Primate (including Human) Evolution

• The mammalian order Primates includes lemurs, tarsiers, monkeys, and apes
• Humans are members of the ape group

Derived Characters of Primates

• Most primates have hands and feet adapted for grasping

• Other derived characters of primates:
  – A large brain and short jaws
  – Forward-looking eyes close together on the face, providing depth perception
  – Complex social behavior and parental care
  – A fully opposable thumb (in monkeys and apes)

Living Primates

• There are three main groups of living primates:
  – Lemurs, lorises, and pottos
  – Tarsiers
  – Anthropoids (monkeys and apes)
The oldest known anthropoid fossils, about 45 million years old, indicate that tarsiers are more closely related to anthropoids than to lemurs.

The first monkeys evolved in the Old World (Africa and Asia). In the New World (South America), monkeys first appeared roughly 25 million years ago. New World and Old World monkeys underwent separate adaptive radiations during their many millions of years of separation.
The other group of anthropoids consists of primates informally called apes. This group includes gibbons, orangutans, gorillas, chimpanzees, bonobos, and humans. Apes diverged from Old World monkeys about 20–25 million years ago.

- Cranial Capacity
  ~ 100 cc
Orangutan

- Cranial Capacity
  275-500 cc

Gorilla

- Cranial Capacity
  340-752 cc

Bonobo

- Cranial Capacity
  300-400 cc

Chimp

- Cranial Capacity
  275-450 cc

Concept 34.8: Humans are mammals that have a large brain and bipedal locomotion

- The species *Homo sapiens* is about 200,000 years old, which is very young, considering that life has existed on Earth for at least 3.5 billion years

Derived Characters of Humans

- A number of characters distinguish humans from other apes:
  - Upright posture and bipedal locomotion
  - Larger brains
  - Language capabilities and symbolic thought
  - The manufacture and use of complex tools
  - Shortened jaw
  - Shorter digestive tract
The Earliest Hominins

- The study of human origins is known as **paleoanthropology**
- **Hominins** (formerly called hominids) are more closely related to humans than to chimpanzees
- Paleoanthropologists have discovered fossils of about 20 species of extinct hominins

Hominins originated in Africa about 6–7 million years ago
- Early hominins had a small brain but probably walked upright

Two common misconceptions about early hominins:
- Thinking of them as chimpanzees
- Imagining human evolution as a ladder leading directly to *Homo sapiens*

Australopiths

- Australopiths are a paraphyletic assemblage of hominins living between 4 and 2 million years ago
- Some species walked fully erect
- “Robust” australopiths had sturdy skulls and powerful jaws (a.k.a. *Paranthropus*)
- “Gracile” australopiths were more slender and had lighter jaws
**Australopithecus afarensis (Lucy)**

- Cranial Capacity: 400-550 cc
- 4 – 2.7 mya

**Australopithecus africanus**

- Cranial Capacity: 450-550 cc
- 3 – 2 mya
Australopithecus Boisei

- Cranial Capacity: 400-530 cc
- 2.2 – 1 mya

Australopithecus sediba (or genus Homo?)

- Cranial Capacity: 420–450 cc
- 1.78 to 1.95 mya

Bipedalism

- Hominins began to walk long distances on two legs about 1.9 million years ago

Tool Use

- The oldest evidence of tool use, cut marks on animal bones, is 2.5 million years old
Early *Homo*

- The earliest fossils placed in our genus *Homo* are those of *Homo habilis*, ranging in age from about 2.4 to 1.6 million years
- Stone tools have been found with *H. habilis*, giving this species its name, which means “handy man”

*Homo habilis*

- Cranial Capacity
  - 500-775 cc
- 2.2 – 1.6 mya

*Homo habilis*

- *Homo ergaster* was the first fully bipedal, large-brained hominid
- The species existed between 1.9 and 1.5 million years ago
- *Homo ergaster* shows a significant decrease in sexual dimorphism (a size difference between sexes) compared with its ancestors

*Homo ergaster*

- Cranial Capacity
  - ~ 871 cc
- 1.9 – 1.5 mya

*Homo ergaster* fossils were previously assigned to *Homo erectus*; most paleoanthropologists now recognize these as separate species
• *Homo erectus* originated in Africa by 1.8 million years ago
• It was the first hominin to leave Africa

---

**Homo erectus**

- Cranial Capacity: 700-1250 cc
- 2 mya – 4,000 ya

---

**Homo erectus**

- Cranial Capacity: 700-1250 cc
- 2 mya – 4,000 ya

---

**Homo floresiensis** (“Hobbit”)

- Cranial Capacity: ~380 cc
- 100,000 - 12,000 ya?
Neanderthals

- Neanderthals, *Homo neanderthalensis*, lived in Europe and the Near East from 200,000 to 28,000 years ago
- They were thick-boned with a larger brain, they buried their dead, and they made hunting tools

*Homo neanderthalensis*

- Cranial Capacity 1200-1700 cc
- 200,000 – 30,000 ya

*Homo sapiens*

- *Homo sapiens* appeared in Africa by 195,000 years ago
- All living humans are descended from these African ancestors
Cro-Magnon (*Homo sapiens*)
- Cranial Capacity 1000-1700 cc
- 130,000 ya – present

Modern *Homo sapiens*
- Cranial Capacity 1000-1700 cc
- 130,000 ya – present

- The oldest fossils of *Homo sapiens* outside Africa date back about 115,000 years and are from the Middle East
- Humans first arrived in the New World sometime before 15,000 years ago
- In 2004, 18,000 year old fossils were found in Indonesia, and a new small hominin was named: *Homo floresiensis*

- Rapid expansion of our species may have been preceded by changes to the brain that made cognitive innovations possible
  - For example, the *FOXP2* gene is essential for human language, and underwent intense natural selection during the last 200,000 years
- *Homo sapiens* were the first group to show evidence of symbolic and sophisticated thought
Fig. 34:45
Australopithecus sediba, Darwinius masillae & Ardi
(Ald) 47 mya
(Ardi) 4.4 mya

Kenyanthropus platyops
3.5 mya

Sahelanthropus tchadensis Skull
BH-029 6-7 mya

Foto: Wolfgang Fuhrmann (Hessisches Landesmuseum Darmstadt)


7. **Homo Neanderthalensis** – Nickname: Neanderthal. Lived: 250,000 to 30,000 years ago. Habitat: Europe and Western Asia. Diet: Relied heavily on meat, such as bison, deer and musk ox.