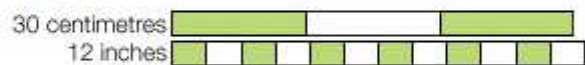
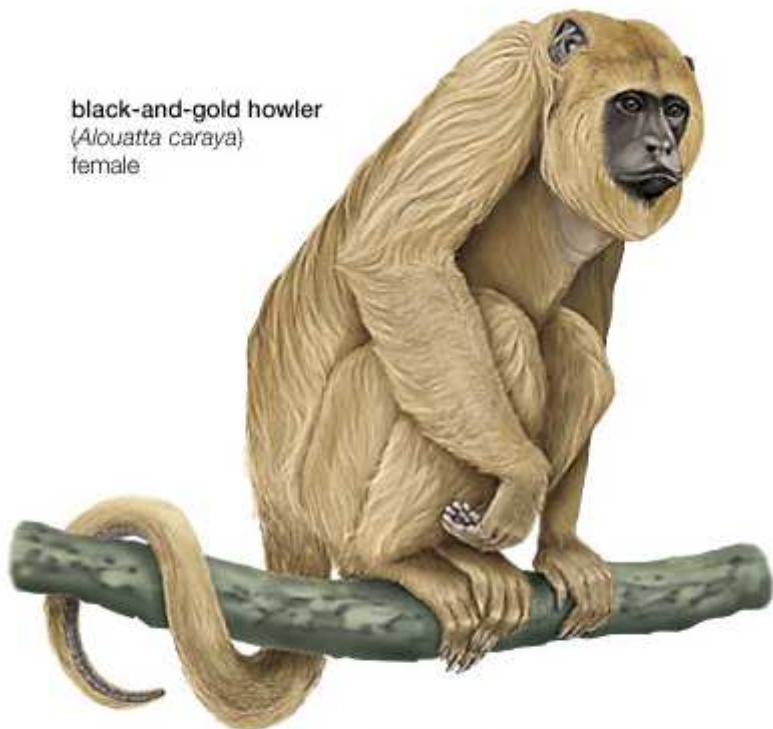


Human Evolution

Dr Giby Kuriakose
II MSc Botany
2015-16

black-and-gold howler
(*Alouatta caraya*)
female



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Female black-and-gold howler monkey (*Alouatta caraya*).

Encyclopædia Britannica, Inc.



Black howler monkey (*Alouatta caraya*).

© Gerry Ellis/BBC Natural History Unit

Human Evolution

I. Primate Heritage

- A. First primates were arboreal
- B. 3 major groups
- C. Apes: Gibbons
- D. Apes: Orangutans
- E. Apes: Gorillas
- F. Apes: Chimps
- G. Apes: Humans

II. Hominid Evolution

- A. family Hominidae
- B. The human branch
- C. Evolution of upright posture & bipedalism
- D. Larger brains & the genus *Homo*
- E. Origins of the “wise man”

Human Evolution

I. Primate Heritage

A. First primates were arboreal – associated features that we've inherited.



Human Evolution

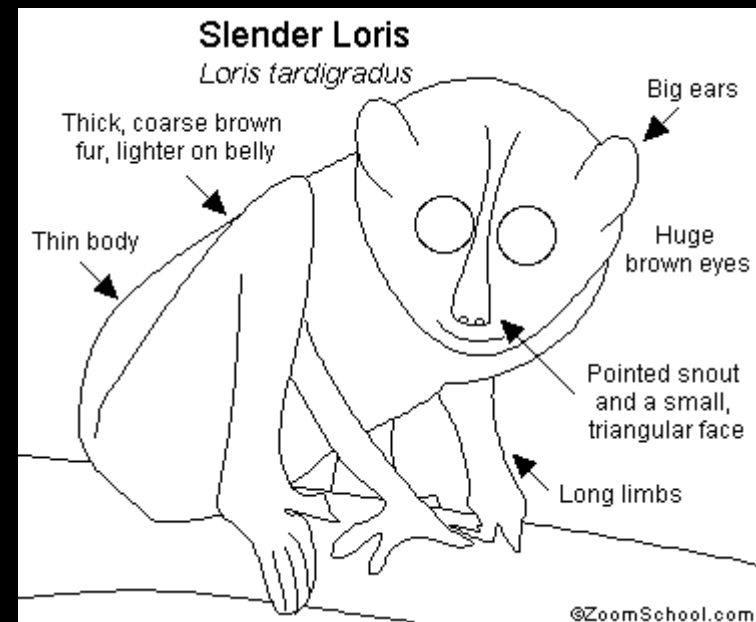
I. Primate Heritage

B. 3 major groups

1. Prosimians part 1: Lorises, lemurs



lorises

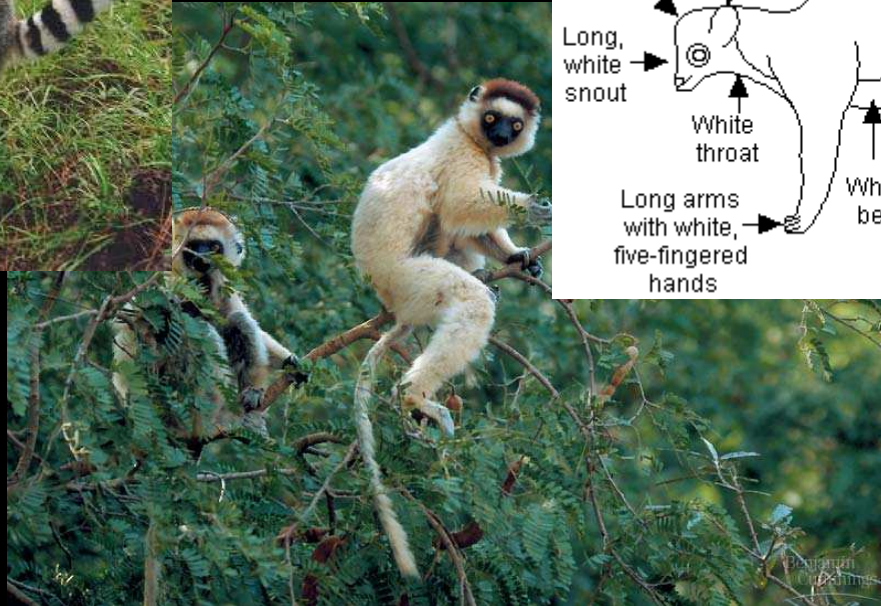


Human Evolution

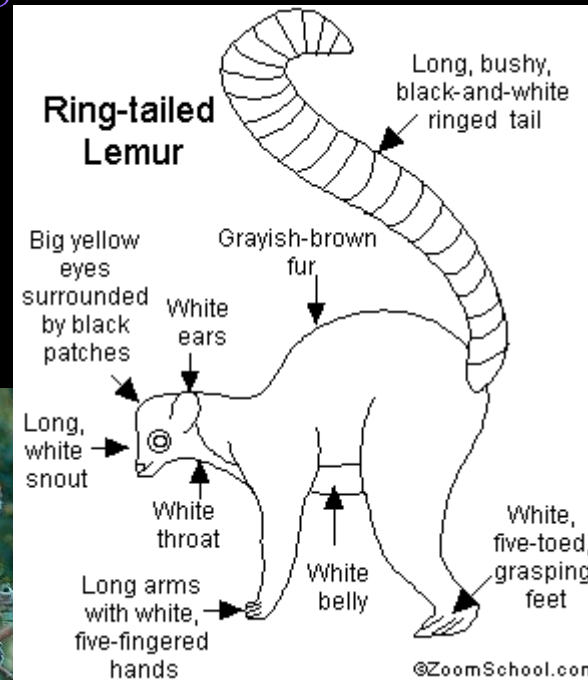
I. Primate Heritage

B. 3 major groups

1. Prosimians part 1: Lorises, lemurs



lemurs



Human Evolution

I. Primate Heritage

B. 3 major groups

2. Prosimians part 2: Tarsiers



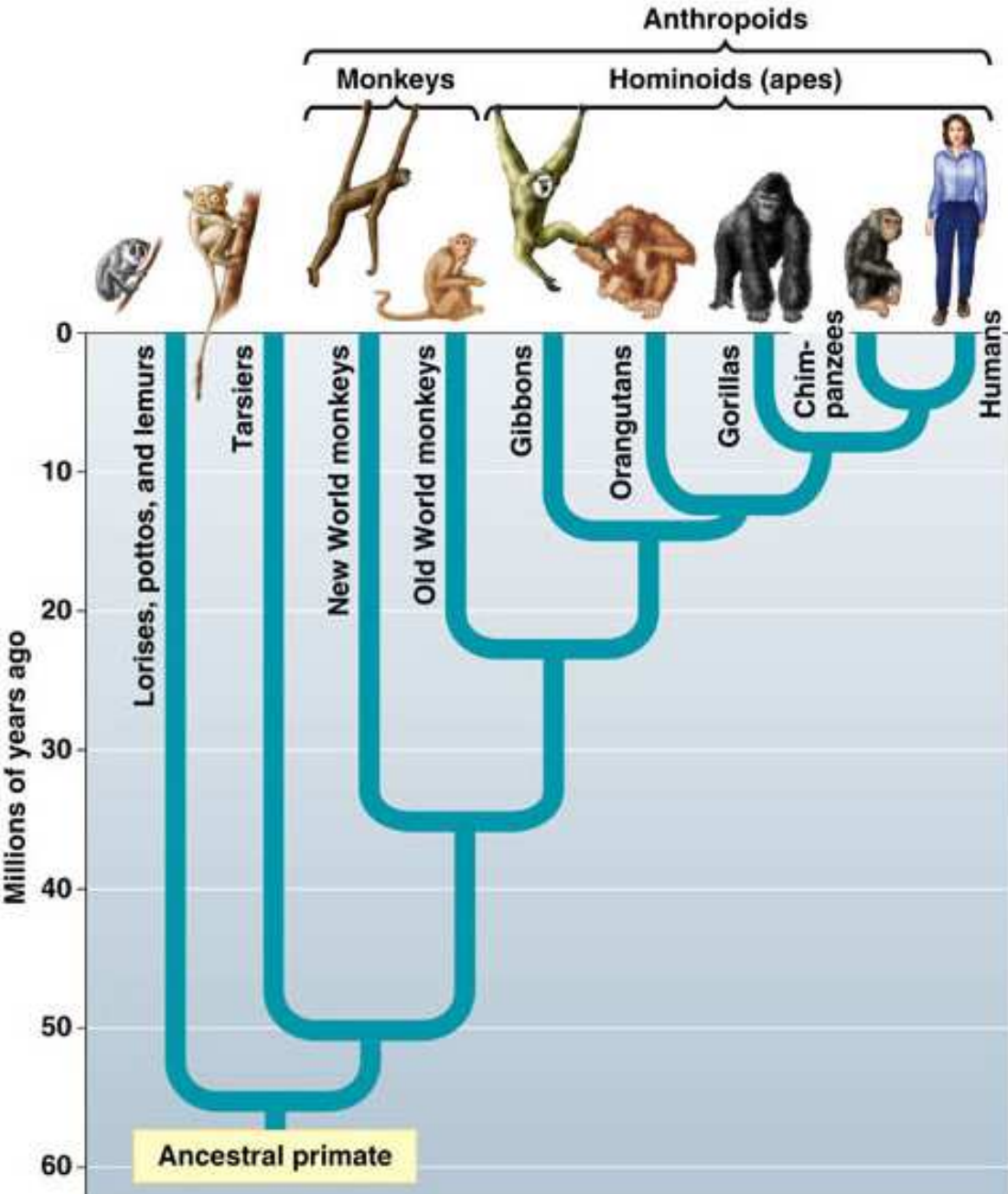
Human Evolution

I. Primate Heritage

B. 3 major groups

3. Anthropoids: monkeys, Gibbons, Orangutans, Gorillas, Chimps, Humans

Human Evolution



Human Evolution

I. Primate Heritage

B. 3 major groups

3. Anthropoids: Monkeys, Gibbons, Orangutans, Gorillas, Chimps, Humans

New World Monkeys



Human Evolution

I. Primate Heritage

B. 3 major groups

3. Anthropoids: Monkeys, Gibbons, Orangutans, Gorillas, Chimps, Humans

Old World Monkeys

baboons



Human Evolution

I. Primate Heritage

B. 3 major groups

3. Anthropoids: Monkeys, Gibbons, Orangutans, Gorillas, Chimps, Humans

Old World Monkeys

baboons



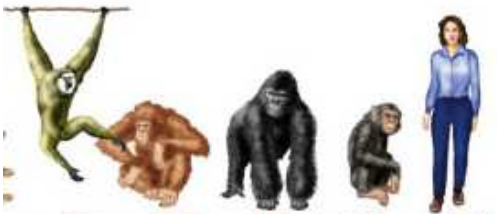
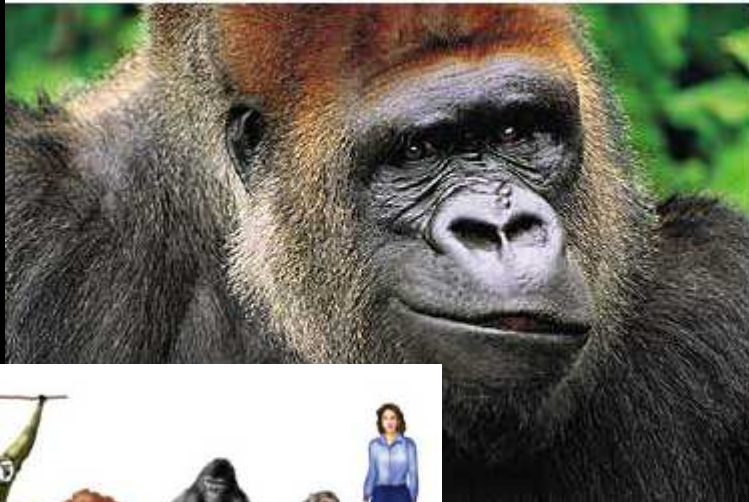
Human Evolution

I. Primate Heritage

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3. Anthropoids: Monkeys, Gibbons, Orangutans, Gorillas, Chimps, Humans Old World Monkeys **mandrills**





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- B. The human branch
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- D. Larger brains & the genus *Homo*
- E. Origins of the “wise man”

F. Apes: Chimps

2 species, tropical Africa
Sister group to humans.

Similarities to humans:

- We share 97% of alleles w/ chimps.
- Many morphological features shared.
- They make and use tools (simple).
- They have sense of self.
- Omnivorous.
- Coddling babies, breast feeding.
- Ability to walk bipedally.
- Bonobos often have frontal sexual intercourse.



Tool use (soaking up juice with mashed end of stick)



Bonobo tool use at
San Diego Zoo
© 2004 San Diego Zoo



© 2004 San Diego Zoo

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- Ability to walk bipedally.
- Bonobos often have frontal sexual intercourse.

F. Apes: Chimps

2 species, tropical Africa
Sister group to humans.

Distinctions from Humans:

- Knuckle walking.
- Big toe has thumb-like dexterity.
- 50% time in trees (including sleeping).
- Thicker, denser body hair.
- Adults have more prominent brow ridge, snout.
- Greater sexual dimorphism (less so than in *Gorillas*).



Human Evolution

I. Primate Heritage

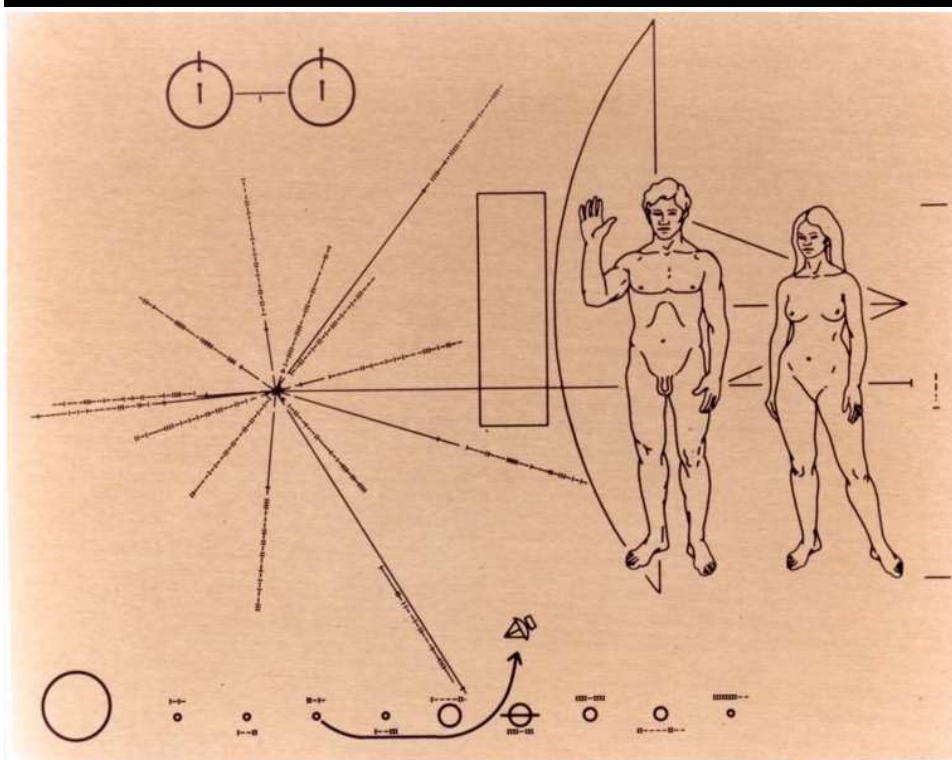
G. Apes #5: Humans (genus *Homo*)

Extant species: *Homo sapiens*

Extinct species (†):

Timeline

- April 6, 1973 - Launch
- April 19, 1974 - Safe passage through the Asteroid belt
- December 2, 1974 - Flyby of Jupiter.
- September 1, 1979 - Flyby of Saturn.
- February, 1985 - Instrument power sharing began due to declining generator power output.
- September 30, 1995 - Routine daily mission operations stopped. Pioneer 11 is 6.5 billion km from Earth.
- November, 1995 - Last communication with Pioneer 11.



- † *Homo habilis* (Handy Man)
- † *Homo rudolfensis* (Rudolf Man)
- † *Homo ergaster* (Working Man)
- † *Homo erectus* (Upright Man)
- † *Homo floresiensis* (Flores Man — discovered 2003)
- † *Homo antecessor* (Predecessor Man)
- † *Homo heidelbergensis* (Heidelberg Man)
- † *Homo neanderthalensis* (Neanderthal Man)
- † *Homo rhodesiensis* (Rhodesia Man)
- † *Homo cepranensis* (Ceprano Man)
- † *Homo georgicus* (Georgia Man)
- † *Homo sapiens idaltu* (elderly wise man — discovered 1997)

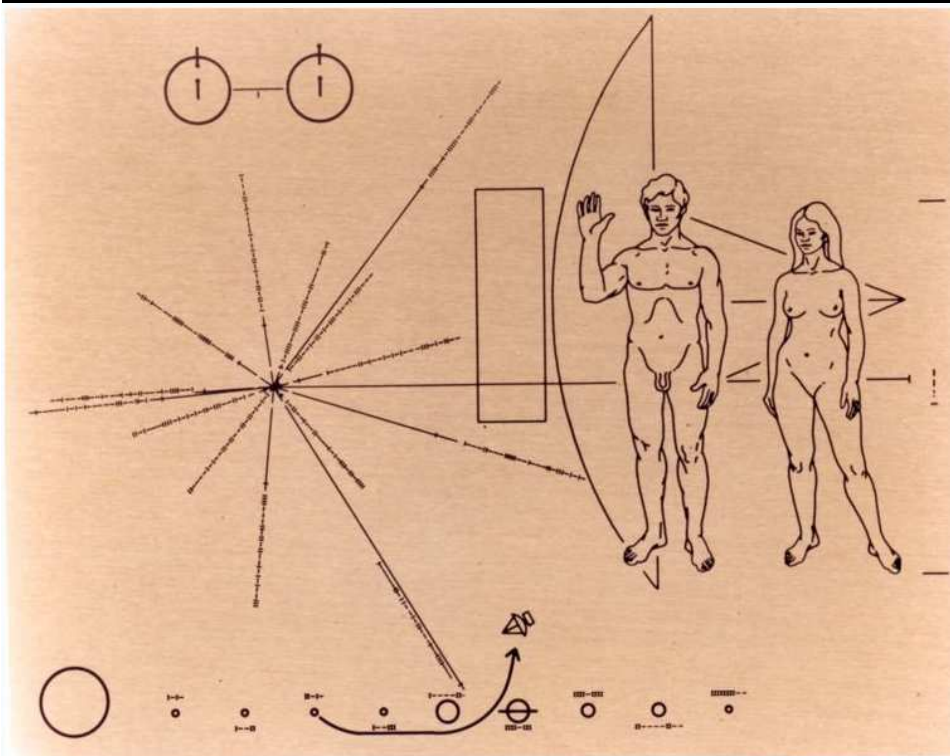
Human Evolution

I. Primate Heritage

G. Apes #5: Humans (genus *Homo*)

Timeline

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- bipedal*
- much less hair*
- reduced sexual dimorphism*
- larger brain*
- shorter jaw, snout*
- speech*
- symbolic thought (not unique)*
- complex tools*
- habitat: variable*
- diet: variable*

View of Solar System from above
2006 OCT 31 00:00:00 UTC
100.0° field of view



Solar System Simulator v4.0

Human Evolution

II. Hominid Evolution

A. Family Hominidae

Hylobatidae (184) *Pongo* (2) *Gorilla* (2) *Pan* (2) *Homo* (1)

SE Asia

SE Asia

<Trop. Africa>

Lesser Apes

Great Apes

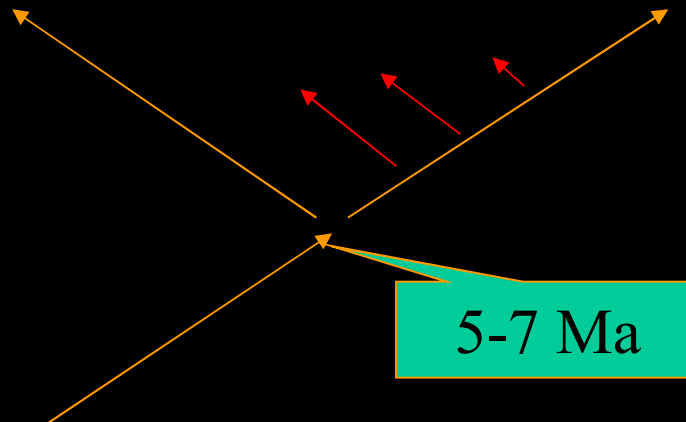


White-cheeked gibbon

Human Evolution

II. Hominid Evolution

B. The species on the human branch: “hominids” (includes several genera such as *Homo*, *Australopithecus*)

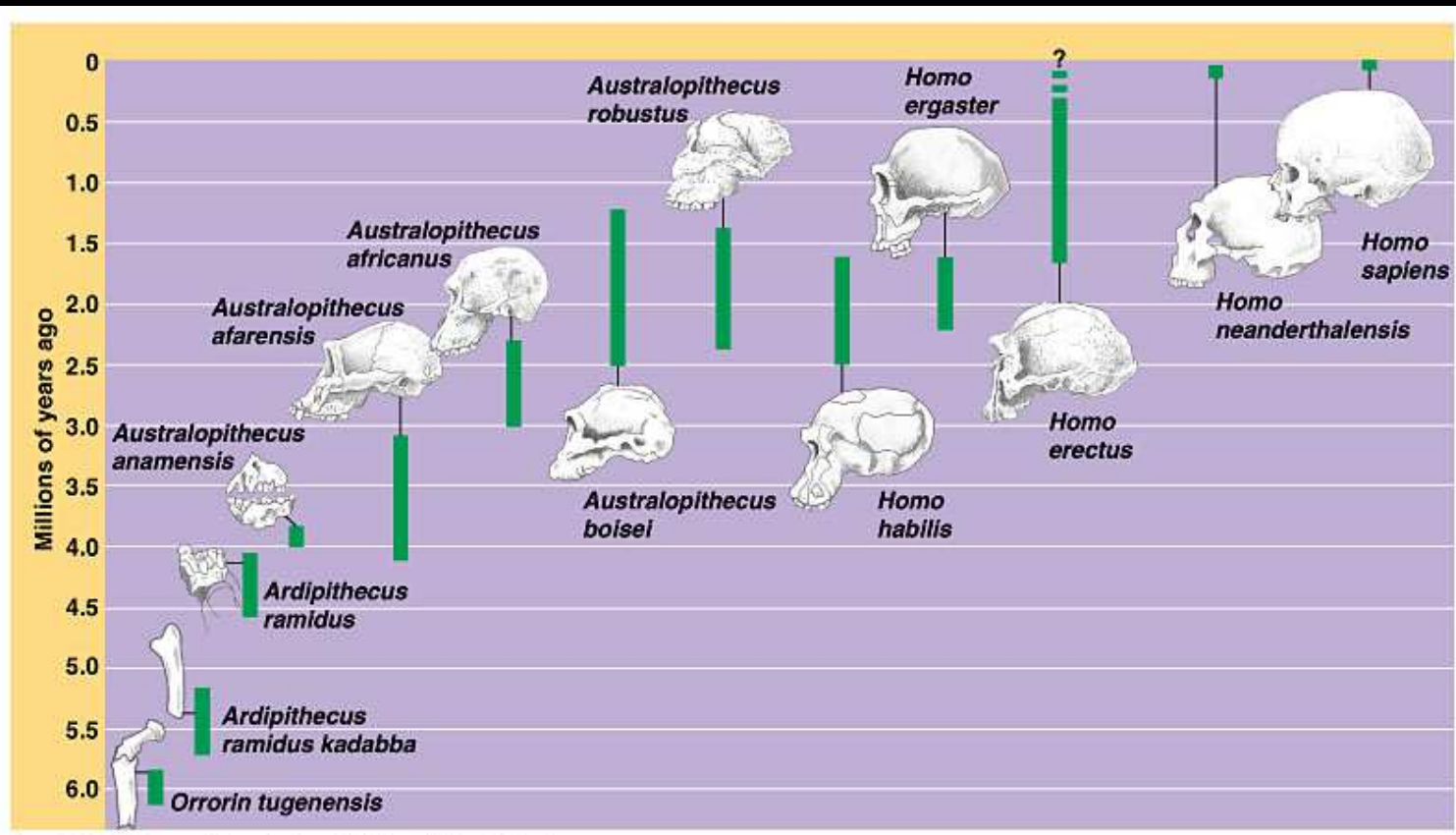


5-7 Ma

Human Evolution

II. Hominid Evolution

B. The species on the human branch: “hominids”

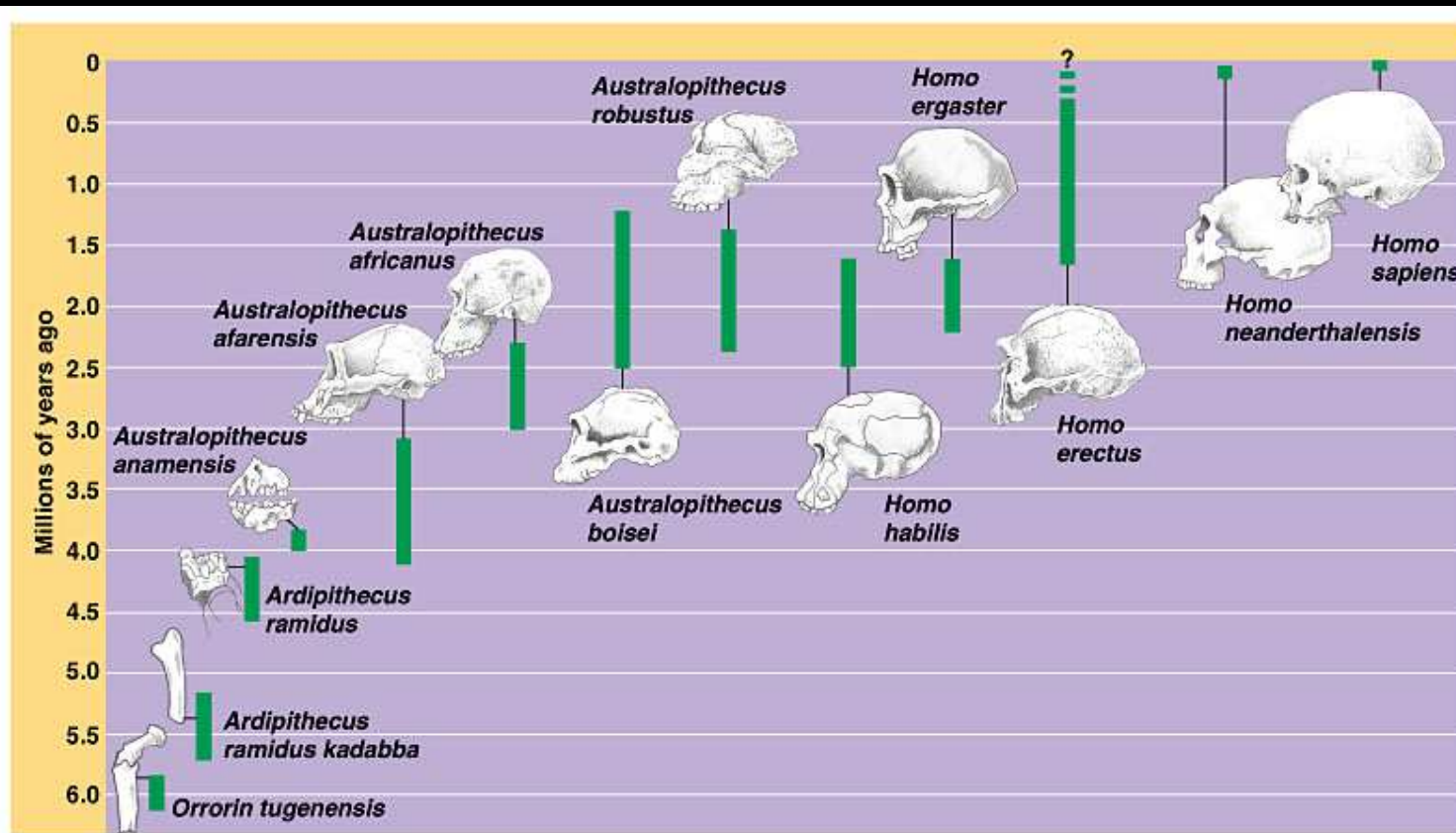


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Human Evolution

II. Hominid Evolution

C. Upright posture evolved before large brains

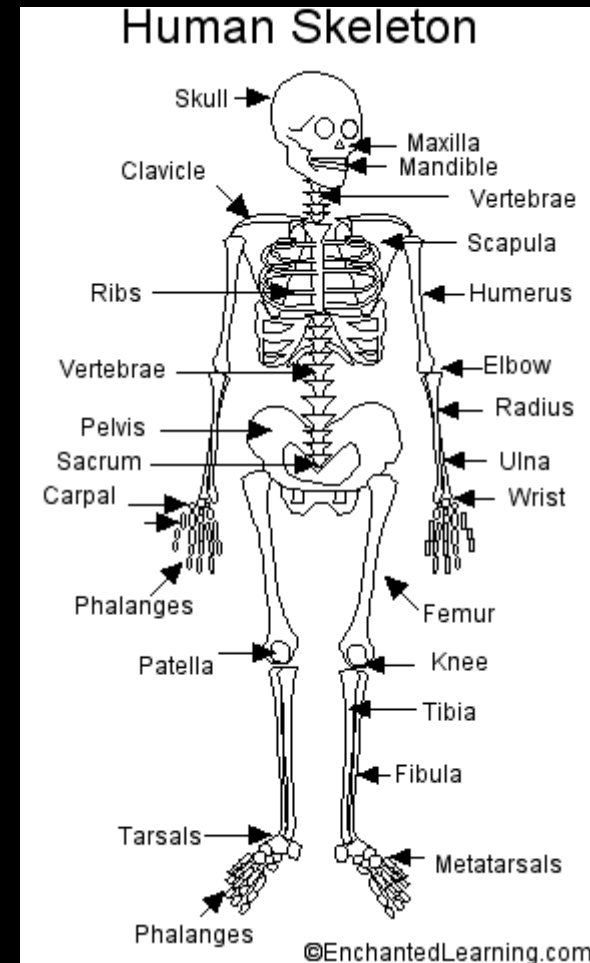
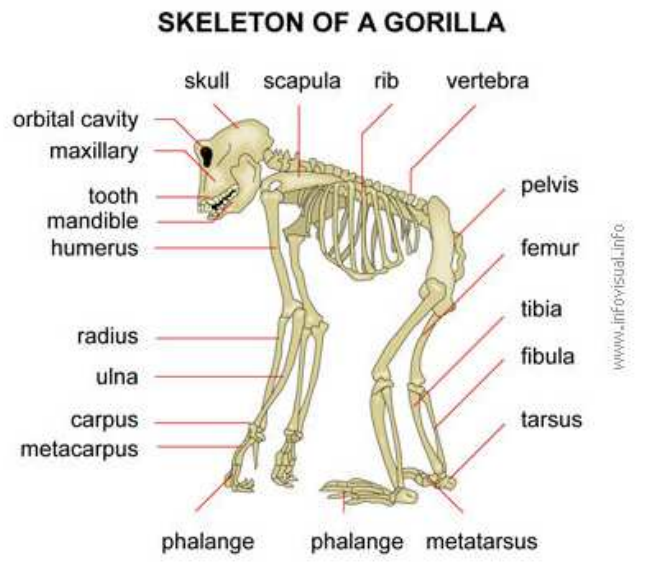


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Human Evolution

II. Hominid Evolution

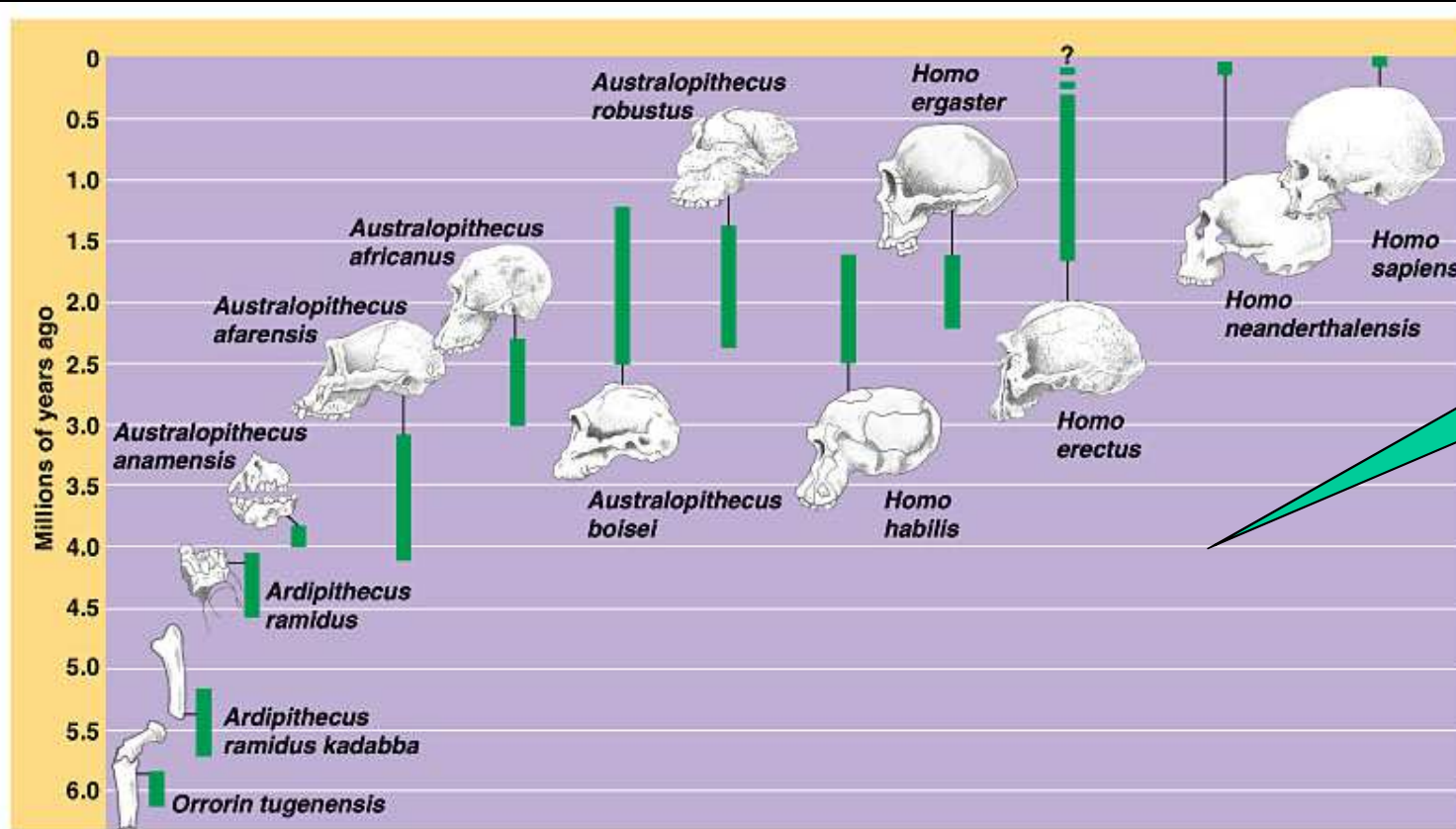
C. Upright posture evolved before large brains



Human Evolution

II. Hominid Evolution

C. Upright posture evolved before large brains



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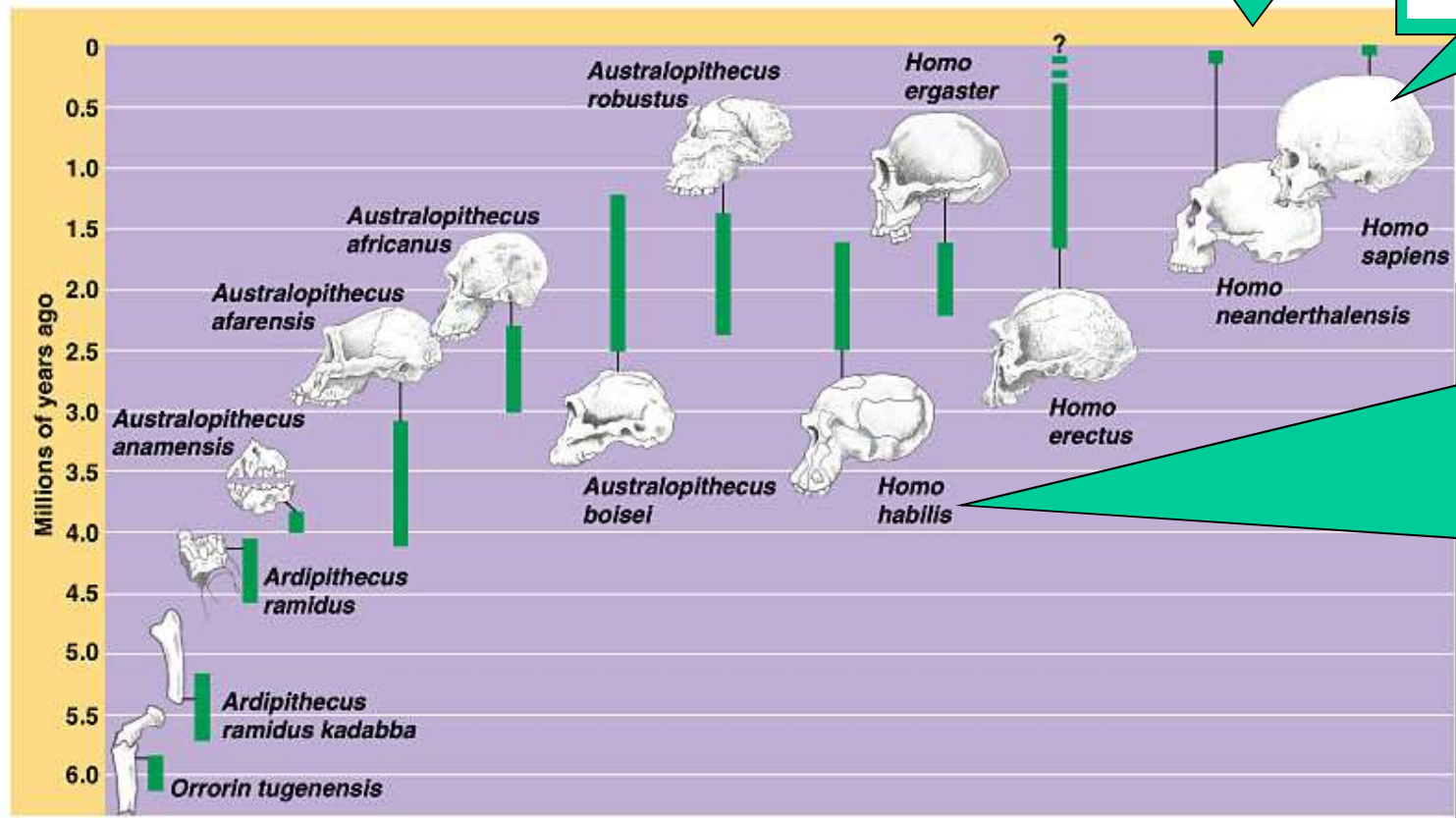
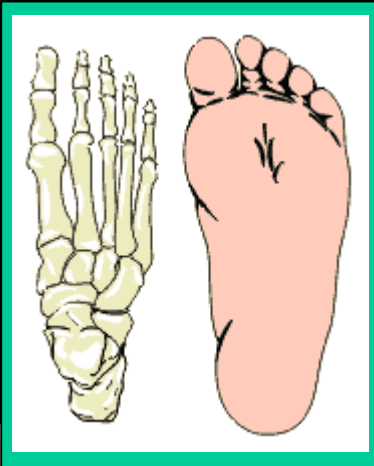
Opening in skull reveals upright posture

Human Evolution

II. Hominid Evolution

C. Upright posture evolved before large brains
Convergent big toe

Position of inner toe reveals upright posture

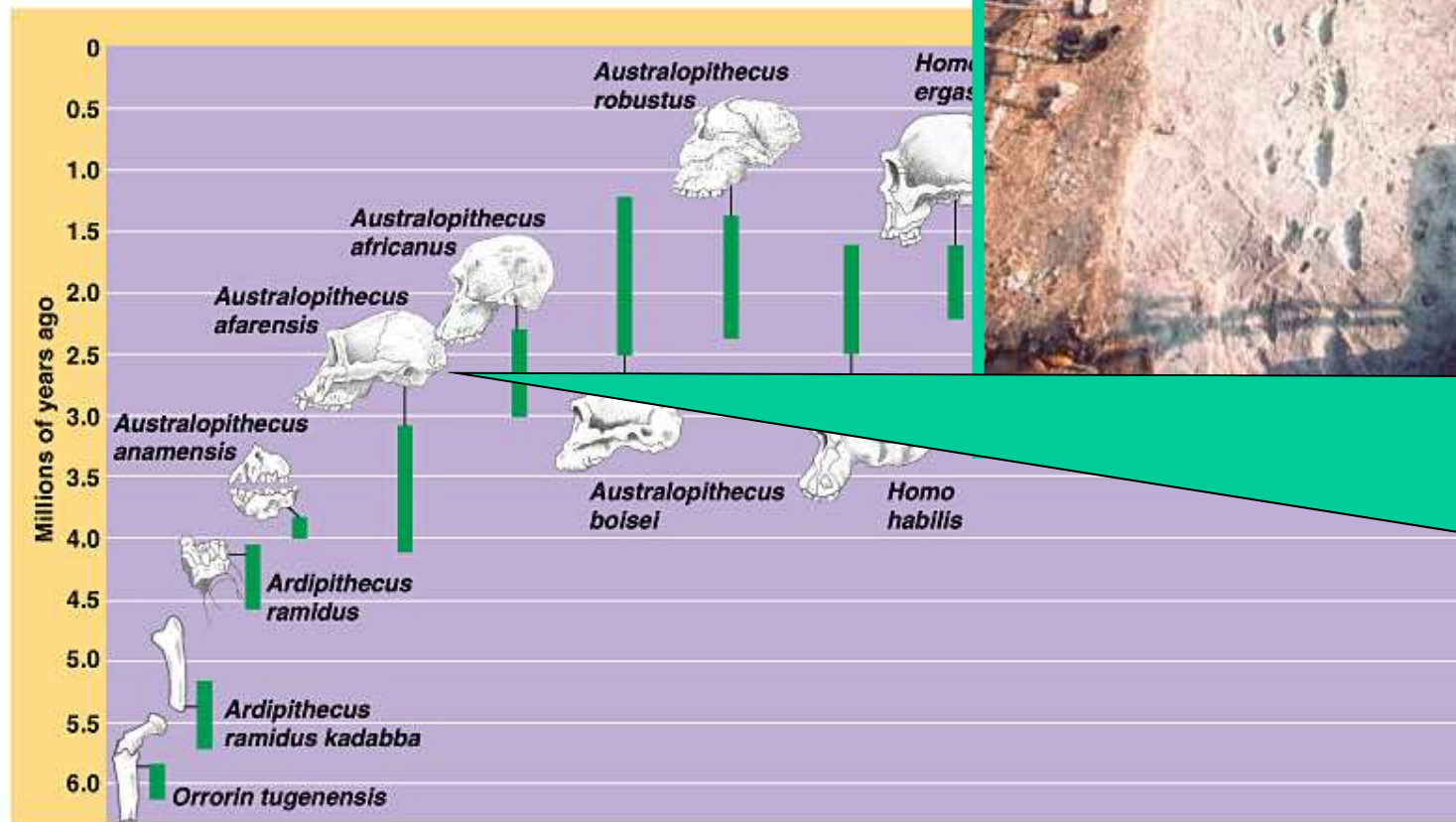


Human Evolution

II. Hominid Evolution

C. Upright posture evolved before large brains

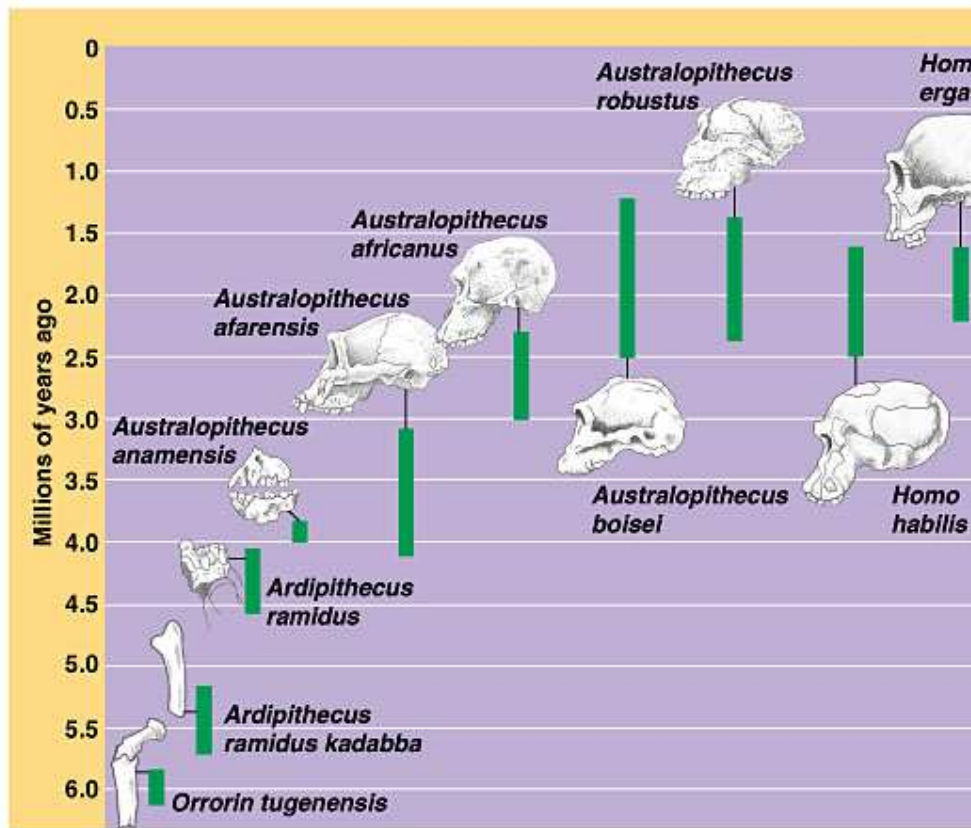
- Convergent big toe
- Tanzania
- ca. 3.5 Ma
- damp volcanic ash



Human Evolution

II. Hominid Evolution

- C. Upright posture evolved before large brains
 - Convergent big toe
 - Tanzania
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 - damp volcanic ash



Human Evolution

II. Hominid Evolution

C. Upright posture evolved before large brains
Convergent big toe

Position of inner toe reveals upright posture



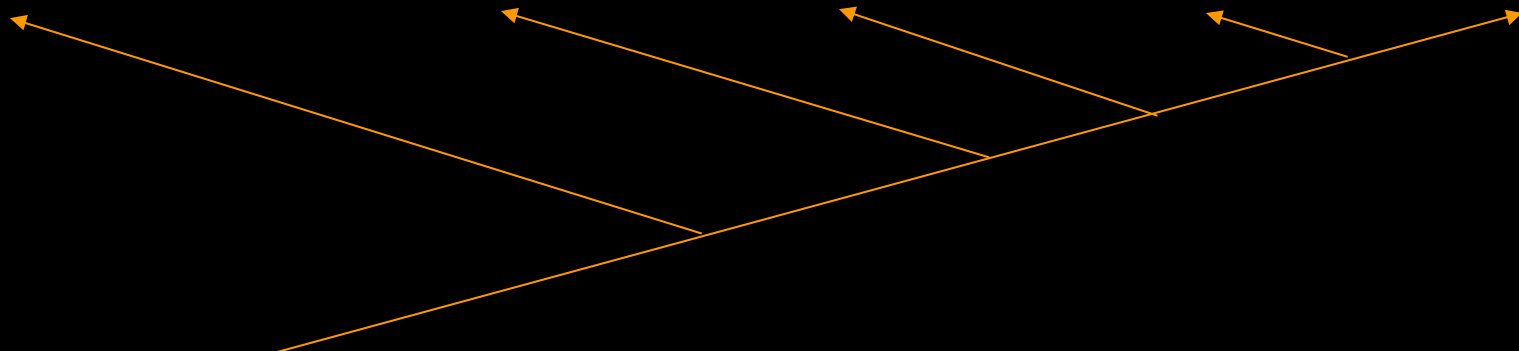
Hylobatidae

Pongo

Gorilla

Pan

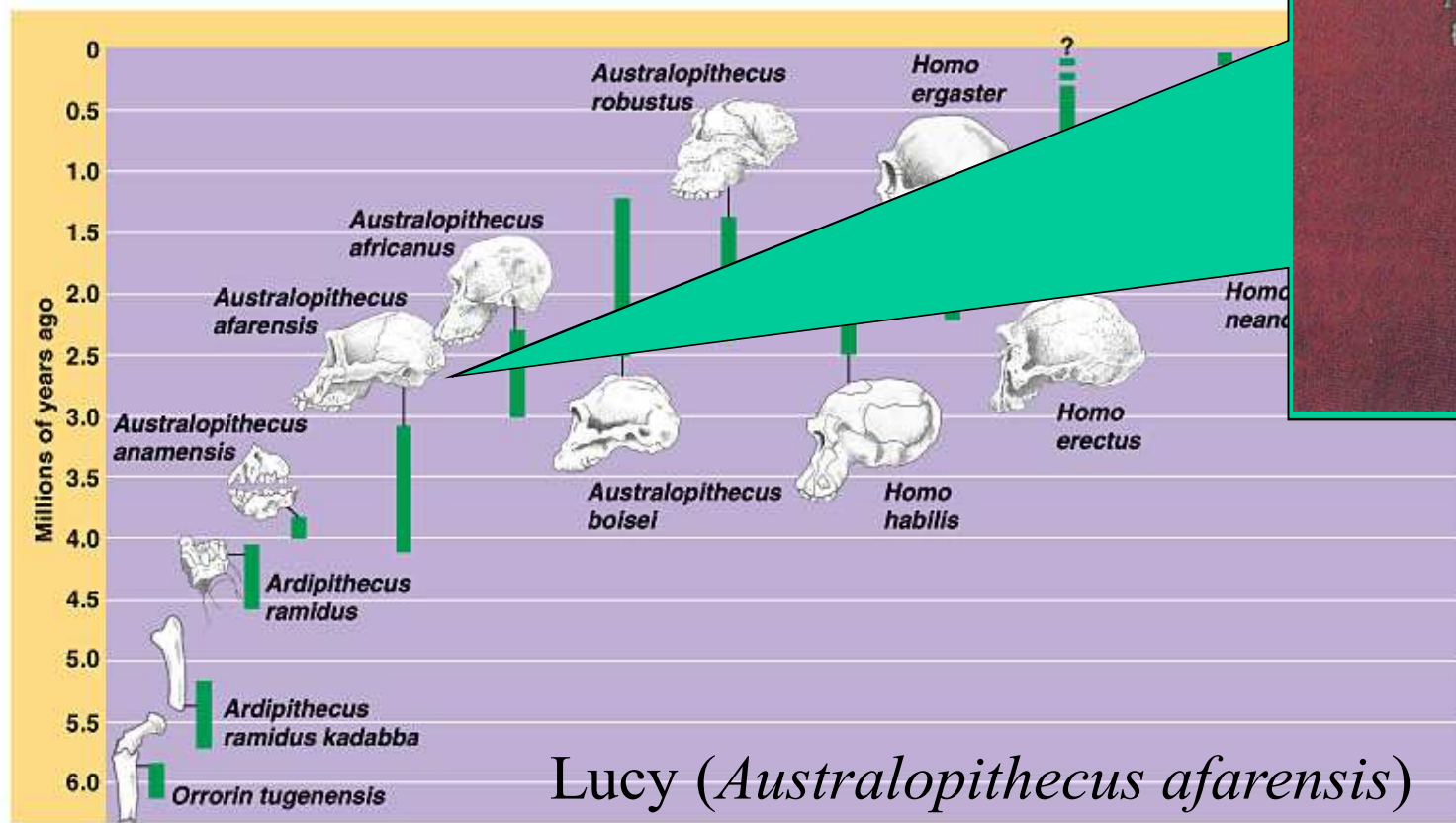
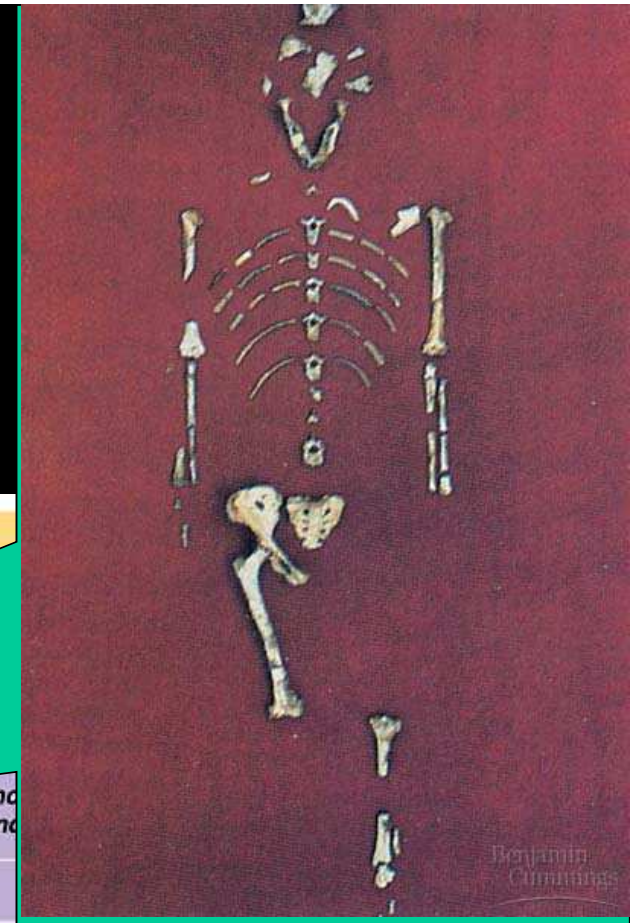
Homo



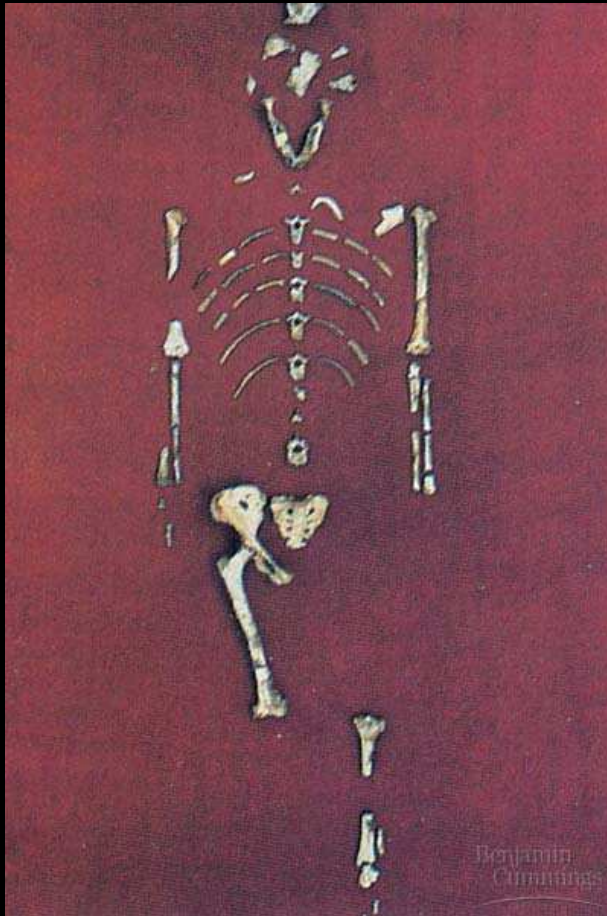
Human Evolution

II. Hominid Evolution

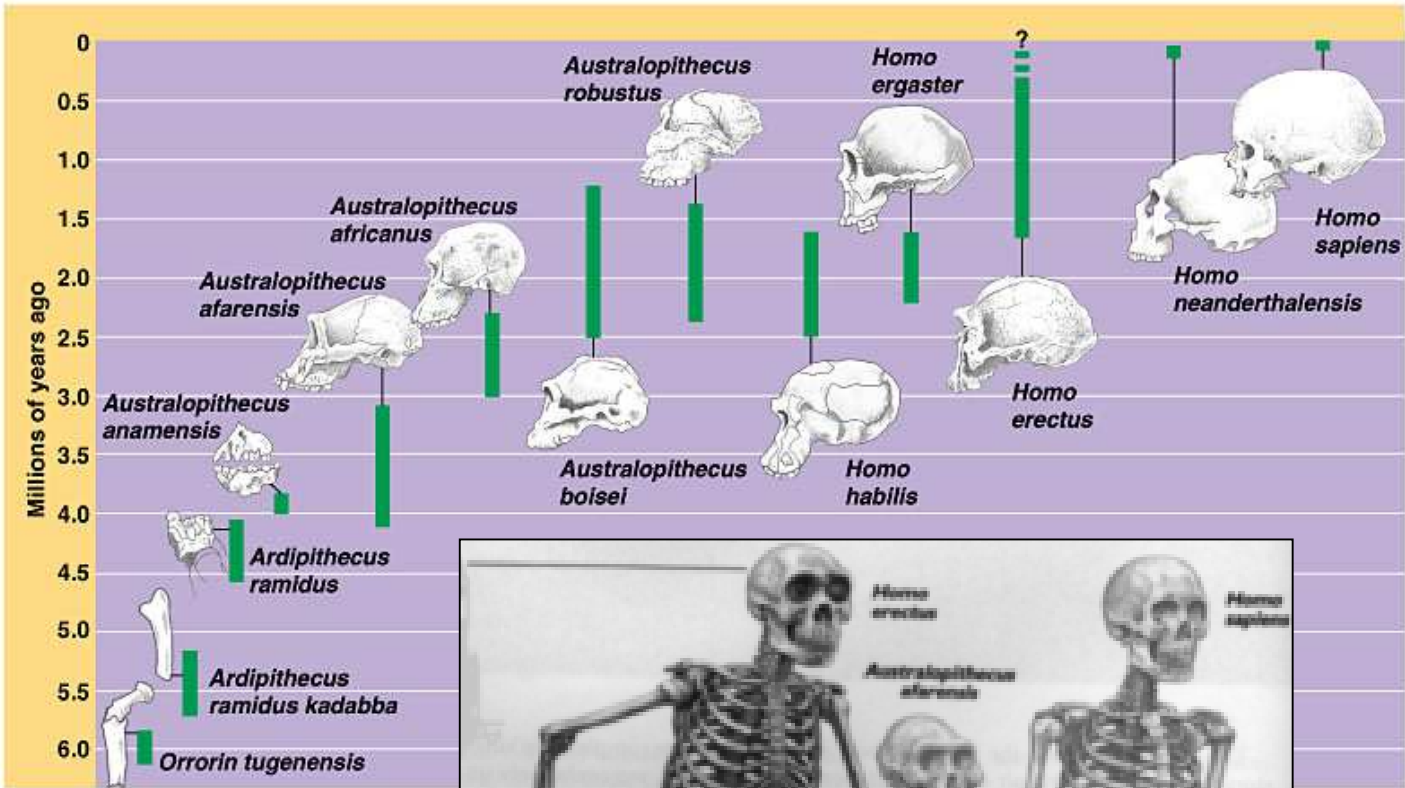
- C. Upright posture evolved before large brains
Pelvis, spine curvature, knee joint all reveal bipedalism



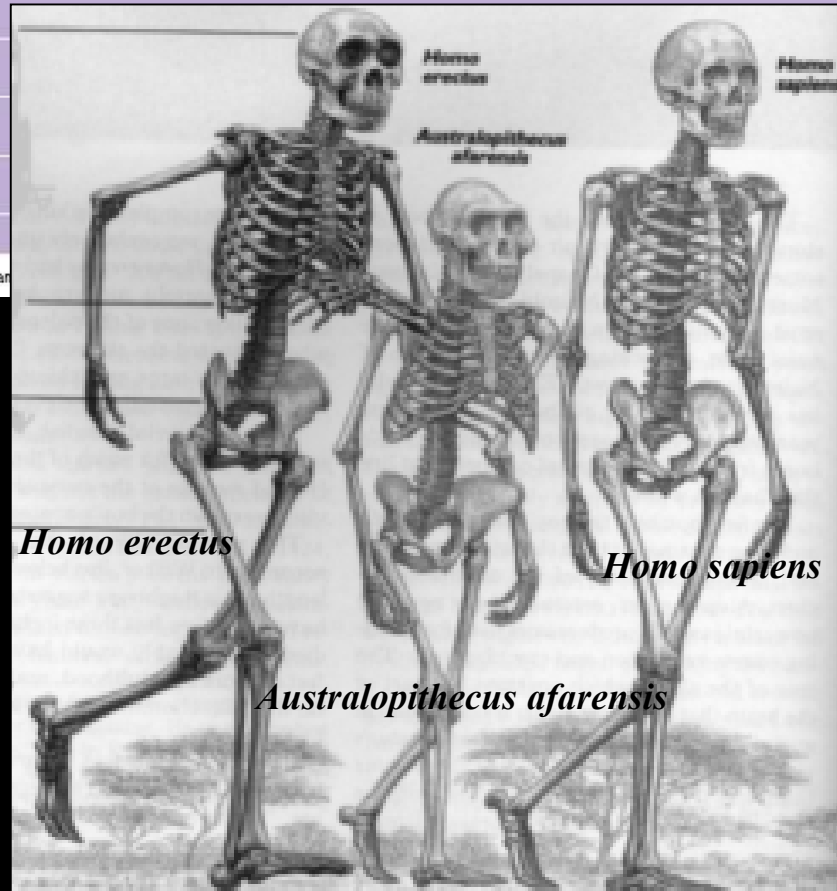
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Lucy (*Australopithecus afarensis*)



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Homo erectus

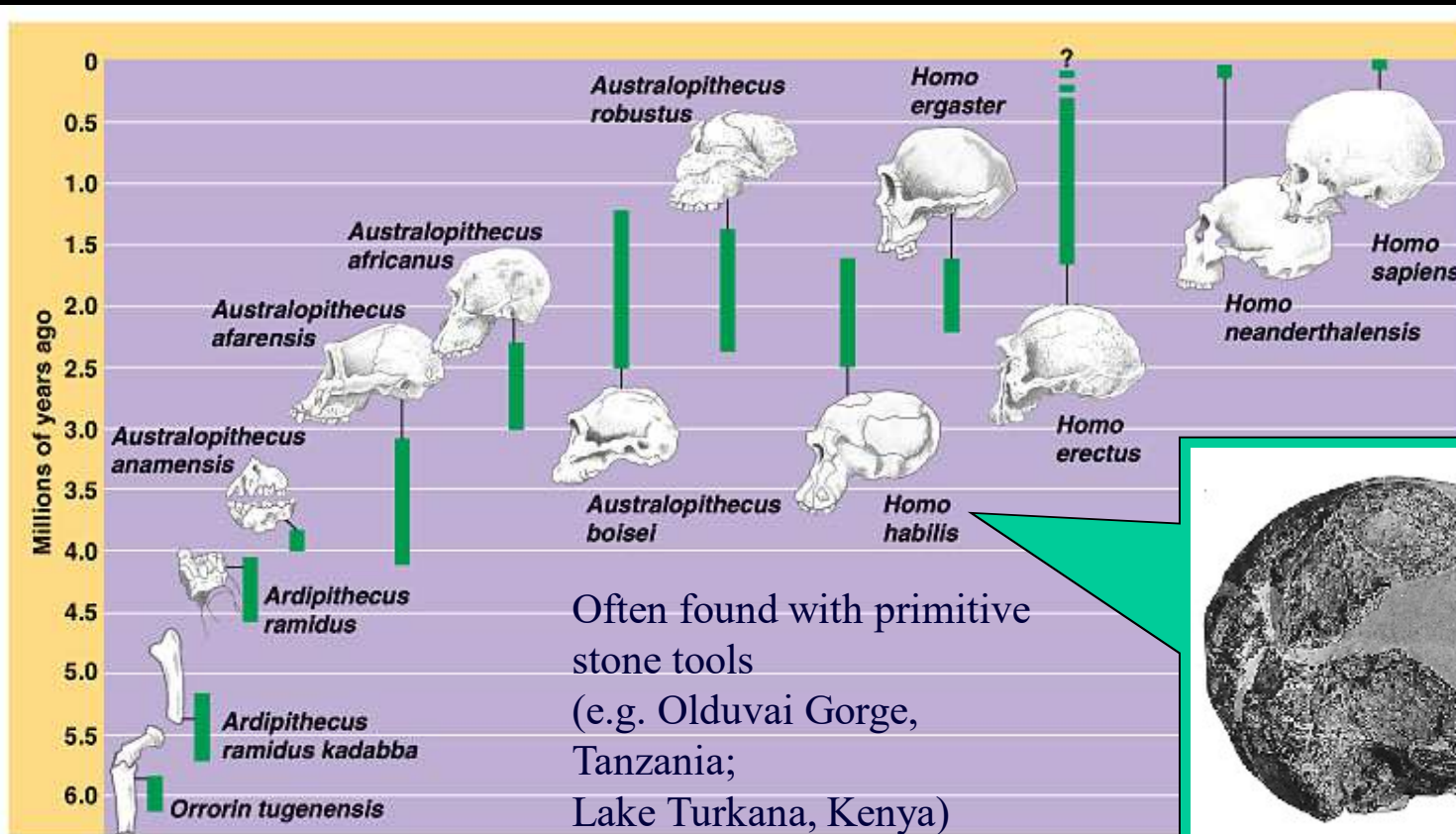
Homo sapiens

Australopithecus afarensis

Human Evolution

II. Hominid Evolution

D. Larger brains (tools) and reduced sexual dimorphism define the genus *Homo*



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Human Evolution

II. Hominid Evolution

D. Larger brains (tools) and reduced sexual dimorphism define the genus *Homo*



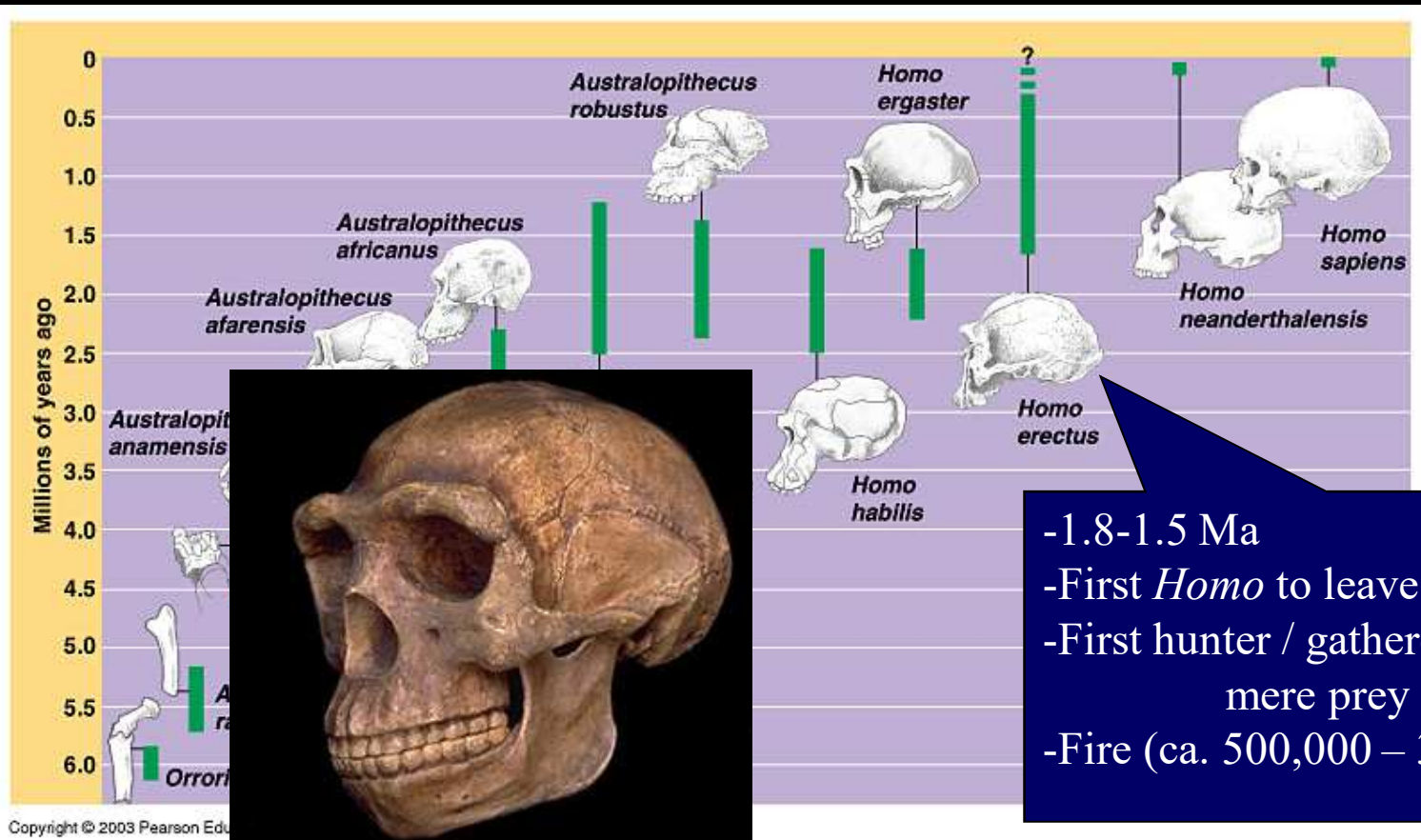
Was *Homo habilis* the first to make tools?

5-7 Ma

Human Evolution

II. Hominid Evolution

D. Larger brains (tools), reduced sexual dimorphism, & the genus *Homo*

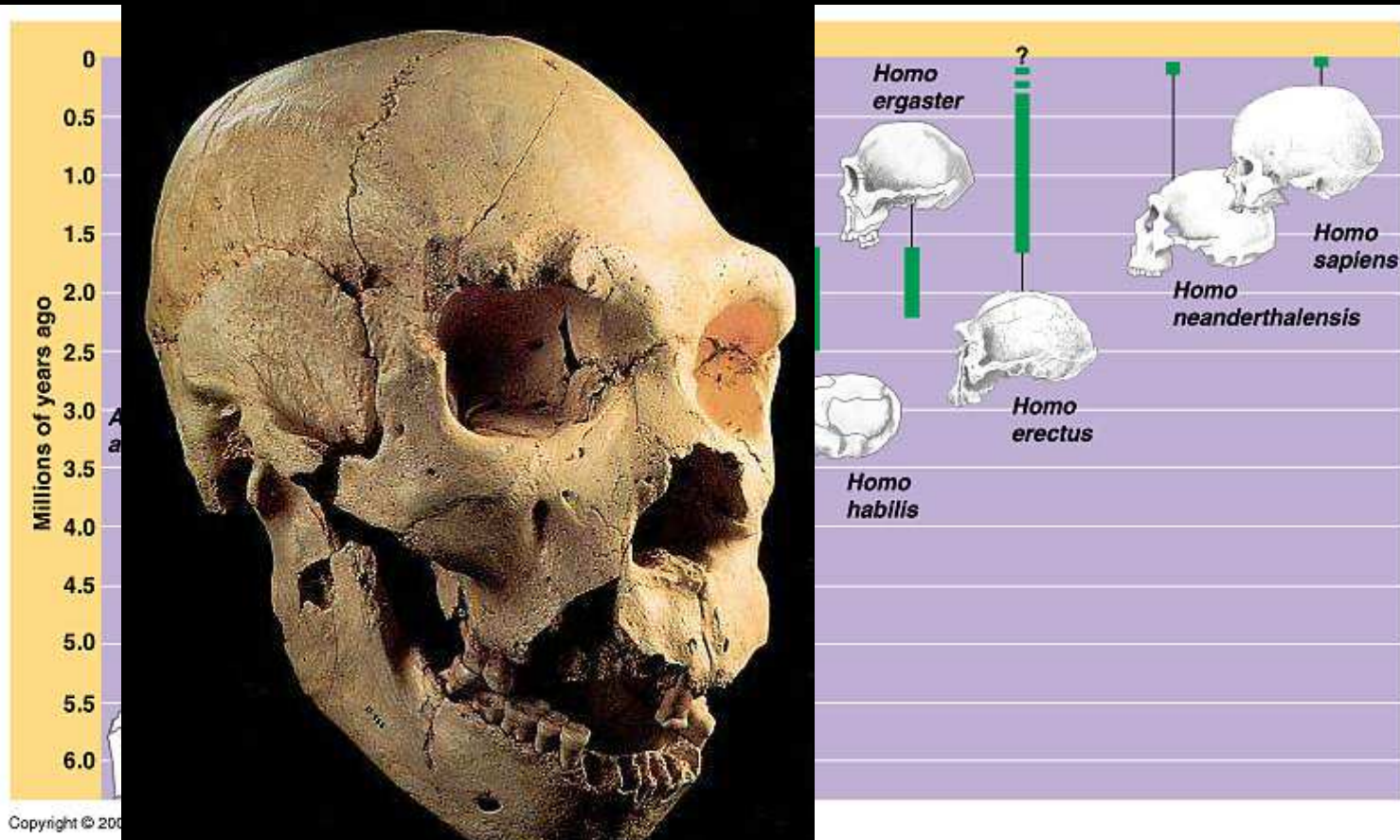


‘Peking man’ (*H. erectus*)

Human Evolution

II. Hominid Evolution

D. Larger brains (tools), reduced sexual dimorphism, & the genus *Homo*

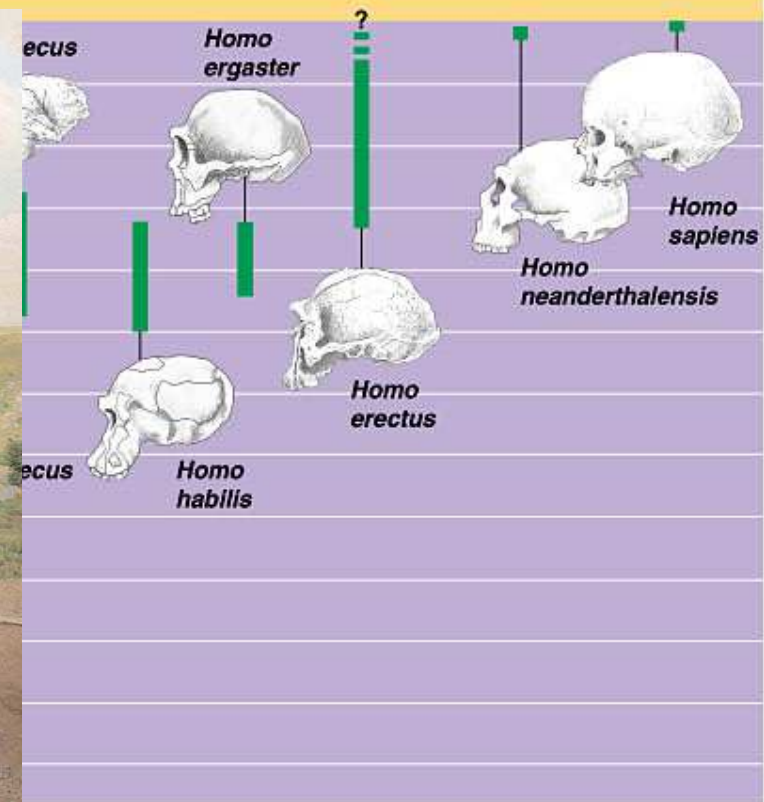


Homo heidelbergensis (Europe: ca. 300,000 ybp)
Sometimes called *H. sapiens* archaic

Human Evolution

II. Hominid Evolution

D. Larger brains (tools), reduced sexual dimorphism, & the genus *Homo*



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***Homo neanderthalensis* (Europe: 200,000-40,000 ybp)
Formerly *Homo sapiens* subspecies *neanderthalis***

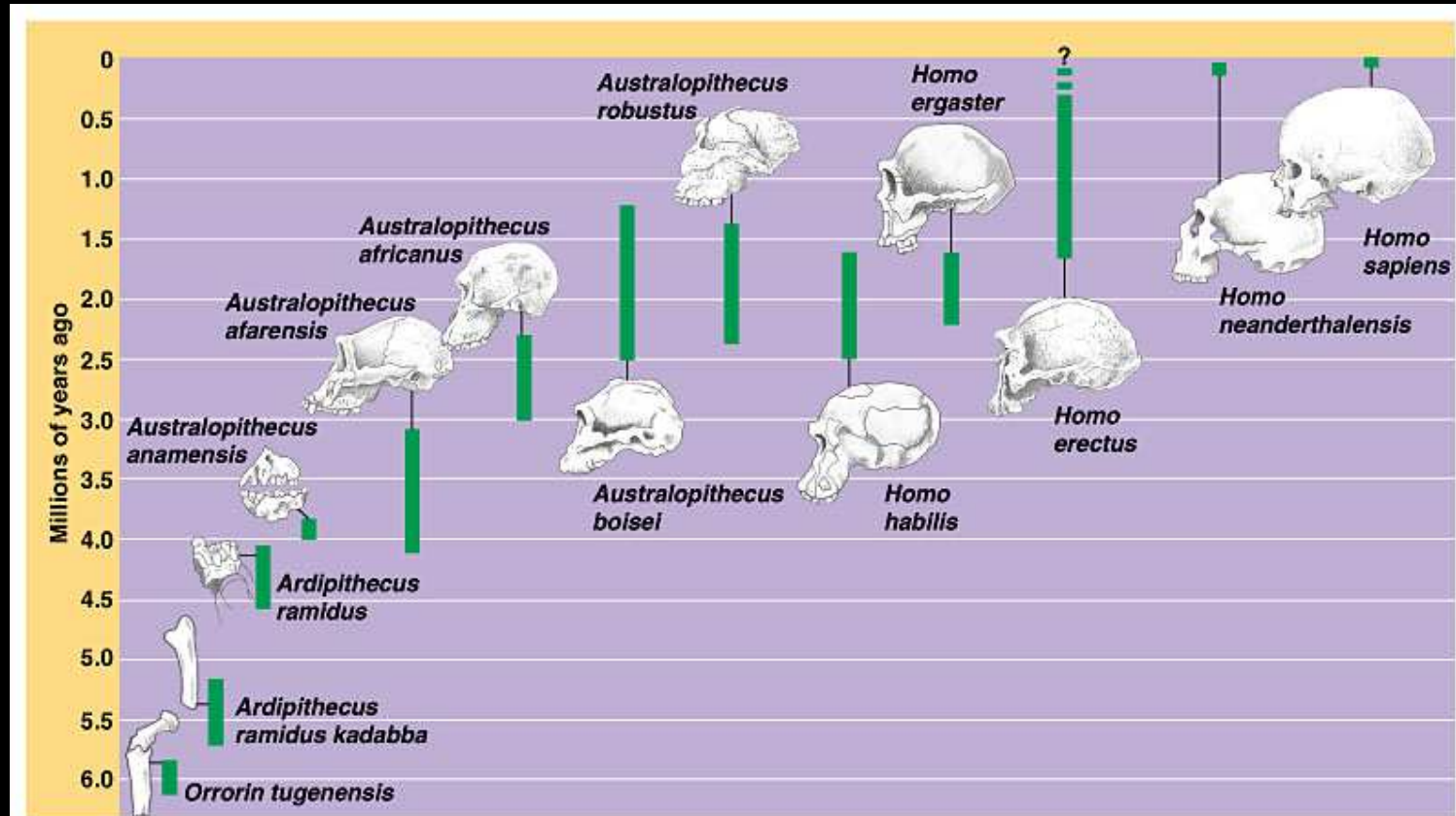
Human Evolution

II. Hominid Evolution

E. Origins of the “wise-man”, *Homo sapiens*

Homo sapiens

Defined by larger brain, forehead, and reduced brow ridge.



Human Evolution

II. Hominid Evolution

E. Origins of the “wise-man”, *Homo sapiens*

Two theories:

1) Multiregional hypothesis

-modern humans evolved from different tribes of *Homo erectus*

-Europeans, for example, came via *H. erectus* > *H. neanderthalensis* > *H. sapiens*

2) Replacement hypothesis

-modern humans came from one tribe of *Homo erectus* and replace all other tribes.

-Neanderthals, etc. thus were evolutionary dead ends

Human Evolution

II. Hominid Evolution

H. sapiens skull is very distinctive

E. Origins of the “wise-man”

Two theories:

- 1) Multiregional hypothesis
(multiple origins)
- 2) Replacement hypothesis
(single origin)



“caucasoid”

“negroid”

“mongoloid”



Homo erectus

Human Evolution

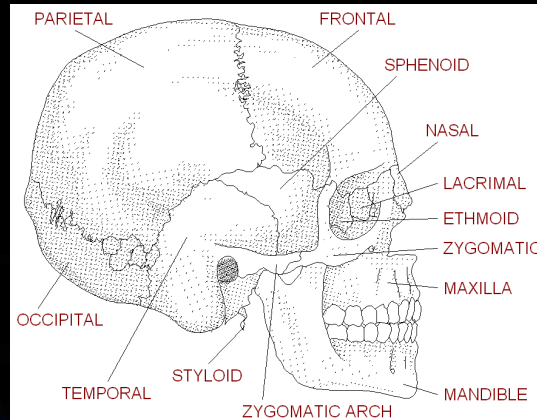
II. Hominid Evolution

H. sapiens fossil record

E. Origins of the “wise-man”

Two theories:

- 1) Multiregional hypothesis
(multiple origins)
- 2) Replacement hypothesis
(single origin)



H. sapiens (15 Ka): America



H. sapiens (40 Ka): Australia



H. sapiens (50 Ka): Asia, Europe



H. sapiens (195 Ka): E Africa



Europe: *H. heidelbergensis*
& *H. neanderthalensis* (400-40 Ka)



Homo erectus (1.6 Ma-200 Ka)

Human Evolution

II. Hominid Evolution

E. Origins of the “wise-man”

Two theories:

- 1) Multiregional hypothesis
(multiple origins)
- 2) Replacement hypothesis
(single origin)

H. sapiens mtDNA



Europe: *H. heidelbergensis*
& *H. neanderthalensis* (400-40 Ka)



“caucasoid” “negroid”



“mongoloid”

