CHAPTER 21 - THE EVOLUTIONARY STORY OF HOMO SAPIENS

DEFINITIONS

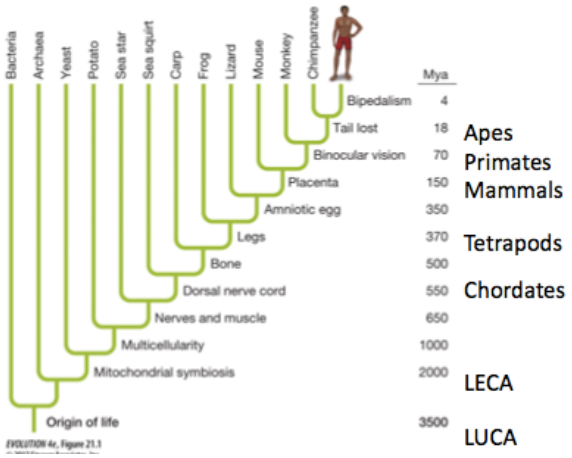
1. **Theory of mind:** The ability to infer intentions and emotions of others.
2. **Domestication:** an evolutionary process , by which plant and animal species used by humans become different from their wild ancestors.

- Neanderthals and early humans interbreed at several different times- some of these genes helped humans adapt to new diets , diseases and environmental conditions as they spread throughout the world.

WHERE DID WE COME FROM?

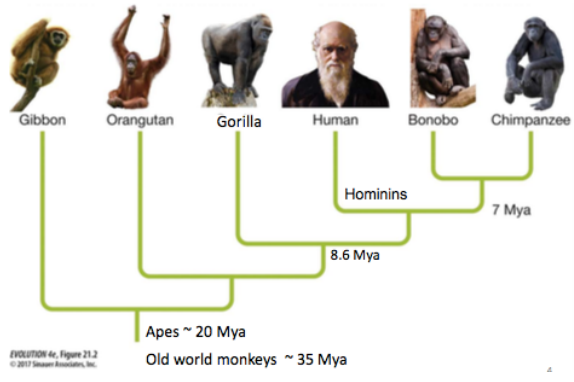
- Humans are descended from the last universal common ancestor (LUCA) of all living organisms on Earth.
- Shared fundamental features: nucleic acids , the genetic code , proteins composed of L amino acids etc.
- Symbiosis between an archaean and a bacterium.

- *Diagram to the right:* The path of evolution leading from the origin of life to homo sapiens. Key traits we gained along the way are indicated.



OUR CLOSEST LIVING RELATIVES

- About 35 Mya , the old world monkeys and apes (the catarrhine primates) arose.
- Humans are in the group called apes which are distinguished from other primates by lack of an external tail. Our closest relatives are Chimpanzees and the Bonobo,
- The lineage that includes Homo sapiens is called the hominins which diverged from the chimpanzee lineage 7 Mya.
- The hominin lineage gave rise to many more species , which all became extinct except homo sapiens.

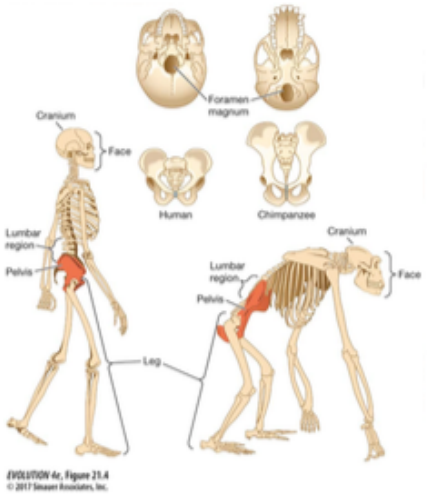


- Other apes : arms longer than their legs , walks upright for short distances , feet are like their hands with opposable first toes but their thumbs are not as opposable as ours.
- African apes are highly social and males are larger than females as a consequence of sexual selection.
- Bonobos use sexual interactions (Heterosexual and Homosexual) to resolve conflicts and maintain bonds.
- Chimpanzees have more conflict-ridden societies, they use tools and are believed to have cognitive abilities and emotions like humans (just less developed) - Rudimentary theory of mind.
- Captive apes can learn sign language or sets of symbolic objects to express rudimentary language abilities = shows that this was present in our common ancestor.

- Humans and Chimpanzees differ by less than 2% of DNA sequences - at several loci they share polymorphic alleles that have persisted since the common ancestor due to balancing selection (perhaps due to pathogen resistance)

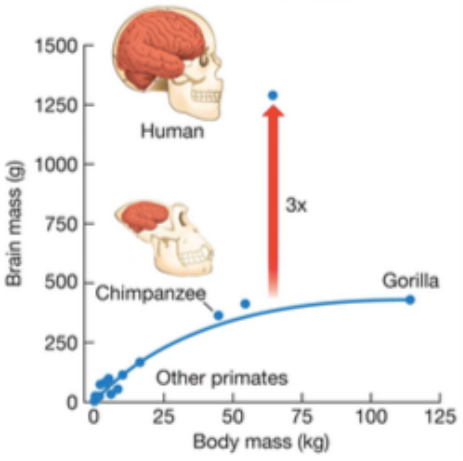
HOW HUMANS DIFFER FROM APES

- Humans :
- Are fully **bipedal**
- **Pelvis** has a different shape - anchoring muscles that stabilize the body.
- Have **longer legs** than other apes and are angled inwards to be directly below their centre of gravity = improves balance
- **Curvature of spine** (especially in lumbar region which is S shaped) improves stability
- **Foramen magnum** (The hole at the base of the skull through which the spinal cord exits the brain) is shifted forward so humans more easily face straight ahead when standing.
- **Feet are highly modified** for running - big toe is not opposable but rather enlarged and directed forward (also curved arch of foot and toe joints that flex upwards)
- Small teeth and flat , non projecting faces.



Evolution of bipedalism
"Naked ape"
Hands

- By the time bipedality evolved , the African climate had become drier and Natural Selection favored walking rather than climate in this new environment.
- When hominins became runners , sweating was important for cooling which probably selected for reduced body hair = The "naked ape"



- Humans have shorter fingers with straighter phalanges , and longer , more opposable thumbs.
- Strong muscles provide our hands with strength and precision.

- The human brain is 3x the size of primate brains and 5x the size of mammalian brains.

- Human babies are larger than primate babies , however , they are cared for longer than primate babies are.
- Primates take care of young for 5 years and have no other babies during this time.

OUR ANCESTRY : HOMININS THROUGH TIME