



Early Hominids & Australopithecines

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Anthropology 570

50 Minute Lecture

Lecture Outline

✧ What Is a Hominid? How can we identify one? - Review

- ◆ Bipedality
- ◆ Post-Cranial Structure
- ◆ Dentition
- ◆ Cranial Features

✧ Pre-*Homo* Hominid Sites

✧ Early Hominids?

- ◆ *Sahelanthropus tchadensis*
- ◆ *Orrorin tugenensis*
- ◆ *Ardipithecus ramidus*
- ◆ *Ardipithecus kadabba*

✧ Gracile Australopithecines

- ◆ *Australopithecus anamensis*
- ◆ *Australopithecus afarensis*
 - *Kenyanthropus platyops?*
 - *Australopithecus bahrelghazali*
- ◆ *Australopithecus garhi*
- ◆ *Australopithecus africanus*

✧ Robust Australopithecines (Paranthropines)

- ◆ *Australopithecus (P.) aethiopicus*
- ◆ *Australopithecus (P.) boisei*
- ◆ *Australopithecus (P.) robustus*

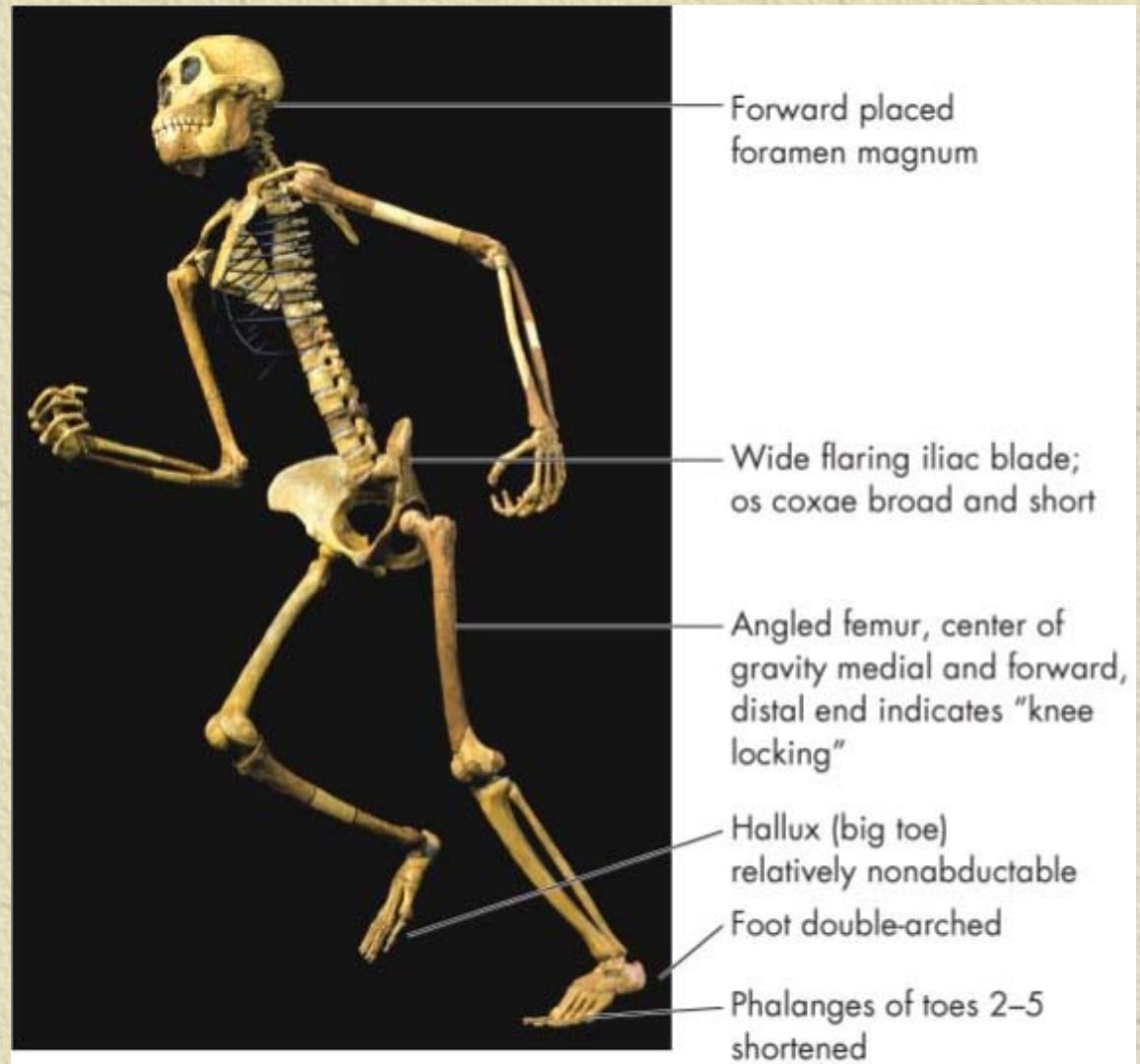
✧ Hominid Evolutionary Phylogeny

What Is a Hominid?

- ✦ The “family of primates that includes humans and our ancestors since diverging from the last common ancestor with chimpanzees, about 6 million years ago” (Stanford, Allen & Antón 2006: 321)
- ✦ Fundamental adaptation in family is bipedality (walking on two limbs)
- ✦ Recognition difficult due to incomplete nature of fossil record, particularly postcranial fossils

How Can A Hominid Be Identified?

✦ Bipedality



(a) Bipedal anatomy

How Can A Hominid Be Identified?

✦ Increasing Body Size & Stature

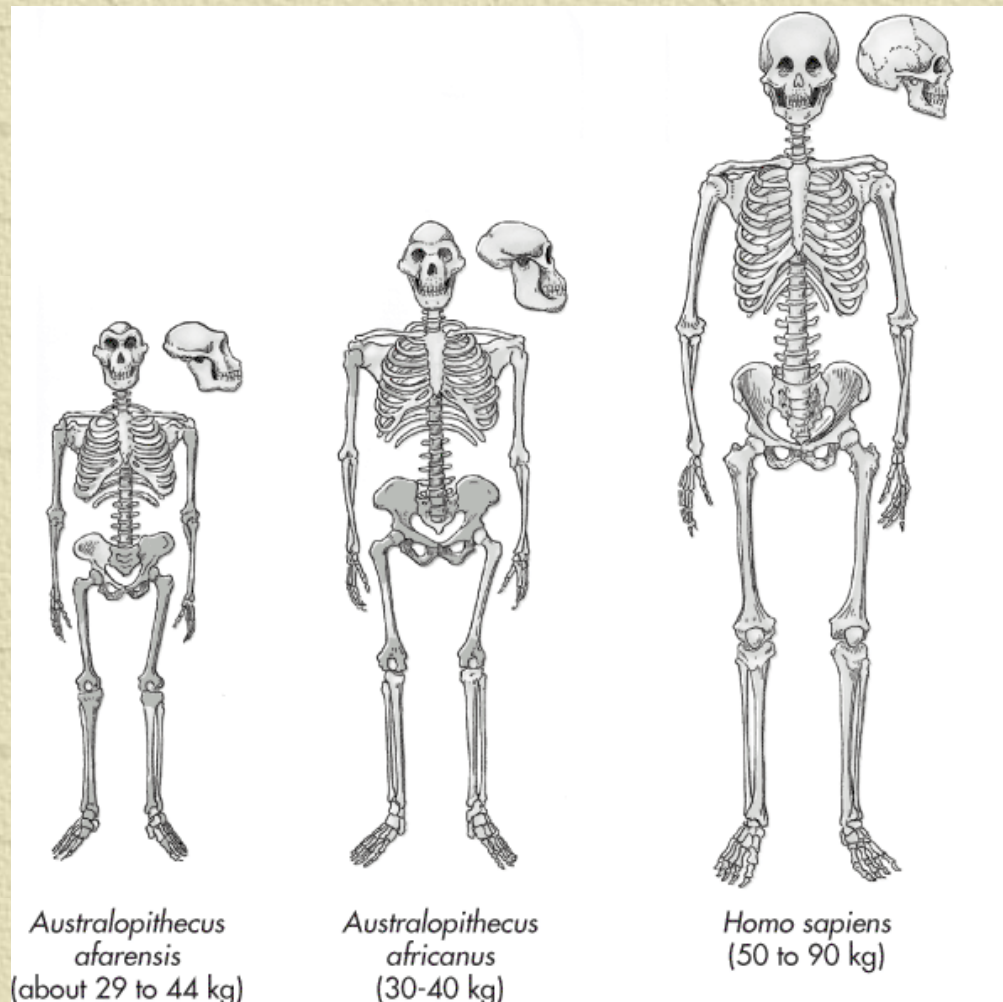
TABLE 10-2 Estimated Body Weights and Stature in Plio-Pleistocene Hominids

	BODY WEIGHT		STATURE	
	MALE	FEMALE	MALE	FEMALE
<i>A. afarensis</i>	45 kg (99 lb)	29 kg (64 lb)	151 cm (59 in.)	105 cm (41 in.)
<i>A. africanus</i>	41 kg (90 lb)	30 kg (65 lb)	138 cm (54 in.)	115 cm (45 in.)
<i>A. robustus</i>	40 kg (88 lb)	32 kg (70 lb)	132 cm (52 in.)	110 cm (43 in.)
<i>A. boisei</i>	49 kg (108 lb)	34 kg (75 lb)	137 cm (54 in.)	124 cm (49 in.)
<i>H. habilis</i>	52 kg (114 lb)	32 kg (70 lb)	157 cm (62 in.)	125 cm (49 in.)

Source: After McHenry, 1992. Note: Reno et al. (2003) conclude that sexual dimorphism in *A. afarensis* was considerably less than shown here.

How Can A Hominid Be Identified?

✦ Increasing Body Size & Stature



How Can A Hominid Be Identified?

✦ Other features that distinguish Hominids from other great apes

✦ Dentition

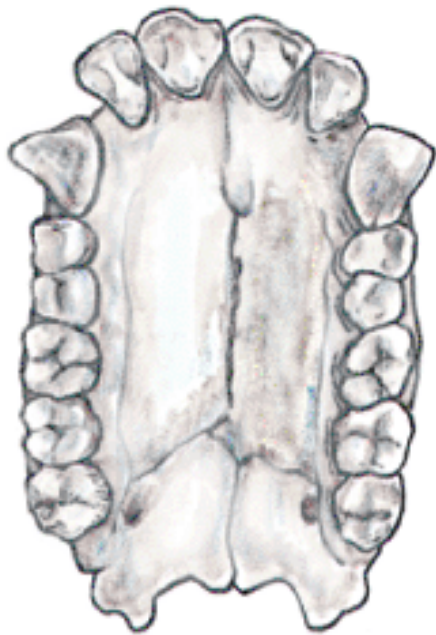
- Parabolic arch vs. U-shaped arcade
- Size of anterior teeth decrease
- Reduction of canine and diastema in CP_3
- Thicker Enamel

✦ Cranial features

- Increasing cranial capacity
- Decreasing facial size
- Decreasing cranial crests
- Decreasing facial prognathism

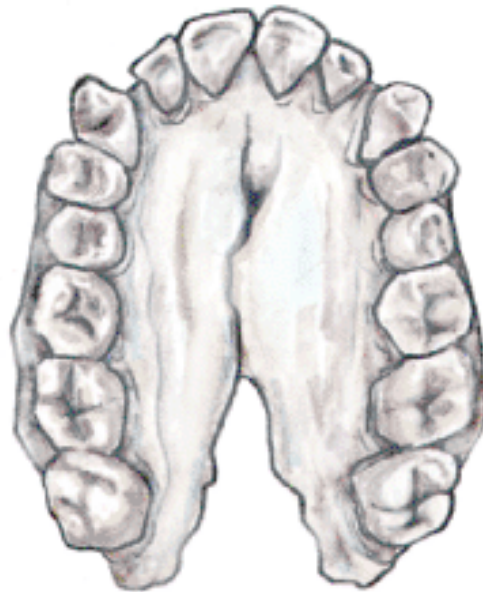
Dentition

- ✦ Parabolic arch
- ✦ Increased reduction of anterior teeth



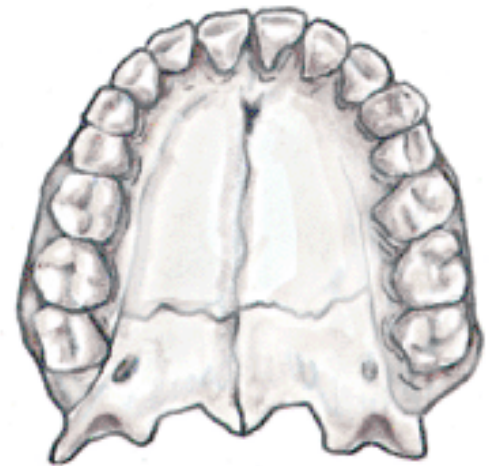
Chimpanzee

(a)



A. afarensis

(b)

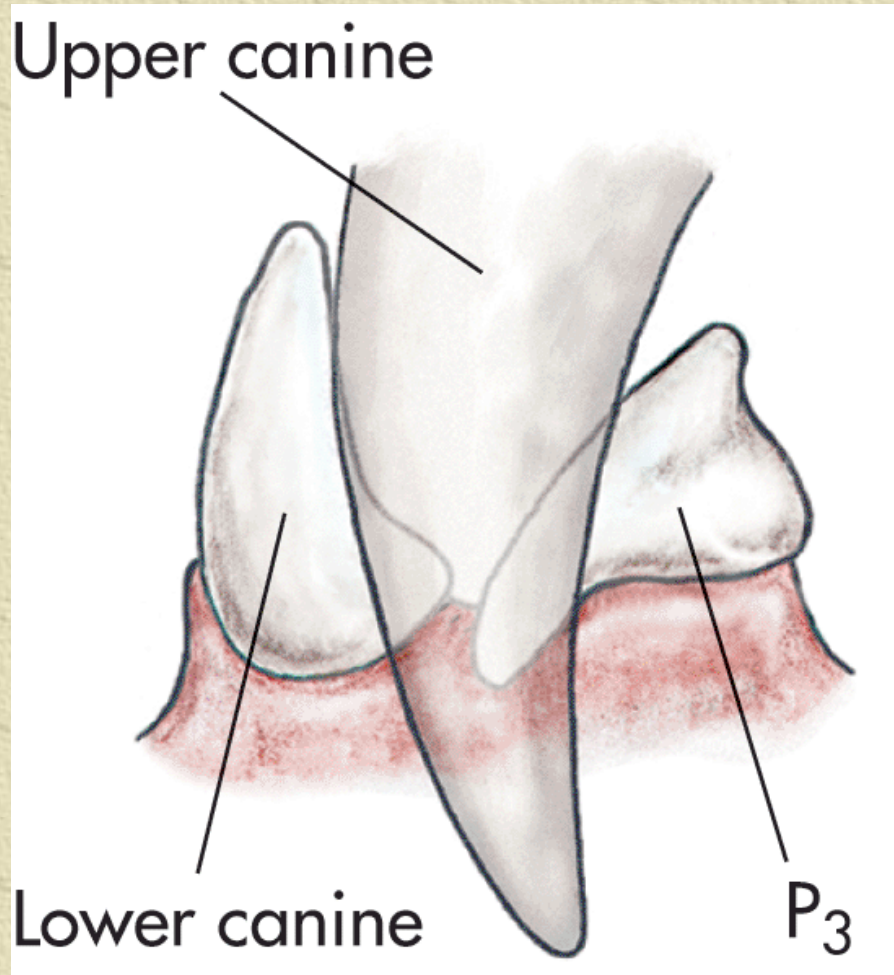


Human

(c)

Dentition

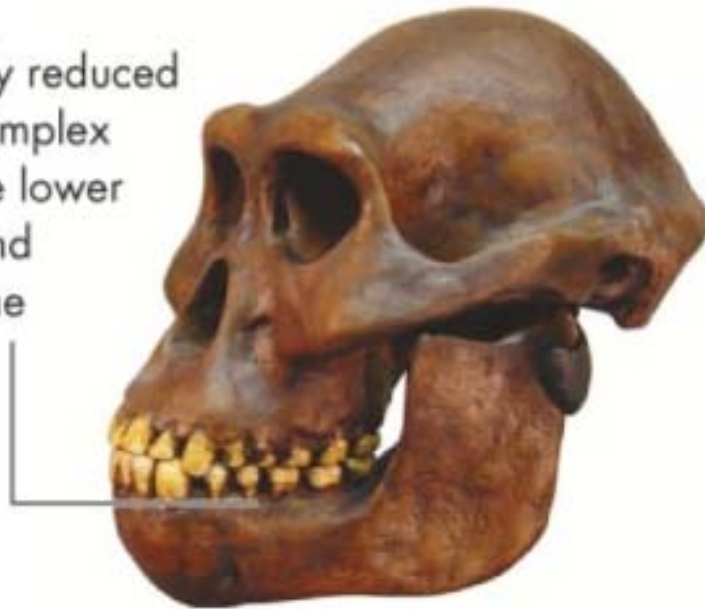
- ✦ Reduction of canine and loss of diastema and CP₃ honing complex



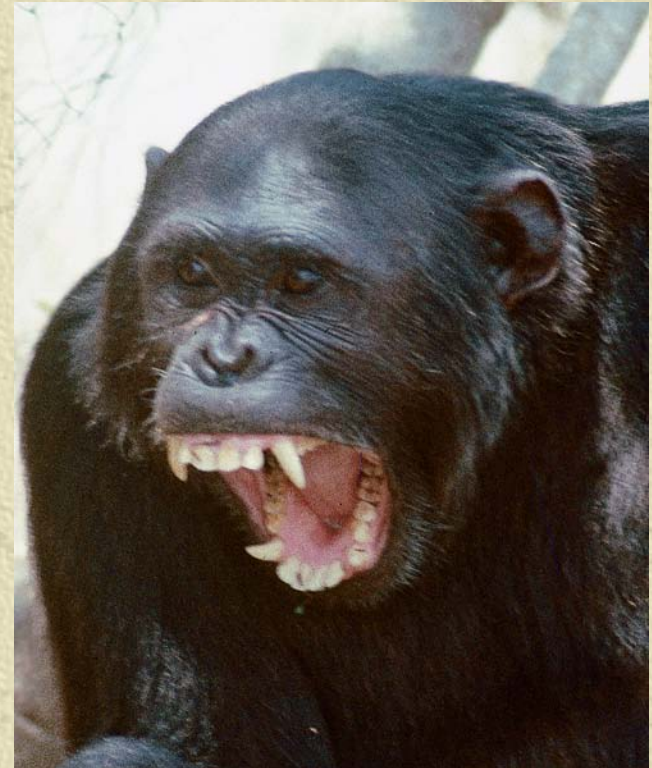
Dentition

- ✦ Reduction of canine and loss of diastema and CP₃ honing complex

Dramatically reduced shearing complex between the lower premolar and upper canine



(c) Jaws



Pre-Homo Hominid Sites

✦ East Africa

- ✦ Lake Turkana
- ✦ Olduvai Gorge
- ✦ Laetoli

✦ South Africa

- ✦ Taung
- ✦ Swartkrans
- ✦ Sterkfontein

✦ Central Africa

- ✦ Chad



East African Hominid Sites

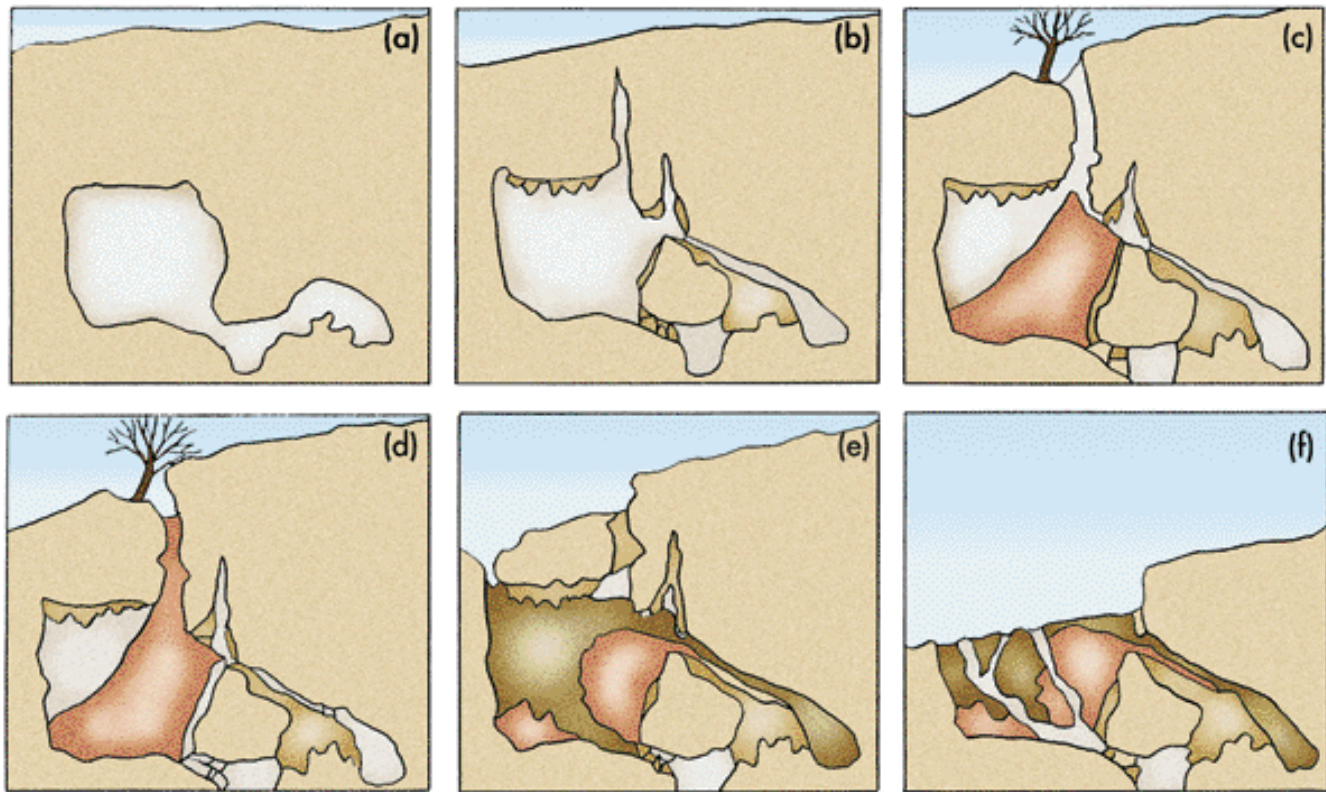
Site	Dates (m.y.a.)	Hominids
Olduvai (N. Tanzania)	1.85–1.0	Australopithecines, early <i>Homo</i>
Turkana (N. Kenya; eastern side of Lake Turkana) (West side of Lake Turkana)	1.9–1.3 (3.5–1.6)	Many australopithecines; several early <i>Homo</i> <i>Australopithecus</i> (<i>A. aethiopicus</i>); also <i>Kenyanthropus</i> * 2 nearly complete crania; 3 jaw fragments, isolated teeth; 1 nearly complete skeleton (<i>H. erectus</i>)
Bouri (N.E. Ethiopia)	2.5	Australopithecines (<i>A. garhi</i>)
Hadar (N.E. Ethiopia)	3.9–3.0	Many early australopithecines (<i>A. afarensis</i>);
Lactoli (N. Tanzania)	3.7–3.5	Early australopithecines (<i>A. afarensis</i>); also, well- preserved footprints

*The genus *Kenyanthropus* has not been accepted as a separate taxon by all researchers.

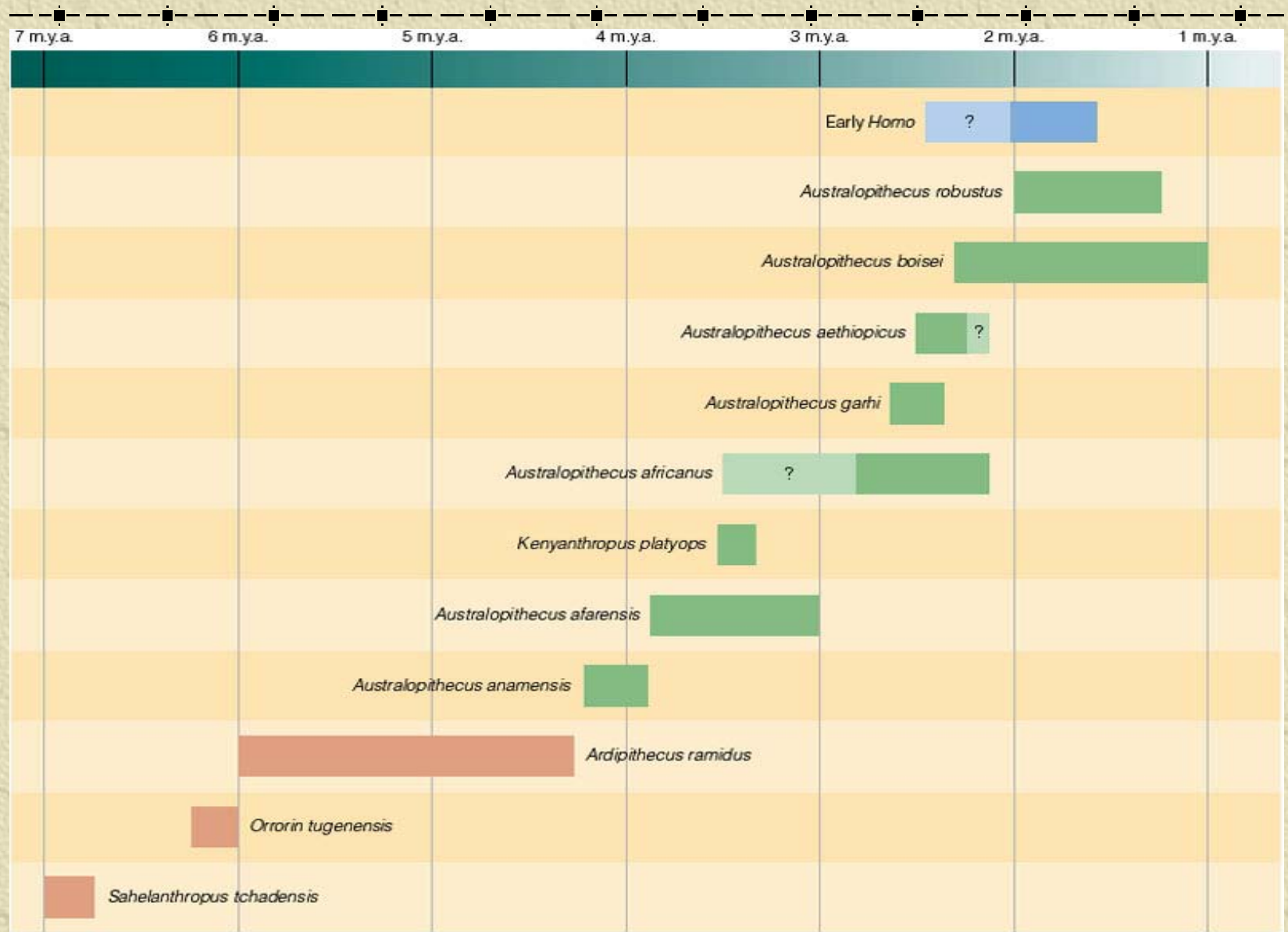
South African Hominid Sites

Site	Site	Hominids
Swartkrans	1.8–1.0	<i>Australopithecus robustus</i> (also called <i>Paranthropus</i>); early <i>Homo</i> ?
Drimolen	2.0–1.5	<i>Australopithecus</i> (<i>Paranthropus robustus</i>)
Taung	3.0–2.0??	<i>Australopithecus africanus</i>
Sterkfontein	3.3–2.6	<i>Australopithecus africanus</i> ; early <i>Homo</i> ?

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Summary of Pre-Homo Hominids



Early Hominids?

✦ Late Miocene & Early Pliocene

✦ 10-4mya

✦ Molecular evidence suggests late Miocene

✦ Fossil record poor from 10-6mya

Sahelanthropus tchadensis

- ✧ Chad
- ✧ 6-7 mya
- ✧ Less prognathic face
- ✧ Large brow-ridge
- ✧ Smaller canines
- ✧ Anterior foramen magnum
- ✧ Small brain
- ✧ U-shaped arcade
- ✧ Thin enamel



Orrorin tugenensis

✦ Kenya

✦ 6 mya

✦ Arm and femoral fragments may suggest bipedalism

✦ Thick enamel

✦ Small teeth

✦ Larger than most Miocene apes

✦ Large upper canines

Ardipithecus kadabba

- ✧ Ethiopia
- ✧ 5.8-5.2 mya
- ✧ Apelike dentition
- ✧ Loss of the CP₃ honing complex is among the first changes in the hominid lineage



Ardipithecus ramidus

- ✧ Ethiopia
- ✧ 4.4 mya
- ✧ Dense forest in river delta
- ✧ Smaller canine
- ✧ Anterior foramen magnum
- ✧ Ape-like molars
- ✧ Intermediate tooth enamel
- ✧ Arm anatomy of both bipeds and quadrupeds

Gracile Australopithecines

- ✦ Definite bipeds
- ✦ Genus *Australopithecus* or “southern ape”
- ✦ Genus named by Raymond Dart in 1920s after first find in Taung South Africa
- ✦ Eastern, Southern & Central Africa
- ✦ 4.2-1.0 mya

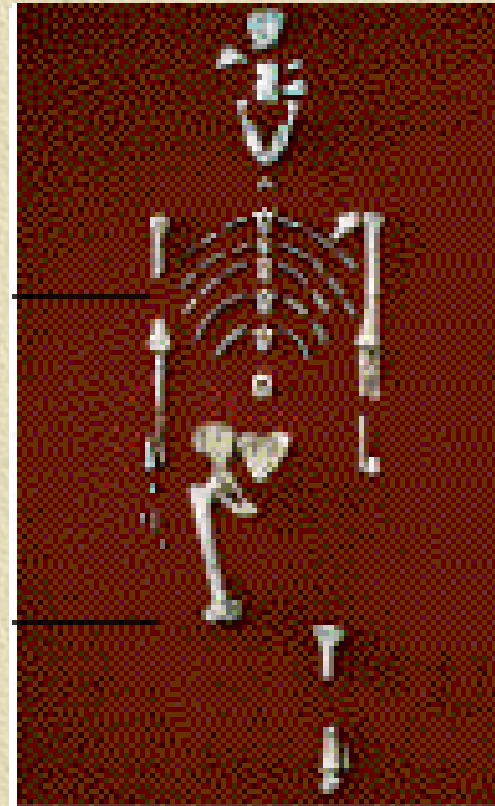
Australopithecus anamensis

- ✧ 4.2-3.9 mya
- ✧ Kenya
- ✧ Thickened tibia
- ✧ Primitive dentition
 - ◆ U shaped arcade
 - ◆ Large anterior teeth
 - ◆ Canine smaller and enamel thicker than *Ar. ramidus*
- ✧ Lump with *afarensis*?
- ✧ Lived in forested region

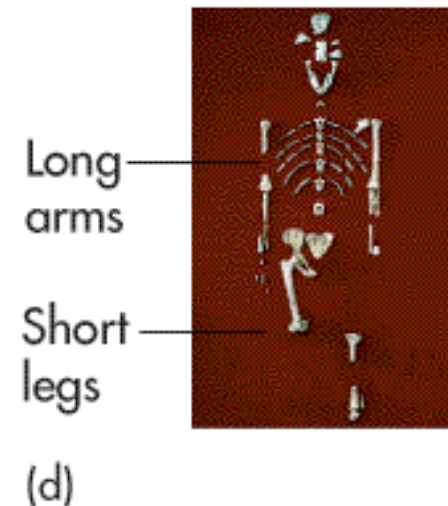
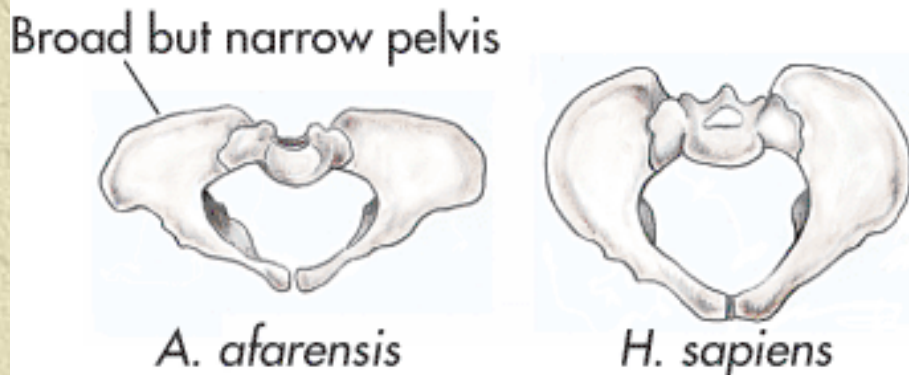
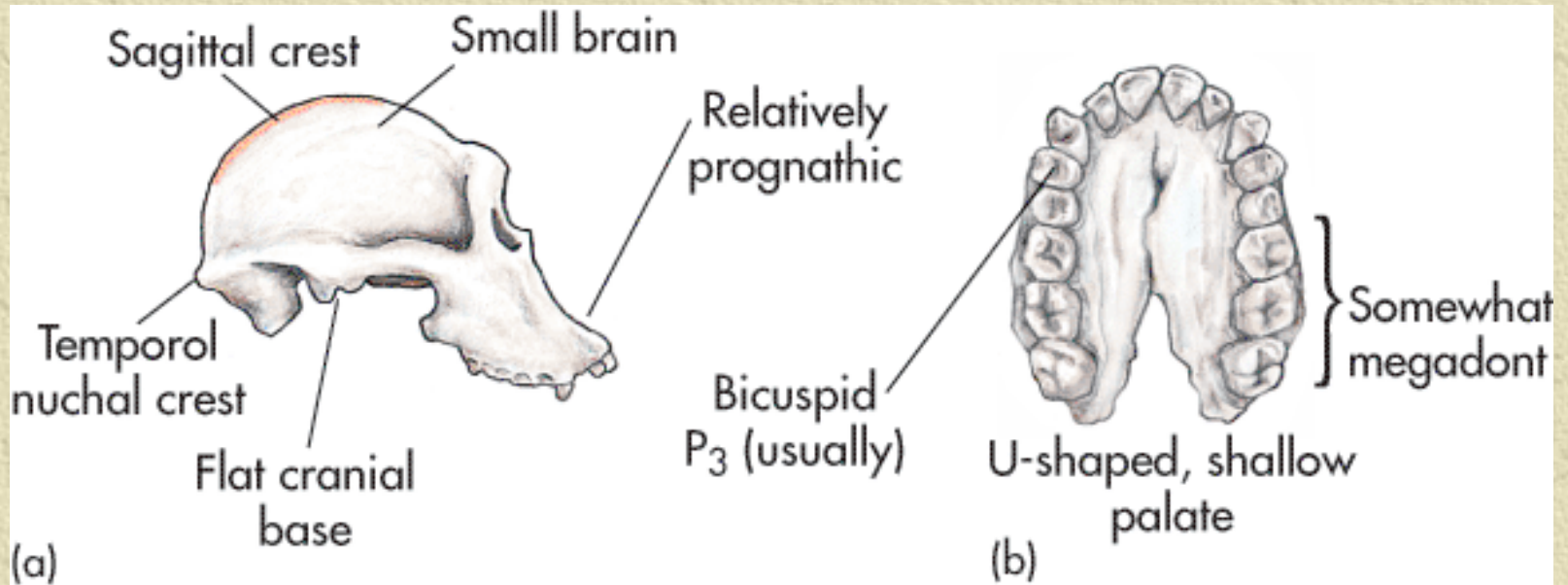


Australopithecus afarensis

- ✧ 3.9-2.9 mya
- ✧ Ethiopia, Tanzania
- ✧ Lucy
- ✧ Sagittal crest
- ✧ Small brain (350-500cc)
- ✧ Moderately prognathic face
- ✧ Cranial vault
- ✧ U shaped dental arcade
- ✧ Large anterior teeth
- ✧ No CP₃ honing complex
- ✧ Molars larger than A. anamensis and earlier hominids



Australopithecus afarensis



Kenyanthropus platyops

✧ 3.5 mya

✧ Kenya

✧ Flat face

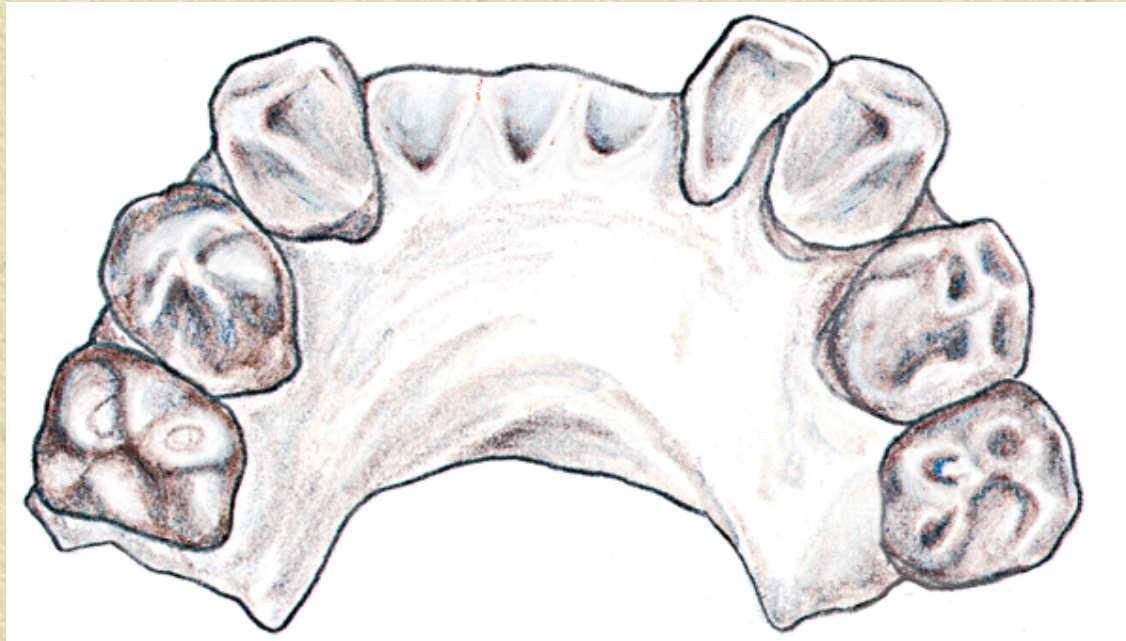
✧ Small molar teeth

✧ *afarensis*?



Australopithecus bahrelghazali

- ✦ 3.5-3.0 mya
- ✦ Chad
- ✦ Mandible fragment with seven teeth
- ✦ A specimen of *afarensis*?



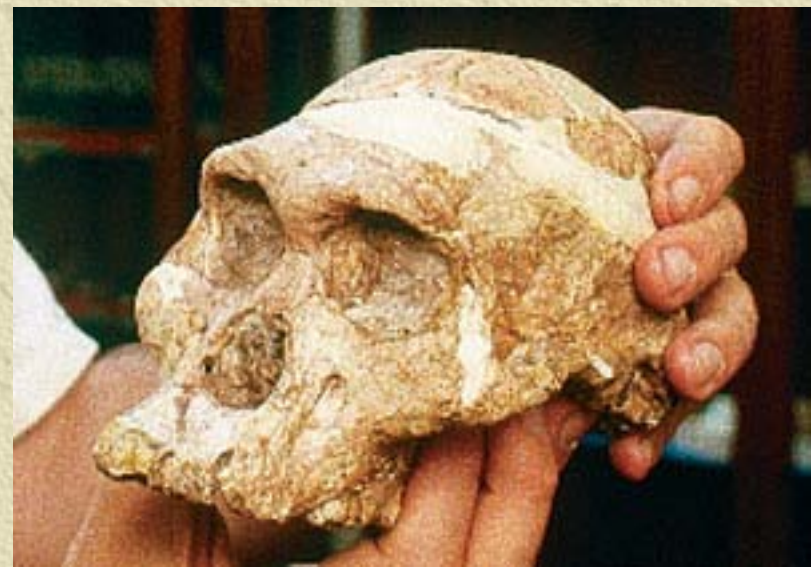
Australopithecus garhi

- ✧ 2.5 mya
- ✧ Ethiopia
- ✧ Small brain
- ✧ Prognathic face
- ✧ Large canines
- ✧ Sagittal crest
- ✧ More human-like postcranial proportions?
- ✧ Tool use?



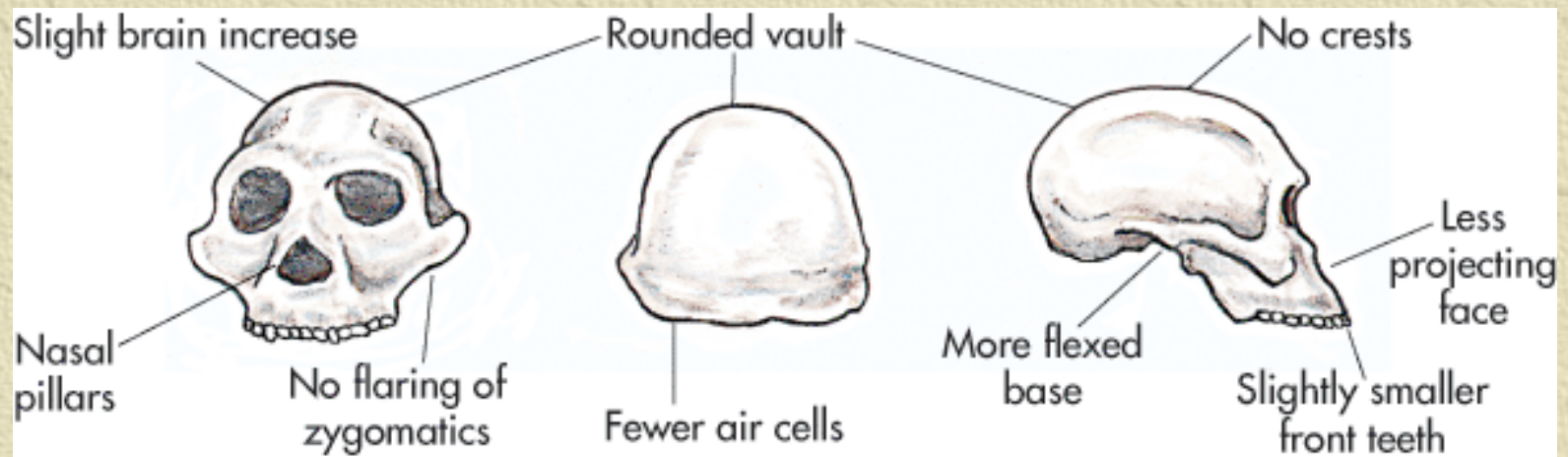
Australopithecus africanus

- ✦ 3.5-<2.0 mya
- ✦ South Africa
- ✦ Slight brain increase
- ✦ Rounded cranial vault
- ✦ No sagittal crests
- ✦ Less projecting face



Australopithecus africanus

- ✦ Generalized teeth
- ✦ Smaller canines, but larger molars than earlier Australopithecines
- ✦ Some anterior pillars around nose
- ✦ Pelvis, leg, spine and foot bones show habitual bipedalism



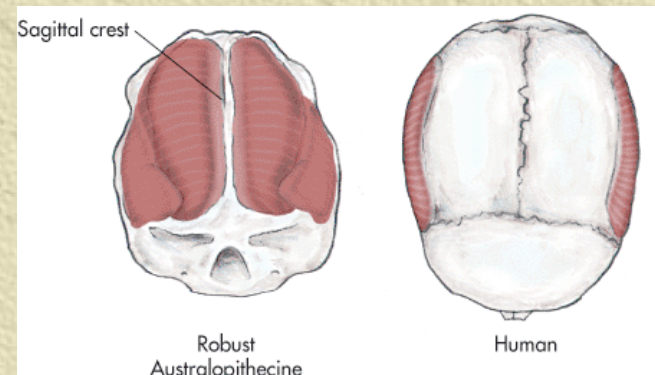
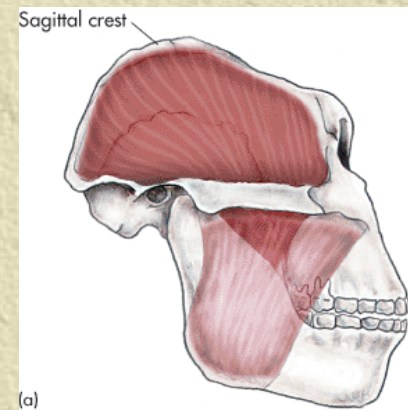
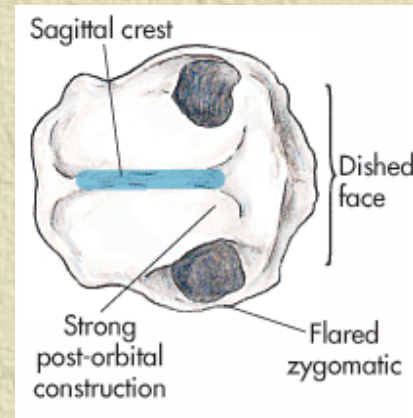
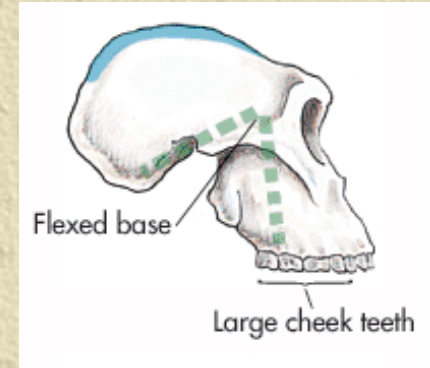
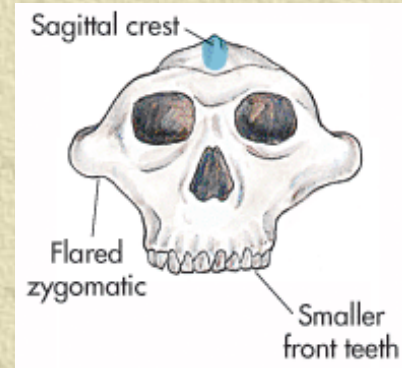
The Robust Australopithecines

✦ Hard object feeding

- ✦ Sagittal crest
- ✦ Flared zygomatic arch
- ✦ Extreme postorbital construction
- ✦ Large cheek teeth

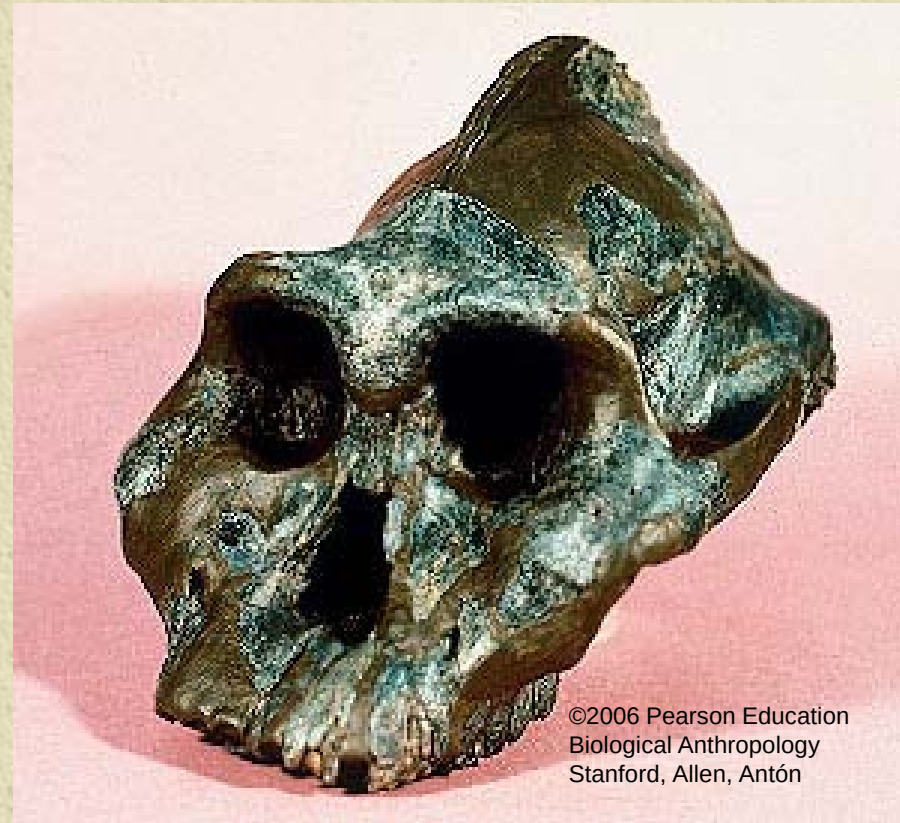
✦ Paranthropines?

✦ Woodland and open woodland habitat



Australopithecus (p.) aethiopicus

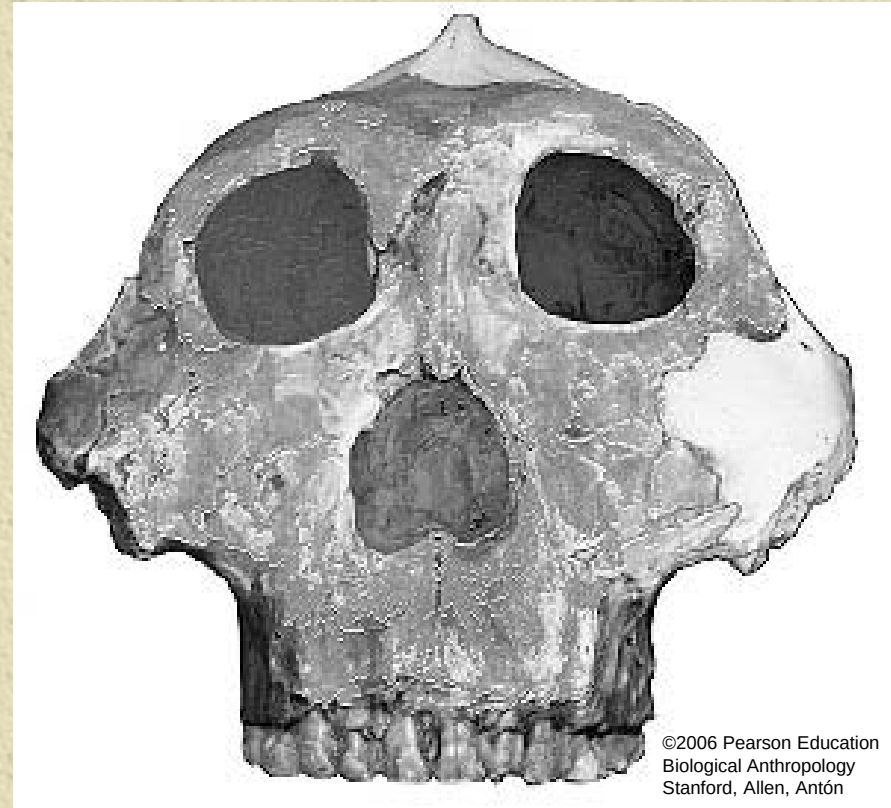
- ✧ 2.7-2.5 mya
- ✧ Kenya
- ✧ Sagittal crest
- ✧ Large molars
- ✧ Small brain
- ✧ Prognathic face
- ✧ Large anterior teeth
- ✧ Likely ancestor of the robust australopithecines
- ✧ *A. (p.) boisei*?



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Australopithecus (p.) boisei

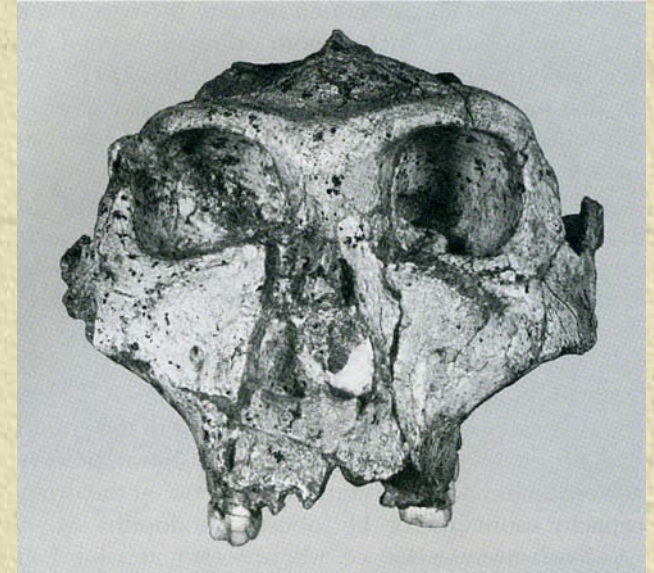
- ✧ 2.3-1.2 mya
- ✧ Kenya, Tanzania, Ethiopia
- ✧ Sagittal crest
- ✧ Large jaws and molars
- ✧ Long flat face
- ✧ Large post-crania
 - ✧ 75-110 lbs.
- ✧ Hyper specialized for mastication



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Australopithecus (p.) robustus

- ✧ 2.0-1.5 mya
- ✧ South Africa
- ✧ Larger Cranial Capacity
 - ◆ 500-550cc
- ✧ Large post crania
 - ◆ 70-90 lbs
- ✧ Anterior pillars
- ✧ Ate animal protein

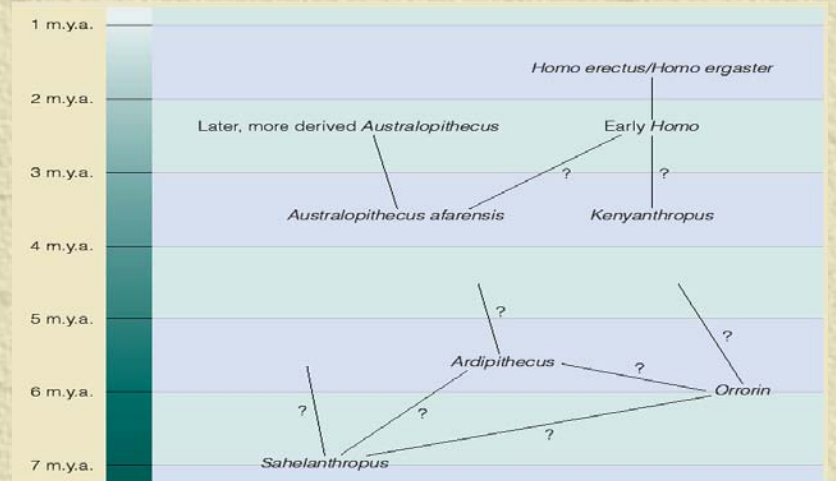
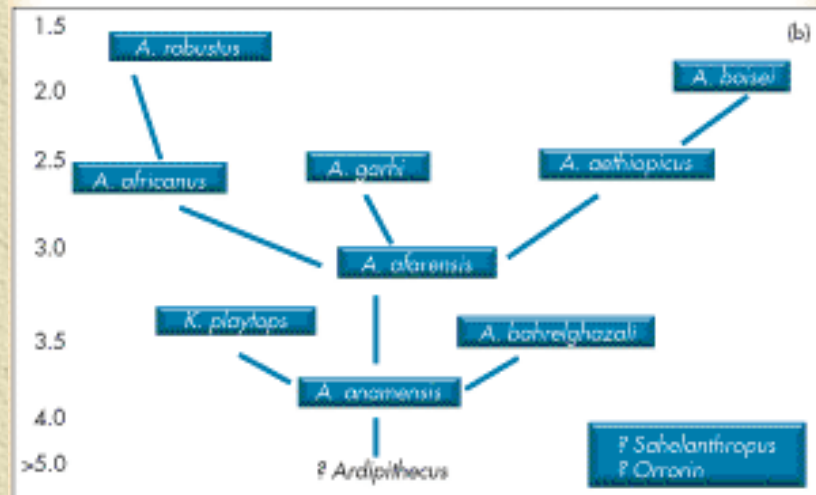
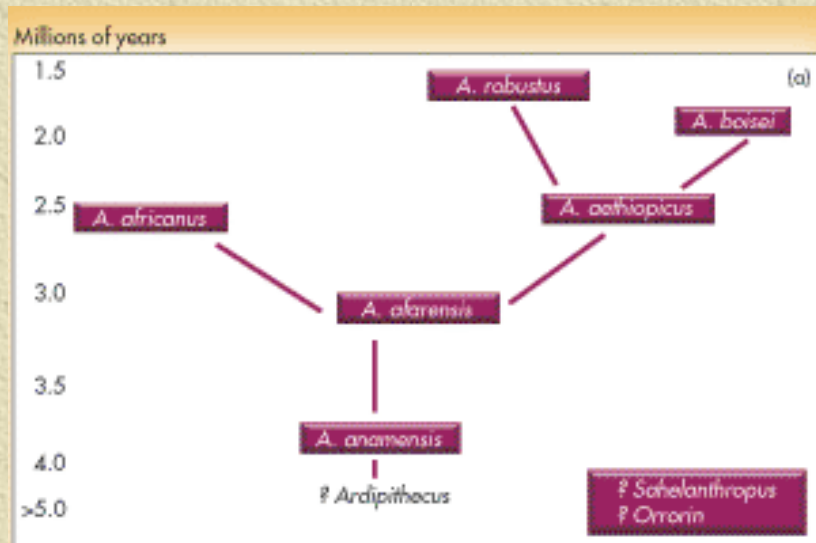


Hominid Evolution

TABLE 12.3 Examples of Potentially Contemporaneous Hominids by Region

AGE (MYA)*	WEST AFRICA	EAST AFRICA	SOUTH AFRICA
~6	<i>Sahelanthropus tchadensis</i>	<i>Orrorin tugenensis</i>	
3.9		<i>Australopithecus afarensis</i> , <i>A. anamensis</i>	
3.5	<i>A. bahrelghazali</i>	<i>A. afarensis</i> , <i>K. platyops</i>	<i>A. africanus</i>
2.5		<i>A. garhi</i> , <i>A. aethiopicus</i>	<i>A. africanus</i>
2.5–2		<i>A. boisei</i> , <i>A. garhi</i>	<i>A. africanus</i> , <i>A. robustus</i>
2–1.5		<i>A. boisei</i> , <i>Homo sp.</i>	<i>Homo sp.</i> , <i>A. robustus</i>
*MYA = millions of years ago			

Hominid Evolution



Discussion Topics

- ✦ Do you think there is enough evidence to support the hominid status of any of the early hominids? *Sahelanthropus*? *Orrorin*? *Ardipithecus*?
- ✦ How do you think the Robust Australopithecines / Paranthropines should be classified? Why?

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