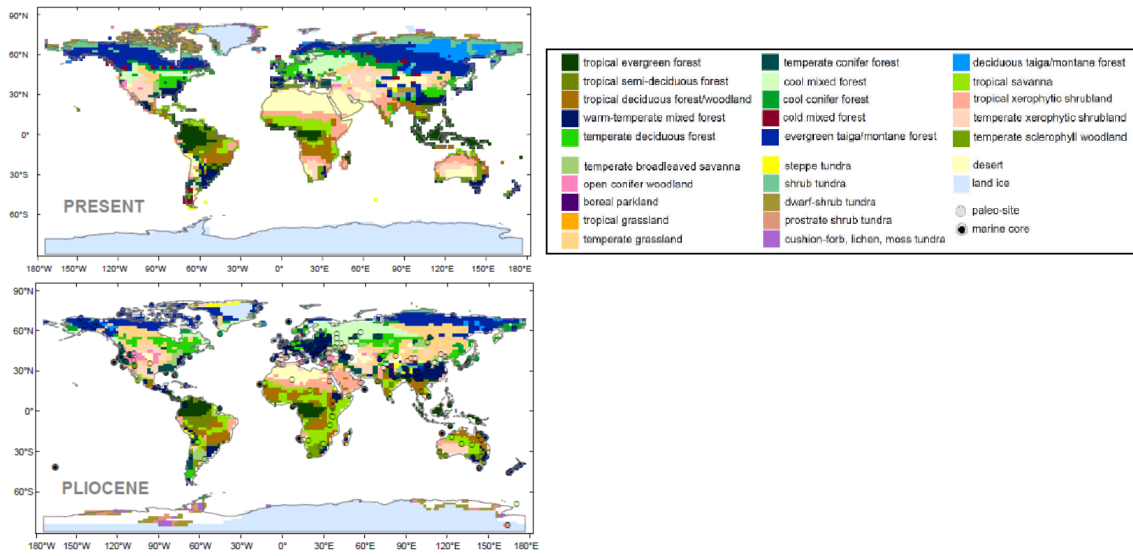
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# Note the Pliocene-Pleistocene transition



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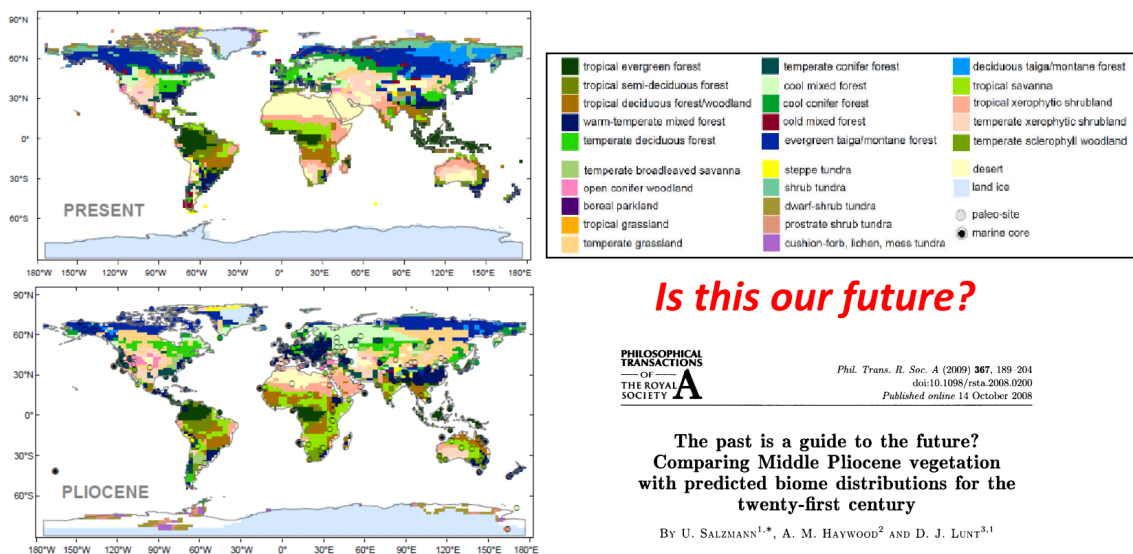
# The Pliocene (5.3-2.6 mya) was warm ...



(Salzmann et al. 2011)

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## ... about 2-4°C warmer ...



*Is this our future?*

PHILOSOPHICAL  
TRANSACTIONS  
OF  
THE ROYAL  
SOCIETY

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

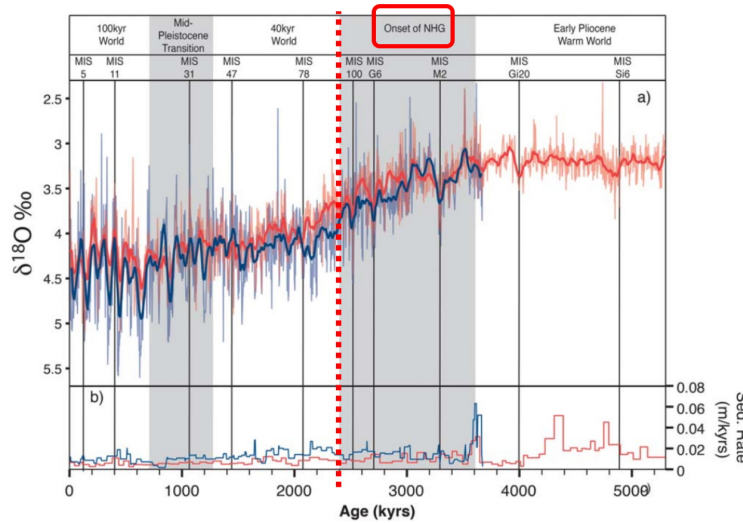
The past is a guide to the future?  
Comparing Middle Pliocene vegetation  
with predicted biome distributions for the  
twenty-first century

By U. SALZMANN<sup>1,\*</sup>, A. M. HAYWOOD<sup>2</sup> AND D. J. LUNT<sup>3,1</sup>

(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. Bell<sup>1</sup>, Simon J. A. Jung<sup>1</sup>, Dick Kroon<sup>1</sup>, Lucas J. Lourens<sup>2</sup>, and David A. Hodell<sup>3</sup>

(Bell et al. 2014)

Note:

Backwards time axis!

NHG = Northern Hemispheric Glaciation

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## Leads to some questions ...

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

What are benthic foraminifera?

0-18

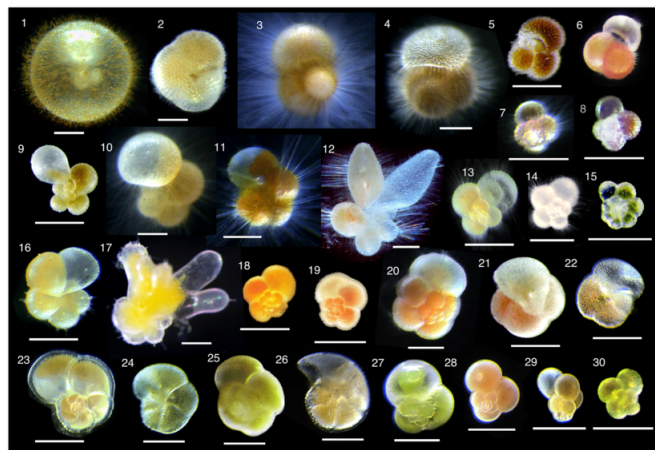
Stable

17.99916

NA: 0.222%

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BUYISOTOPE.COM



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

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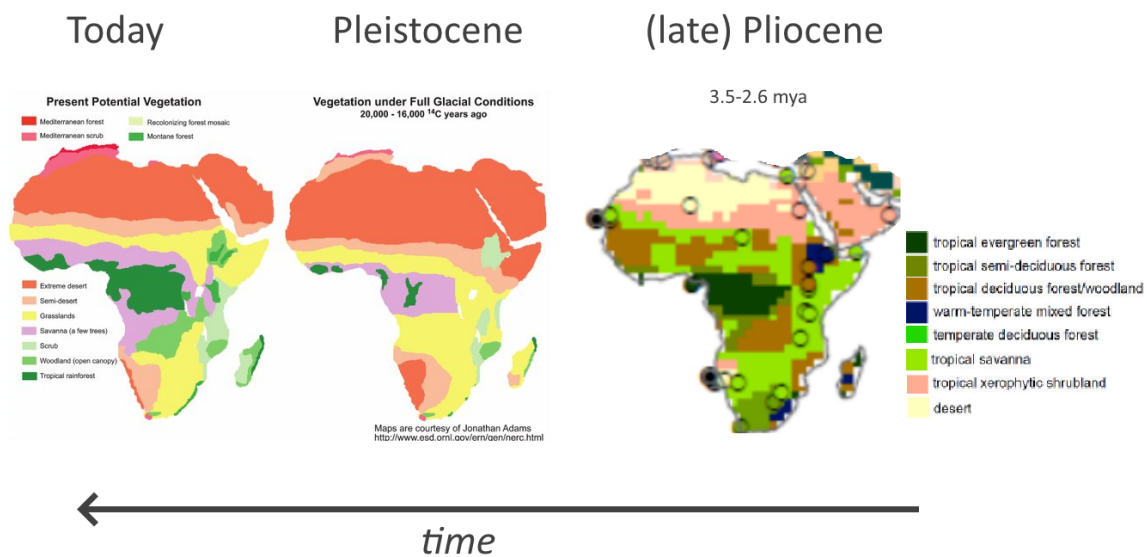


# Brief intro to one biome: The Mammoth Steppe



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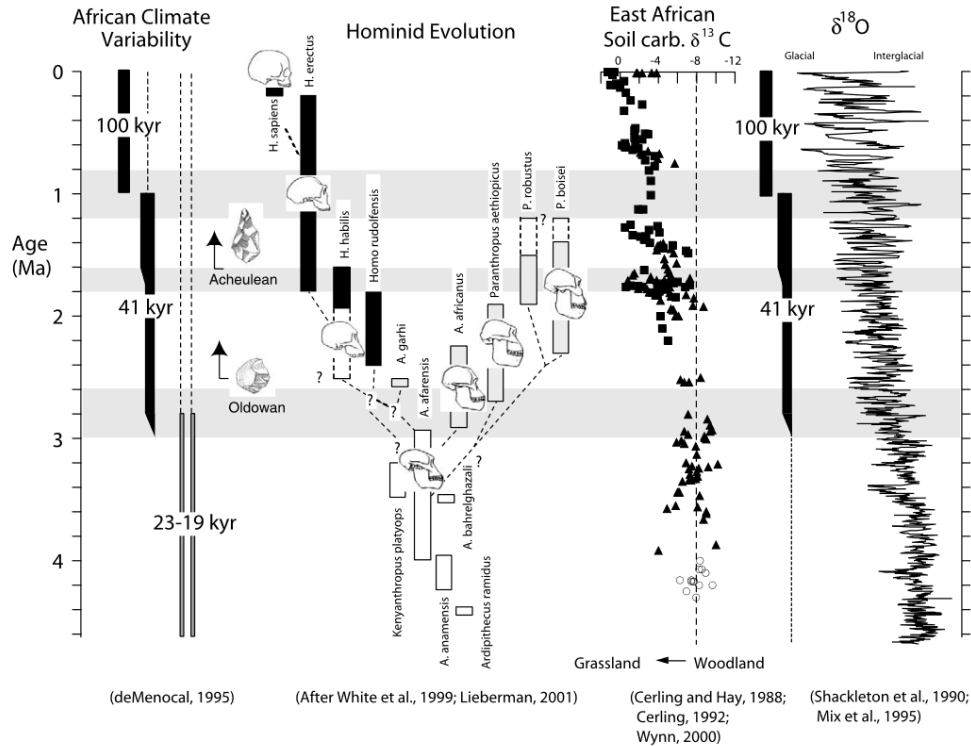
## What does this mean for hominids?



- **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 200400003-2)

## Ever since Darwin ...

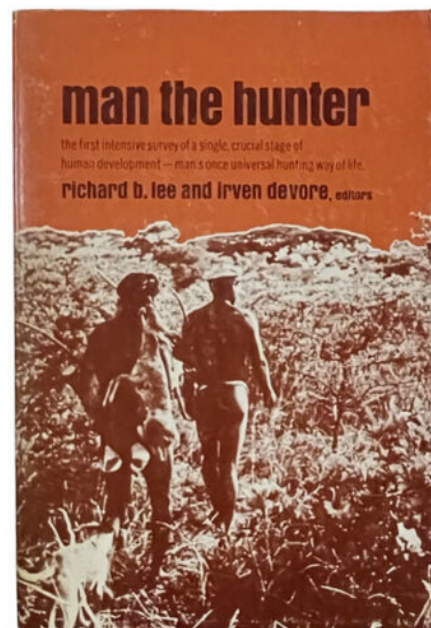
the main idea has been:

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.

corrolaries

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](#)

Edited by Metin I. Eren, Anthropology, Kent State University, Kent, OH; received August 23, 2021; accepted December 15, 2021 by Editorial Board Member C. O. Lovejoy

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

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



(Barr et al. 2022)

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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<sup>1,2\*</sup>, James Watson<sup>3,4</sup>, Tammy Buonasera<sup>1,5</sup>, John Southon<sup>6</sup>, Jennifer C. Chen<sup>7</sup>, Sarah Noe<sup>8</sup>, Kevin Smith<sup>1</sup>, Carlos Viviano Llave<sup>2</sup>, Jelmer Eerkens<sup>1</sup>, Glendon Parker<sup>5</sup>

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## Extinct megafauna (>100 kg)

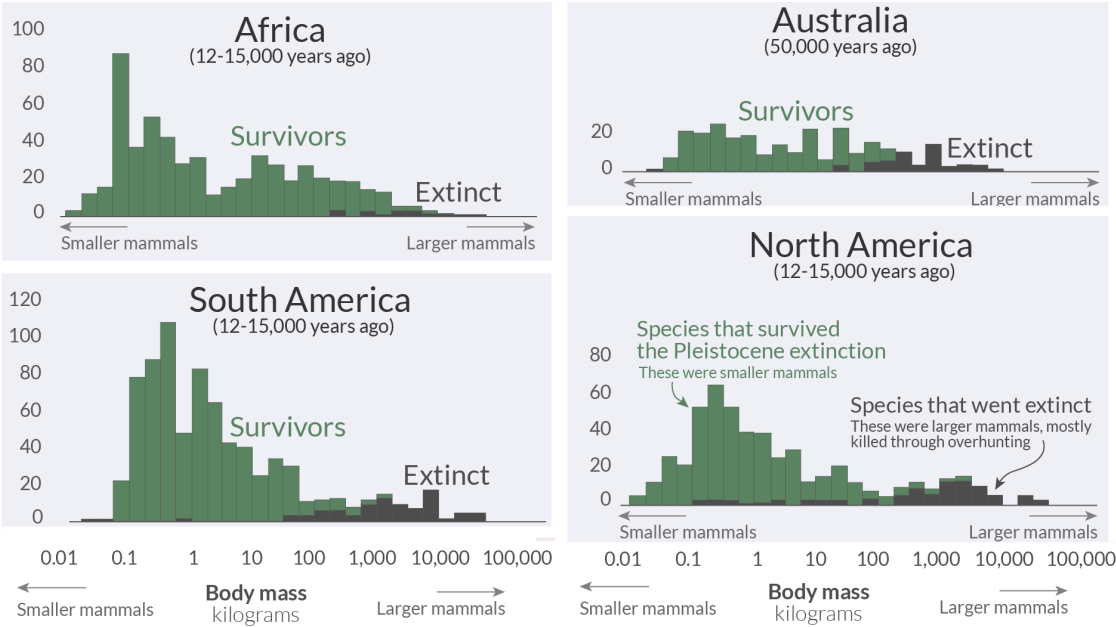
50,000 years ago, large species, especially large mammals lived everywhere



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# And most of the megafauna goes extinct

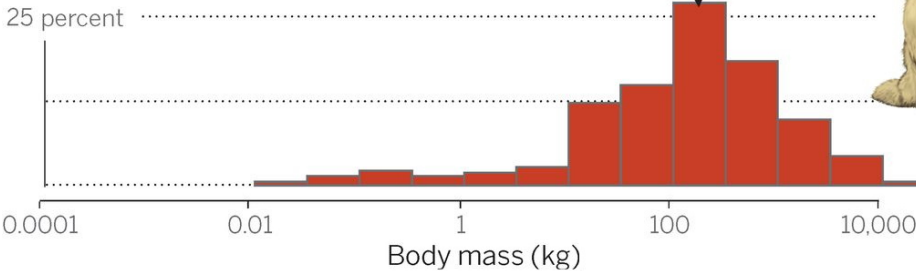
*note the size bias!*



# And most of the megafauna goes extinct

## Size-differential defaunation

Frequency of extinction (median value highlighted)



Pleistocene extinct

(Dirzo et al. 2014)

# Compare location of extinct megafauna

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



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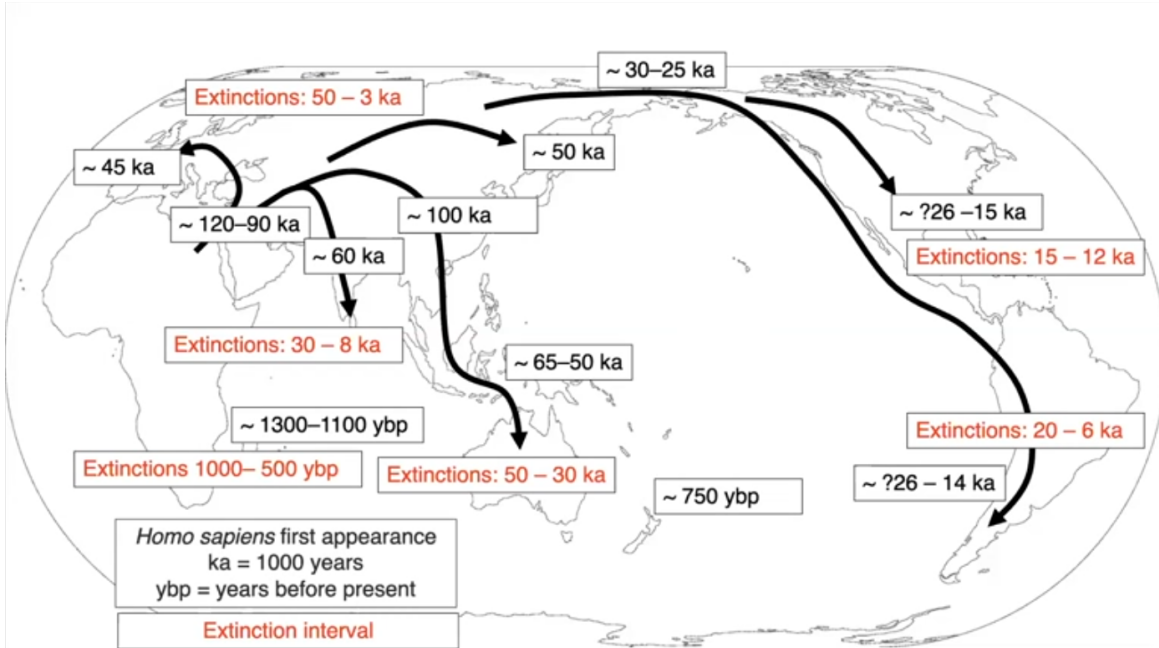
# To extant megafauna



Images from a variety of online sources

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# Global human dispersal ... followed by extinctions



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## Was it humans or climate?

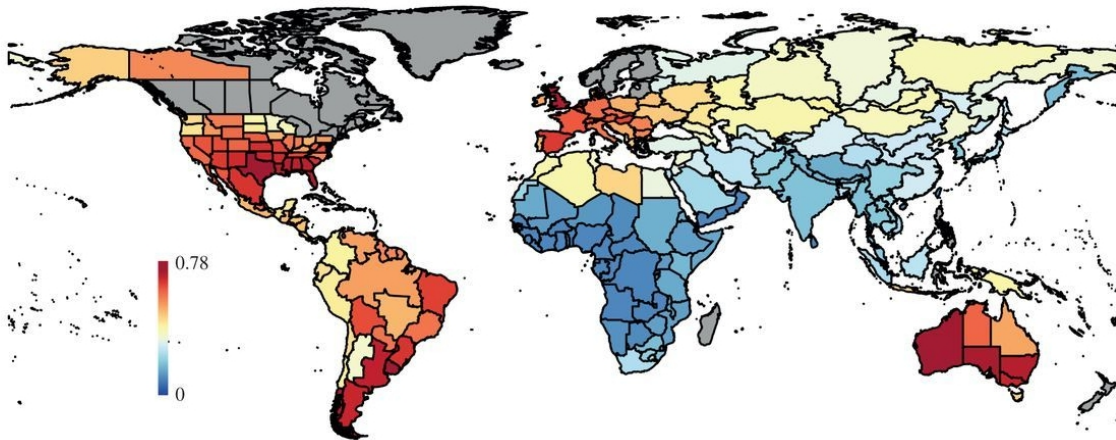
Pleistocene Park: The Plan to Revive the Mammoth Steppe to Fight Climate Change



(start at 2:46)

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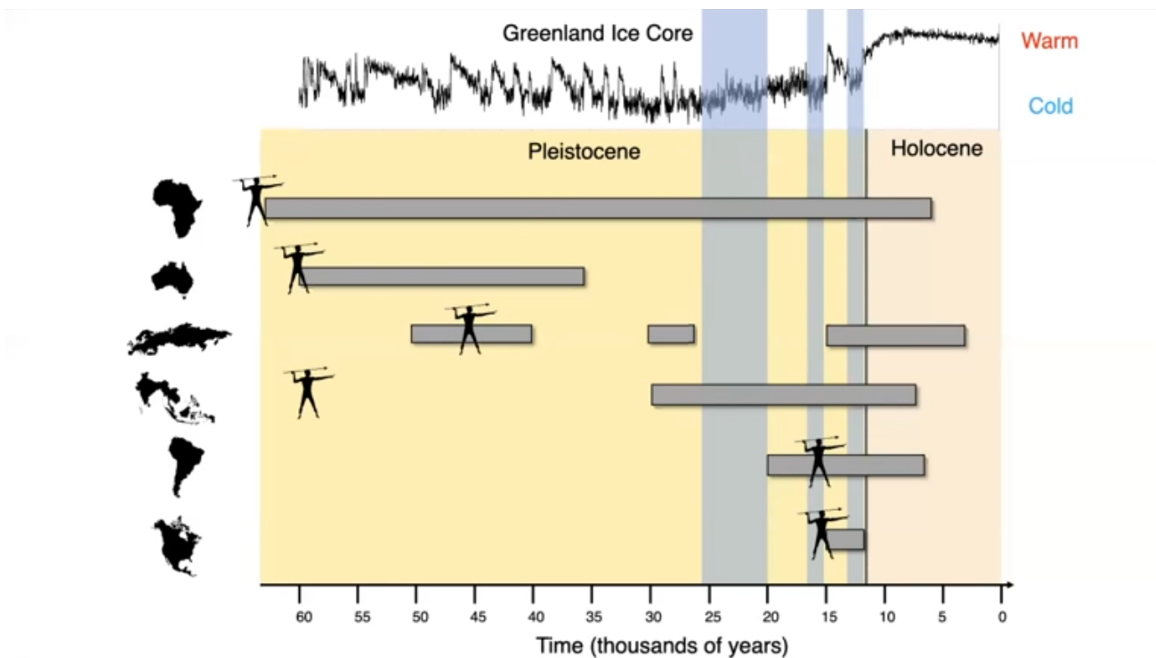
# Longer co-existence -> relatively less extinction



region	extinction (genera)
- Sub-Saharan 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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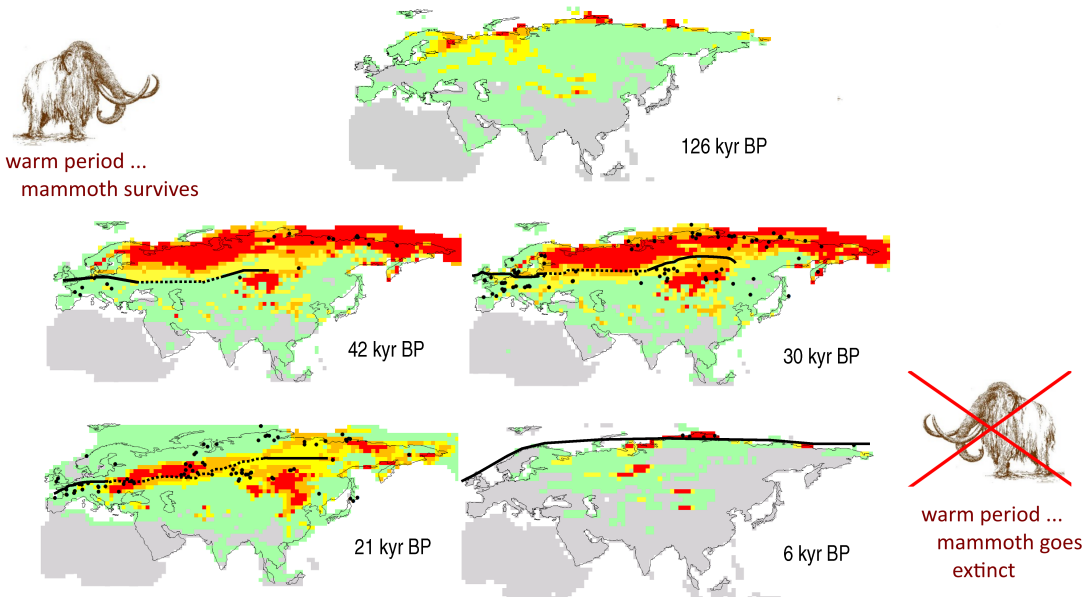
## Climate and/or humans?



(kind of a smoking ... spear?)

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# Does climate play *some* role?

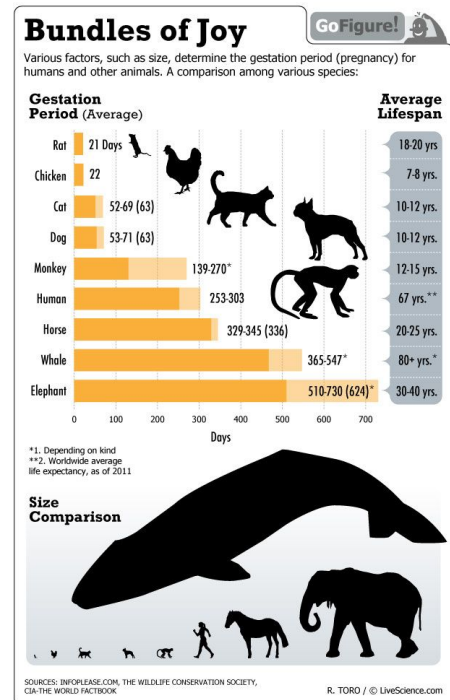


Woolly Mammoth (*Mammuthus primigenensis*) habitat fragmentation ... leads to higher **risk** when human X-factor arrives.

# 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.

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## Take-aways re. science

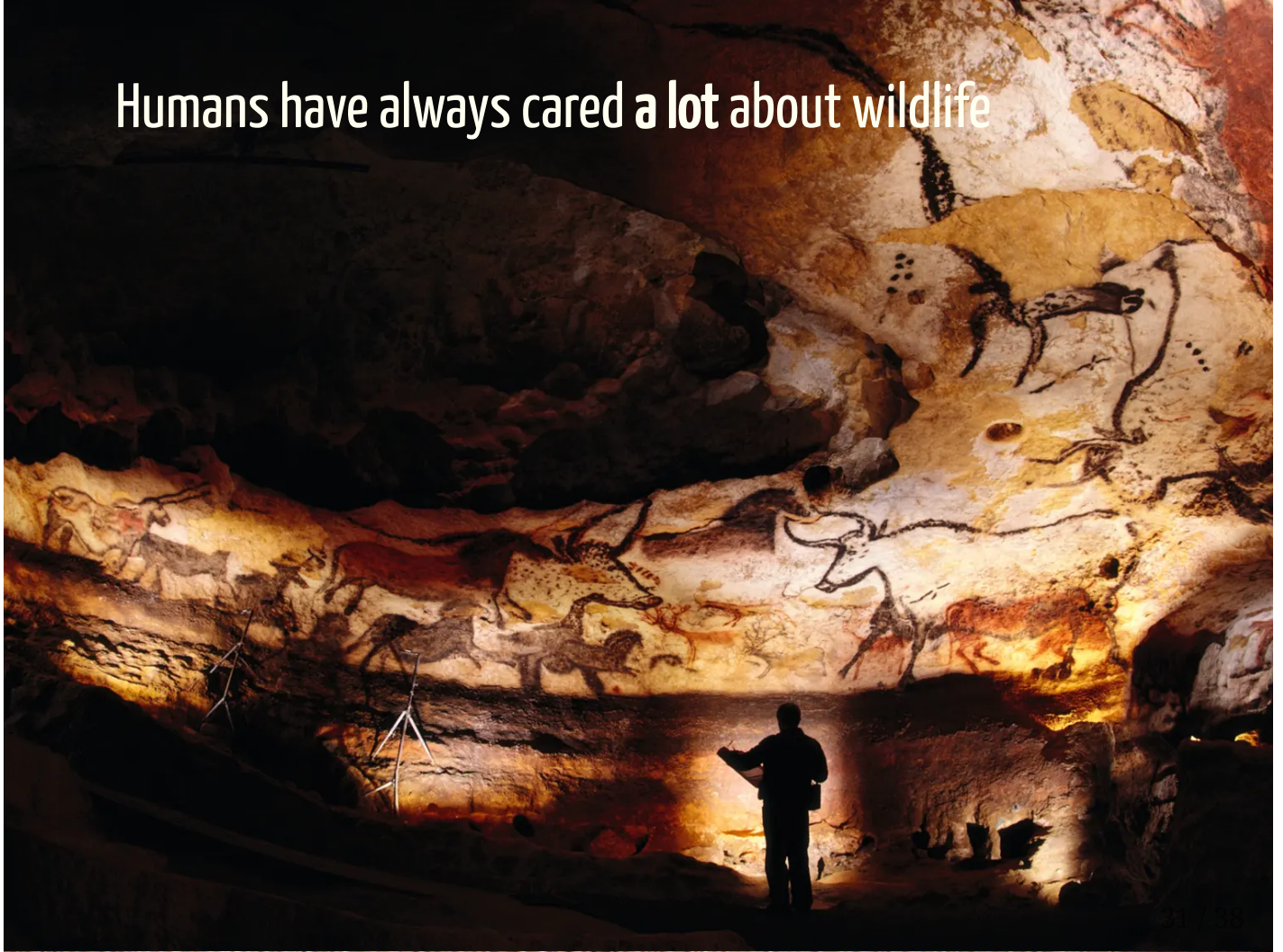
**Paleontology** (paleoecology, paleoclimatology, etc.) requires:

- 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



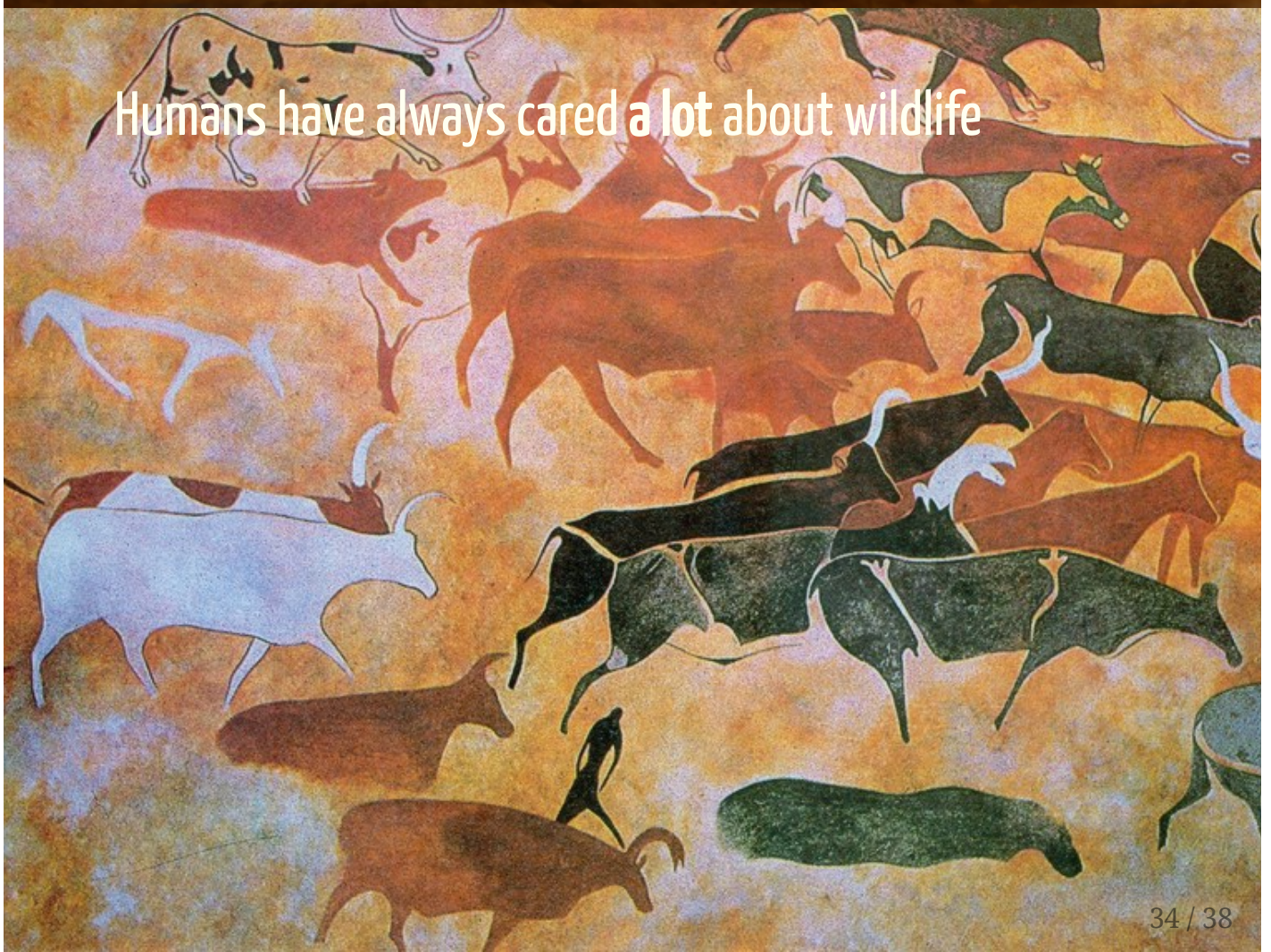


Humans have always cared a lot about wildlife



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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



Start at 8:39

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# References I

- Bell, D. B., Jung, S. J., Kroon, D., Lourens, L. J., & Hodell, D. A. (2014). Local and regional trends in Plio-Pleistocene  $\delta^{18}\text{O}$  records from benthic foraminifera. *Geochemistry, Geophysics, Geosystems*, 15(8), 3304-3321.
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