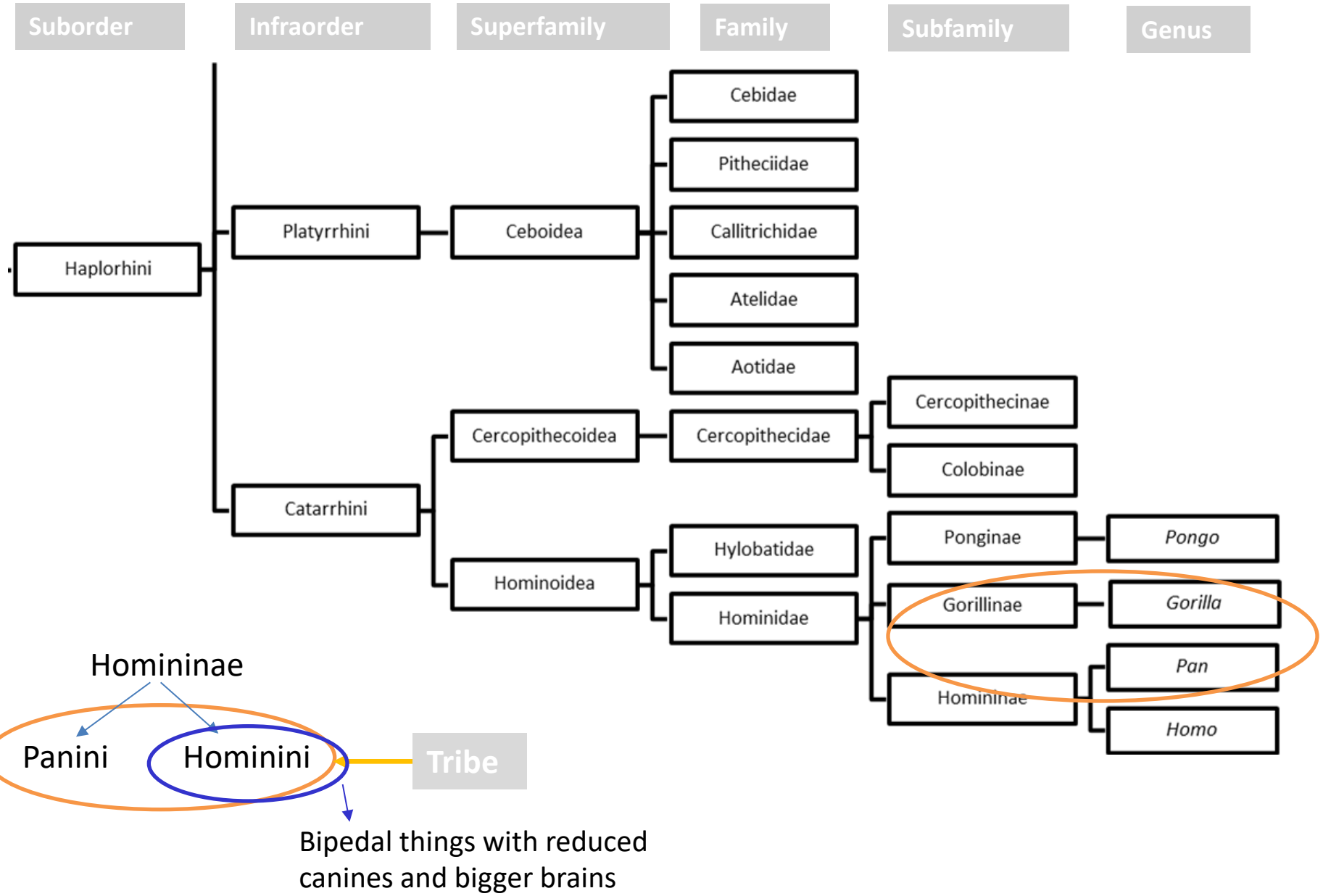
HOMININS- AUSTRALOPITHECUS THROUGH HOMO

Lab 6

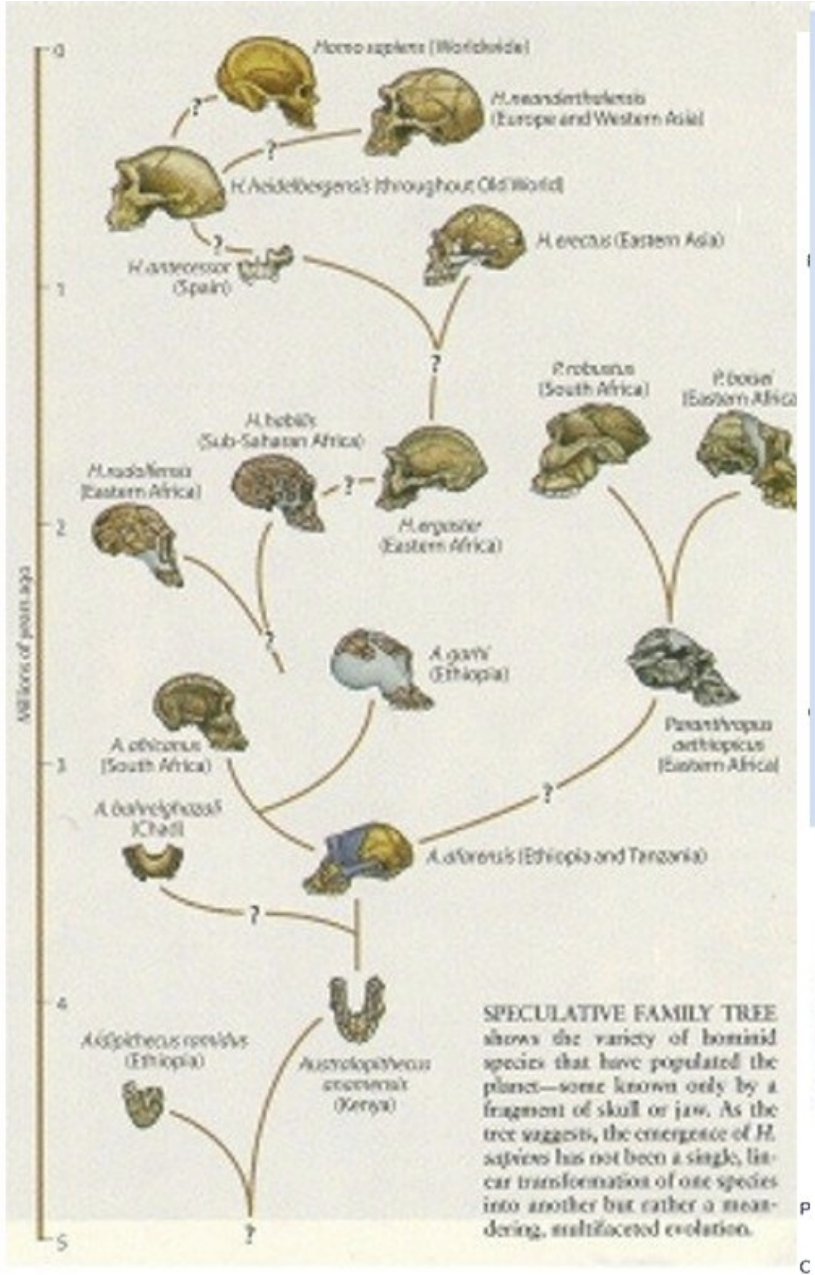
Goals for Lab

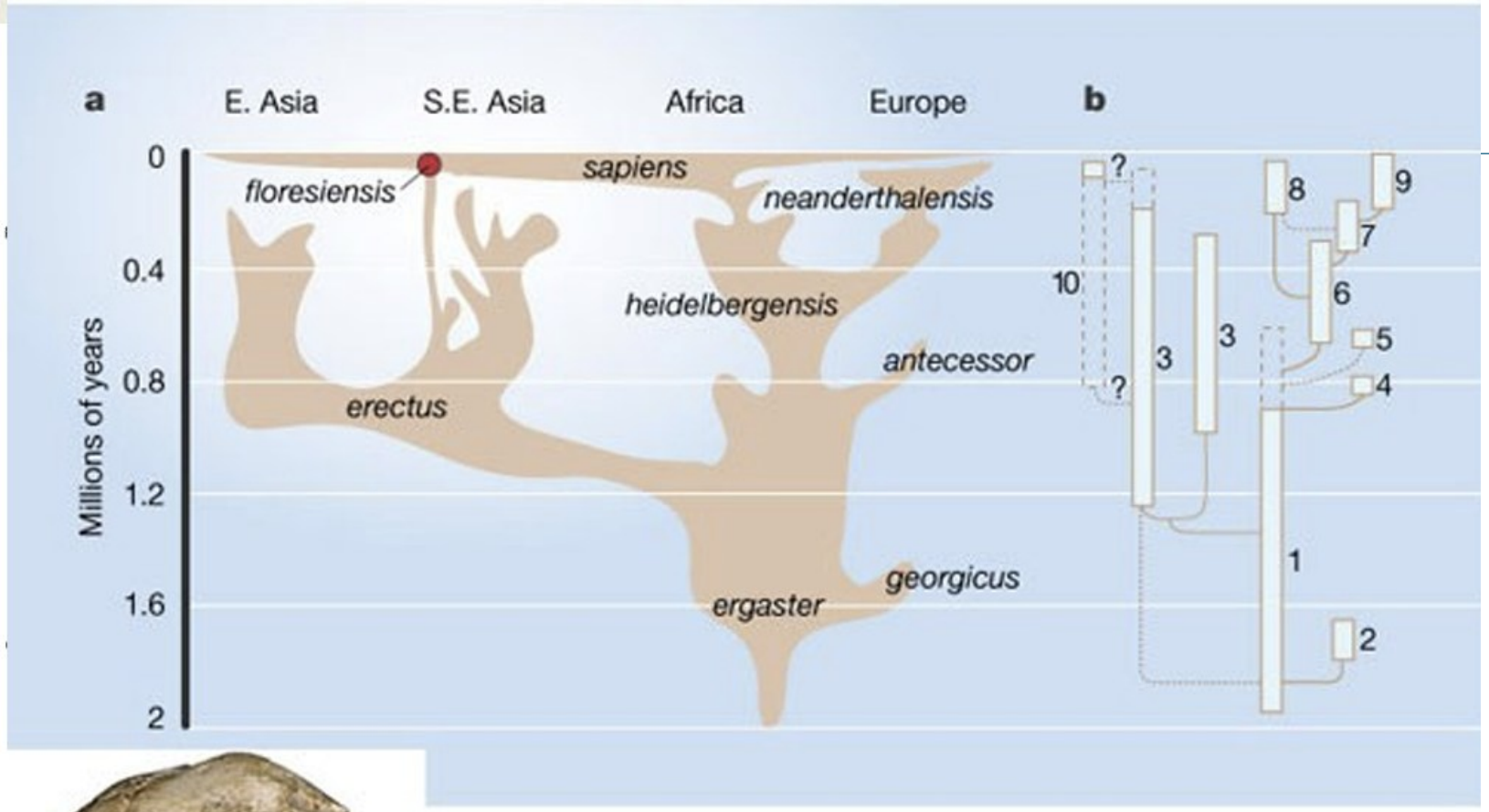
- Learn to appreciate the nature of variation among the genus *Australopithecus*.
- Examine the evolution of the genus *Homo* during the late Pliocene and early Pleistocene.
- Introduce you to the various casts of fossil skulls of the genus *Homo* and compare them to *Australopithecus*.



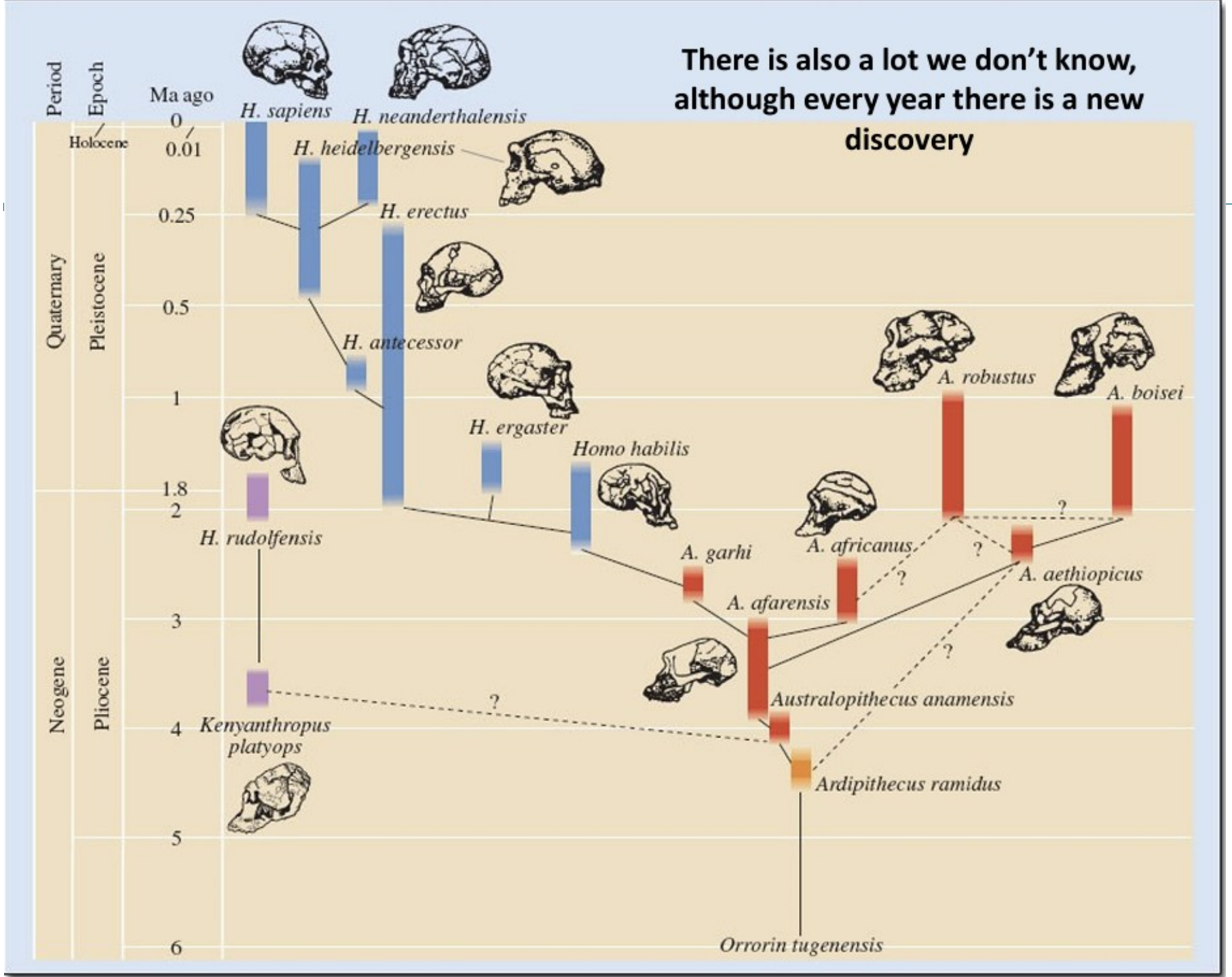
="Hominins" – members of human lineage (after we split with chimps/bonobos)

Based on that limited fossil evidence (and very limited aDNA) SO MANY different phylogenies are created





CRETACEOUS boundary Cretaceous/Cenozoic, last major extinction event destroyed dinosaurs)

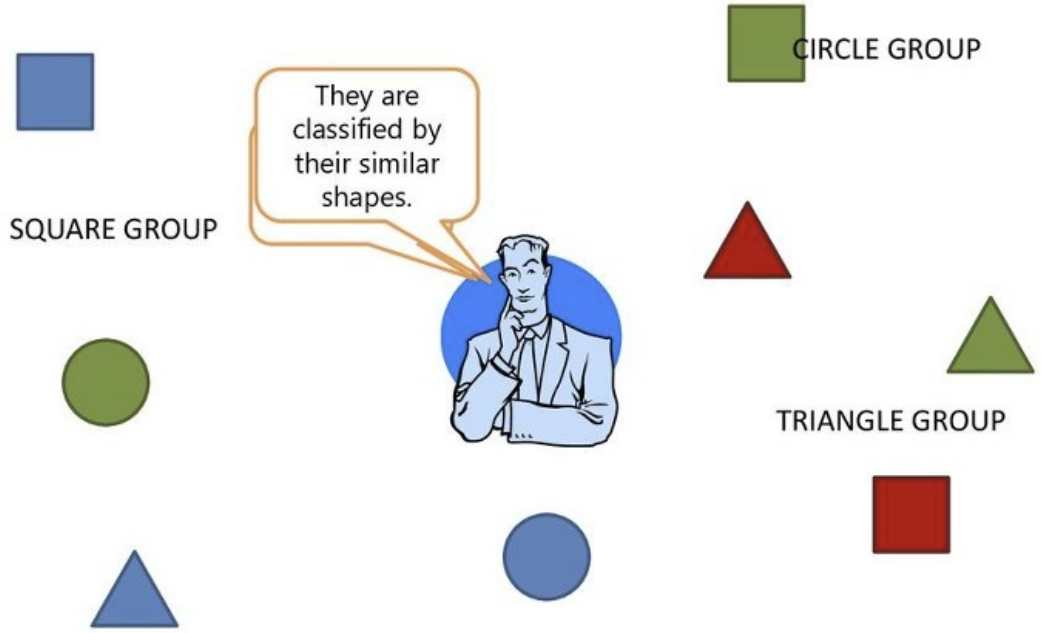

There is also a lot we don't know, although every year there is a new discovery
Period
Epoch
Ma ago
Holocene
Quaternary
Pleistocene
Neogene
Pliocene
0
0.01
0.25
0.5
1
1.8
2
3
4
5
6
H. sapiens
H. neanderthalensis
H. heidelbergensis
H. erectus
H. antecessor
H. ergaster
Homo habilis
H. rudolfensis
A. robustus
A. boisei
A. africanus
A. garhi
A. afarensis
A. aethiopicus
Australopithecus anamensis
Kenyanthropus platyops
Ardipithecus ramidus
Orrorin tugenensis
?

Usually, I do an activity like this:

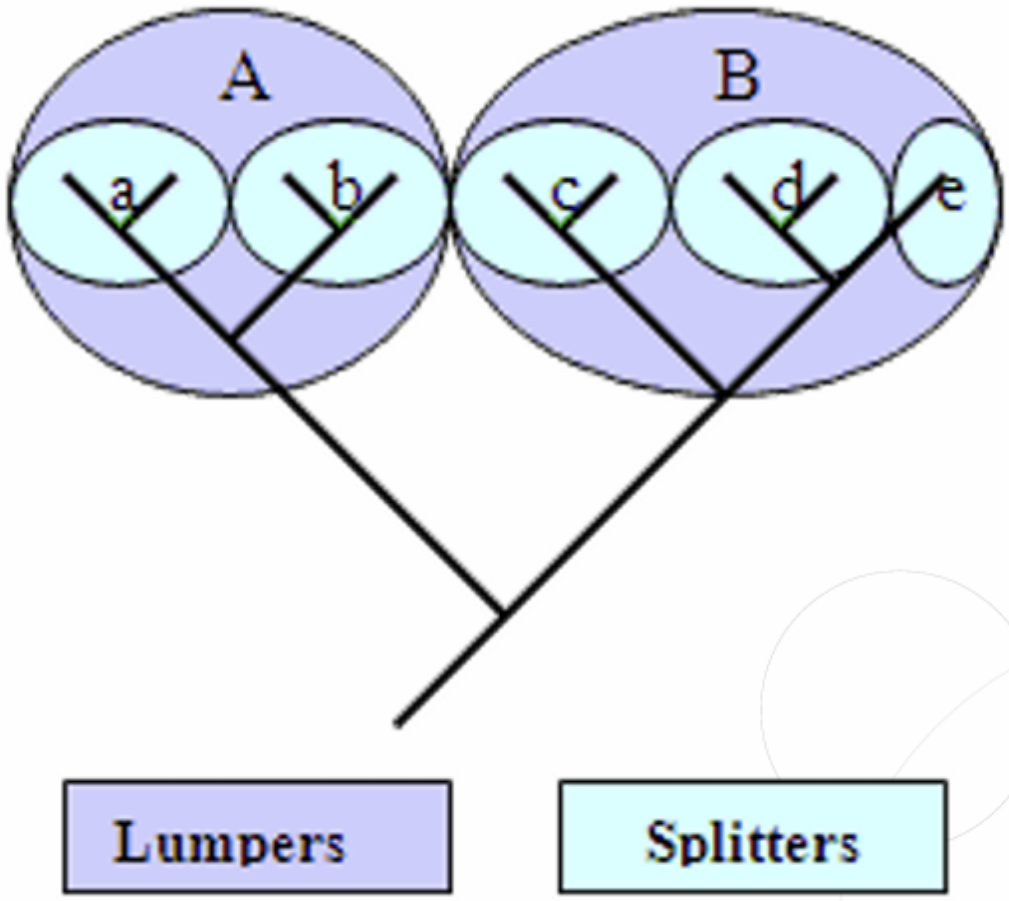
CLASSIFY THE CLASSROOM'S SKULL ACTIVITY

- Group one vs group two, put the skulls into ANY NUMBER of groups based on ANY similarities
- Then we will compare classifications

Classifying = putting thing into groups based on similarities.



HUMAN EVOLUTIONARY BIOLOGISTS ALSO DISAGREE



- There is no correct classification. Even if we had less limited evidence, classification is relatively subjective
- Broadly, there are two schools of thought concerning the classification of findings within human evolutions
- Lumpers
  - Group similar things together, or classify them into broad categories. They judge that differences are less important than similarities
- Splitters
  - Focus on differences, creating new categories to classify things that differ in key ways. They create complex classification systems with many categories.
- In taxonomy, lumpers group similar populations into a single species, while splitters identify distinct populations as separate species.
- In the fossil record, lumpers and splitters debate how many different hominid lineages make up our branch of the tree of life

Conclusion: you aren't wrong. Just don't use random online sources. Stick to memorizing the names and dates of hominins given to you in class.

give the names and dates of all australopiths

200 Sign i

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The names and dates of Australopiths include:

- **Australopithecus afarensis**: Dates are not specified, but it lived between 3.2 and 1.4 million years ago.
- **Australopithecus africanus**: Dates are not specified, but it lived between 3.3 and 2.1 million years ago.
- **Australopithecus anamensis**: Dates are not specified, but it lived between 1.9 and 1.4 million years ago.
- **Australopithecus sediba**: Dates are not specified, but it lived around 1.9 million years ago.
- **Australopithecus garhi**: Dates are not specified, but it lived around 4.2 million years ago.
- **Australopithecus bahrelghazali**: Dates are not specified, but it lived around 4.2 million years ago.

Australopithecus is a genus of early hominins that existed in Africa during the Pliocene and Early Pleistocene. The genera Homo, Paranthropus, and Kenyanthropus evolved from some Australopi... +
Wikipedia

Kingdom Animalia
Phylum Chordata
Class Mammalia
Order Primates
See more

<- No

Here's how Dr. Barrier/Dr. Šešelj want you to remember things. Only use these!

Pre- genus Homo

Sahelanthropus tchadensis	7 – 6 Ma	Chad
Orrorin tugenensis	6 Ma	Kenya
Ardipithecus ramidus	4.5 Ma	Ethiopia
Australopithecus anamensis	4.2 – 3.9 Ma	E. Africa
Australopithecus afarensis	3.9 – 3.0 Ma	E. Africa
Australopithecus bahrelghazali	3.5 Ma	Chad
Australopithecus deyiremeda	3.5 – 3.0 Ma	Ethiopia
Australopithecus africanus	3 – 2.4 Ma	S. Africa
Australopithecus garhi	2.5 Ma	Ethiopia
Australopithecus sediba	2.0 Ma	S. Africa
Paranthropus aethiopicus	2.5 Ma	E. Africa
Paranthropus robustus	1.9 – 1.5 Ma	S. Africa
Paranthropus boisei	2.2 – 1.4 Ma	E. Africa
Kenyanthropus platyops	3.5 MA	Kenya

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Genus Homo

Species	Time span
Homo habilis	1.9 -1.4 Ma
Homo rudolfensis	2.4 -1.9 Ma
Homo erectus	1.6 – ? Ma
Homo ergaster	1.9 – 0.9 Ma
Homo antecessor	~ 800 Ka
Homo heidelbergensis	600-300 Ka
Homo naledi	335-236 Ka
Homo sapiens neanderthalensis	130-30 Ka
Homo sapiens sapiens	315 Ka - present

You can break this down to make things easier:

Genus	Species
Bigger group, share some similarities	More specific, share more similarities
Pennsylvania	Philadelphia

Memorize the order of the genuses. Memorize general time frames and trends. Then you can usually logically remove some options and guess the right answer without knowing the exact date.

Pre Australopith

- Older than 4 myo
- Lots of climbing adaptations, smallest brains

Sahelanthropus, Orrorin, Ardipithecus

Australopiths

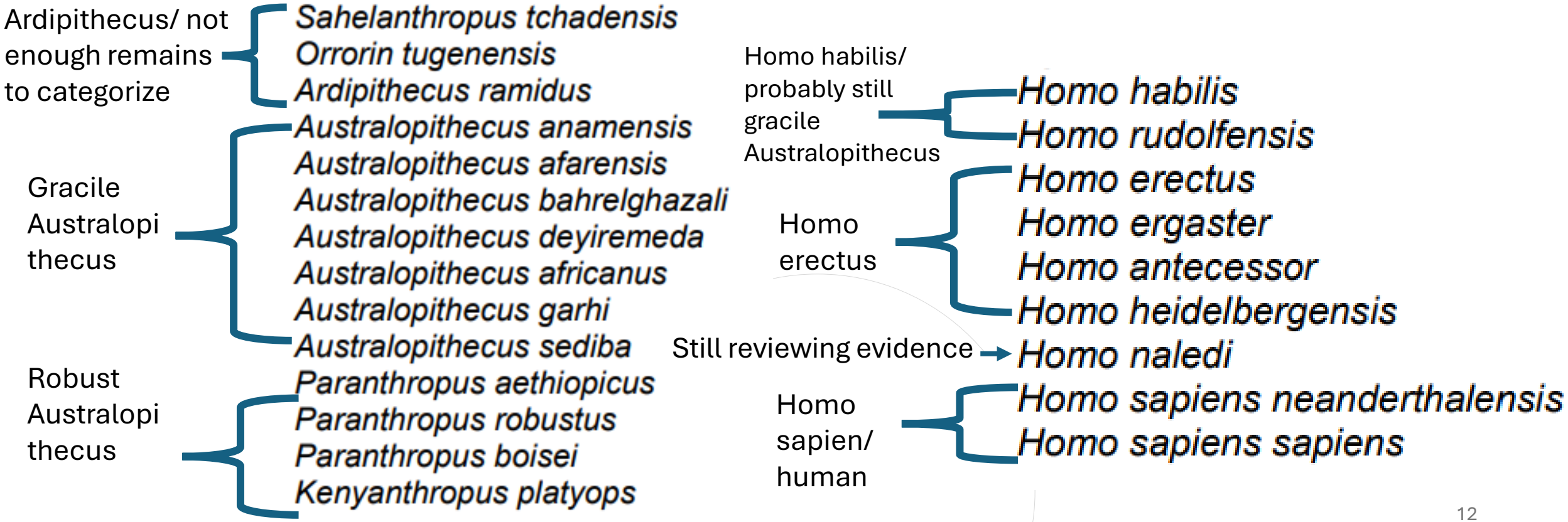
- Range starts older than 2 myo
- Crazy variation and mid range brains/bipedalness
- Australopithecus

Homo

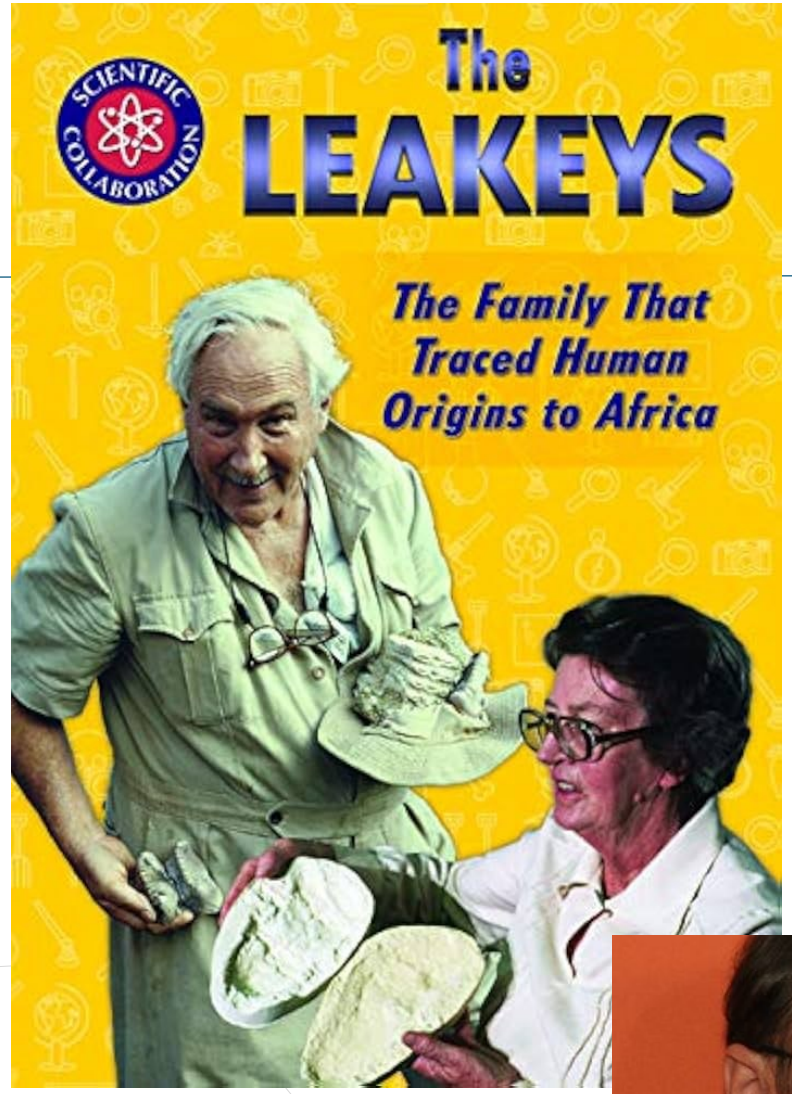
- Range starts younger than 2 myo
- Less variation, largest brains, most bipedal
- Homo

Note that a lumper (me) might see things differently

- I consider physiological variation between these “species” insufficient to be different species (I very well may be wrong!)



You’re an anthropologist in a very competitive field. Why might you choose to label something you find a new species instead of another specimen of an existing species? (Why is splitting so popular?)



Random traits that separate us from other apes (we are a weird ape)

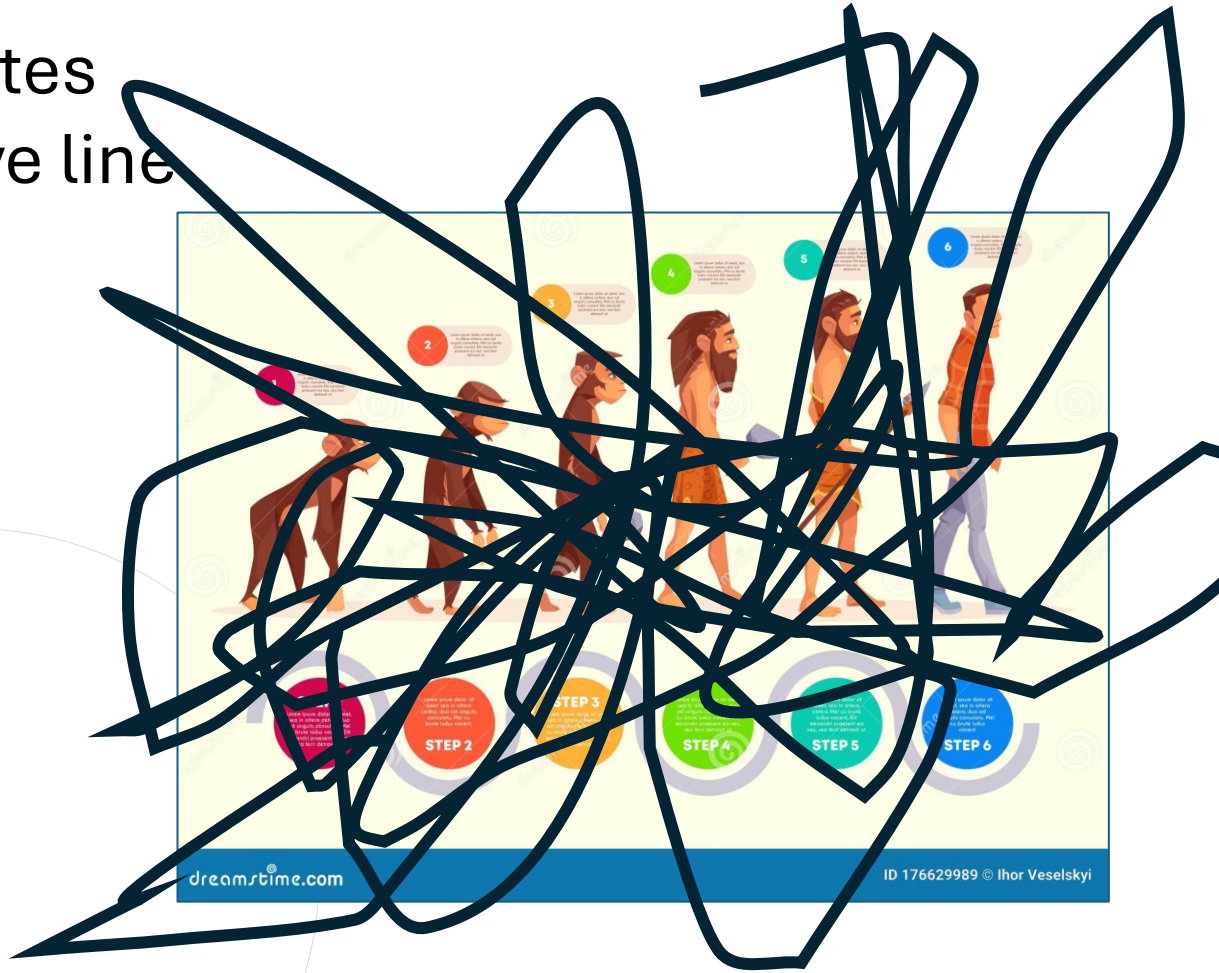
- Habitual bipedal locomotion (& associated adaptations)
  - Habitual means you pretty much always do it
- Decreased size of the anterior teeth (incisors and canines)
- Parabolic dental arcade
- Lack of prognathism
- Lack of a CP3 honing complex (P3 is bicuspid and humans lack a diastema)
- Increased size and complexity of the brain
- A high degree of precision grip ability in the hands
- Great reliance on material culture (i.e., tools)

Mosaic Evolution

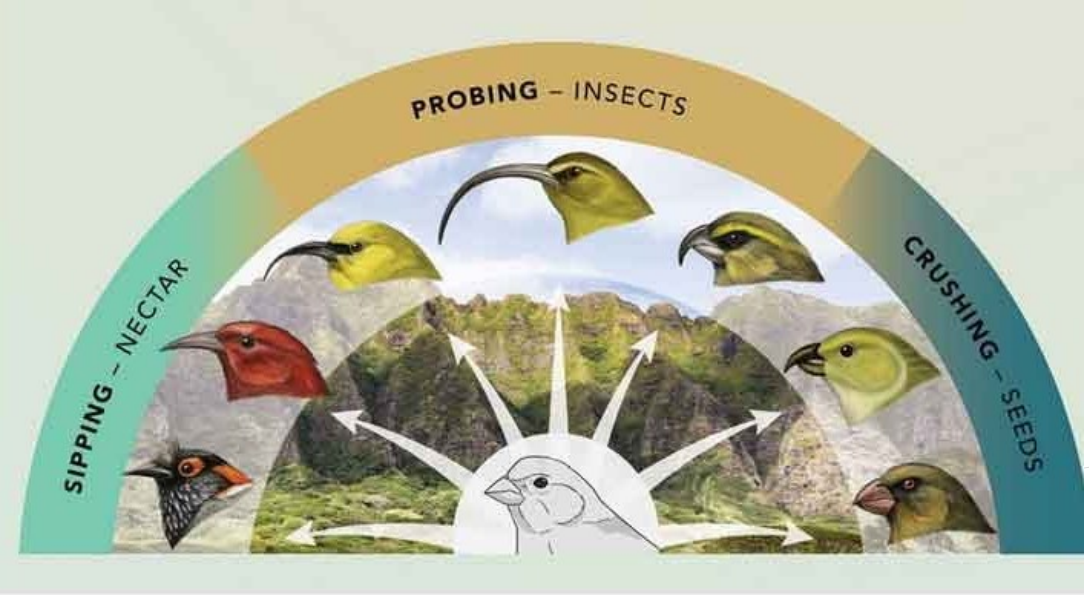
For human ev example -> brains were not getting bigger at the same rate as we were become bipedal

- Ancestral and derived traits DIFFER among different lineages because…
  - Different traits evolved at different rates
  - Evolution is not a straight, progressive line

	Humans	Frogs
# aortic arches	Derived (only 1 left)	Retained (2)
# digits	Retained (5)	Derived (4 –front)

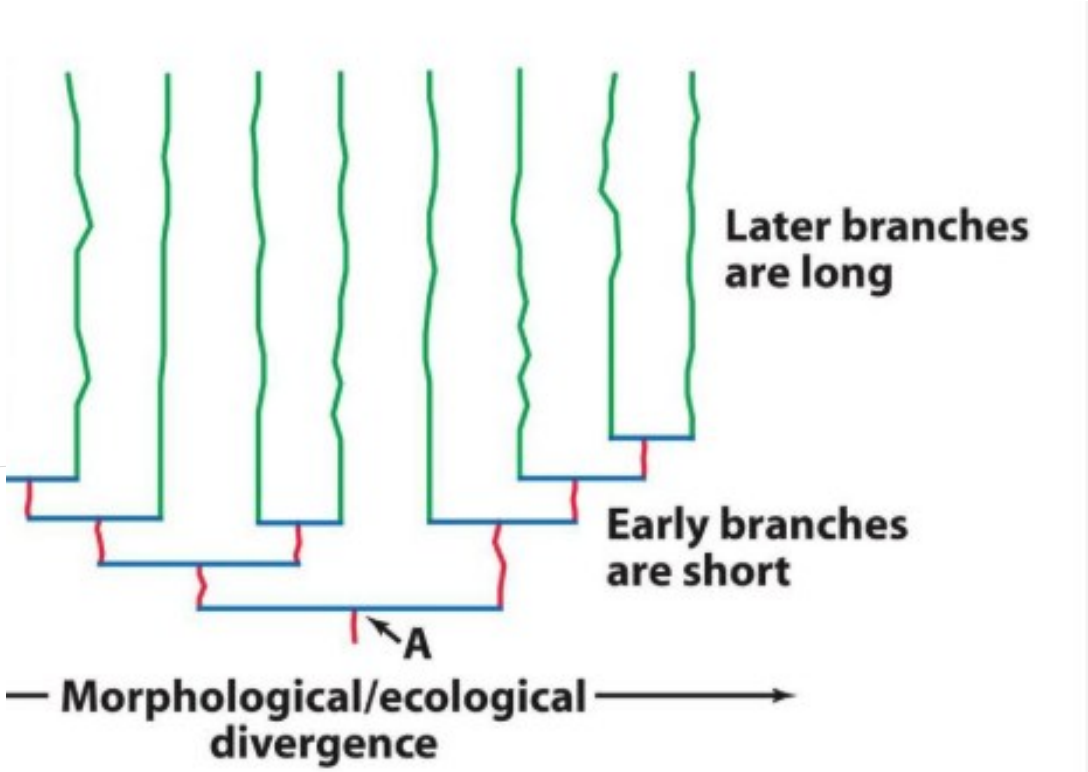


Adaptive Radiation



Hawaiian honeycreepers are the example of adaptive radiation in islar ecosystems, evolving from a single ancestor into multiple species with divers beak shapes and feeding habits specialized for different food sources.

Image Source: https://www.allaboutbirds.org/news/why-evolution-goes-wild-on-islands-the-science-of-adaptive-radiation/

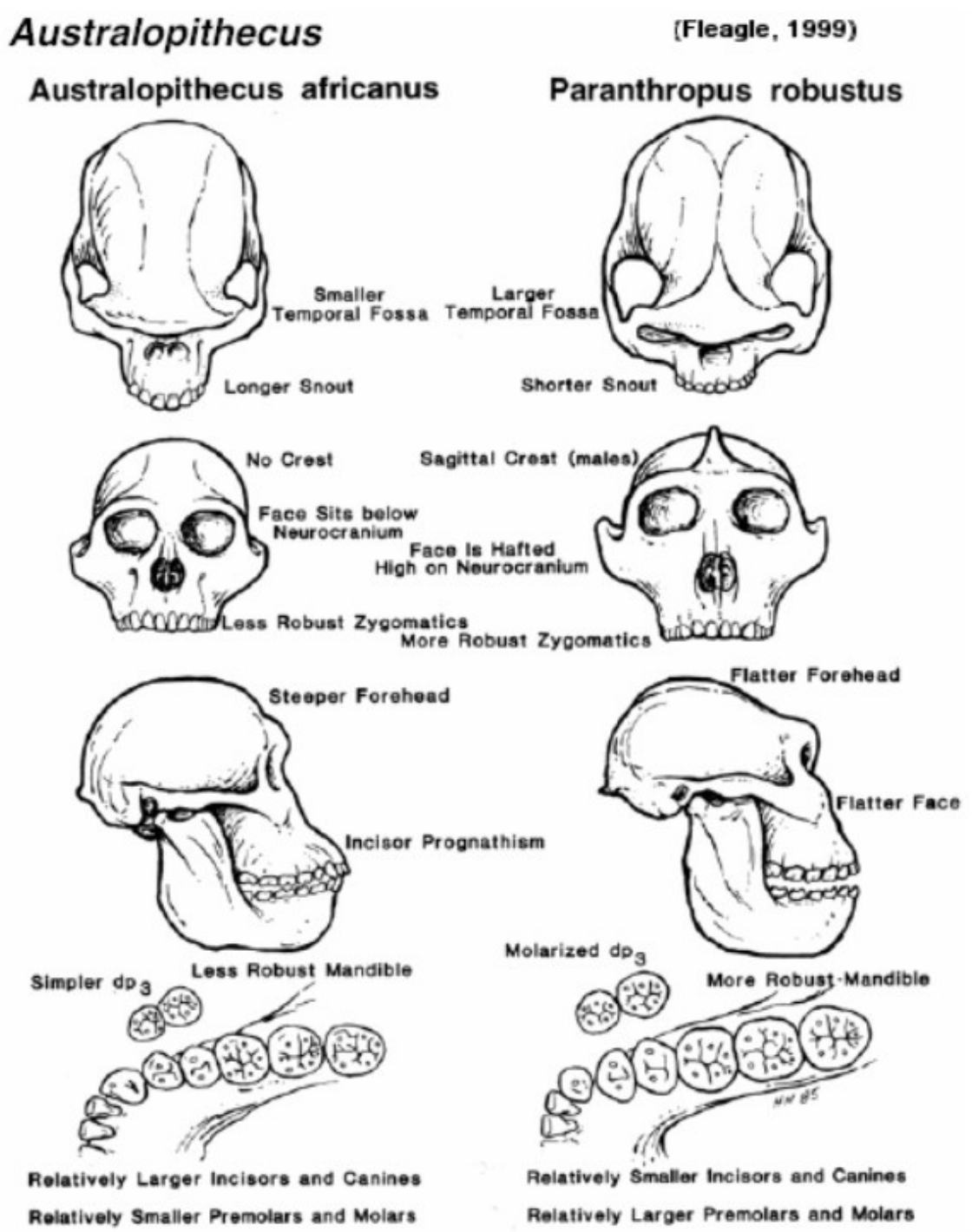


WEIRDNESS WITH AUSTRALOPITH VARIATION

Extremely different skulls between gracile and robust Australopiths

They are all found in Africa, relatively close together

Adaptive radiation due to climate variation in the Pleistocene?



WEIRDNESS WITH HOMO ERECTUS VARIATION

“Huge” variation between Asian, African, and European morphology

Still adaptive radiation but due to differing habitats AND a changing climate

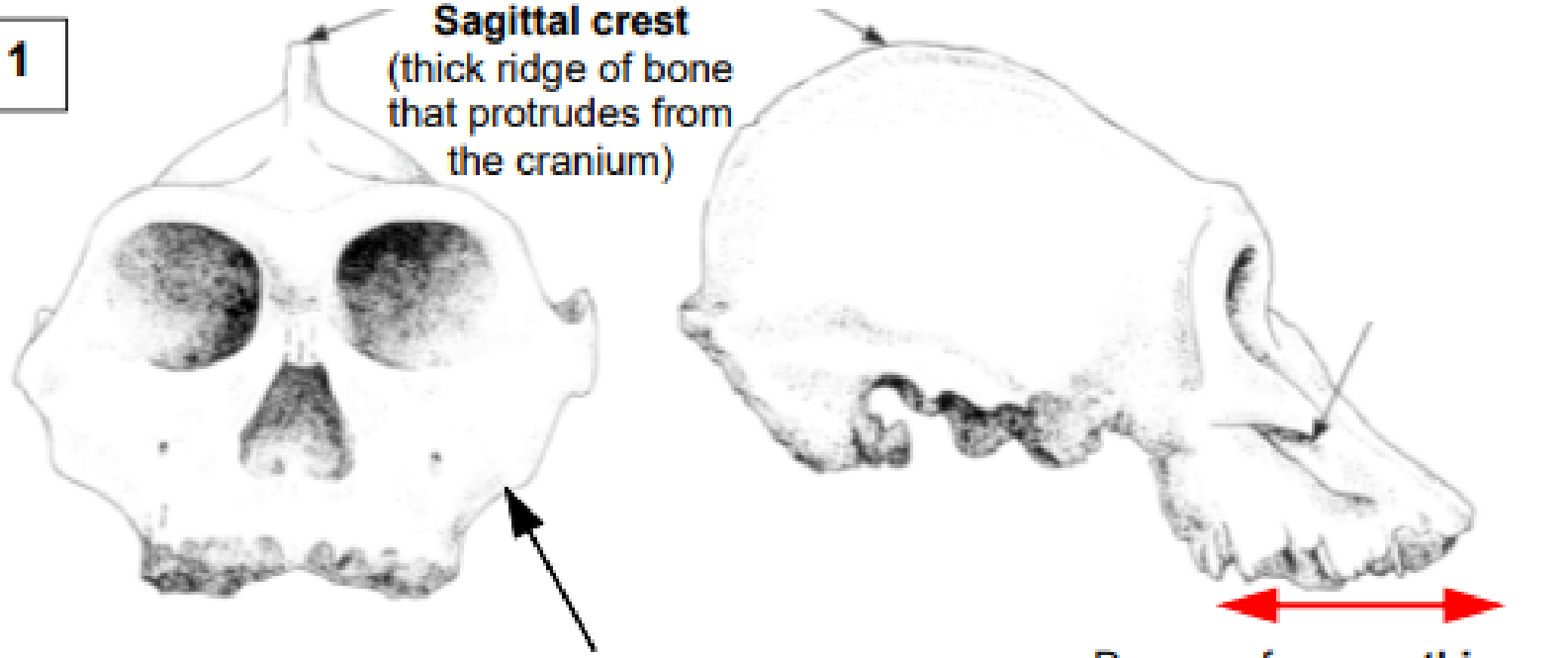
NEW VOCAB FOR LAB

YOU WILL USE A LOT OF STUFF FROM PREVIOUS LABS- YOU GOT THAT DOWN

Sagittal crest

Facial dishing

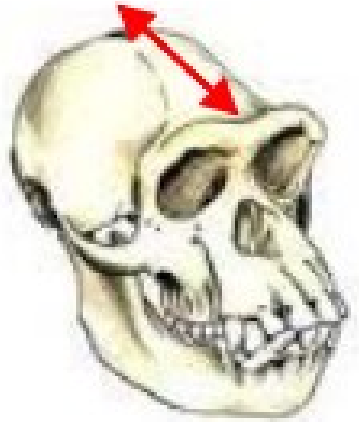
Figure 1



Forehead height

Figure 2

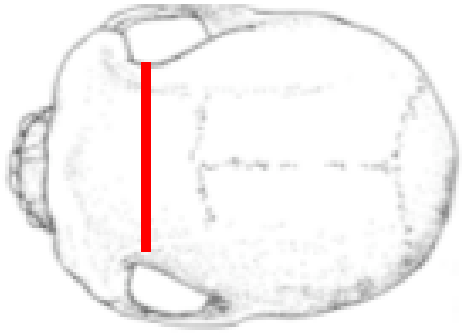
Forehead height: does the area above the eye orbits project up (creating a forehead), or immediately recede or slope back (no forehead)?



Post-orbital constriction

Figure 3

Postorbital constriction: how "pinched in" is the skull behind the browridges when looking from above?

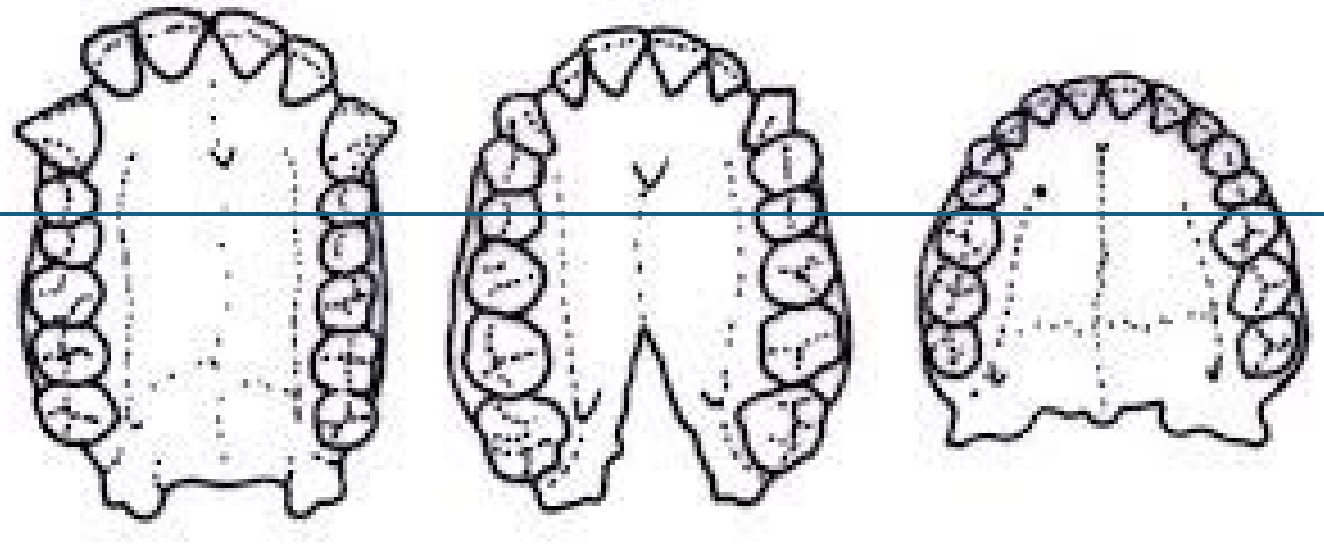


supraorbital tori (browridges)

size of anterior teeth versus posterior teeth

Anterior

Posterior



Where’s the widest point of the skull

Figure 4

Widest point on the cranium: when viewed from behind, is the widest point low, middle, or high on the cranium? Is the widest point on the parietal, temporal or occipital bone? (Measure with spreading calipers)

Use the spreading calipers like this to find that widest point -> where are they spread the widest?

If some of this stuff makes you uneasy…

- Your instincts are spot on.
  - A lot of this terminology and technology comes right out of phrenology and race science
  - Measuring, describing, and categorizing features was super sexy among the European scientists right at the time hominin fossils were being collected for the first time
  - Our interpretations of hominin fossils were built on this colonial history- we constantly need to be re-examining their work and understanding our own as an extension of it