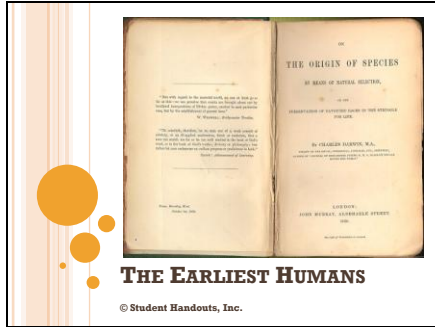


Slide 1



Slide 2

FIRST THEORIES OF HUMAN EVOLUTION

- **Charles Darwin**
 - **On the Origin of Species** (1859)
 - First to link biological diversity to evolution
 - **The Descent of Man, and Selection in Relation to Sex** (1871)
 - Described human evolution
 - Saw aesthetic factors ("looks") as sexual attractors
- **Thomas Huxley**
 - **Evidence as to Man's Place in Nature** (1863)
 - First book to describe human evolution
- These scientists wrote about human evolution before human fossil evidence was ever discovered

Slide 3

FOSIL EVIDENCE FOR EVOLUTION

- **Paleontology**
 - Study of prehistoric life of all forms, typically using fossils
- **Paleoanthropology**
 - Study of prehistoric human life (and human ancestry), typically using fossils
- **Mary and Louis Leakey**
 - Lifetimes dedicated to finding fossil evidence of human ancestors in Africa
- **Olduvai Gorge**
 - "The Cradle of Mankind"
 - Great Rift Valley in eastern Africa (Tanzania)
 - Erosion reveals layers of datable artifacts, bones, and fossils going back 2,000,000 years

Slide 4

HOMINID EVOLUTION

- **Hominids** = "great apes"
 - Chimpanzees, gorillas, humans, and orangutans
- Numerous intermediary fossils have been found
 - But scientists disagree on which are human ancestors and which are evolutionary dead ends

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graph TD; A[Homo habilis] --> B[Homo erectus]; B --> C[Homo sapiens neanderthalensis]; B --> D[Homo sapiens sapiens];
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Slide 5

HUMAN EVOLUTION

- **Homo habilis**
 - 2.4 to 1.4 million years ago
 - Fossils found in southern and eastern Africa
 - Used simple bone and stone tools
 - Nicknamed "handy man"
- **Homo erectus**
 - 1.8 million years ago to 70,000 years ago
 - First human ancestor to walk fully upright
 - Some made complex stone tools
 - Example - "Peking Man"
 - Descendants were humans and neanderthals

Slide 6

NEANDERTHALS

- *Homo sapiens neanderthalensis*
- Circa 400,000 to 30,000 years ago
- Lived in Europe and Asia
- **Archaeogenetics** – analysis of ancient and modern DNA
 - Comparison of human and Neanderthal DNA shows that humans are not descended from Neanderthals
 - Genes reveal that Neanderthals had red hair and fair skin
 - Fair skin developed to aid in the absorption of Vitamin D from the sun in areas far north of the equator
 - **Convergent evolution** – different species (such as humans and Neanderthals) developing same characteristic(s)

Slide 7


HUMANS – *HOMO SAPIENS*

- “Homo” (Latin) means “man” or “human”
- “Sapiens” (Latin) means “wise” or “intelligent”
- “Homo sapiens” = “wise man” or “wise human”
- Humans and Neanderthals both considered “sapiens”
- Anatomically modern humans in Africa by 200,000 years ago
 - Middle Paleolithic period

Slide 8

MITOCHONDRIAL “EVE”

- **Mitochondrial DNA**
 - DNA that is passed from women




Mitochondrial “Eve”

- Lived 60,000 to 250,000 years ago
- Most recent common female ancestor of all living humans
- Lived in or around modern-day Tanzania in Africa
- She was part of a group of early humans
 - But only her mitochondrial DNA survives today

Slide 9

Y-CHROMOSOMAL “ADAM”

- **Y-chromosome**
 - DNA that is passed from men



Y-chromosomal “Adam”

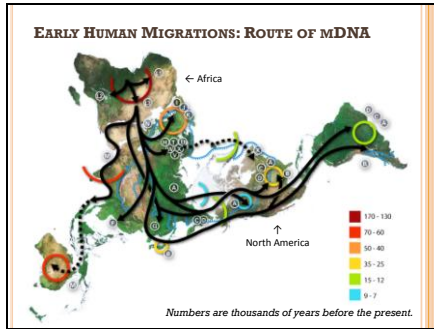
- Circa 60,000 years ago
- Most recent common male ancestor of all living humans
- Lived in Africa
- He lived as part of a group of early humans
 - But only his Y-chromosome survives today

Slide 10

HUMANS – HOMO SAPIENS SAPIENS – “US”

- **Fully modern humans (like us) in Africa by around 60,000 years ago**
 - Descendants of Mitochondrial Eve and Y-chromosomal Adam
 - Culture, language, music, etc.
- **“Out of Africa” theory**
 - **Archaeogenetics** (analysis of ancient and modern DNA) shows that humans began spreading throughout, and out of, Africa beginning around 60,000 years ago
- **Early human migrations**
 - Humans left southeastern Africa and spread throughout the continent
 - Humans traveled along the Indian Ocean to reach Australia
 - By 10,000 years ago, modern human beings had spread all over the globe

Slide 11



Slide 12

REVIEW QUESTIONS

1. Who was the first person to link biological diversity to evolution?
2. What family of paleontologists dedicated their lives to finding the fossils of human ancestors at Olduvai Gorge in Africa?
3. What has archaeogenetics told us about Neanderthals?
4. Who was Mitochondrial Eve?
5. Who was Y-chromosomal Adam?
6. Describe the “Out of Africa” theory.
7. What parts of the world were the first to be settled by modern humans? The last?
