

Adaptive radiation: a situation where there is one isolated “pointsource” for species evolution.
Artificial selection: mankind imposes selective environmental pressure to select for desired traits. For example, bacteria in the lab, dog breeding in the field. Alternatively called selective breeding.
Gradualism versus punctuated equilibrium: The former states that speciation has followed slow and steady trends over time, and the latter states that it occurs in short, rapid spurts. These phenomena are observational, but do not explain the mechanism of the change.
Genetic drift/founder effect/bottlenecking: all of these selective pressures on population will cause some gene frequencies to go up and some to go down.

Human evolution:

Copy cladogram from board entitled primate phylogenetic tree.

Important misconceptions debunked: Dinosaurs and humans never coexisted—forget the Flintstones, Barney and Baby Bop. Cavemen and humans coexisted briefly, but Neanderthals are extinct: ignore the Geico commercials. While we are closer to Neanderthals than we are to chimps, Neanderthals are also not and were never directly ancestral to us. Chimpanzees stand as our closest extant primate relative, and Neanderthals are a dead lineage.

The driving force in primate evolution to hominids was the development of brain size leading to creativity: this conferred an adaptive advantage. Hominids are humans and their immediate ancestors.

Primate types: Anthropoid: marmoset, monkey (w/tail), ape (no tail), human. ~AND~
Prosimian: lemur, loris, tarsier. Prehensile, or grasping, refers to tail, hands, and feet of primates. Anthropoids have an opposable thumb and a unique dental formula, or similar number and arrangement of teeth. Additionally, they have a large brain case or cranial capacity.

Some modern examples of anthropoids are the gibbon, orangutan, gorilla, and chimpanzee. Our immediate extant ancestor is the chimpanzee, which has the larger cranium:body ratio. It is not the absolute brain size, but the relative size, that is important. Know these Latin names:
Orangutan: *Pongo pygmaeus*, Gorilla: *Gorilla gorilla*, Chimpanzee: *Pan troglodytes*, Human: *Homo sapiens*.

Anthropologists Goodall and Fossey did, respectively, chimp and gorilla behavioral research in Africa. Fossey was murdered by poachers. Both were protective of the communities they observed.

Bipedalism refers primarily to walking on 2 legs. The emergence of human intellect was driven by walking upright. The upright spine results in increased cranial capacity, not the reverse.

There is copious fossil evidence that Africa is the cradle of emergent human civilization. Based on Mitochondrial and Y chromosome lineages, human races are believed to have emerged from “Out of Africa” (see supplement), descendants of a modern tribe called the Bantu, about 100,000 years ago.

Important Discoveries: (see handouts from skull models, and human evo floorplan from AMNH)
Louis and Mary Leakey (1960): discovered *Australopithecus boisei* at Olduvai Gorge, and uncovered 1.6-2.6 myo fossils of *Homo habilis* (handy).

Donald Johanson discovered *Australopithecus afarensis*, a fossil from 3.2 mya, literally southern ape of the Afar valley. Found in 1974, Lucy, a juvenile female, was the oldest bipedal hominid ever discovered. She is believed to be the “missing link” between chimp and hominid, as Lucy has the same cranial capacity as a chimpanzee.