



BE A PALEOANTHROPOLOGIST

FOR A DAY

Paleo - anthropo - logy

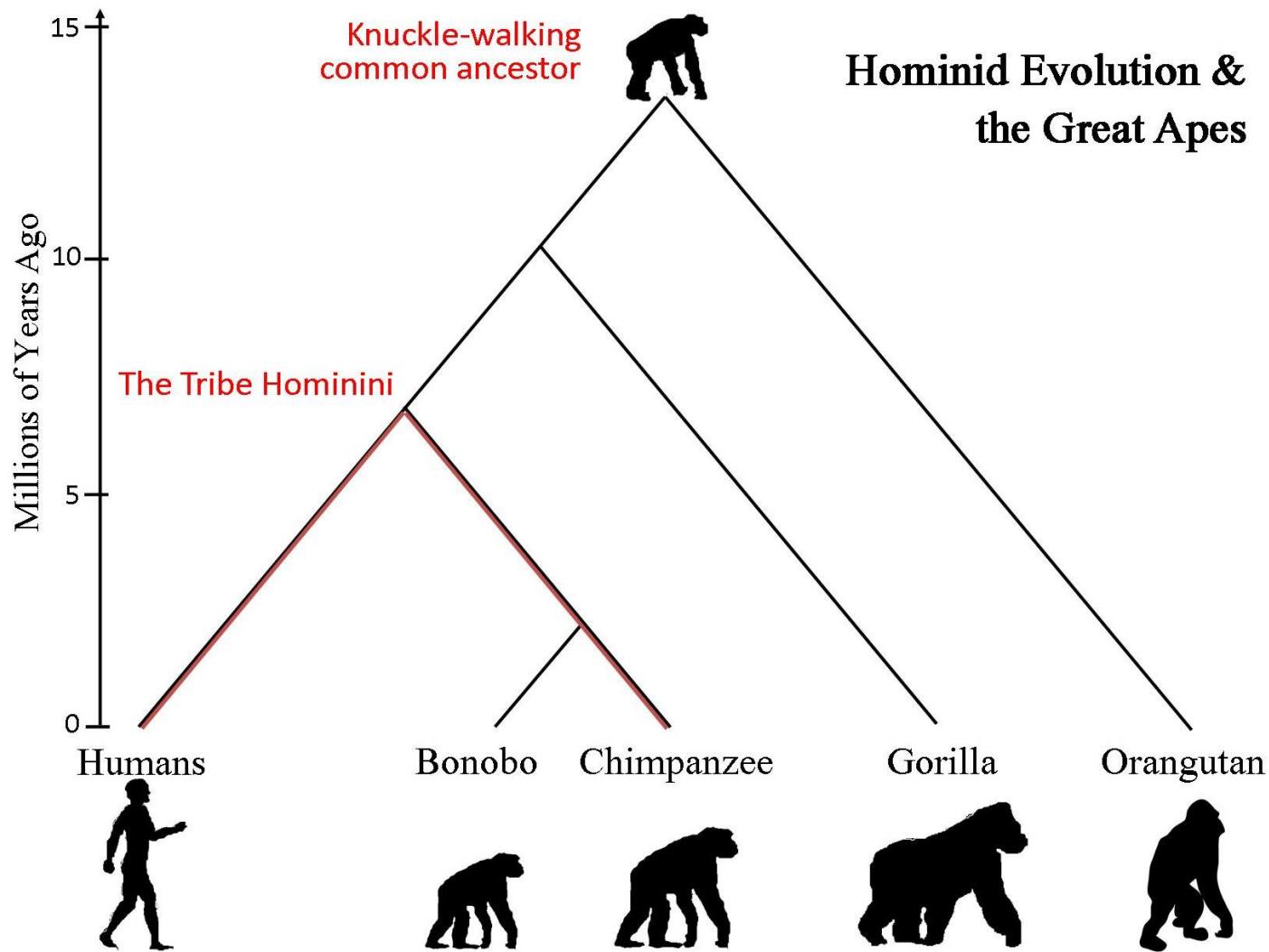
Greek: palaeos "ancient" - anthropos "man" - logia "study"

The study of human origins includes two main branches:

- **Paleontology** → The study of ancient life
- **Physical Anthropology** → The study of human development in the context of primates

Hominid or Hominin?

- **Hominids** descend from the common ancestor of all Great Apes
- **Hominins** are a part of the lineage leading to *Homo sapiens*



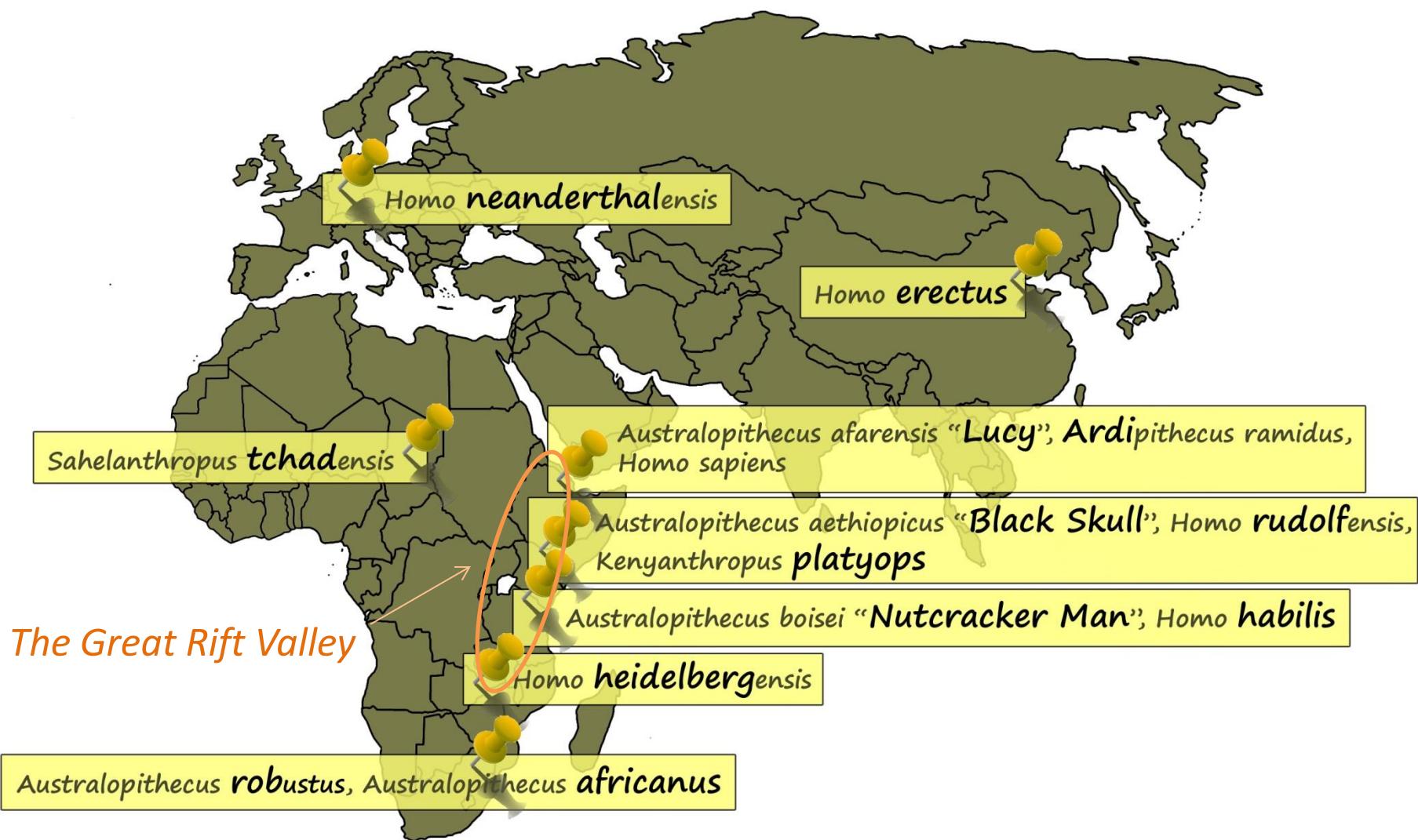
Fossilization and Excavation

- **Permineralization** – most common process of fossilization where minerals in the sediment seep into broken down bone and soft tissue
- Excavation process:
 - Survey (Test Pits and Geomapping: e.g. *A. sebida*)
 - Excavation (Planning and Gridding)
 - Lab analysis



*trowel
and
brush*

Hominin Species and Site Locations



Morphological Changes – Upright Stature

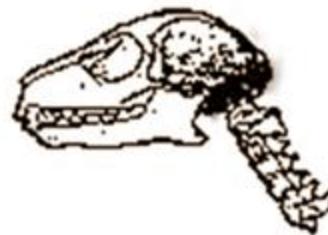
**Spine and Foramen
Magnum Position**



Human



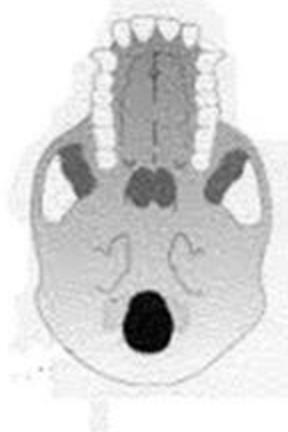
Chimpanzee



Dog

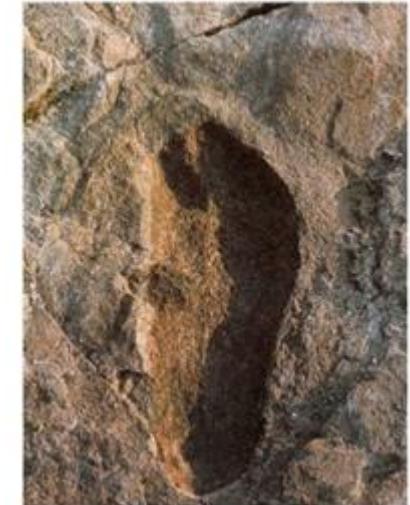


Foramen
magnum



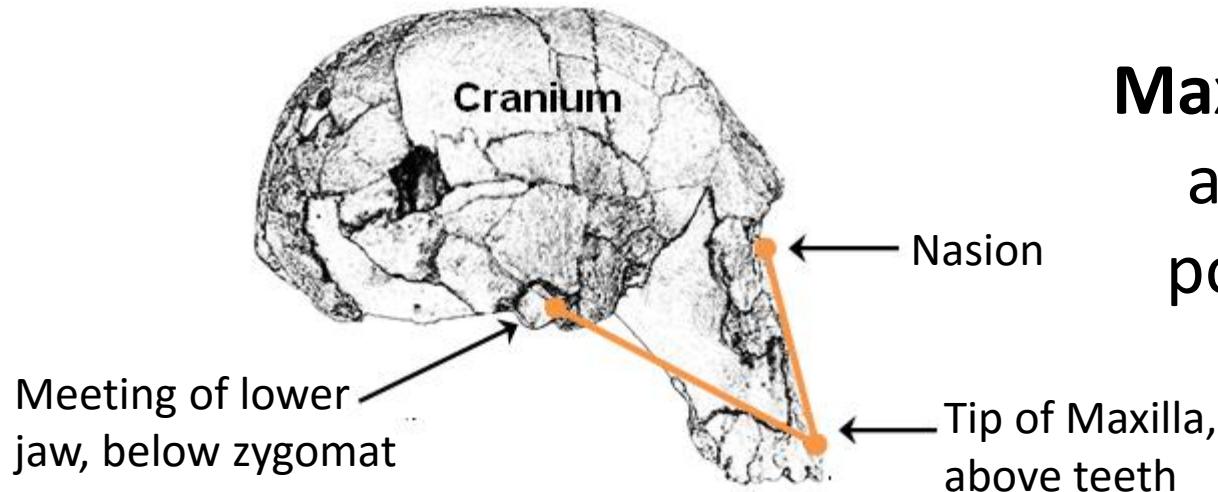
Morphological Changes – Upright Stature

- **Quadrupedalism → Bipedalism**
 - Arborealism- Living in trees
 - Laetoli Footprints (3.6 MYA) →
- **Foramen Magnum**- The “Big Hole”, meeting point of spine and cranium
- **Opisthion Index**- Ratio of the Foramen Magnum position to the total cranial length



Morphological Changes – Facial Prognathism

- **Prognathism-** The **Protrusion** of the face and jaw, pronounced in the genus *Australopithecus*
- **Orthognathism-** tendency for a flat face, seen in humans
- **Maxilla-** A paired bone that forms the upper jaw
- **Zygomatic Process-** Facial bone connecting the cheek bones to the side of the cranium
- **Nasion-** Concavity at the bridge of the nose

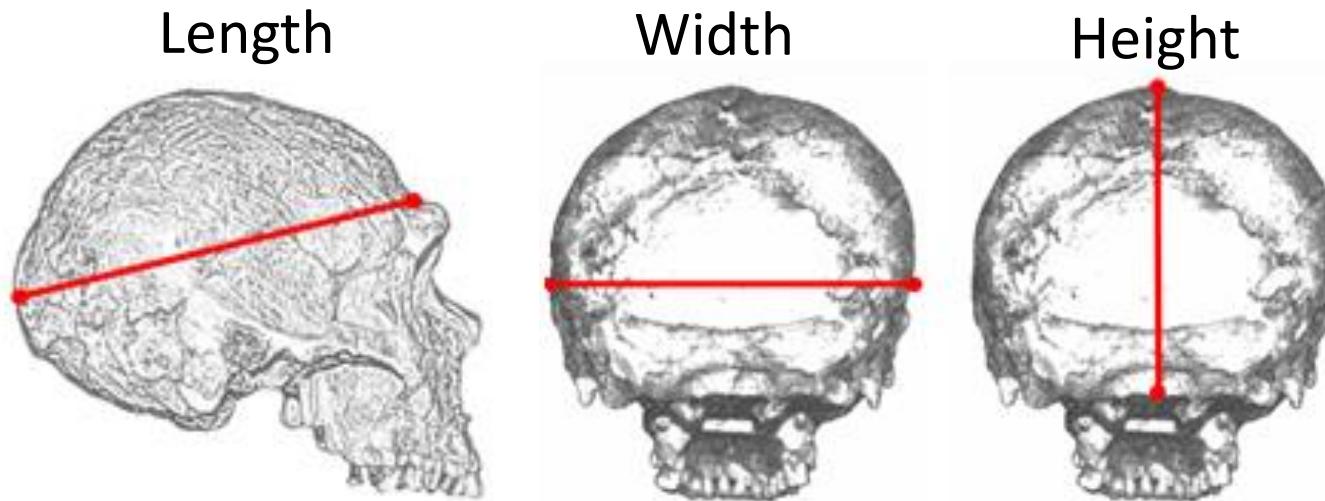


Maxillary Angle: Acute angle formed by 3 points of upper jaw

Morphological Changes – Cranial Capacity

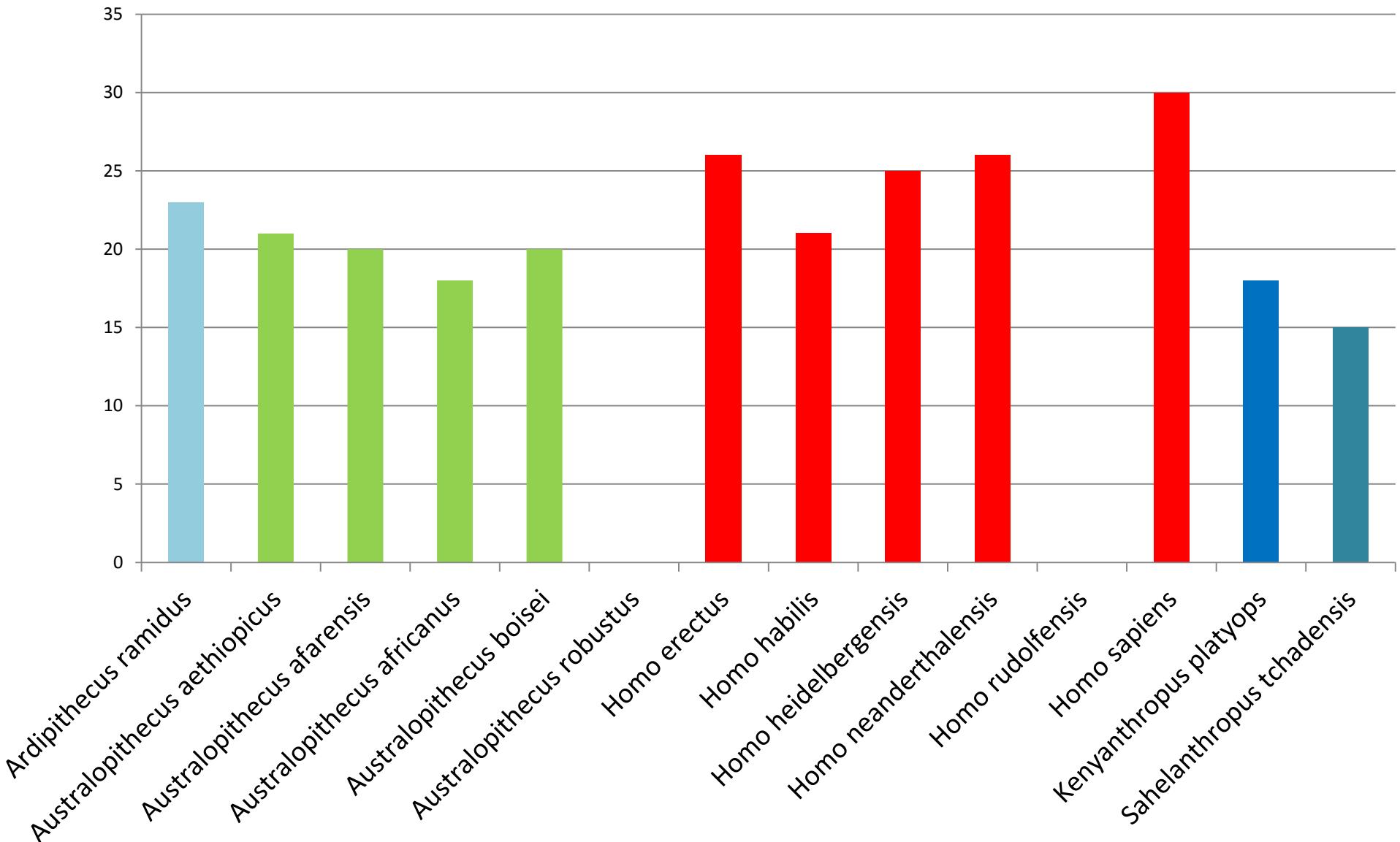
- **Cranium**- Portion of the skull housing the brain
- **Frontal Lobe**- Brain region responsible for problem solving, memory, and language

Estimation Technique- A sphere within a cube:
spherical volume = $0.524 \times$ cubic volume

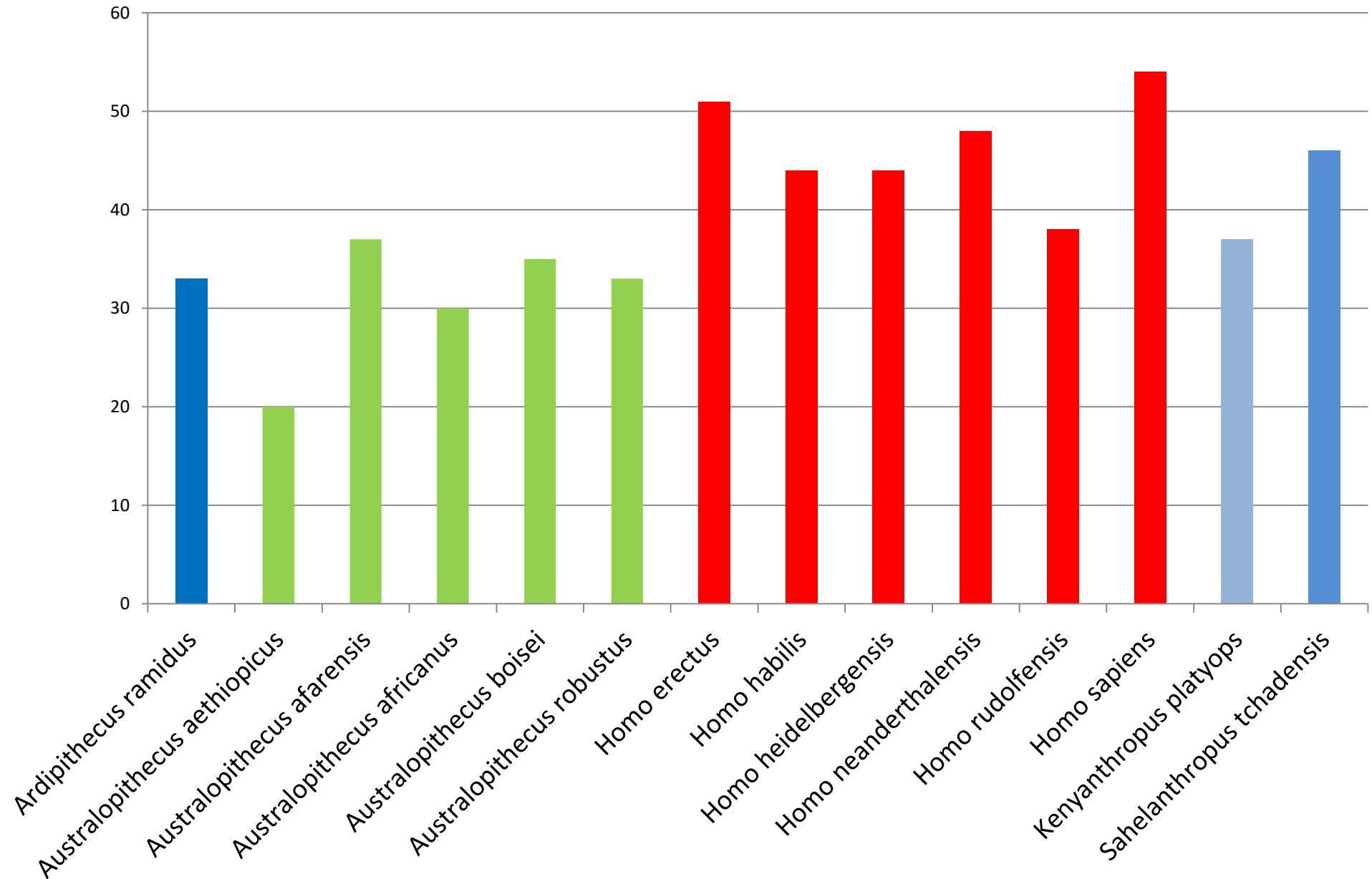


	Bipedalism			Prognathism	CC			
Name	Opisthocranion-opisthion distance (cm)	Opisthocranion-orale distance (cm)	Opisthion index	Maxillary angle (°)	Height	Width	Length	Cranial capacity (cm³)
<i>Ardipithecus ramidus</i>	3.4	14.5	23	33	7.5	8.7	10.3	268
<i>Australopithecus aethiopicus</i>	4.5	21.6	21	20	6.9	10.4	13.7	393
<i>Australopithecus afarensis</i>	3.2	16	20	37	8.5	9.4	12.6	402
<i>Australopithecus africanus</i>	3	16.8	18	30	9.4	8.8	12.5	413
<i>Australopithecus boisei</i>	4	19.8	20	35	9	11.3	15	610
<i>Australopithecus robustus</i>	unmeasurable			33	unmeasurable			
<i>Homo erectus</i>	5.2	20	26	51	10.5	13.2	17.4	964
<i>Homo habilis</i>	3.3	15.4	21	44	10	10.2	12.8	522
<i>Homo heidelbergensis</i>	4.8	19.5	25	44	11	12.7	16	894
<i>Homo neanderthalensis</i>	5.8	22.2	26	48	14	14.5	17.8	1445
<i>Homo rudolfensis</i>	unmeasurable			38	9	11.5	16	662
<i>Homo sapiens</i>	5.5	18.6	30	54	14.5	14	17.5	1421
<i>Kenyanthropus platyops</i>	3.2	17.7	18	37	9.5	11	11.8	493
<i>Sahelanthropus tchadensis</i>	2.5	17.2	15	46	8.2	9.5	13.3	414

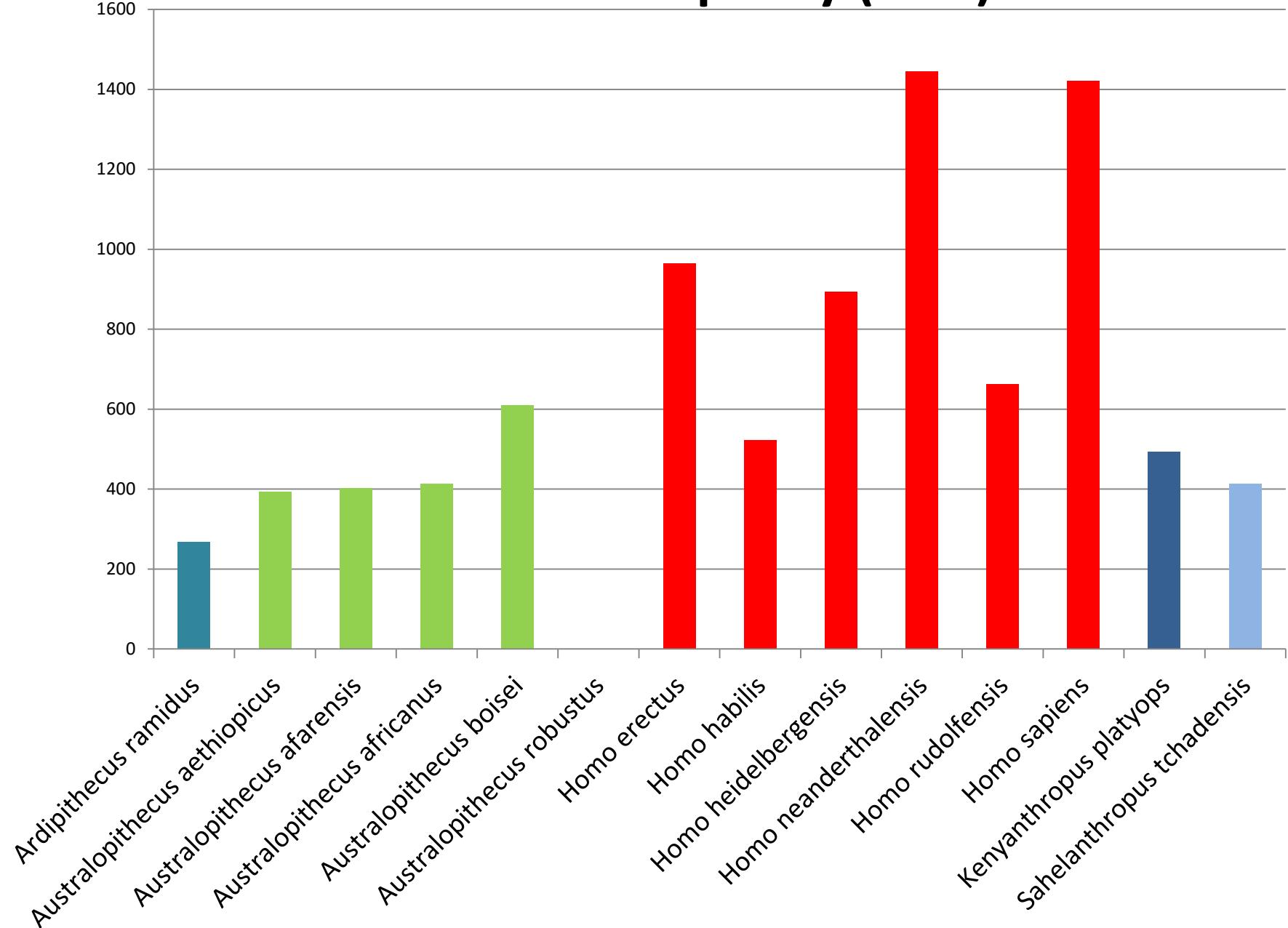
Opisthion index



Maxillary angle (°)



Cranial capacity (cm³)



DISCUSSION

-  **Based on the Opisthion Index, which species are bipedal?**
-  **What are the benefits of bipedalism?**
-  **What characteristics define orthognathic (less prognathic) skulls?**
-  **How could jaw and teeth size reflect in a hominid's diet?**
-  **How does the cranial capacity vary?**
-  **How does the cranial vault shape vary?**
-  **Do any skulls have a larger cranial capacity than Homo sapiens?**

2 common dating methods:

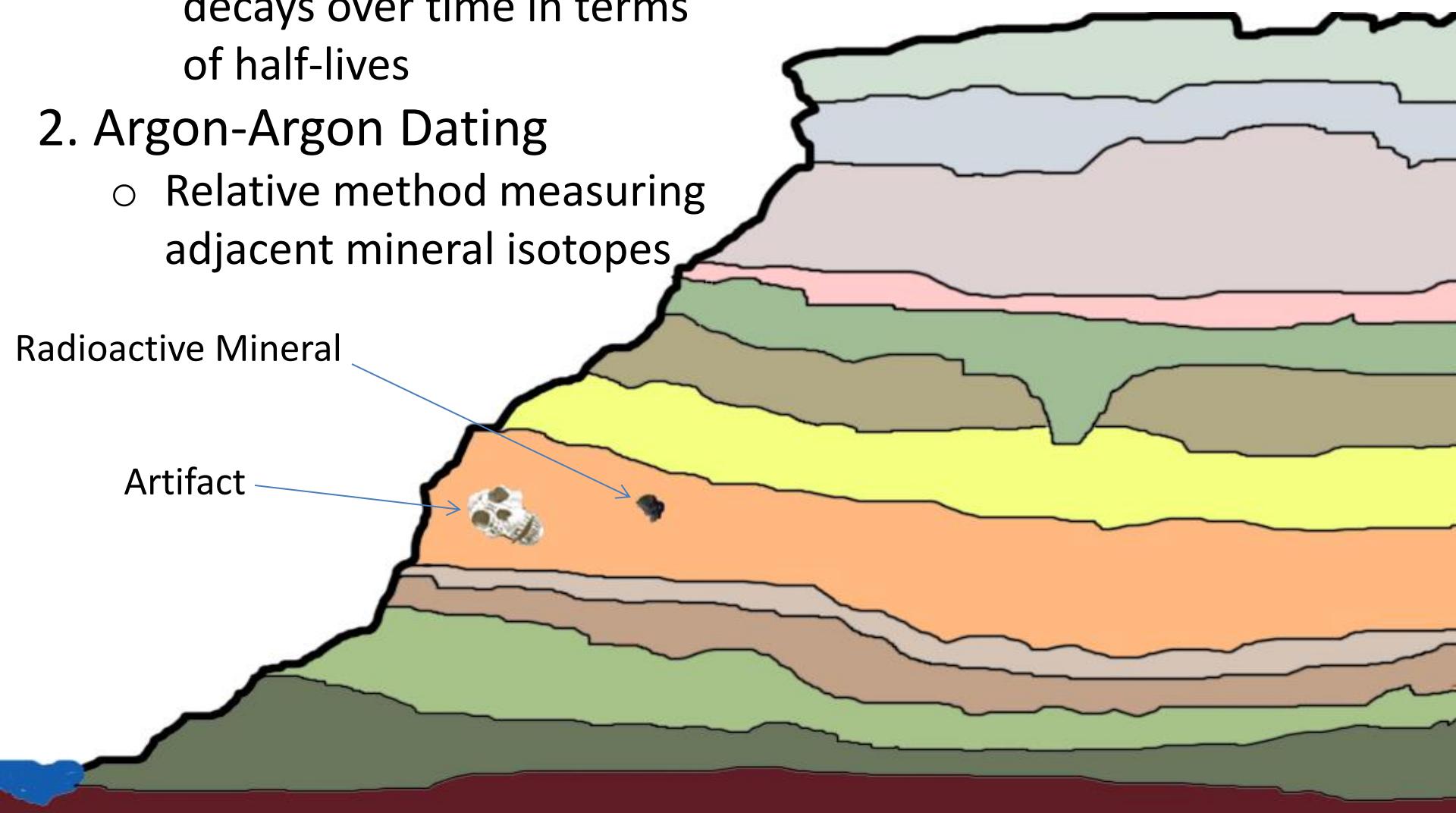
1. Radio Carbon Dating

- Carbon14-carbon12 ratio decays over time in terms of half-lives

2. Argon-Argon Dating

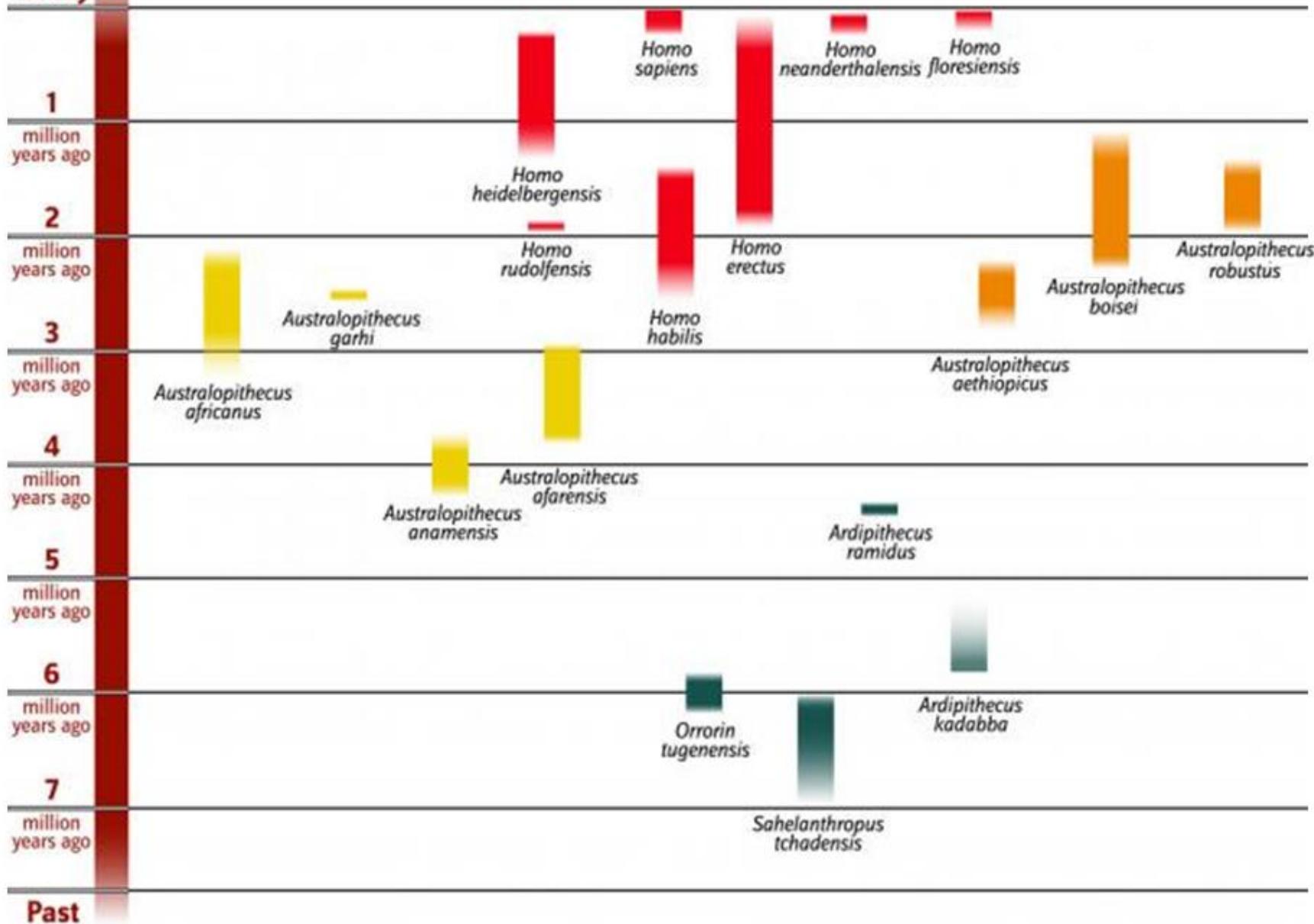
- Relative method measuring adjacent mineral isotopes

Stratigraphy:





Today



CONCLUSION

-  **What are the three milestones of human evolution?**
-  **In what order did these milestones occur?**
-  **Which species have robust features? Gracile features?**
-  **Does a bigger brain make you smarter?**