

The Human Animal



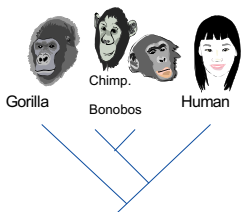
BIO1300 – The Human Animal




1

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





BIO1300 – The Human Animal




2

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



BIO1300 – The Human Animal




3

H. Habilis Tools

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



BIO1300 – The Human Animal




4

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




BIO1300 – The Human Animal




5

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


BIO1300 – The Human Animal




6

Ergaster/Erectus Tools

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




BIO1300 – The Human Animal




7

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



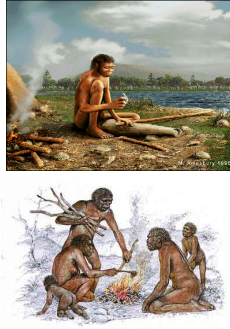
BIO1300 – The Human Animal



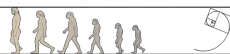
8

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




BIO1300 – The Human Animal



9

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)





BIO1300 – The Human Animal



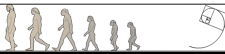
10

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





BIO1300 – The Human Animal




11

Neanderthal Anatomy

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

BIO1300 – The Human Animal



12

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




BIO1300 – The Human Animal




13

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



BIO1300 – The Human Animal



14

Neanderthal Vocalizations




BIO1300 – The Human Animal




15

Homo sapiens

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

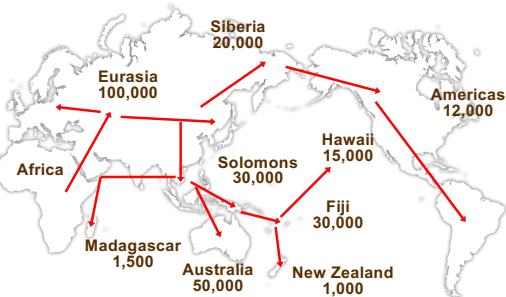


BIO1300 – The Human Animal




16

Global Migration of Modern Humans



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

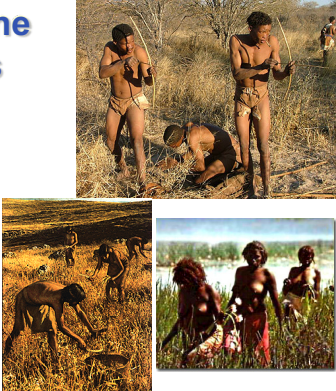
BIO1300 – The Human Animal




17

Pleistocene Humans

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



BIO1300 – The Human Animal



18

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



BIO1300 – The Human Animal



19

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



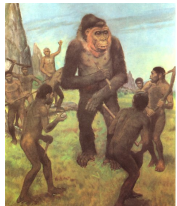
BIO1300 – The Human Animal



20

Pleistocene Extinctions

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






BIO1300 – The Human Animal




21

Pleistocene Extinctions

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


BIO1300 – The Human Animal




22

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



BIO1300 – The Human Animal



23

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. Atl-Atl









BIO1300 – The Human Animal




24

Cro-Magnon Artwork

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

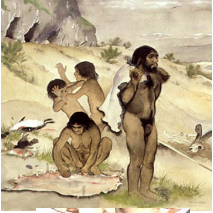
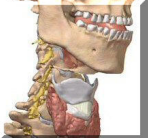
BIO1300 – The Human Animal



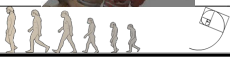
25

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


BIO1300 – The Human Animal



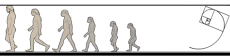
26

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



BIO1300 – The Human Animal



27

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



BIO1300 – The Human Animal



28

From Agriculture to Civilization

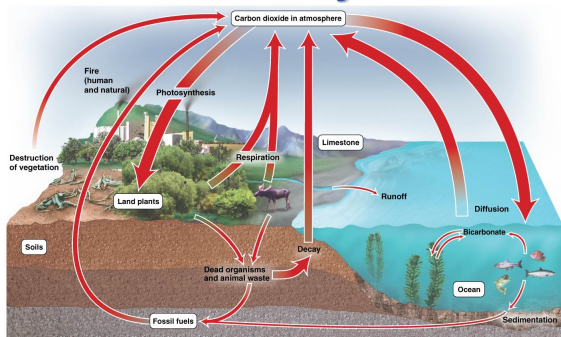


BIO1300 – The Human Animal



29

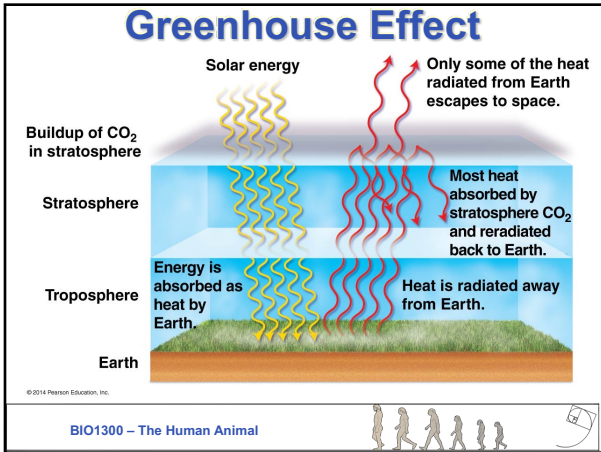
Carbon Cycle



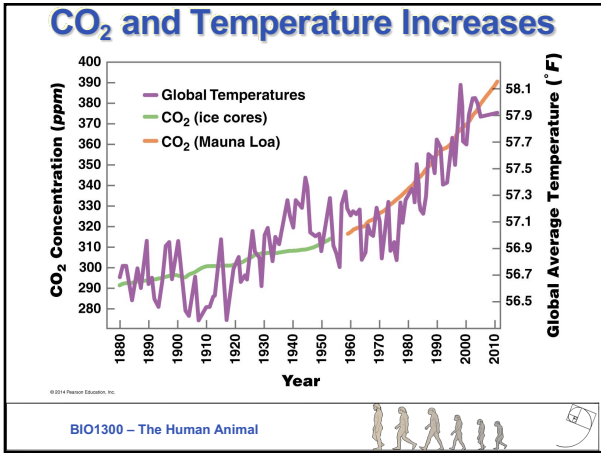
BIO1300 – The Human Animal



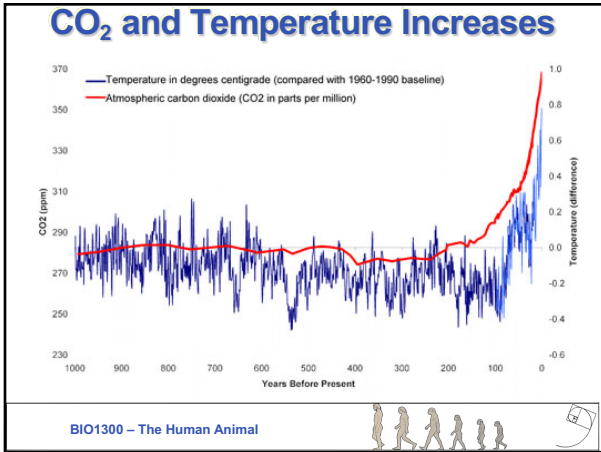
30



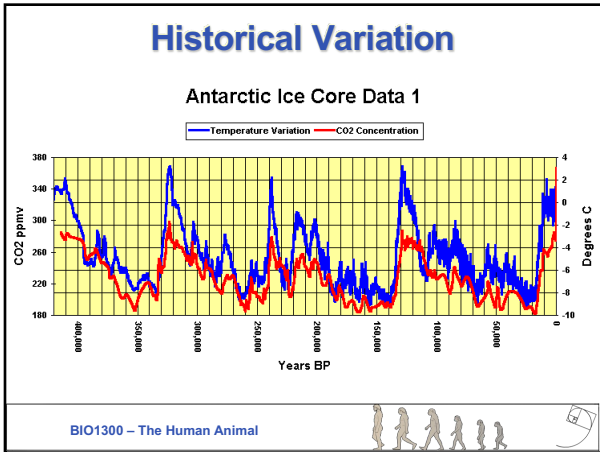
31



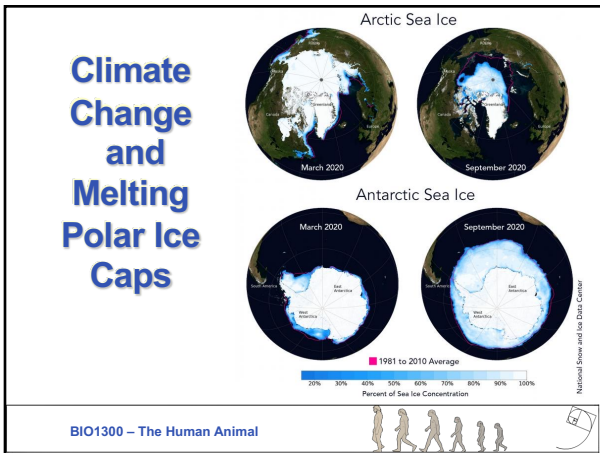
32



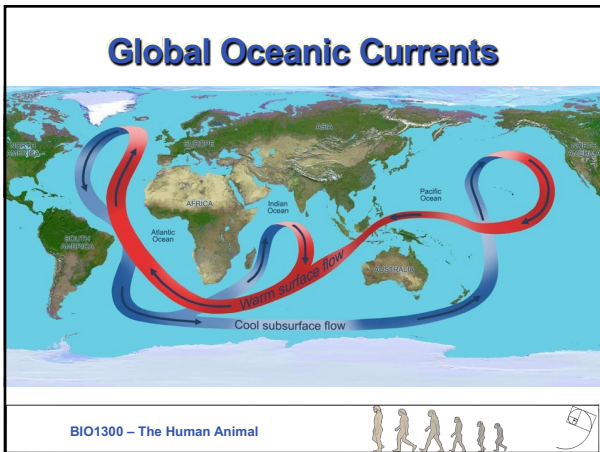
33



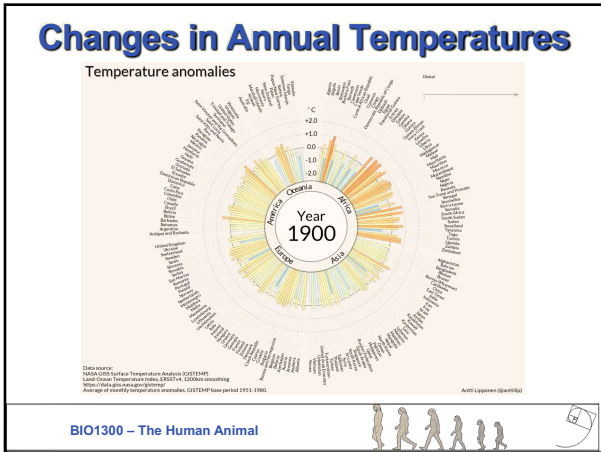
34



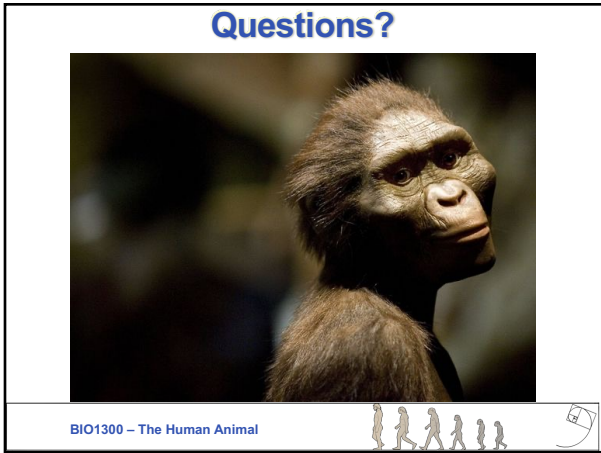
35



36



37



38