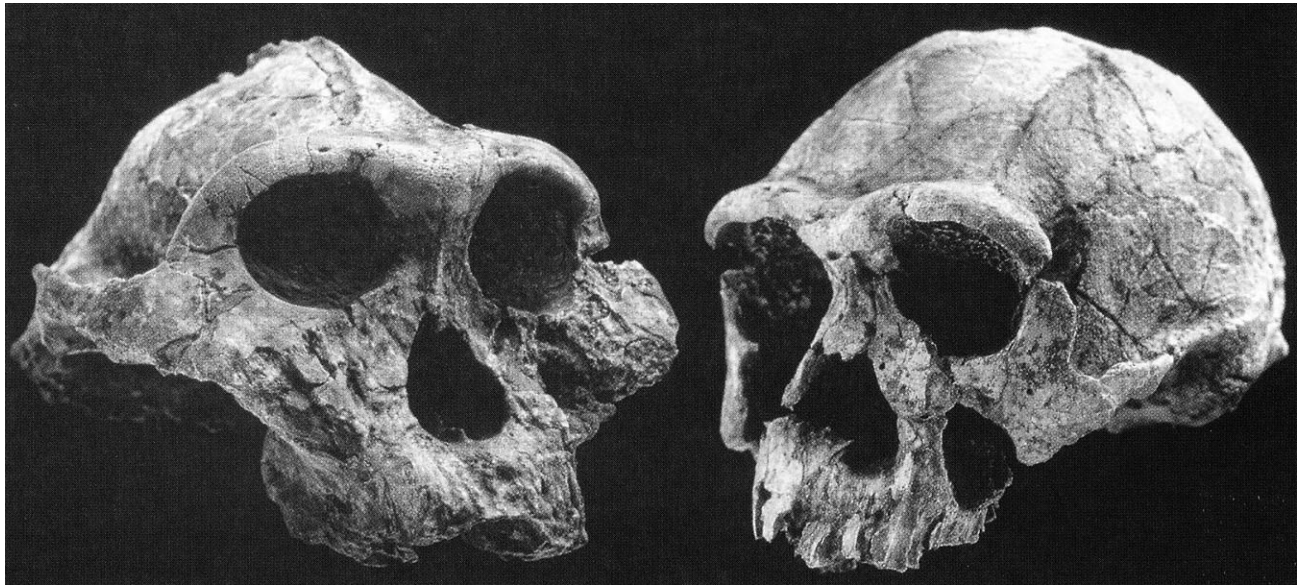
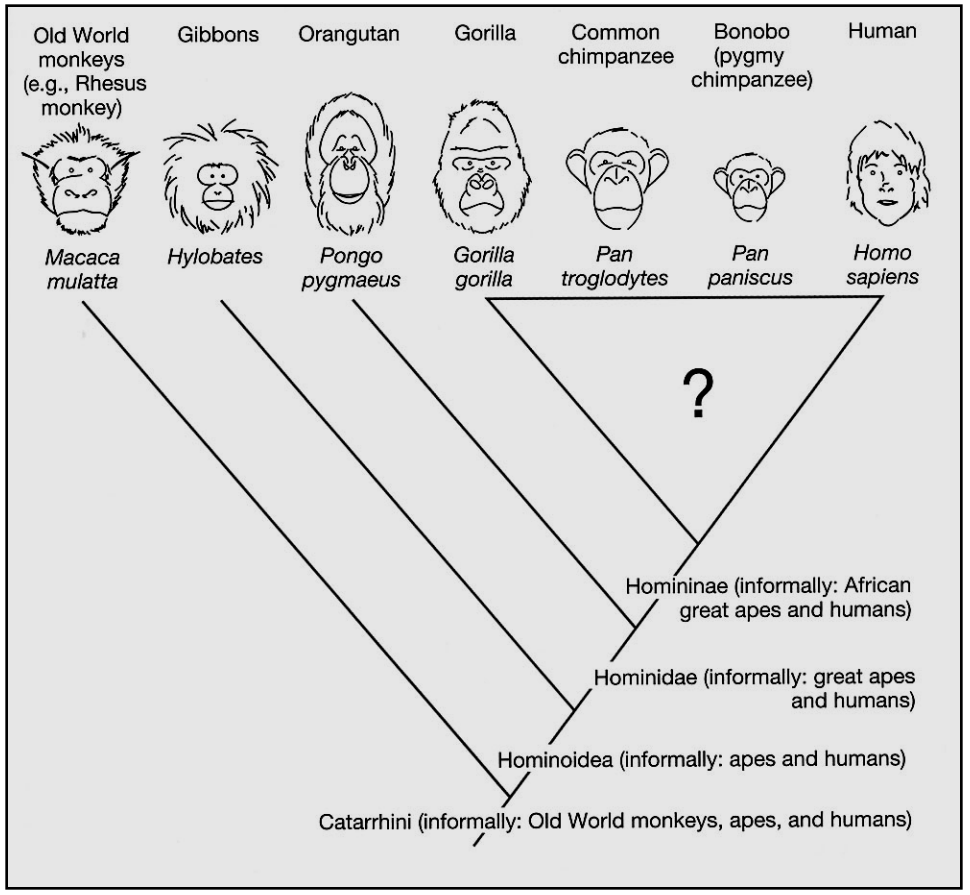
Human Evolution



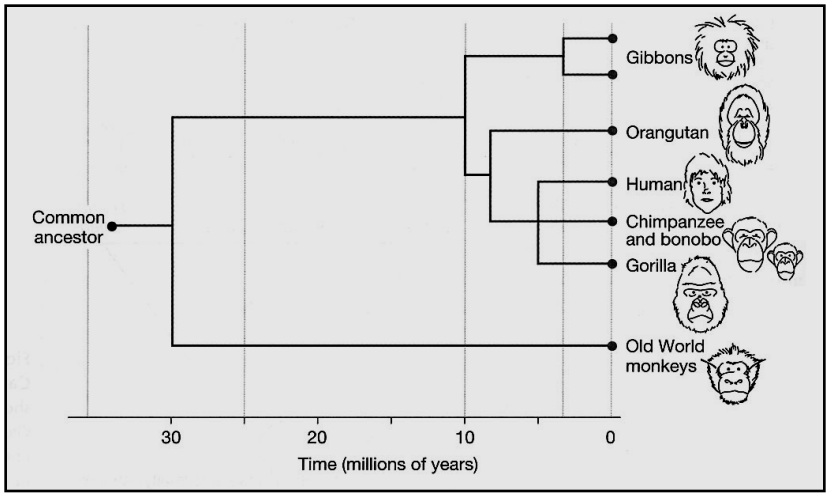
“light will be thrown on the origin of man and his history”

Humans and primates

- Prosimians
  - Lemurs, bushbabies
- Simians are monkeys
  - New world monkeys (platyrhini)
  - Old world monkeys (catarrhini)
- Apes
  - Hominidae



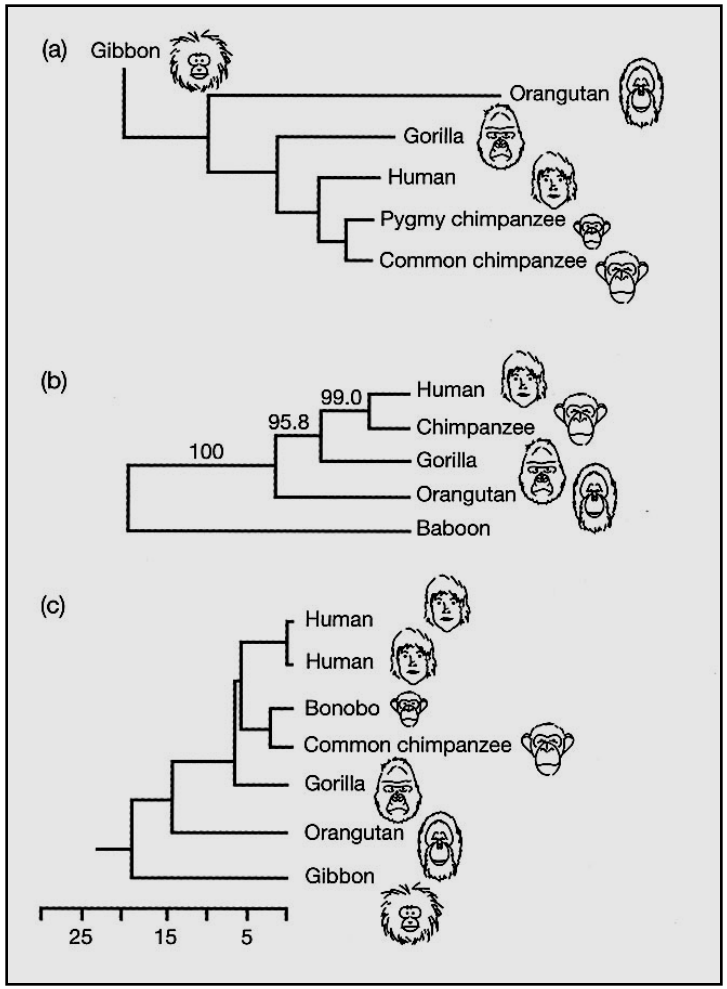
Humans closely related to African great apes



- Sarich and Wilson 1967
- Serum albumin reaction
  - Rabbit antibodies
- Dated with fossils
  - Old world monkeys and apes 30 mya
- Humans and African great apes last shared a common ancestor 5 mya

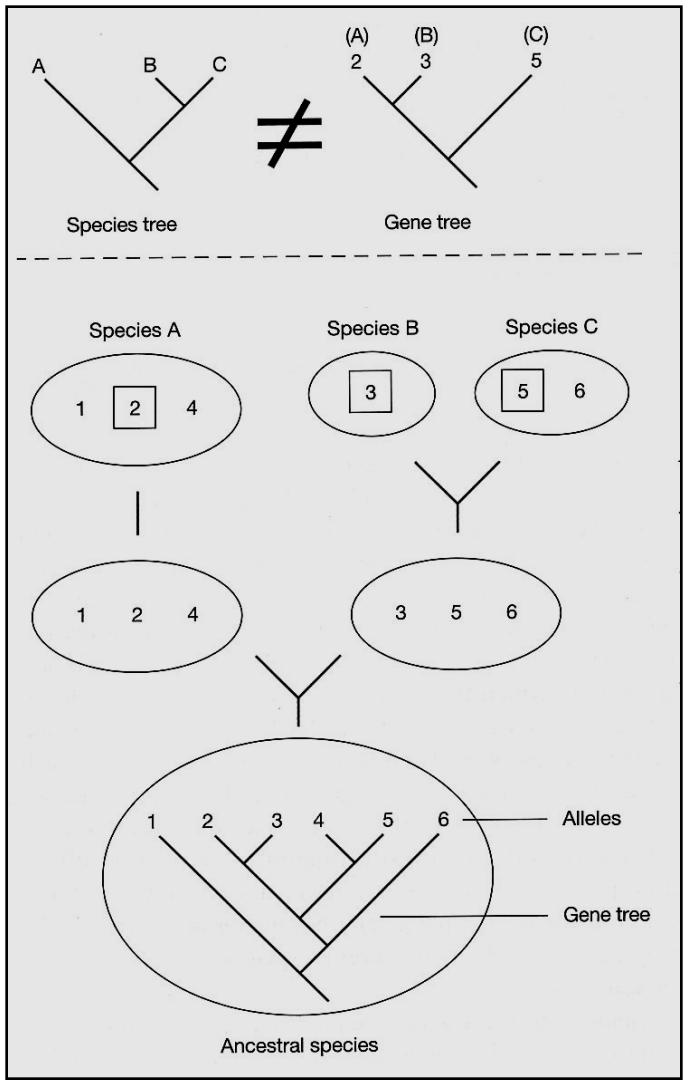
Humans more closely related to chimps than gorillas

- 3 molecular phylogenies
  - mtDNA (maternal)
  - Y-linked gene (paternal)
  - Autosomal genes

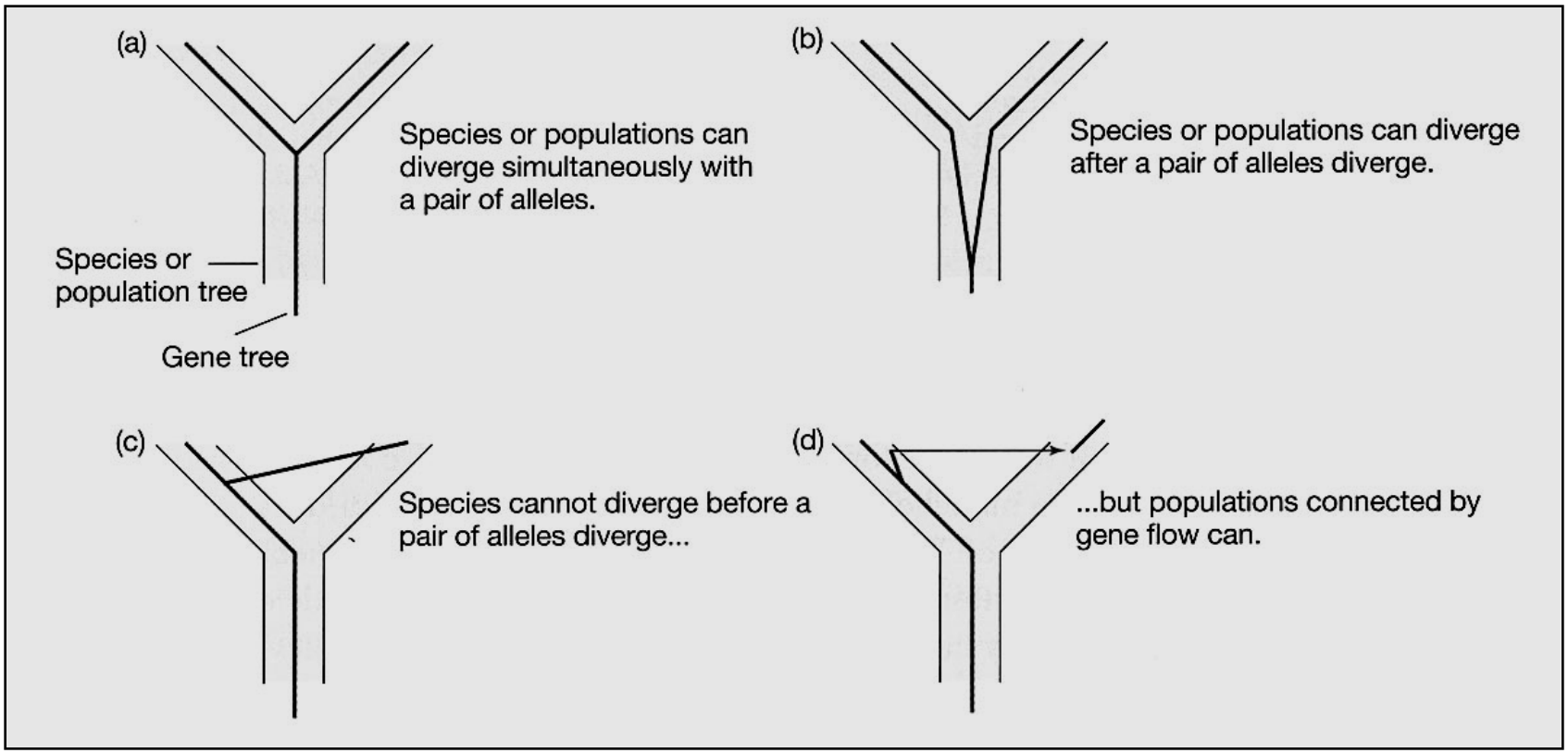


Importance of concordance

- Concordance means agreement
  - Results with those three different data sets agree
  - Important because molecular phylogenies trace history of genes
  - Of 14 separate independent data sets
    - 11 show humans and chimps
    - 2 show gorillas and chimps
    - 1 shows humans and gorillas



Species trees and gene trees



Concensus, conclusion?

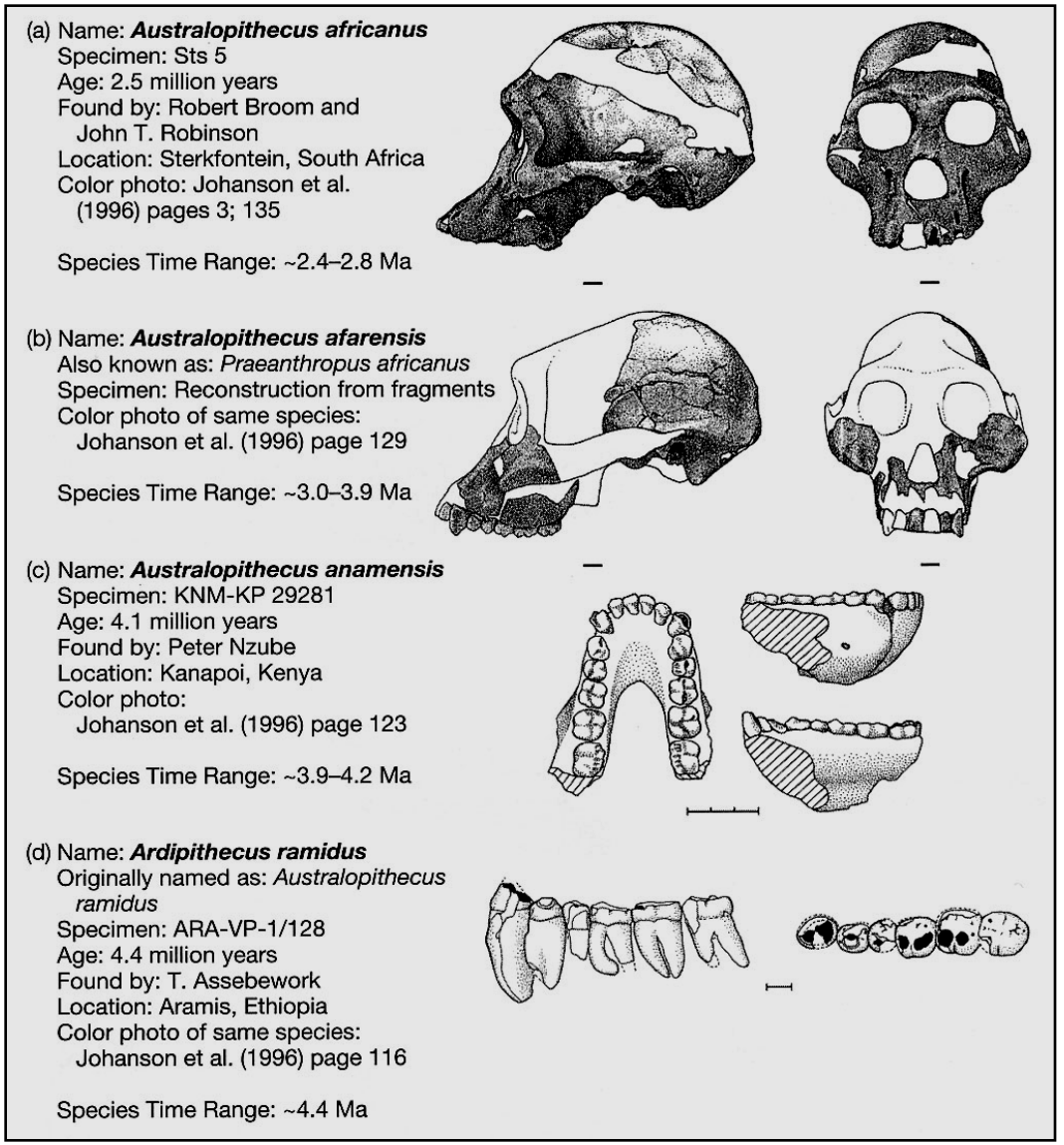
- Humans and chimps shared recent common ancestry
  - About 5 mya
- Gorillas likely the next most closely related
  - orangutan

Recent Human Ancestry

- Ok, so humans and chimps split 5 mya
- What might the common ancestor have been like?
  - Parsimony: limited tool use, broad diet, cooperative group living
    - Hunting, warfare, cannibalism, social alliances, status
- What evidence is there of the lineage of humans AFTER that split
  - I.e., the recent ancestry of the human lineage

Gracile Australopithecines

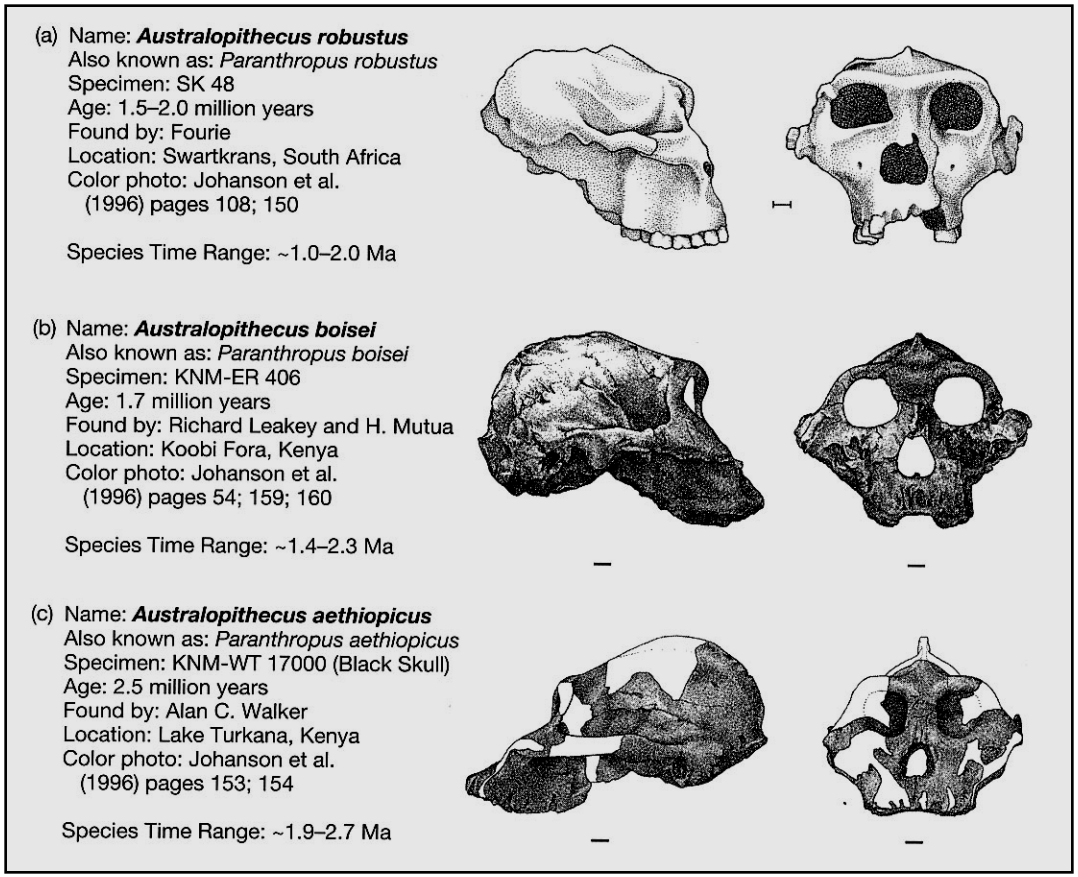
- small braincases
  - 400 to 500 cc
- walked on two legs
- female 1 meter tall
- males 1.5 meter



bipedalism

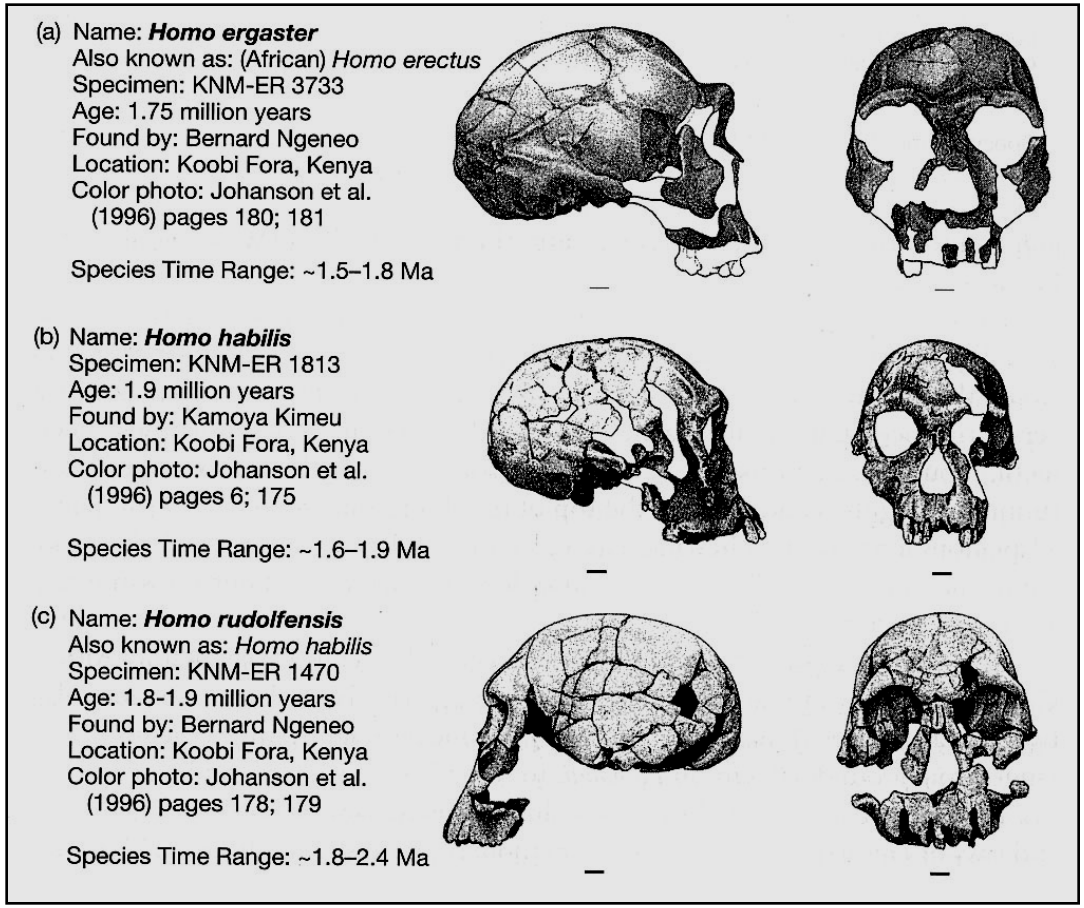
Robust Australopithecines

- Small brained
  - larger than gracile *Australopithecus*
- Large bony crest
  - Jaw muscle attachments
- Bipedal
- Similar size to gracile *Australopithecus*



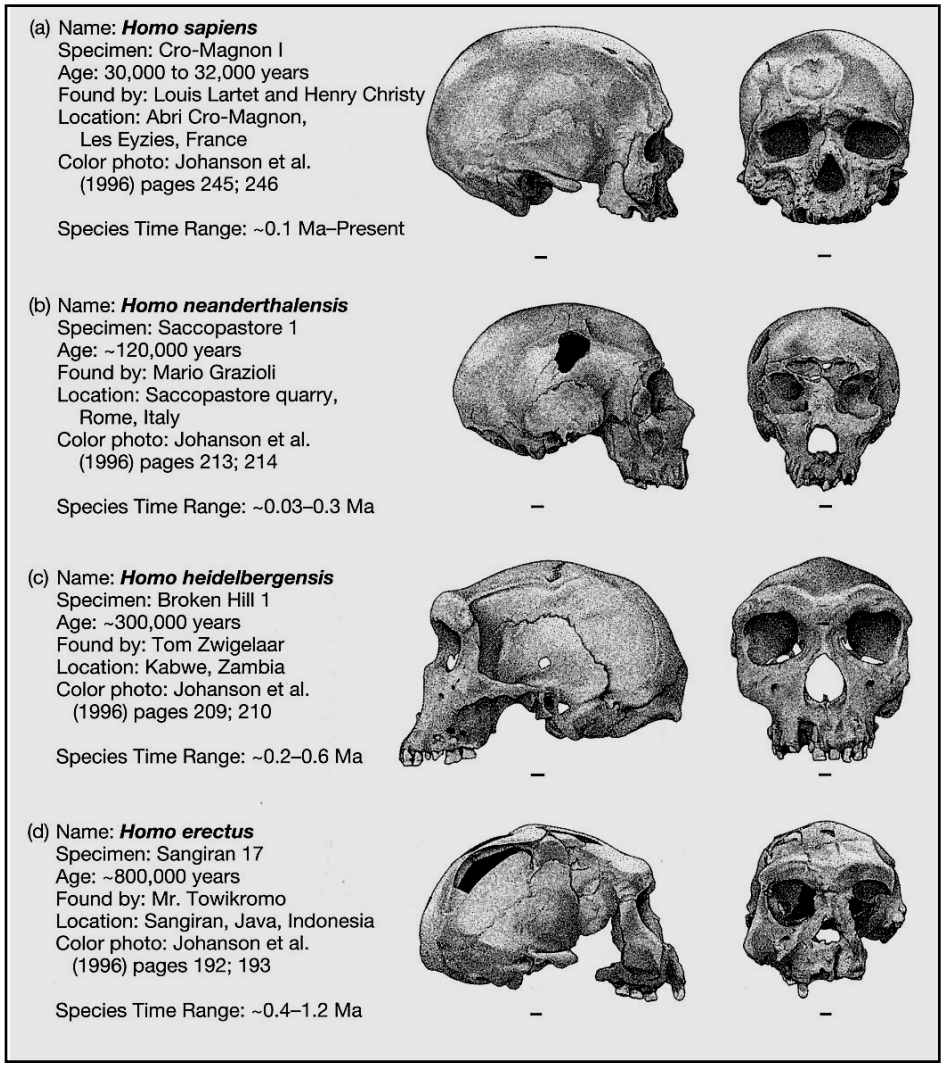
Archaic humans, Genus *Homo*

- All African
- *H. habilis*
  - 600 cc brain
- Teeth and jaws smaller than in *Australopithecus*
- Taller
- Less sexually dimorphic in size



Modern humans

- Last 100,000 years
- Biggest brain
  - 2000 cc Cro-Magnon
  - Today about 1200 cc
- Higher foreheads
- Flatter faces with prominent nose
- Culture?
  - Cro-magnon I buried in grave with 2 men 1 woman and infant
  - Animal bones, jewelry, stone tools



The last survivor

- Modern *Homo sapiens* only descendent of multispecies radiation of African hominids
- Many species co-existed at one time
  - Up to at least 5 species

- origin and spread of modern *Homo sapiens?*

Paleontological agreement on this:

- *H. sapiens* are descendents of some or all of the *H. ergaster/H. erectus* group of species.

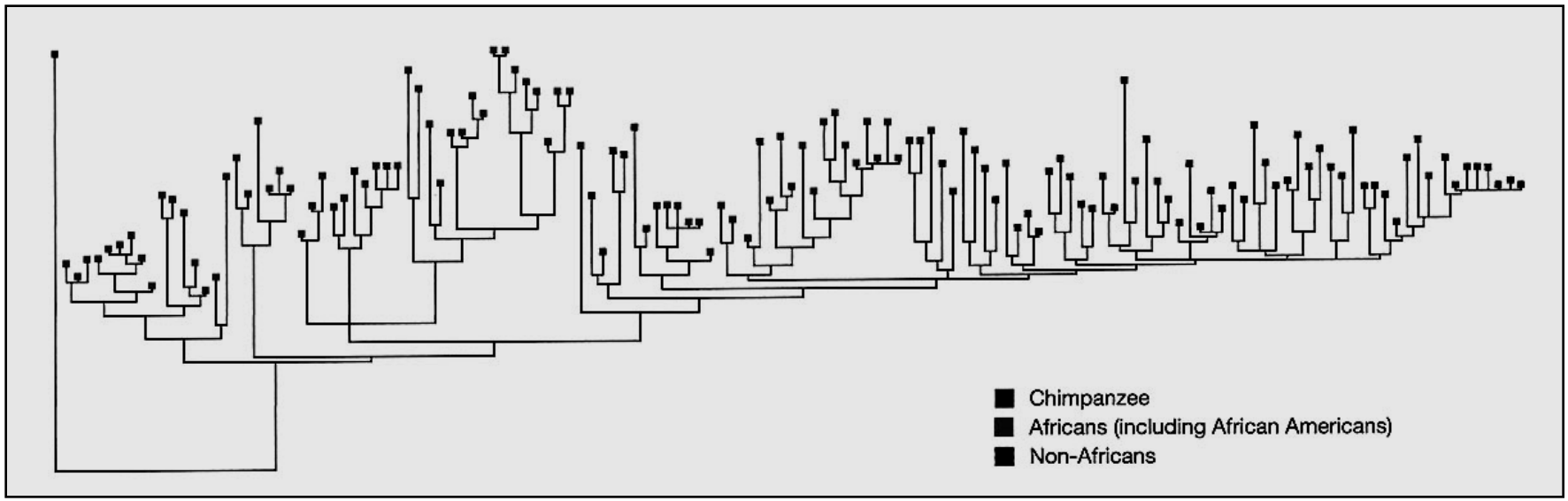
- How and where did modern humans arise?
  - Archaic humans certainly in Africa
  - Recent humans more widespread

Geographic range

- Oldest *H. ergaster/erectus* fossils (1.6 to 1.9 mya)
  - Koobi Fora (Africa)
  - Dmanisi (Caucasus Eastern Europe)
  - Longgupo Cave (China)
  - Sangiran and Mojokerto (Java)
- Oldest *H. sapiens* 100,000 years ago
  - Africa and western middle-east
    - Bit later through Europe and Asia

Some results

- mtDNA, 189 people



- ‘Mitochondiral Eve’ not single person
- Likely was African
  - But when?

Nested genetic variation

- Founder effects predict
  - Descendent populations have subset of genetic variation found in original source population
- 12 alleles of TTTTC repeats