

The Human Animal

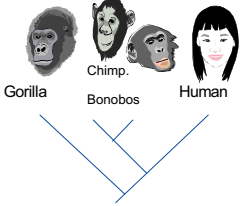


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Molecular Evidence

- Humans and Chimps/Bonobos share 95% of our DNA in common
- The 5% is responsible for the important difference in body, brains and behaviours




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Early *Homo* Evolution

- Four main species (*H. habilis*, *H. rudolfensis*, *H. ergaster*, *H. erectus*)
- *H. habilis* and *H. rudolfensis* ~2.5-1.5 MYA
- Brain >600cc
- Development of rudimentary tools
- Development of language and rudimentary culture



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H. Habilis Tools

- Primitive Oldowan Tools
- Also found animal bones with scratches from tools






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Relationship with Large Cats

- Sabre-toothed Tiger
- Main predator of hominins
- Caves found with chewed bones
 - Mostly Australopithecus, but also some coexisting *Homo*
 - Humans were more intelligent and capable of group defense

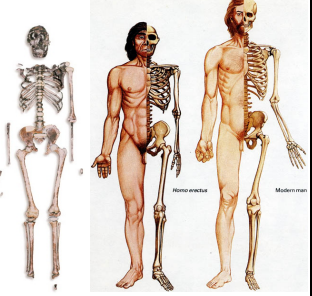



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Homo ergaster and *Homo erectus*

- 1.9-0.5 MYA
- Larger brain (~1000cc) and height (~1.85m)
- Nomadism and migration out of Africa
- Discovered fire use
- More advanced tools developed




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Ergaster/Erectus Tools

- Acheulian Toolbox
- Small axes
- Stone flakes used as knives and blades




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Ergaster/Erectus Success

- Better competitor than earlier hominins
- The first to hunt large animals
- Drove many to extinction
 - Australopithecines
 - *H. habilis*
 - Sabre-toothed tigers
 - Mammoths



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Fire and Migration

- *Homo erectus/ergaster* first to use fire
- Permitted living in colder northern climates
 - North of China
- Fireplace could have been first stable social gatherings
 - Communication
 - Cultural transmission
 - Community development and stability




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The Hobbit – *Homo floresienses*

- Discovered recently on Flores Island in S. Pacific
- Small adult size (equivalent of modern 3 year old child)
- Dwarfism common on islands (limited resources, lack of predators)

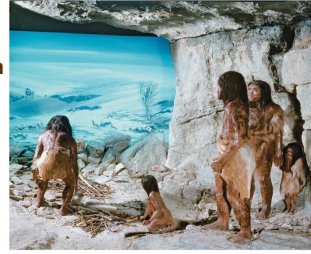


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Homo neanderthalensis

- 200,000 - 28,000 YA
- Middle East and Europe
- Brains larger than modern humans (1400cc compared to 1360cc)
- Lived in caves and shelters
- Had well-developed culture
 - Burials with decorations




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Neanderthal Anatomy

- Prominent face
- Teeth became very worn with age (used as tools)
- Thick and strong bodies
- Well adapted to cold climates



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Neanderthal Tools

- Mousterian style
- Scraper
- Pointed darts for spears
- Copied modern human tools
 - Intermediate forms of tools
 - Did not have sophistication of modern *H. sapiens* tools

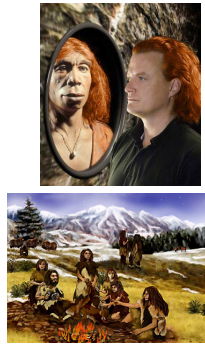


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Relationship Sapiens-Neanderthal

- Not purely antagonistic
- Reproductive hybridization
 - Evidence that Neanderthal DNA found in European and Asian populations
- Limited hunting abilities, no large animals
- No fishing (lacked hooks, nets, needles)
- Shorter lifespan so cultural transmission between generations was more limited



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Neanderthal Vocalizations




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Homo sapiens

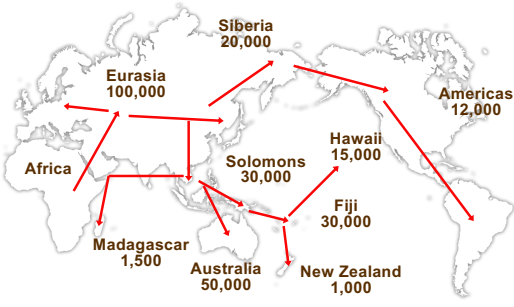
- Modern humans
- Emerged approx. 200,000-130,000 YA
- Composite tools
- Good cooperative hunters
- Cooperative culture, language and art well-developed



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Global Migration of Modern Humans



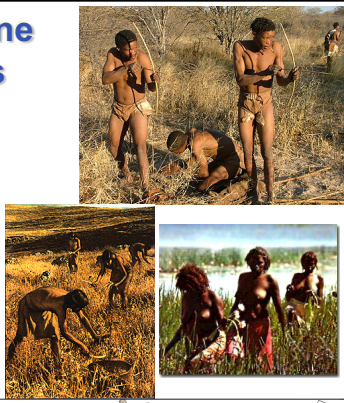
Region	Date
Eurasia	100,000
Siberia	20,000
Americas	12,000
Hawaii	15,000
Fiji	30,000
New Zealand	1,000
Australia	50,000
Madagascar	1,500
Solomons	30,000
Africa	-

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Pleistocene Humans

- Hunters and gatherers over large distances
- Required certain amount of nomadism
- Hippocampus well developed due to spatial perception




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Humans in North America

- Arrived ~12,500-11,000 YA during glacial period (Bering land bridge)
- All N.Am. Aborigines have relatively homogenous genetic diversity due to founder effect
- Showed susceptibility to European diseases upon arrival of colonists



SIBERIA Arctic Ocean
BERINGIA
North Pacific Ocean NORTH AMERICA North Atlantic Ocean



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Pleistocene Extinctions

- At around ~11,000YA, several species of large animals went extinct
- For the most part, they were well adapted to cold climates
- In Eurasia: Giant Elk, Hairy Rhinoceros
- North America: Mastodon, Sabre-toothed Tiger

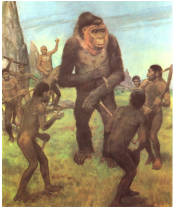


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Pleistocene Extinctions

- Himalayas: Giant Ape (*Gigantopithecus*)
- Possible origin of Yeti/Bigfoot mythology

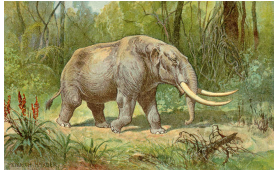


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Pleistocene Extinctions

- In North America:
 - Mastodons
 - Mammoths
 - Giant sloth
 - Giant Bison


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Pleistocene Extinctions

- Principal Hypothesis: overhunting (Pleistocene Overkill Hypothesis)
- Evidence:
 - Mostly large mammals and birds affected
 - Extinctions in different places at different times
 - Extinctions correlated with sudden arrival of humans



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Humans in North America

- Excellent group hunters
 - Mammoths, mastodons, Giant sloth, Bison
- Facilitated extinction of large predators due to lack of prey food (e.g. large cats)
- Clovis Tools
 - e.g. Atlatl







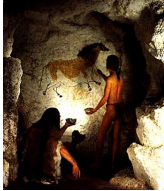

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Cro-Magnon Artwork

- Multi-colour cave paintings in Lascaux which show many animals now extinct
- Figurines to model female fertility (Venus)
- Instruments: flutes, shakers

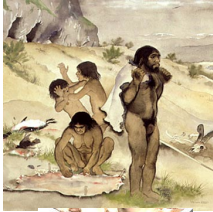
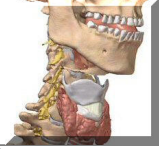





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Why the Great Leap in Modern Humans?

- Factor #1: Language
 - Anatomy of larynx, tongue and throat allowed for great diversity of sounds
 - Allowed for instantaneous transmission of information, without reliance on demonstration
 - More cultural evolution occurred in last 40,000yrs than in previous millions





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Why the Great Leap in Modern Humans?

- Factor #2: Changes in lifecycle
 - Reduced reproduction
 - Bi-parental care
 - Long lifespan
- Allowed for long periods of learning required for living a complex life
 - Required much care, protection and teaching



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Why the Great Leap in Modern Humans?

- Consequences of monogamy and parental care:
 - Community stability
 - Development of societies
- Advantages to living in groups:
 - Coordinated hunting
 - Harvesting of fruit, nuts and plants over greater distances
 - Better protection from predators



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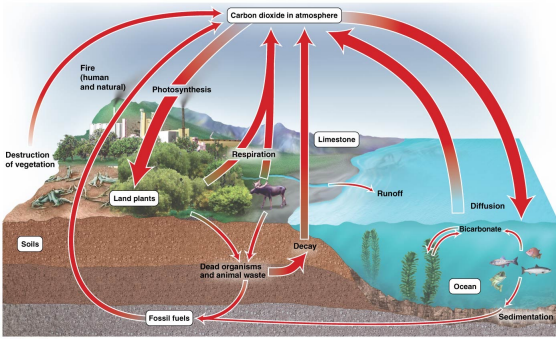
From Agriculture to Civilization




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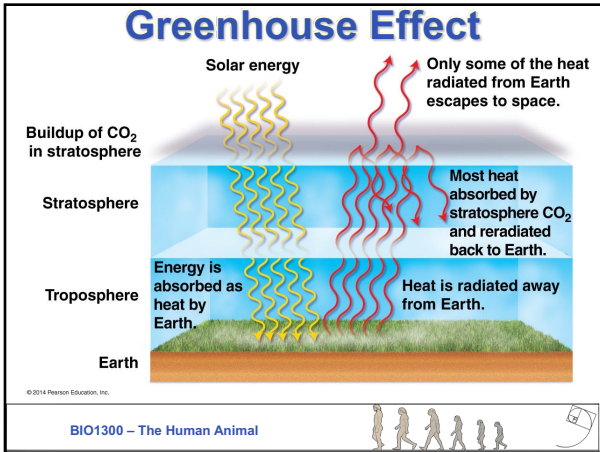
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Carbon Cycle

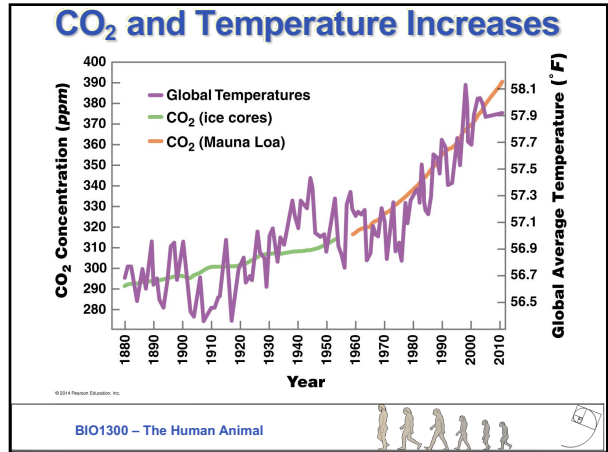


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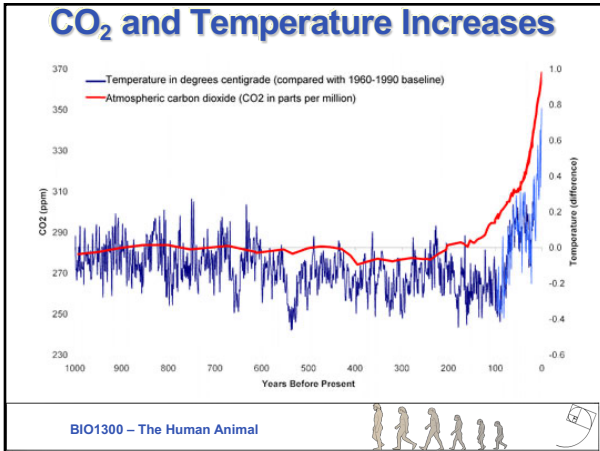
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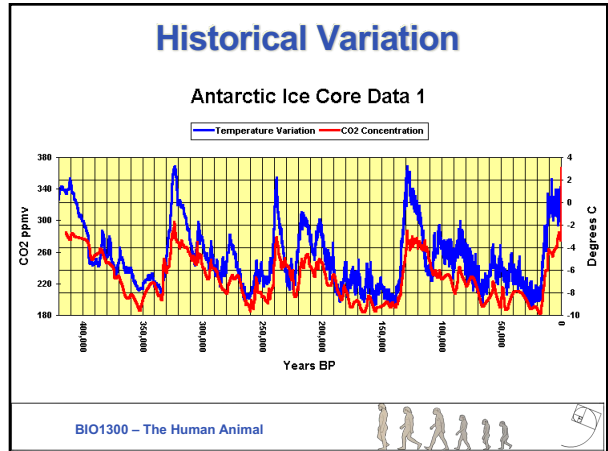
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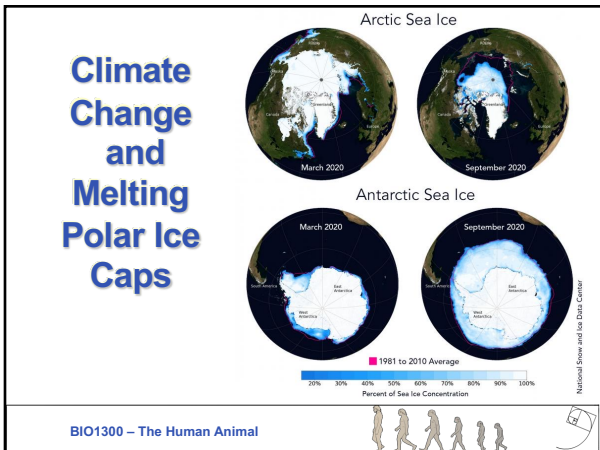
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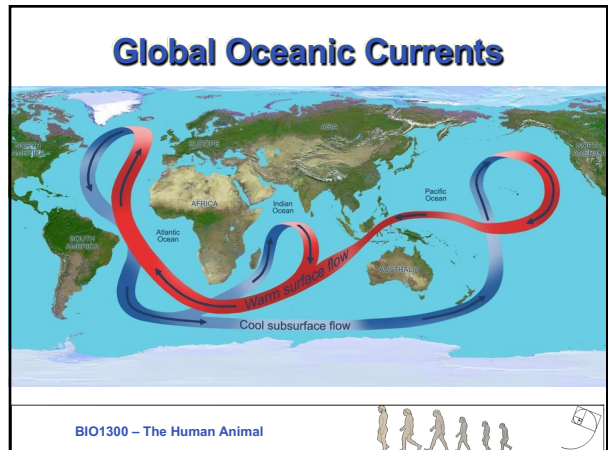
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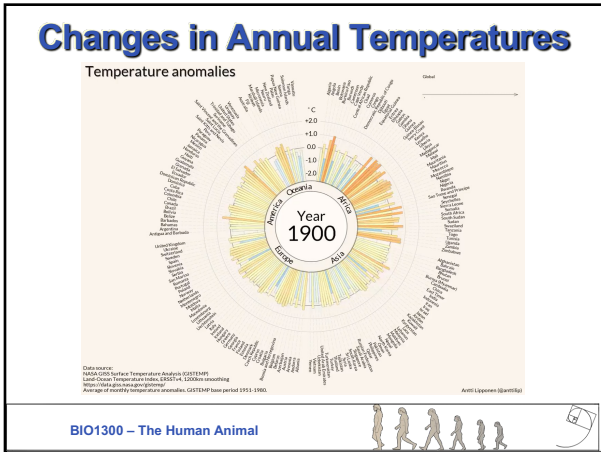
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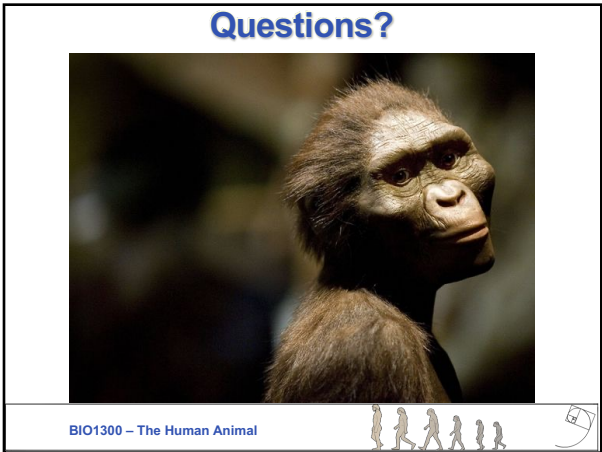
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