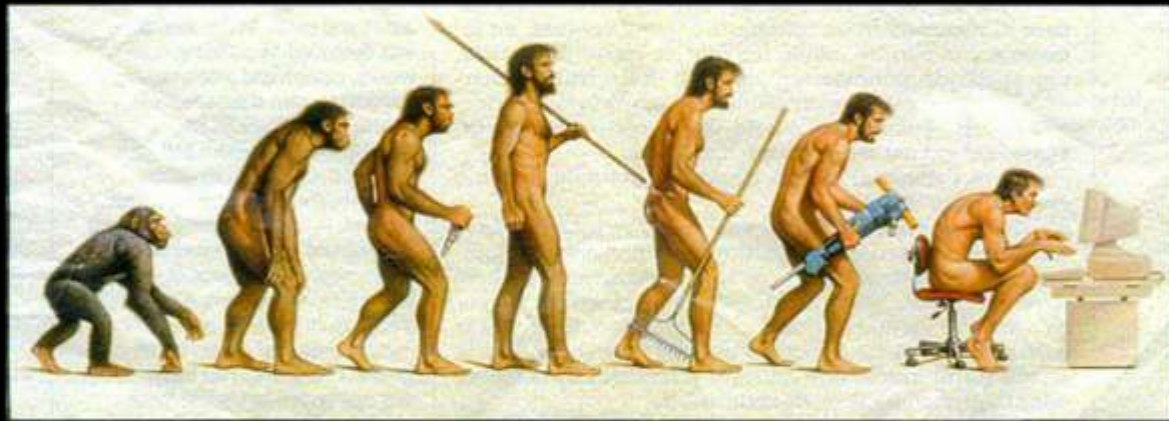


Hominid/Human Evolution



Dr. M. Rizwan Subject: Paleontology
School of Studies in Earth Science

Primate Classification- 1980's

Order Primates

- Suborder Prosimii: tarsiers and lemurs

- Suborder Anthropoidea: monkeys, apes, and hominids

 - Superfamily Hominoidea

 - Family Pongidae: great apes

 - Family Hominidae: Homo and hominid ancestors

Primate Classification – 2000's

Order Primates

Suborder Prosimii: tarsiers and lemurs

Suborder Anthropoidea: monkeys, apes, and
hominids

Superfamily Hominoidea

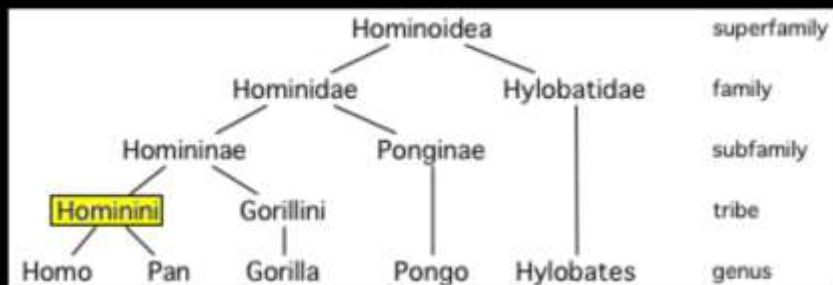
Family Hylobatidae: gibbons

Family Hominidae

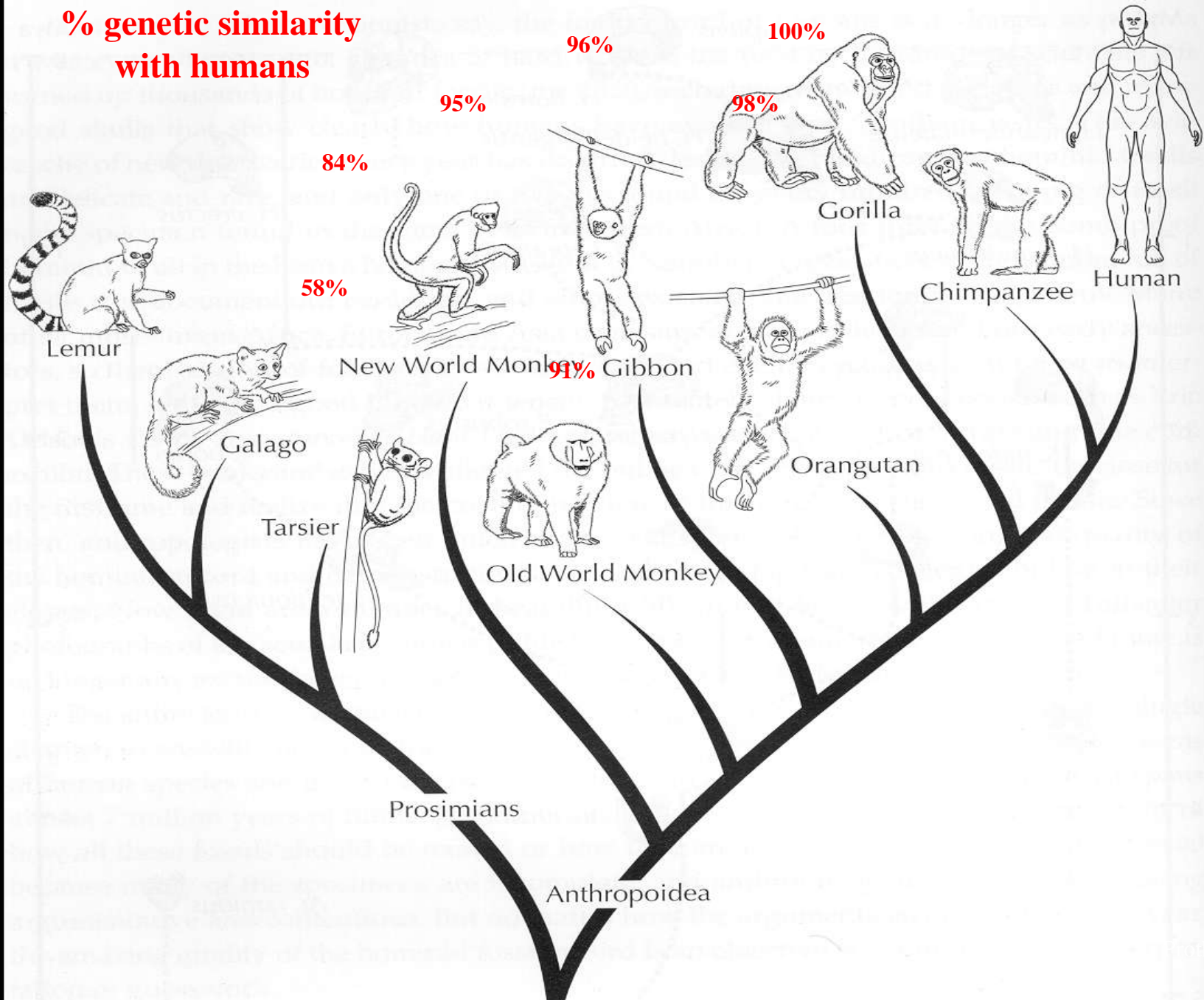
Subfamily Ponginae: orangutans

Subfamily Homininae: gorillas, chimps,

Homo and hominin ancestors



**% genetic similarity
with humans**



Tarsiers, a primitive
Primate (Prosimian)
from Southeast Asia.





Tarsier
sanctuary,
Philippines

A Galago or bush
baby, a primitive
Primate
(Prosimian) from
Africa.



A Slow Loris, a
primitive Primate
(Prosimian) from
Southeast Asia.
Check out the
fingers.



Lemurs, primitive Primates (Prosimians) from Madagascar.



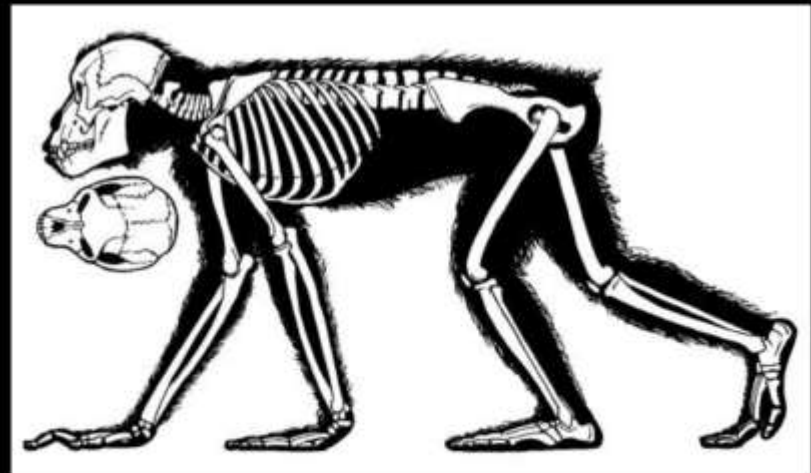
Monkeys, such as baboons, have tails and are not hominoids.



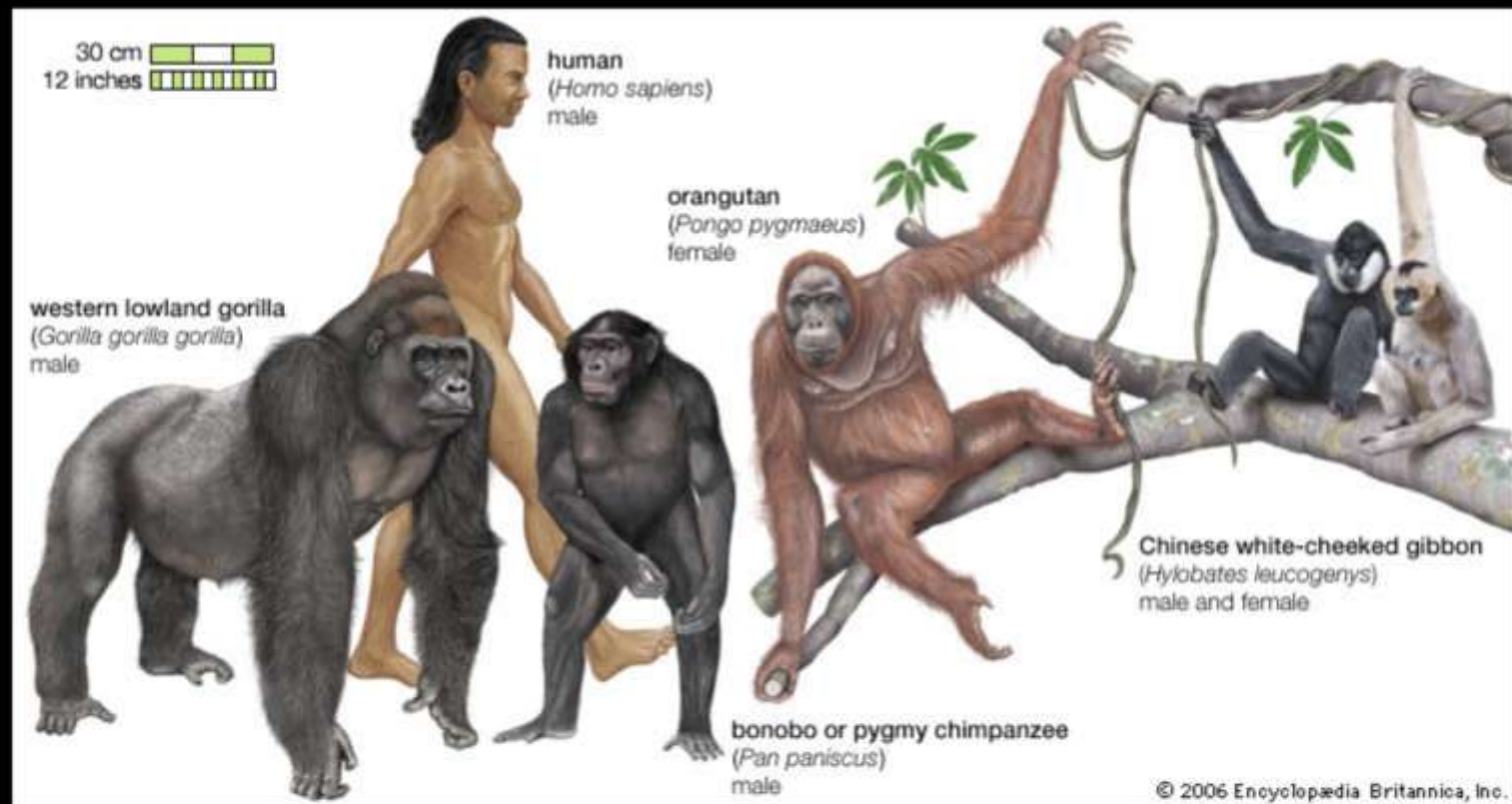
Smallest Primate – Pygmy Marmoset, a New World monkey from Brazil



Proconsul, the oldest hominoid, 18 MY



Hominoids



A lesser ape, the Gibbon from Southeast Asia, a primitive living hominoid similar to *Proconsul*.



Female



Male

Hominoids



The Orangutan, a Great Ape from Southeast Asia.



Dogs: Hominoids best friend?



Gorillas, Great Apes from Africa.



Bipedal Gorilla!

Gorilla enjoying social media

Animals doing people things



1/22



Looking at their phones

It's not all that uncommon for an animal to try his hand -- or paw, rather -- at an activity generally reserved for humans.

This gorilla at the Louisville Zoo, for example, enjoys looking at photos on visitors' mobile phones. In fact, on September 6, 2015, a zookeeper captured a **video** of the primate sitting by the glass of his enclosure, flipping through internet photos of other gorillas with a teenage boy.

By CBS News staff writer Christina Capatides.

CREDIT: *Jukin Media*

Chimp



Gorilla



Chimpanzees, Great Apes from Africa.

Pan troglodytes

I'm cool



Chimps are simple tool users



Chimp



Human



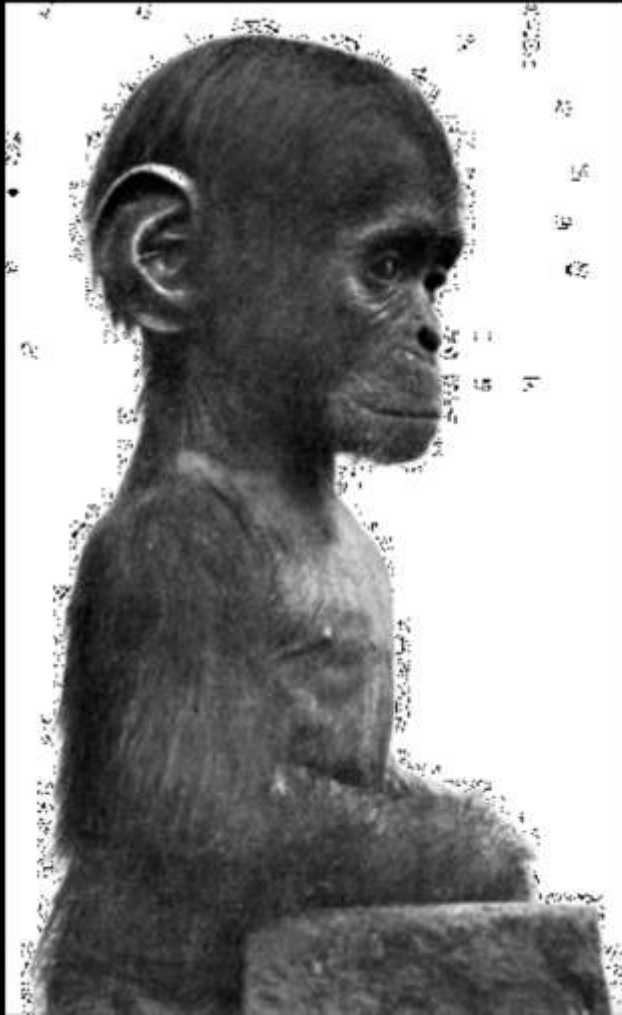
Neoteny in
Human Evolution.
Humans
resemble baby
chimps more than
adult chimps.
Humans are said
to be
paedomorphic.



7•1 A juvenile and adult chimpanzee showing the greater resemblance of humans to the baby and illustrating the principle of neoteny in human evolution.



Neoteny in Human Evolution. Humans resemble baby apes more than adult apes. Humans are said to be paedomorphic.



Chimp

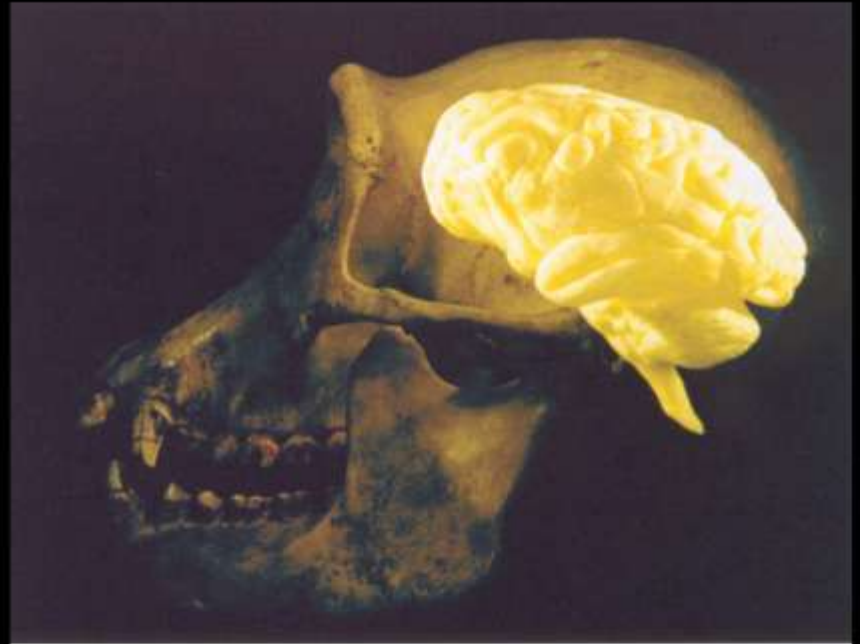


Gorilla

Chimp skull on the left, human skull on the right

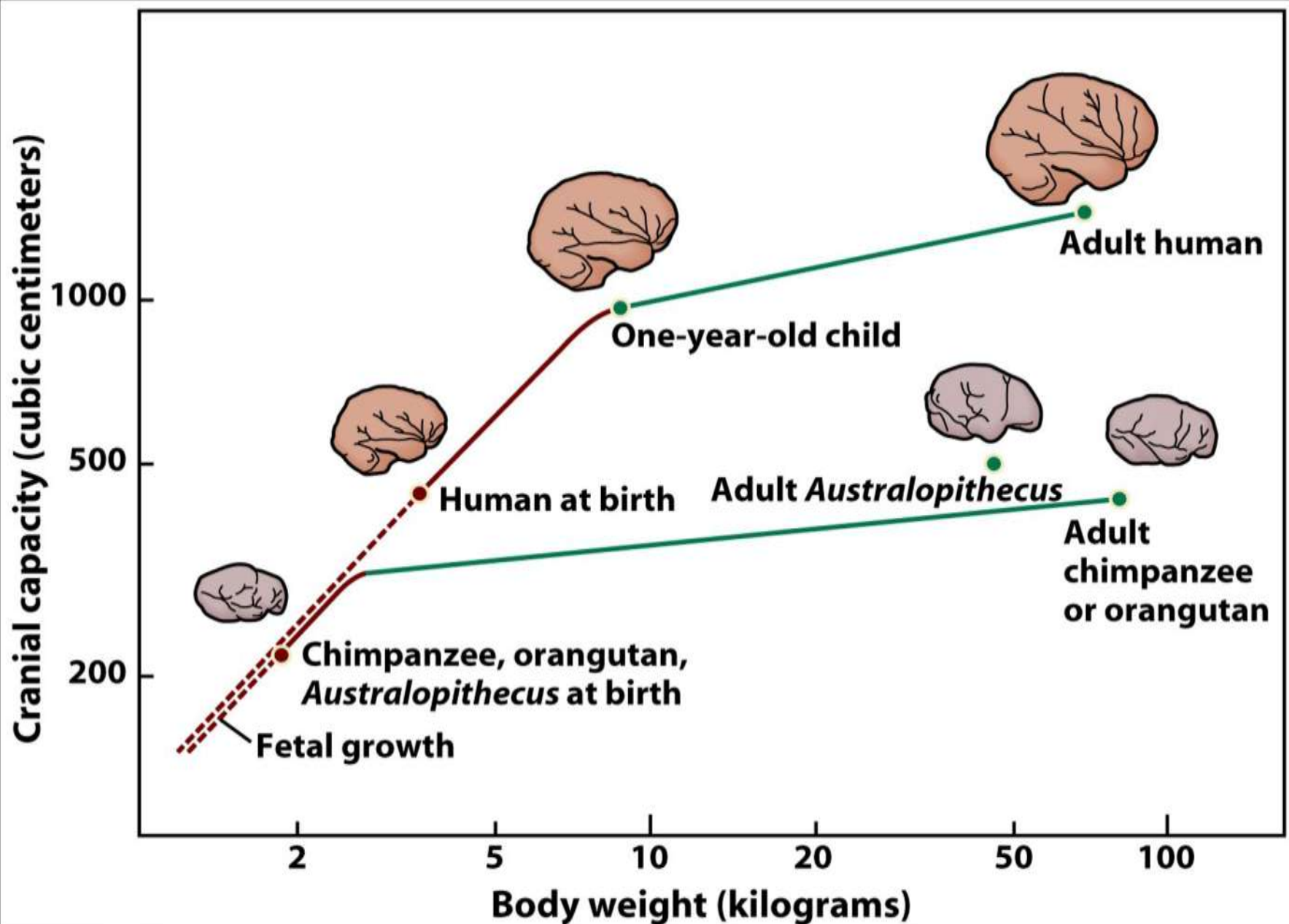


Chimp



Homo sapiens



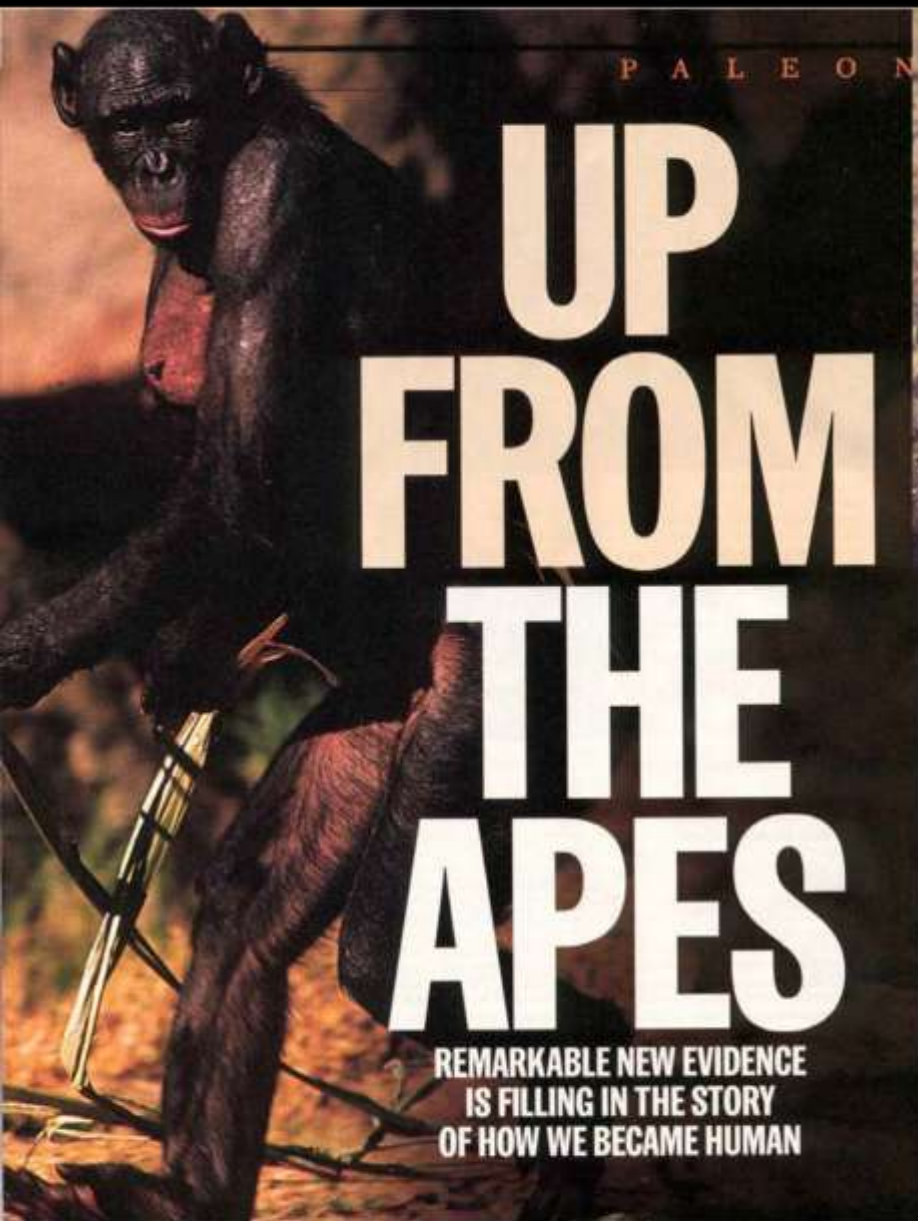


Consequences of Neoteny

- Large brain and cranium
- Small jaws and teeth with small face
- Retention of juvenile growth patterns
- Long juvenile period = extended learning
- Retardation of onset of puberty
- Longer life span
- Naked skin

Human babies are weaker and more helpless than newborn apes.



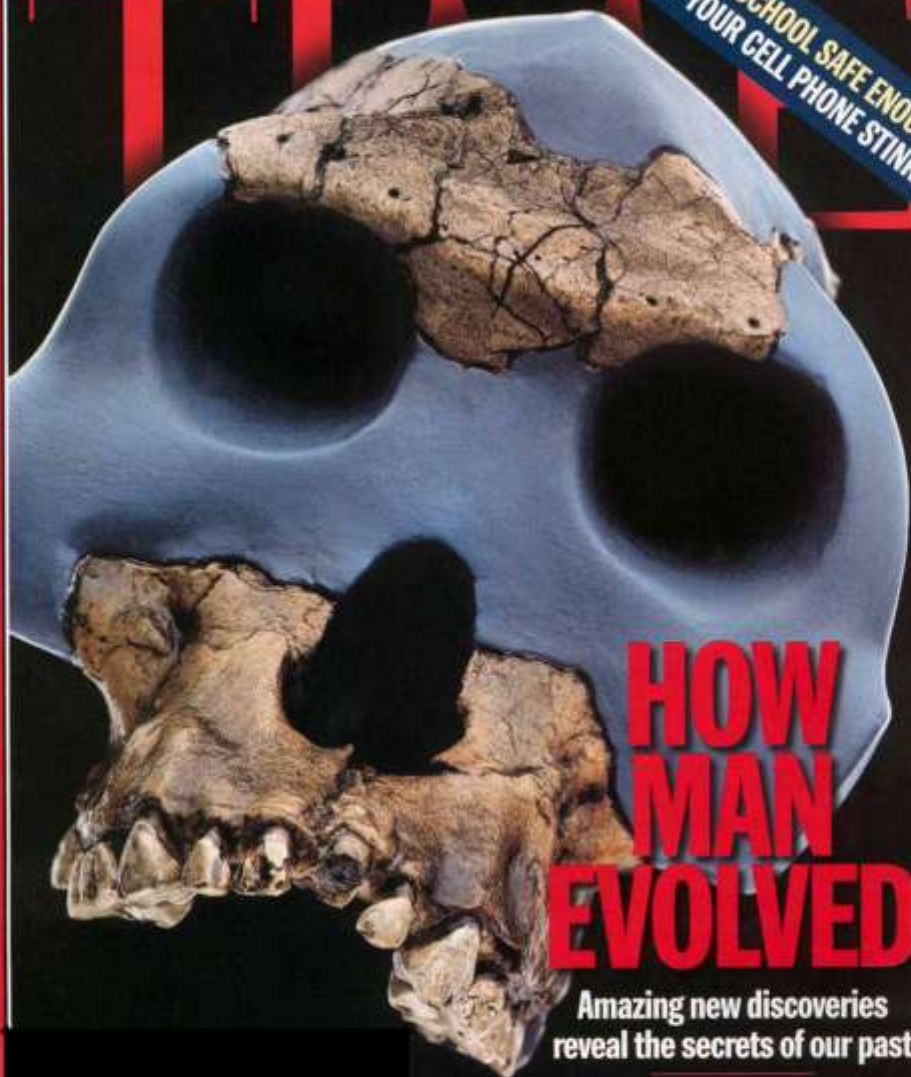


Bonobos: *Pan paniscus*

AUGUST 23, 1999 \$3.50

www.fox.com

IS YOUR SCHOOL SAFE ENOUGH?
WHY YOUR CELL PHONE STINKS



HOW MAN EVOLVED

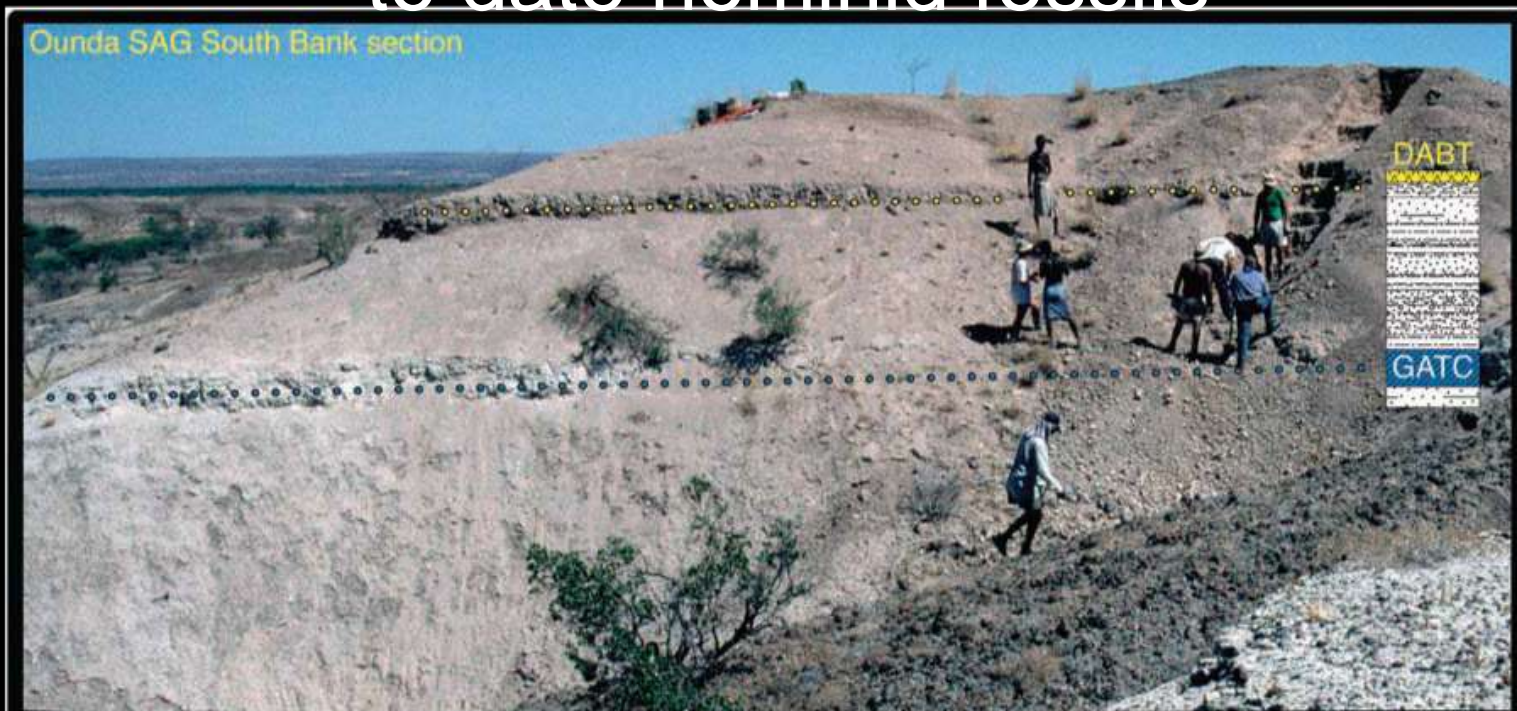
Amazing new discoveries
reveal the secrets of our past

Plus: Stephen Jay Gould
on the creationism wave

Collecting hominid fossils in East Africa



Using Stratigraphy and Radiometric Dating to date hominid fossils



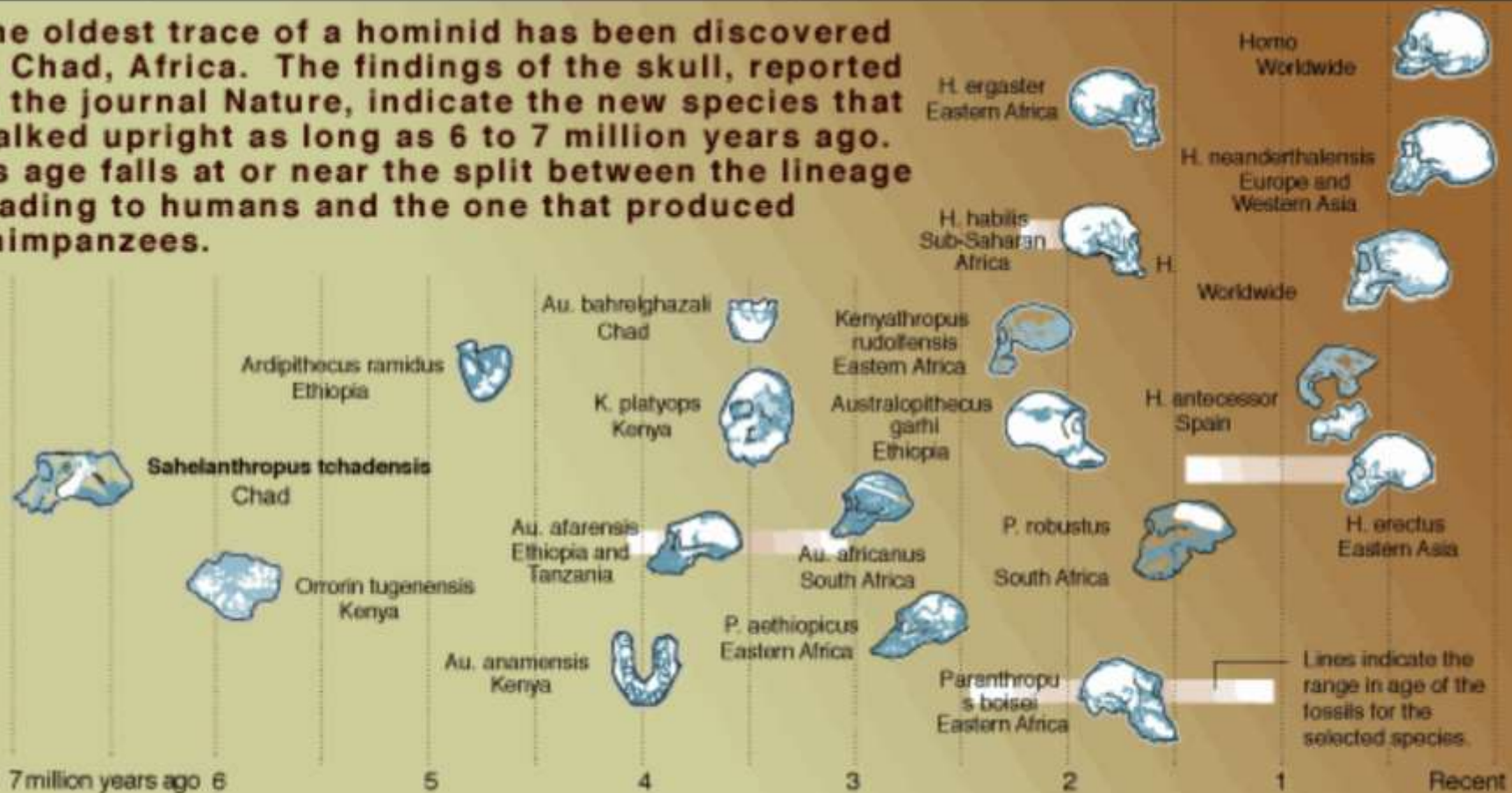
A Hominid Jawbone in Ethiopia

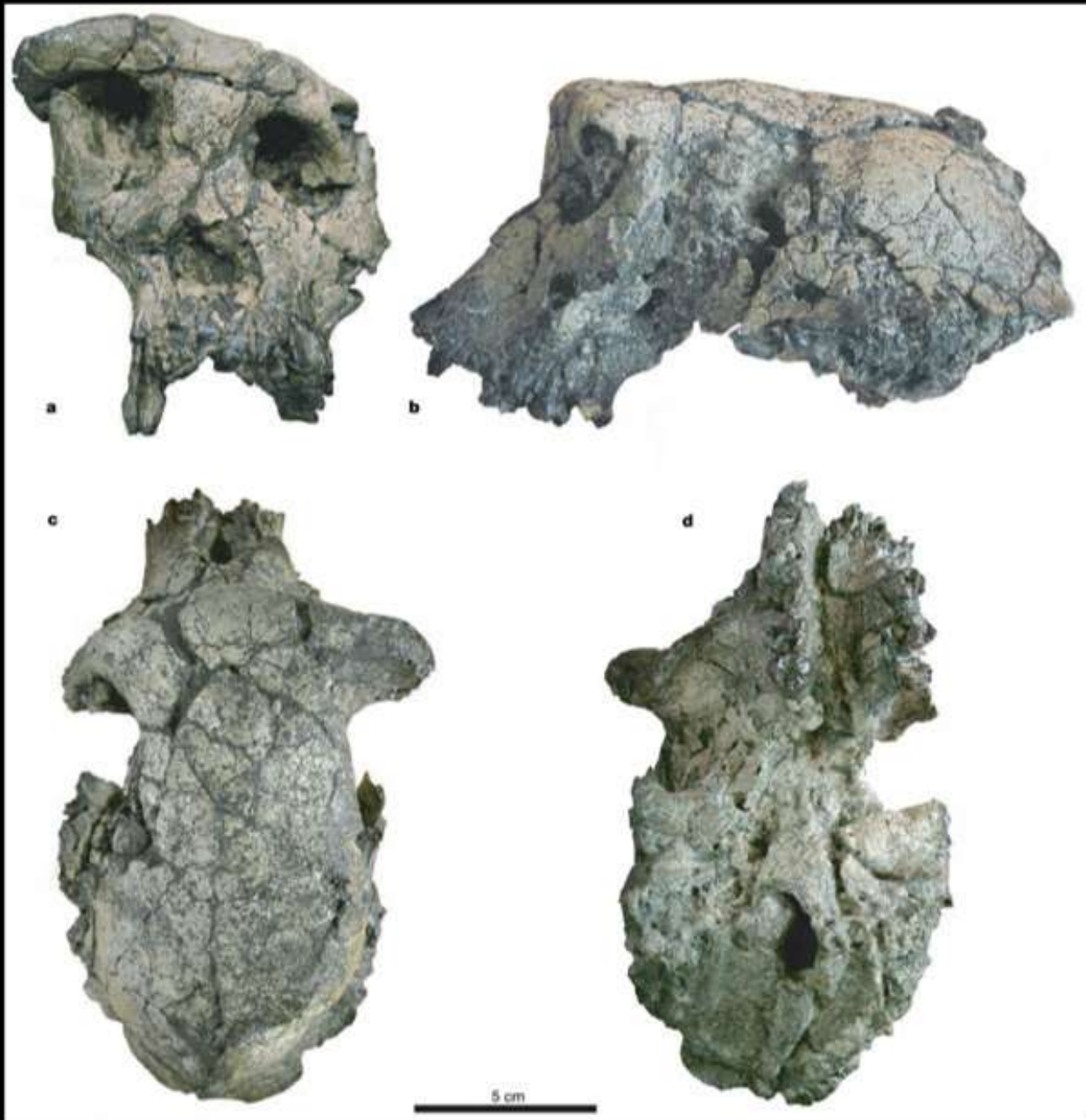




Sahelanthropus tchadensis, 6.5 MY old

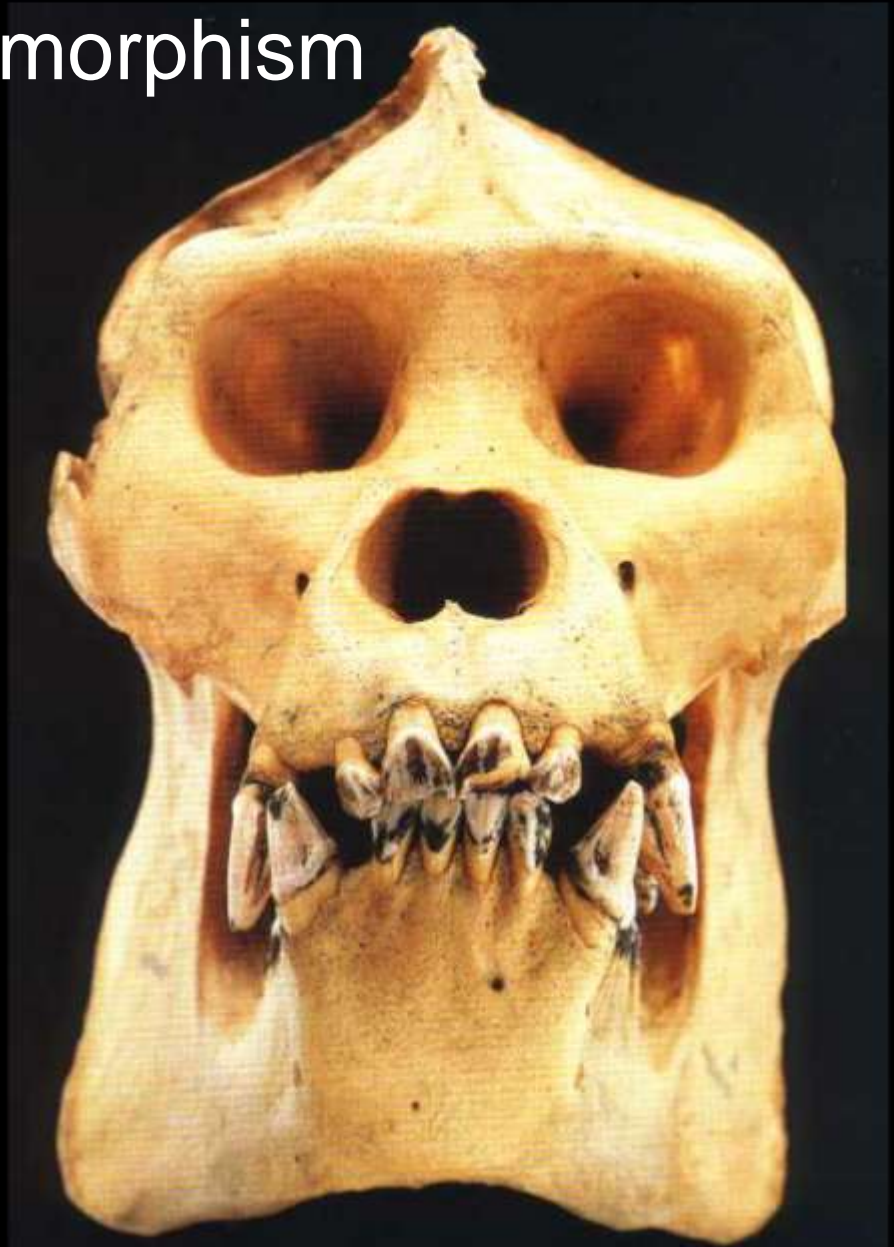
The oldest trace of a hominid has been discovered in Chad, Africa. The findings of the skull, reported in the journal *Nature*, indicate the new species that walked upright as long as 6 to 7 million years ago. Its age falls at or near the split between the lineage leading to humans and the one that produced chimpanzees.





*Sahelanthropus
tchadensis*,
6.5 MY old
Is it a female
gorilla?

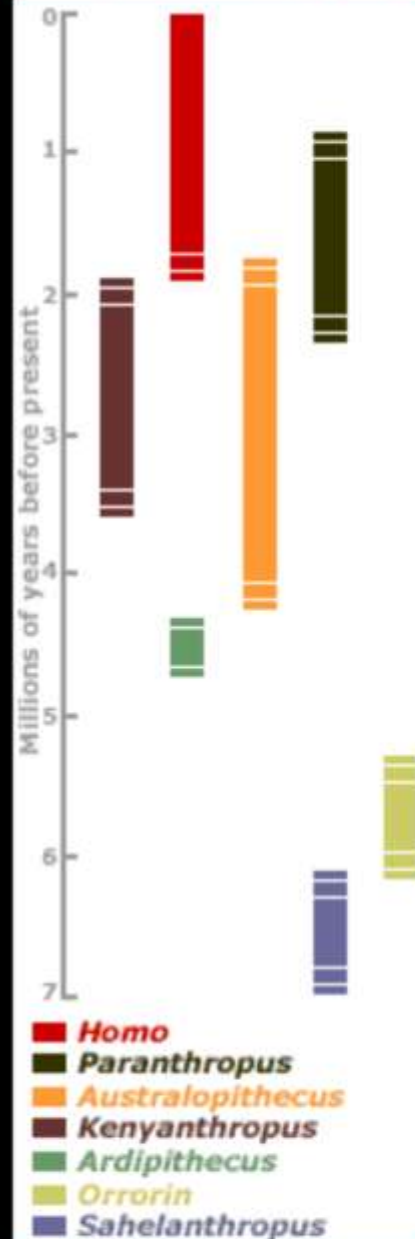
Gorilla – female on left, male on right; note the sexual dimorphism





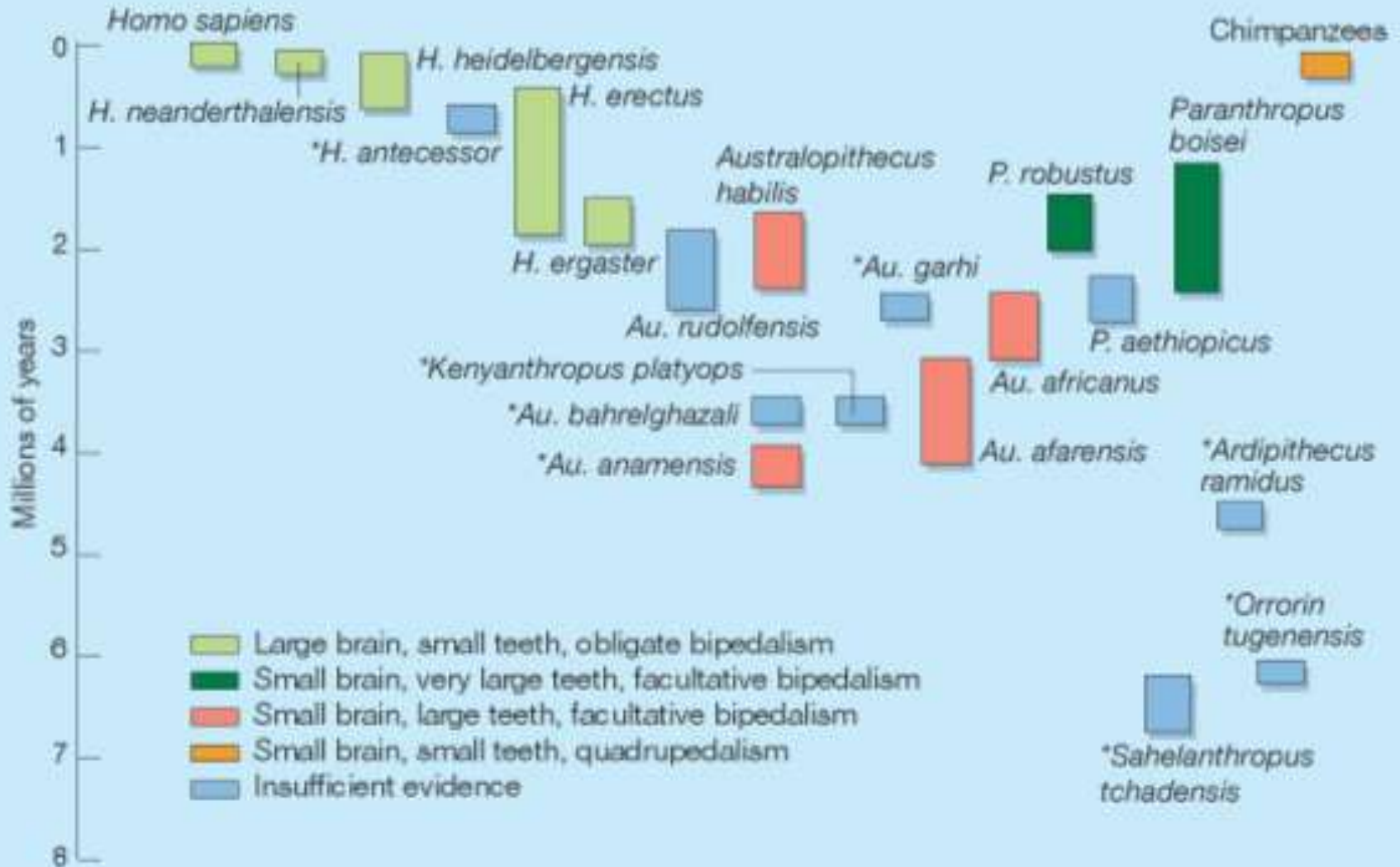
*Sahelanthropus
tchadensis*, 6.5 MY old.
Hominin or not?

Complex hominid tree

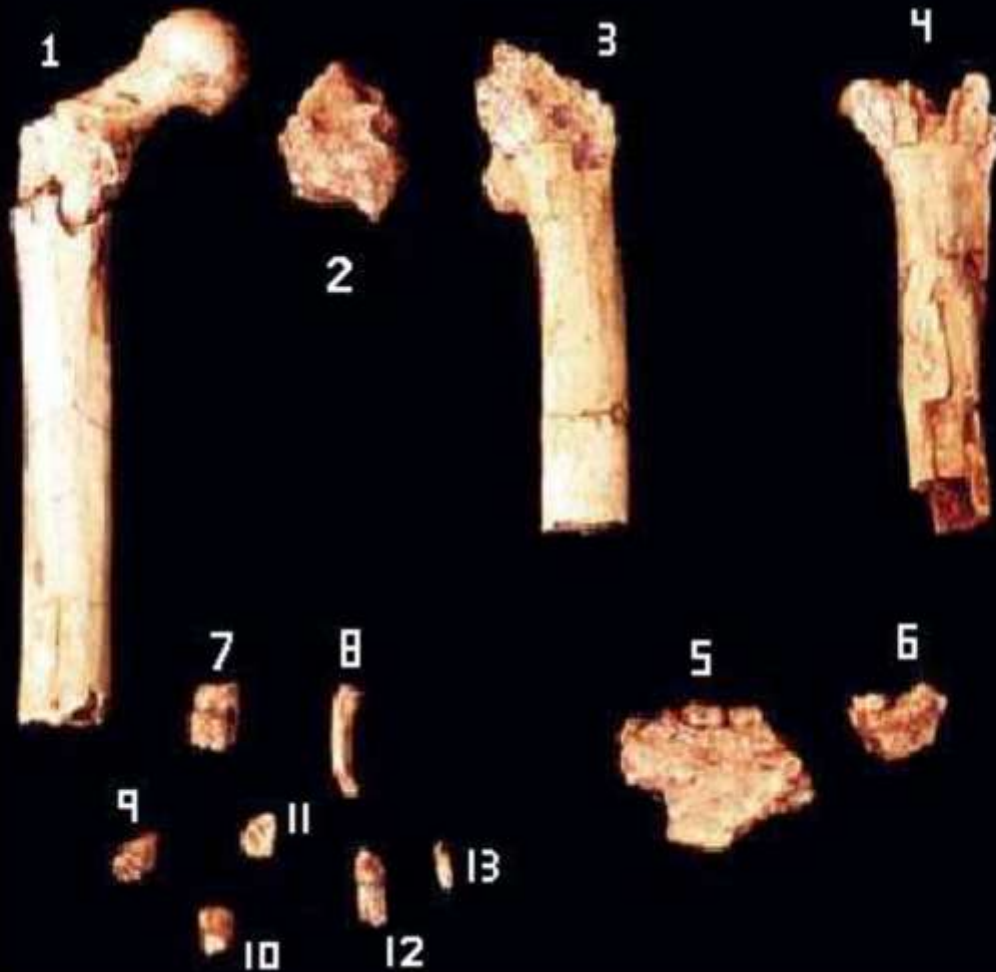


Scientists are having difficulty working out how the different hominids relate to each other.

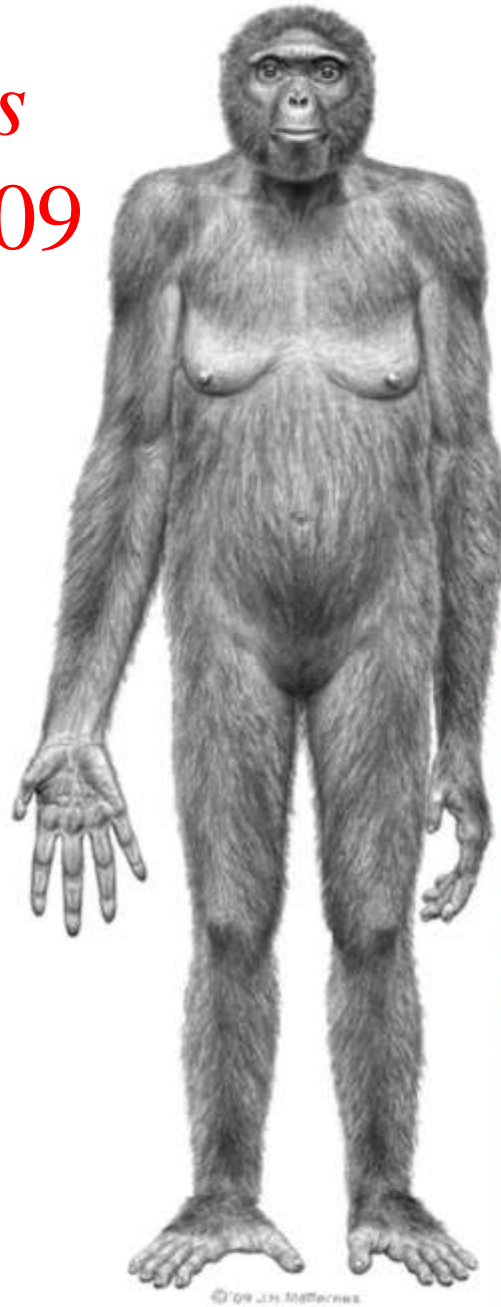
Hominin Record, 2002

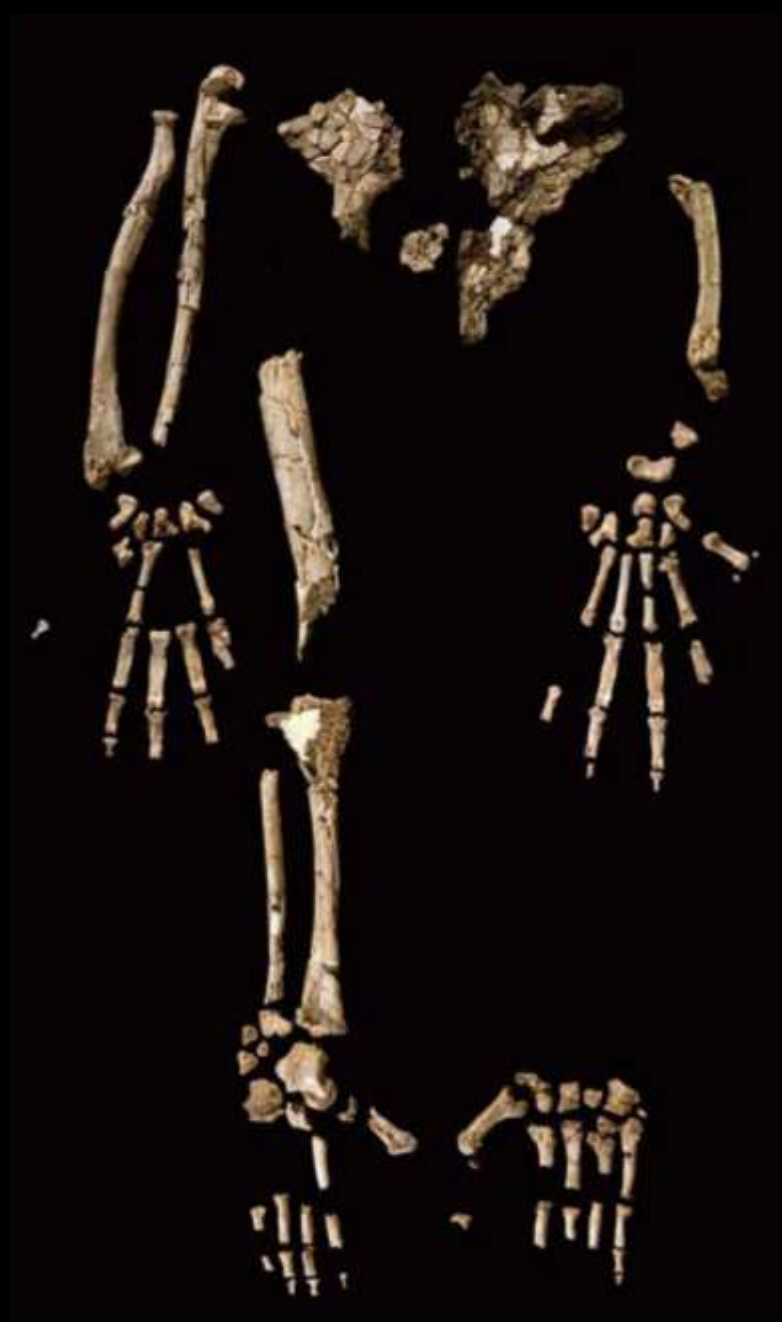


Orrorin tugenensis – the sum total of specimens



*Ardipithecus
ramidus*, 2009





Ardipithecus ramidus, 2009



Hand



Foot

NGM.COM | JULY 2010

NATIONAL GEOGRAPHIC

4 Million Year Old Woman

ARDIPITHECUS RAMIDUS,
OLDEST HOMINID SKELETON



BIRDS THAT DECORATE 68

PAKISTAN'S TROUBLED HEARTLAND 82

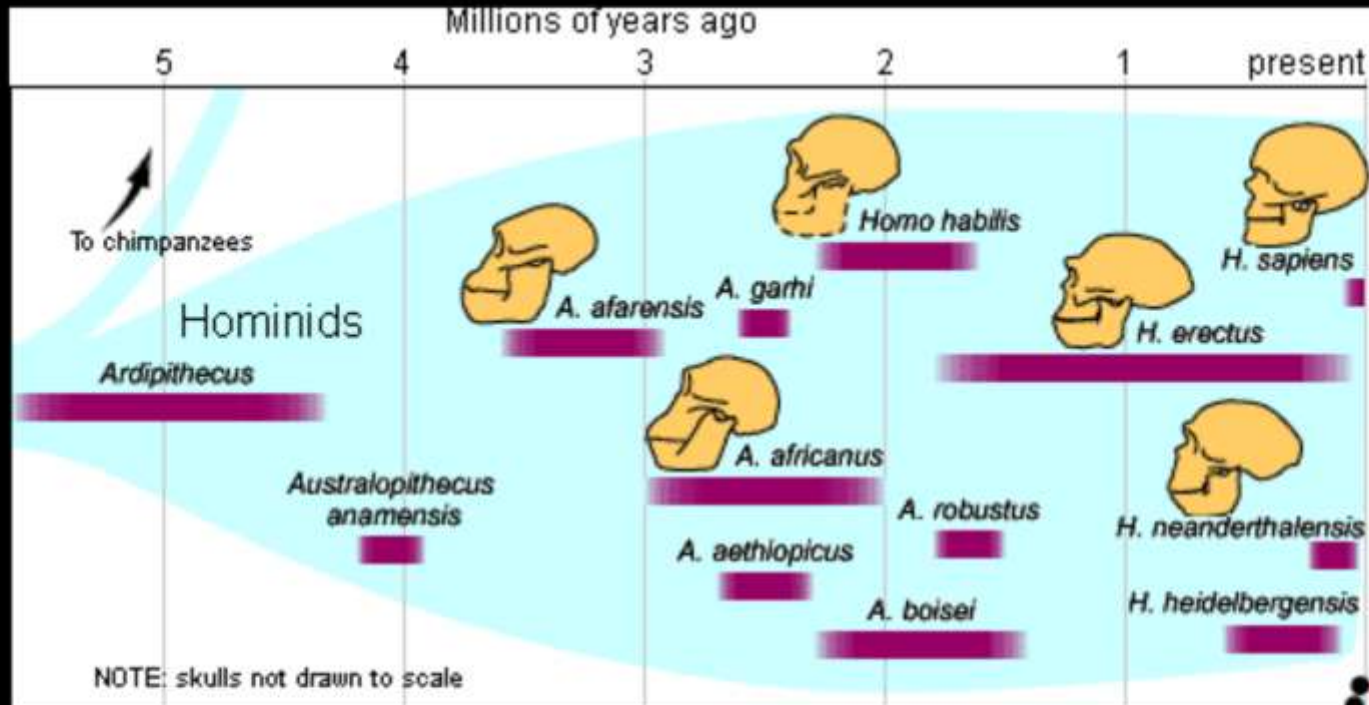
ENCHANTED BRAZILIAN DUNES 108

THE 21ST-CENTURY GRID 118

*Ardipithecus
ramidus*

Digitally
Reconstructed
Skull from
Broken Pieces
using
Computed
Tomography

Ardipithecus is now thought to be the oldest definite hominin/hominid



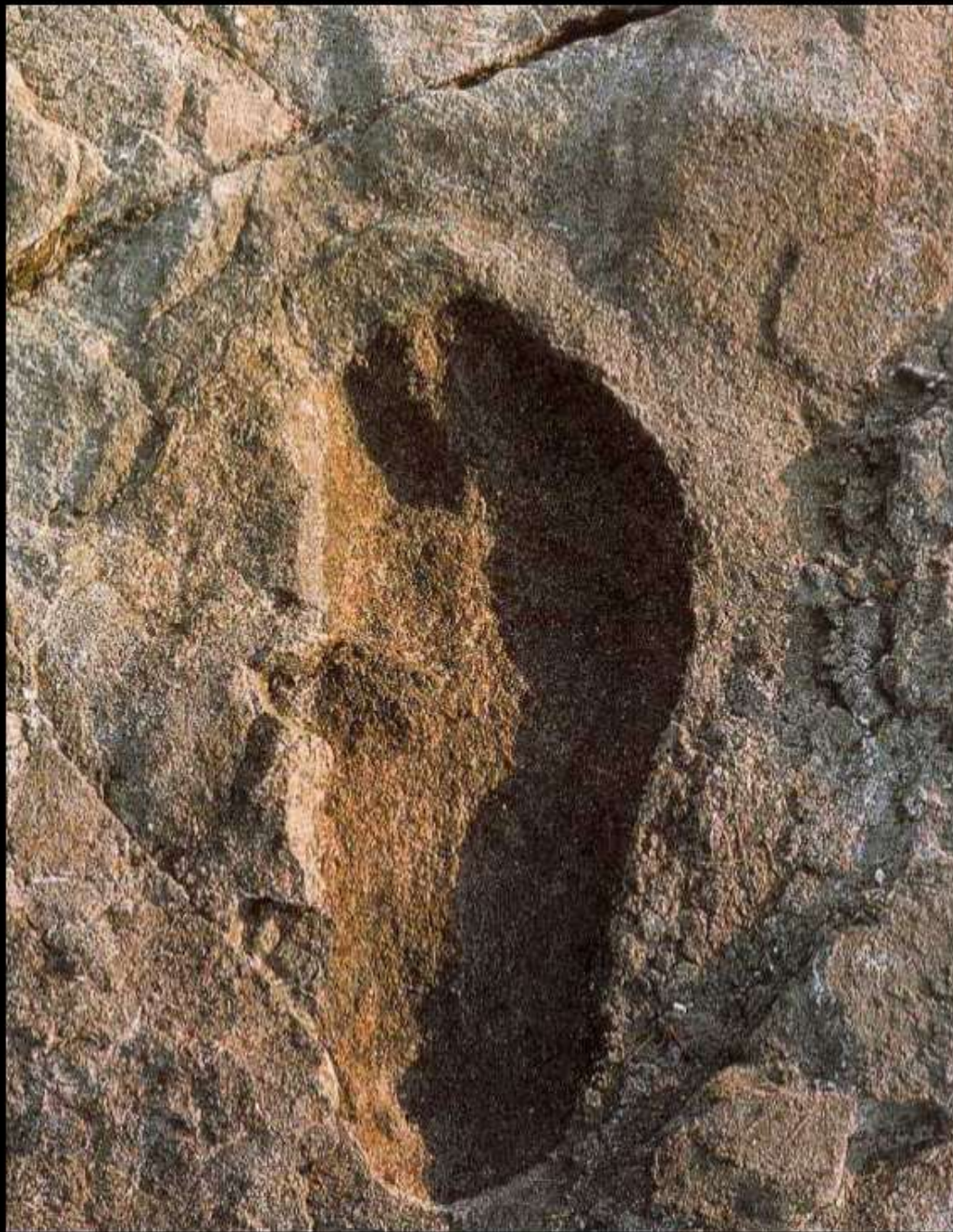
Australopithecus anamensis



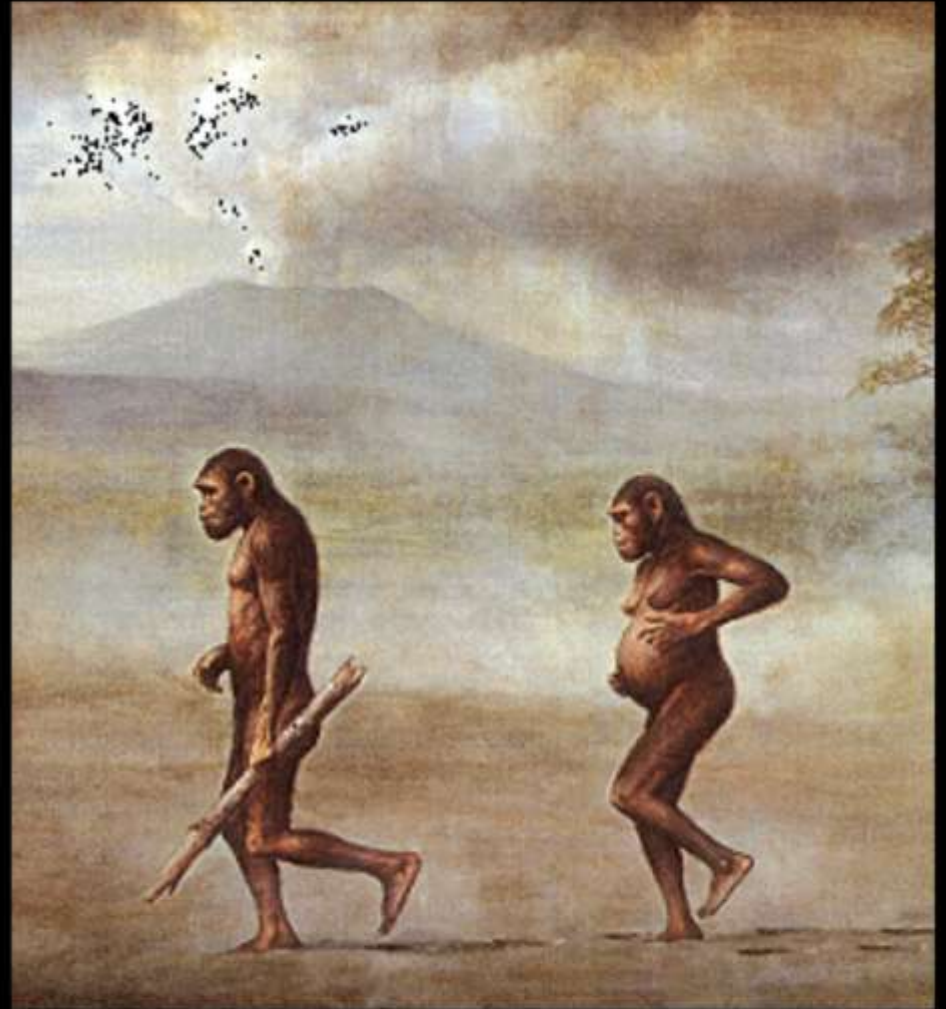
Bipedal Footprints of *Australopithecus* in
Lithified Volcanic Ash 4 MY old from
Tanzania. Found by Mary Leakey.







Australopithecus
couple making
footprints in
volcanic ash



Jawbones of *Australopithecus afarensis*



Fossil remains
of “Lucy”, the
most complete
specimen of
Australopithecus
afarensis.



Adult skulls, *A. afarensis*



Pelvis of *Australopithecus afarensis*



Reconstruction of *Australopithecus* *afarensis*



Figure 19-43
Earth System History, Second Edition
© 2005 W. H. Freeman and Company



A scientist holds a skull named "Selam" of *A. afarensis* discovered in Ethiopia in 2006. A 3.3 million-year-old skeleton of the earliest child ever found shows the ancient ancestor of modern humans walked upright but may have also climbed trees, scientists said.

Face-to-face
with
A. afarensis.



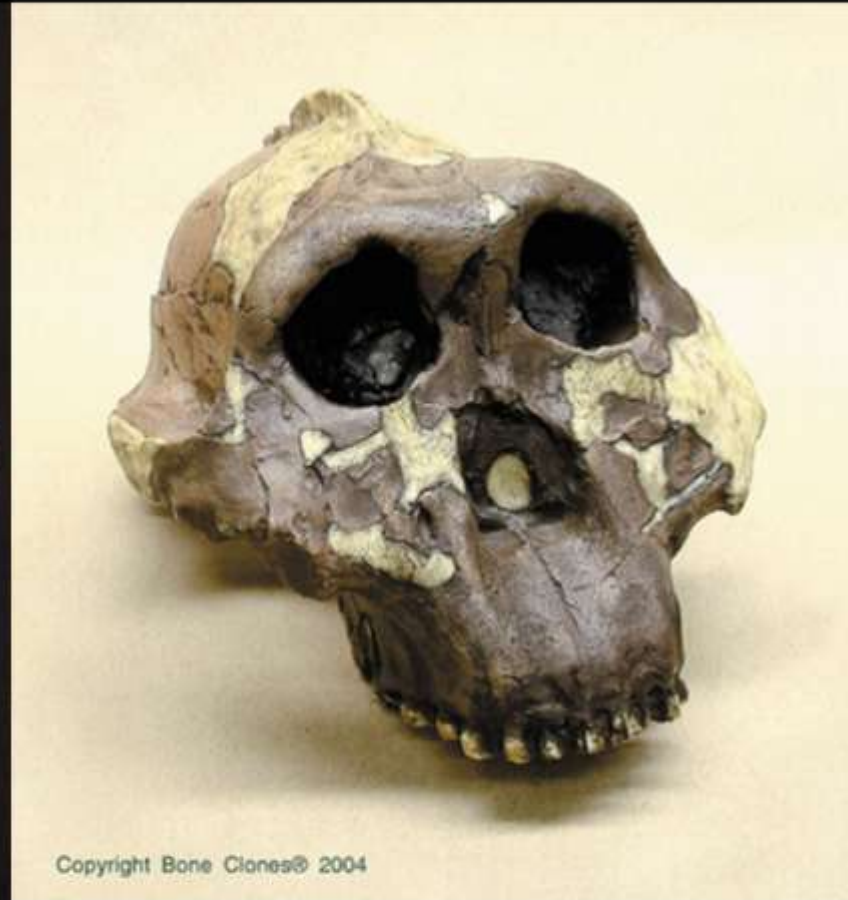
The Taung Child, *A. africanus*



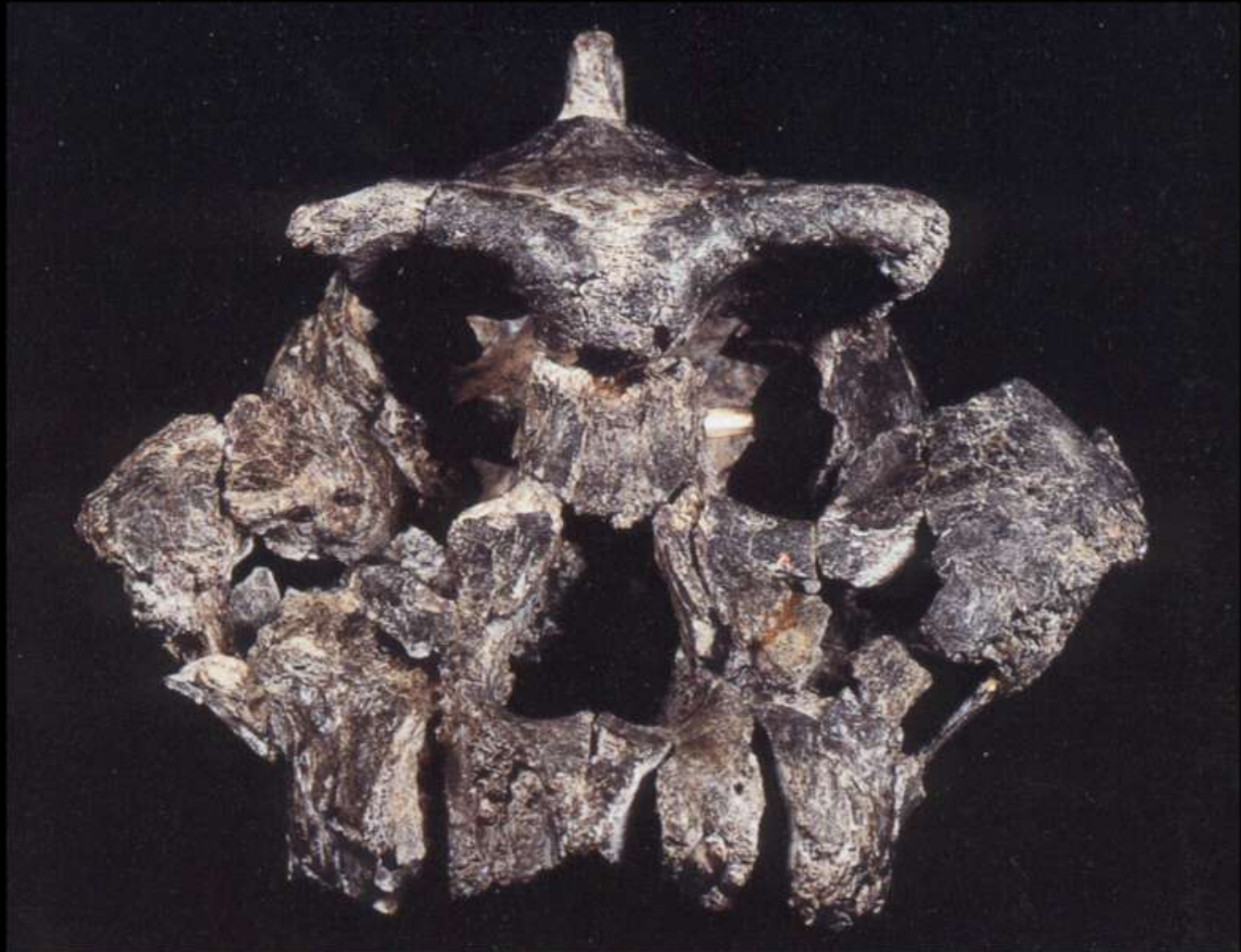
Australopithecus africanus adult



Skull of *Paranthropus boisei*



Paranthropus aethiopicus



Paranthropus aethiopicus





Justus Erus
found the
fossil

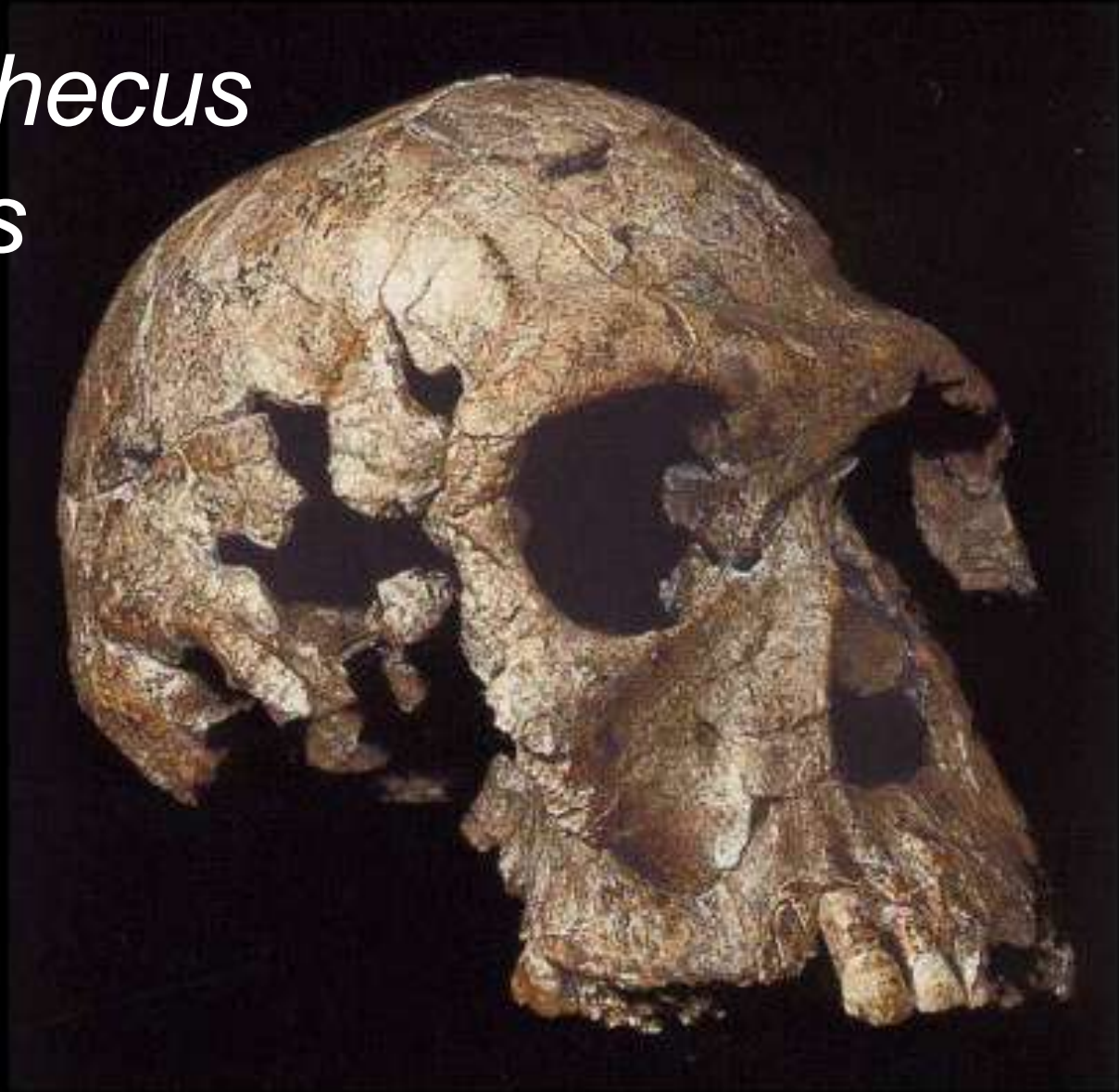
*Kenyanthropus
platyops*, 3.5 MY
old from Kenya



Homo rudolfensis or
Kenyanthropus? rudolfensis



Skull of *Homo* or
Australopithecus
habilis

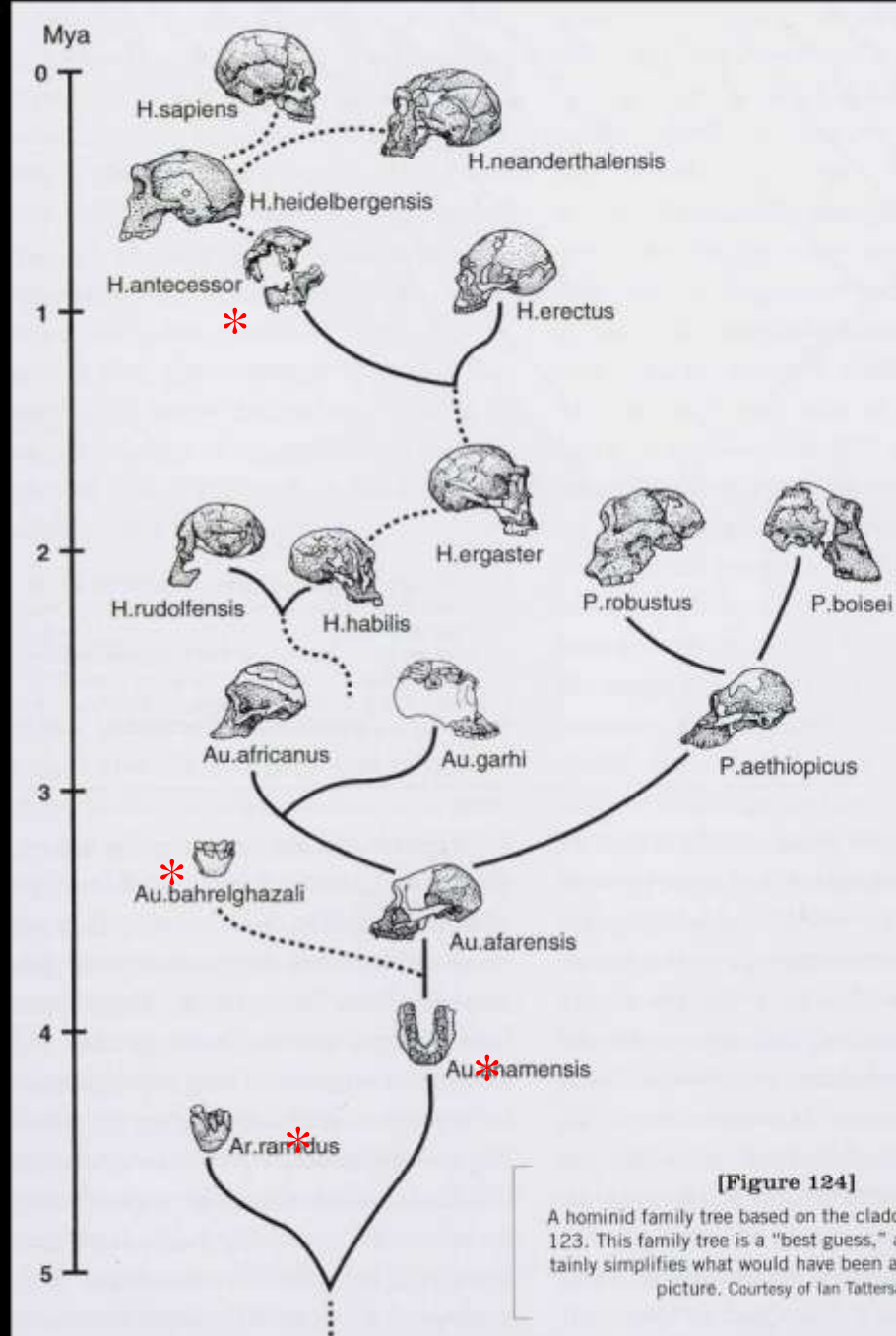


H. rudolfensis,
H. habilis, and
P. boisei.
Hominids in
East Africa
around 2
MY ago.



Phylogeny 2000

* Poorly known

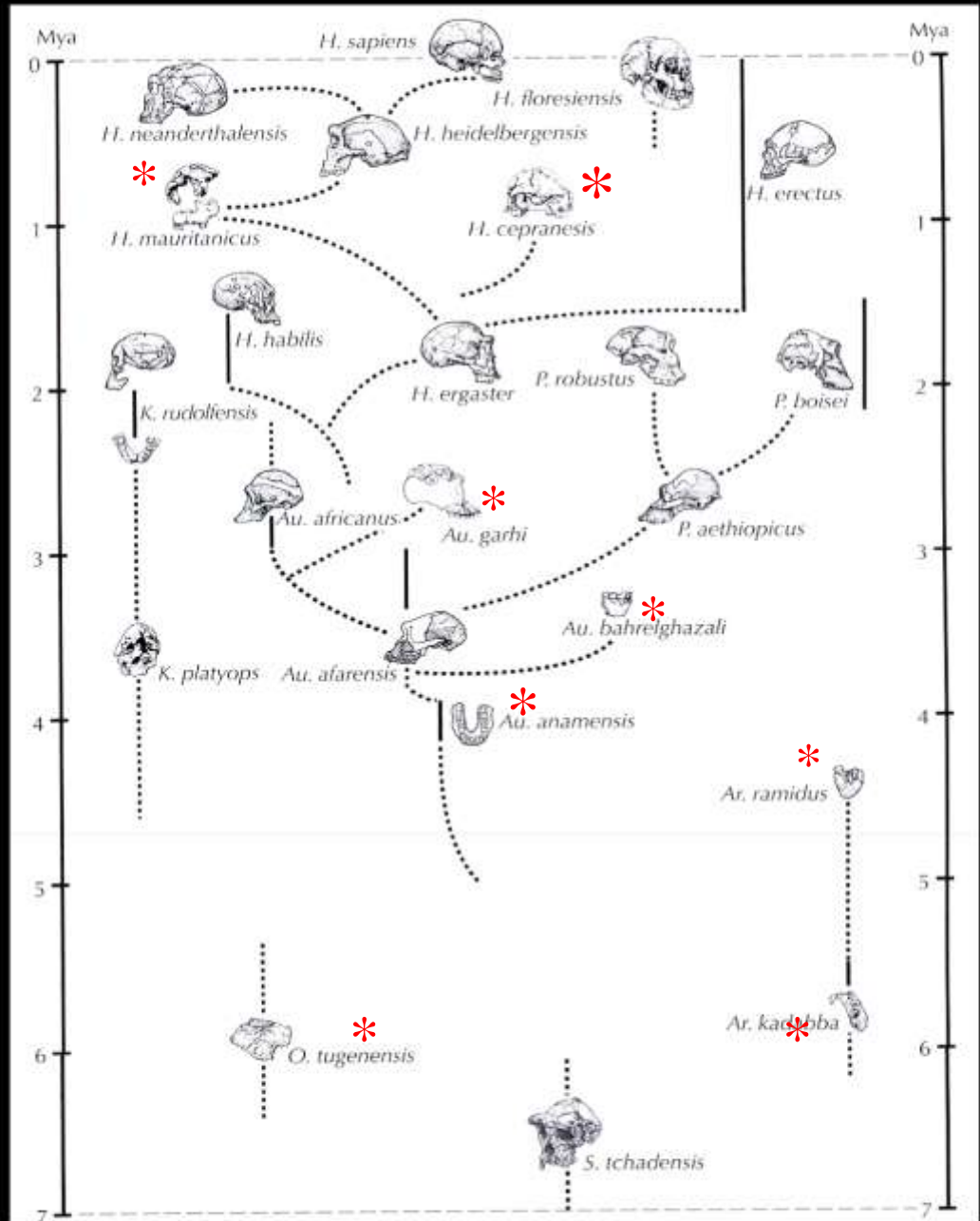


[Figure 124]

A hominid family tree based on the cladogram in Figure 123. This family tree is a "best guess," and almost certainly simplifies what would have been a more complex picture. Courtesy of Ian Tattersall.

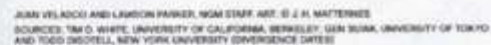
Phylogeny 2007

* Poorly known



The record of our lineage in Africa now extends back over six million years. The Middle Awash of Ethiopia has yielded fossils of all three major phases in hominid evolution—*Ardipithecus*, *Australopithecus*, and *Homo*.

The record of our lineage in Africa now extends back over six million years. The Middle Awash of Ethiopia has yielded fossils of all three major phases in hominid evolution—*Ardipithecus*, *Australopithecus*, and *Homo*.



2010

3
M.Y.A.

Au. africanus
Southern Africa

Eastern Africa
EARLIEST
STONE TOOLS



Australopithecus

- Striding terrestrial biped
- Large chewing teeth
- Wide environmental niche
- Pan-Africa range

Au. afarensis
"Lucy"
Eastern Africa

Au. afarensis

4
M.Y.A.

Au. anamensis
Eastern Africa

Au. anamensis

5
M.Y.A.

Ar. ramidus
Eastern Africa



Ar. ramidus
"Ardi"

Ardipithecus

- Quadruped in trees, biped on ground
- Small canines in both males and females
- Woodland omnivore
- Restricted eastern Africa range

Ar. kadabba

6
M.Y.A.

Orrorin tugenensis
Kenya

Sahelanthropus tchadensis
Chad

DATES OF DIVERGENCE
OF HUMANS FROM
LIVING APE SPECIES**

8-6
MILLION
YEARS AGO
(M.Y.A.)
CHIMPS

11-8 M.Y.A.
GORILLAS

20-14 M.Y.A.
ORANGUTANS

Last
common
ancestor with
chimpanzees

*Average female body size shown.

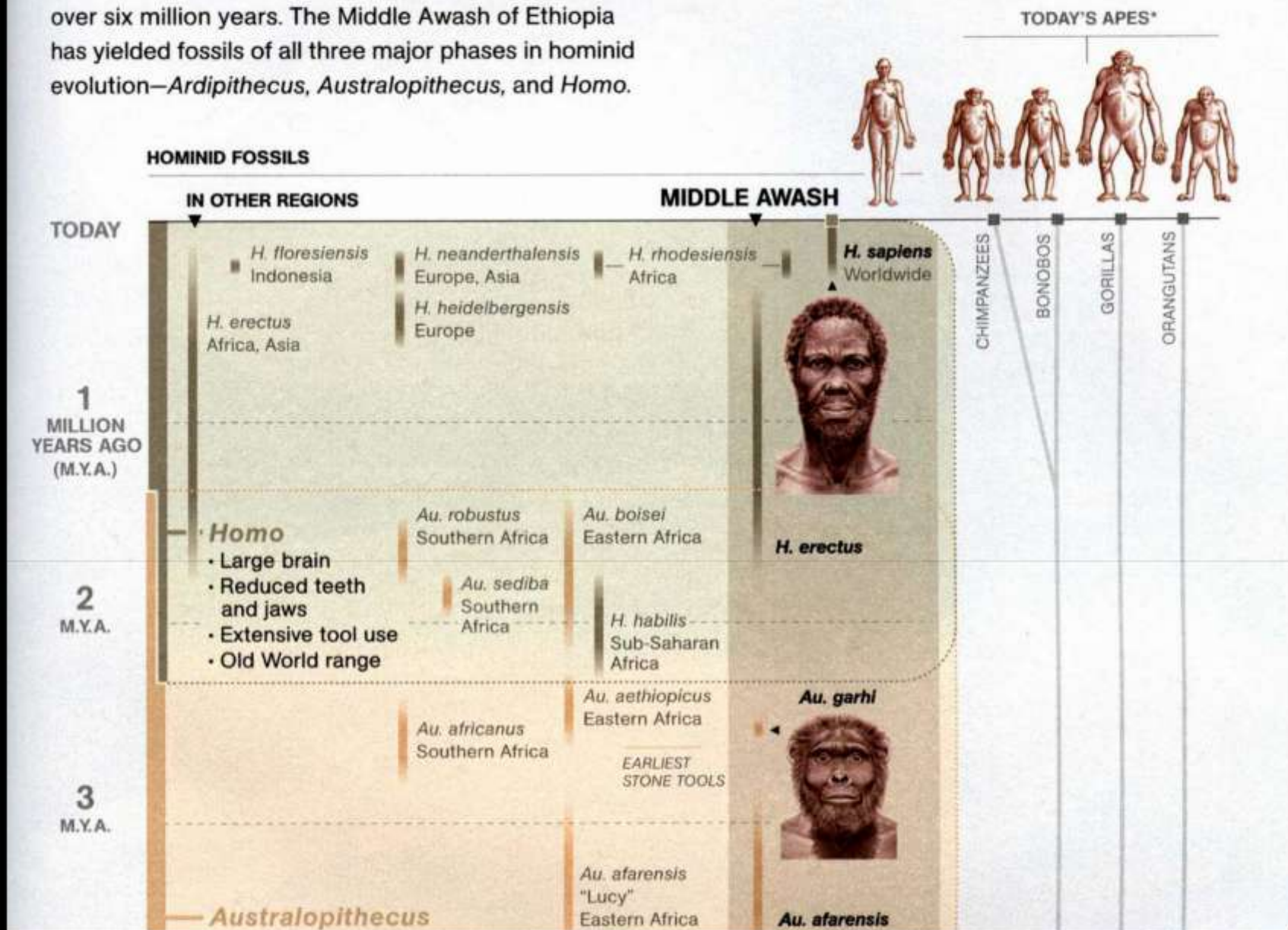
**Recent molecular studies support the more recent dates within each range.

JUAN VELASCO AND LAWSON PARKER, NGM STAFF. ART: © J. H. MATTARNES

SOURCES: TIM D. WHITE, UNIVERSITY OF CALIFORNIA, BERKELEY; GEN SUWA, UNIVERSITY OF TOKYO
AND TODD DISOTELL, NEW YORK UNIVERSITY (DIVERGENCE DATES)

THE HUMAN FAMILY

The record of our lineage in Africa now extends back over six million years. The Middle Awash of Ethiopia has yielded fossils of all three major phases in hominid evolution—*Ardipithecus*, *Australopithecus*, and *Homo*.



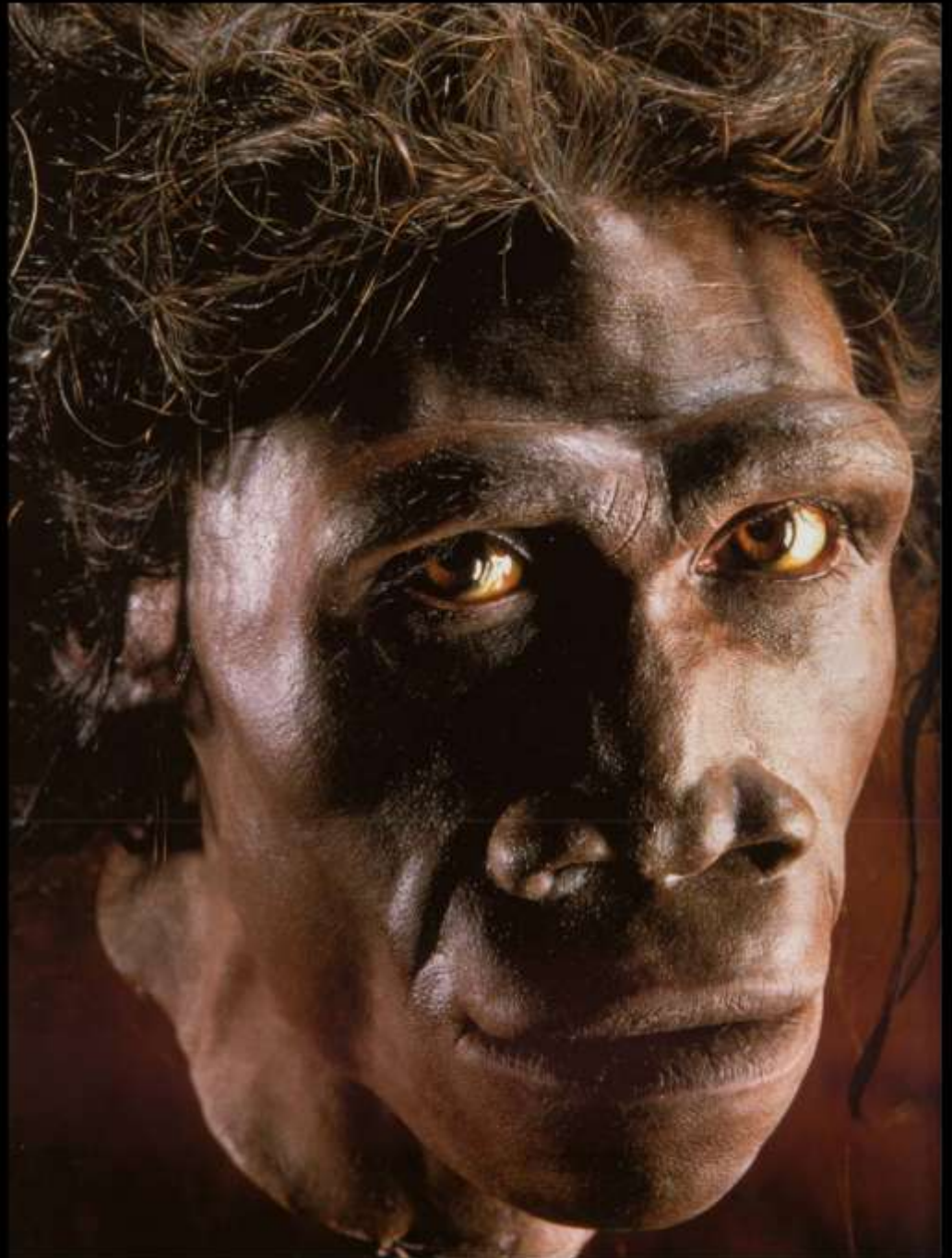
Skeleton of
Homo ergaster,
Turkana Boy
from Kenya



H. ergaster skull of Turkana Boy



The face
of *Homo*
ergaster



Skull of *Homo erectus* from China



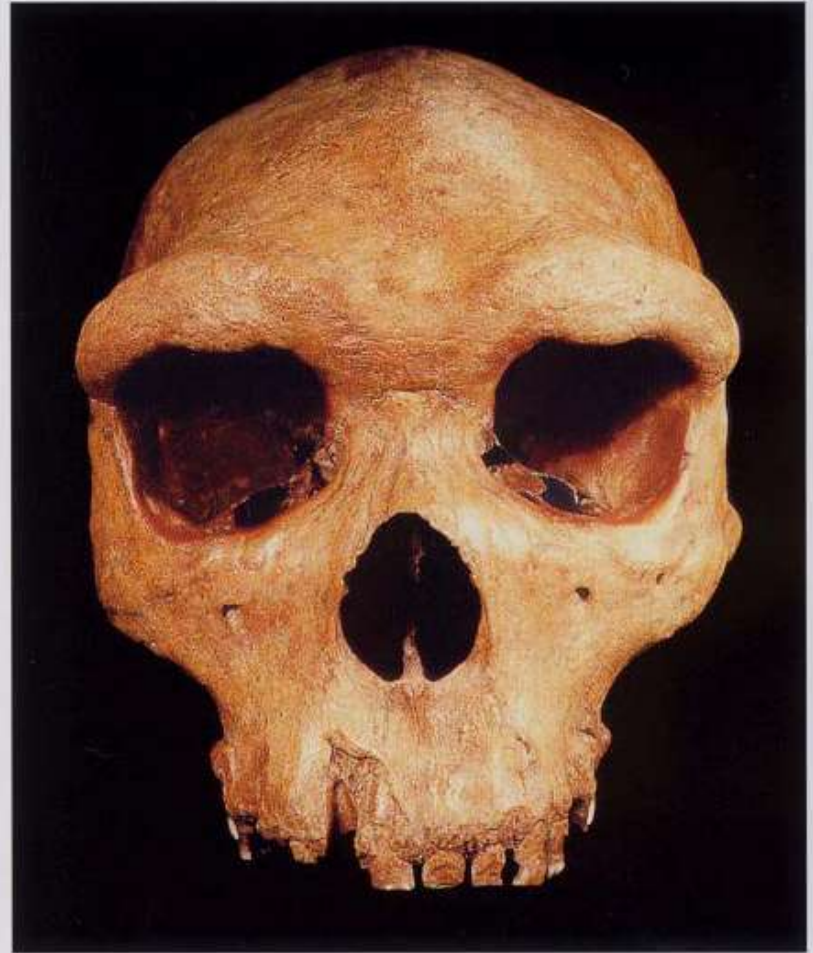
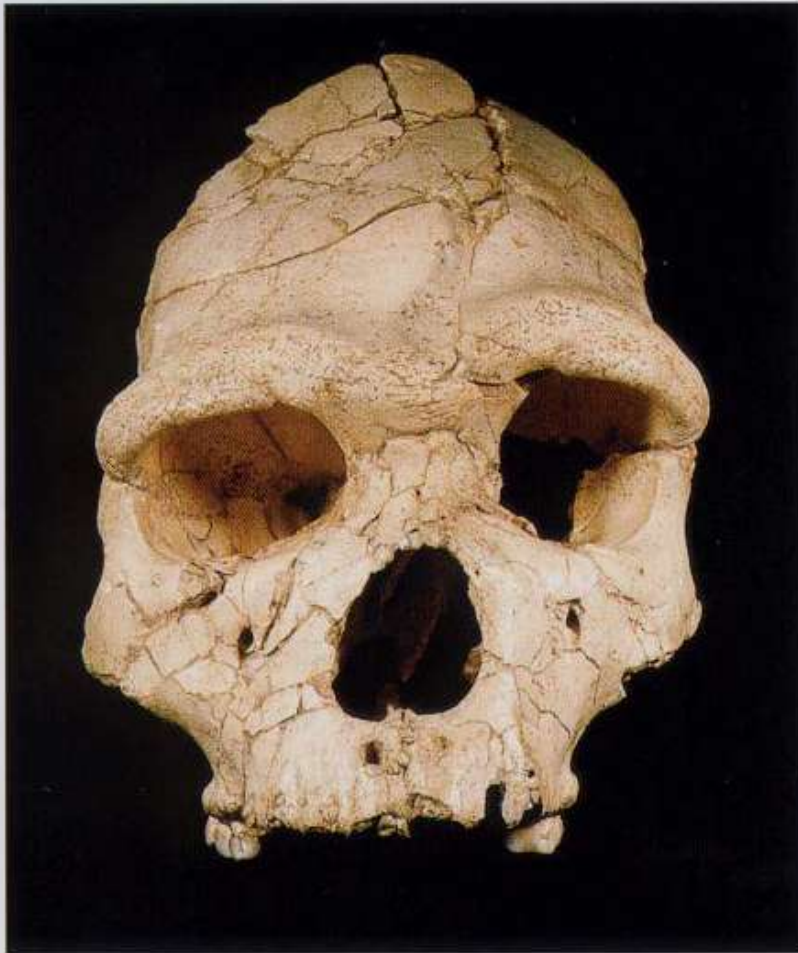
Homo erectus from
Indonesia, 700,000 years BP



Homo antecessor from
Spain, 800,000 years BP



Homo heidelbergensis,
500,000 years BP



Neanderthal
skull, Spain,
40,000 yrs BP



Neanderthal burial, Iraq, 50,000 yrs. BP



Neanderthal skeleton, Germany



*Homo
sapiens,*
Israel, 90,000
yrs BP

FYI: Abraham lived
only 4,000 yrs BP



Cro-Magnon man from France, 30,000 years old



Homo floresiensis, a hobbit-size human
from Flores Island, Indonesia, 18,000 BP



Modern human

Now, some Reconstructions
to help your imagination

A troop of
A. afarensis
feeding on
tubers in
the forest.

Bonobo



A. afarensis
family unit
crossing the
savannah.



Homo erectus using fire to sharpen spears



Homo neadertalensis leading a nomadic existence



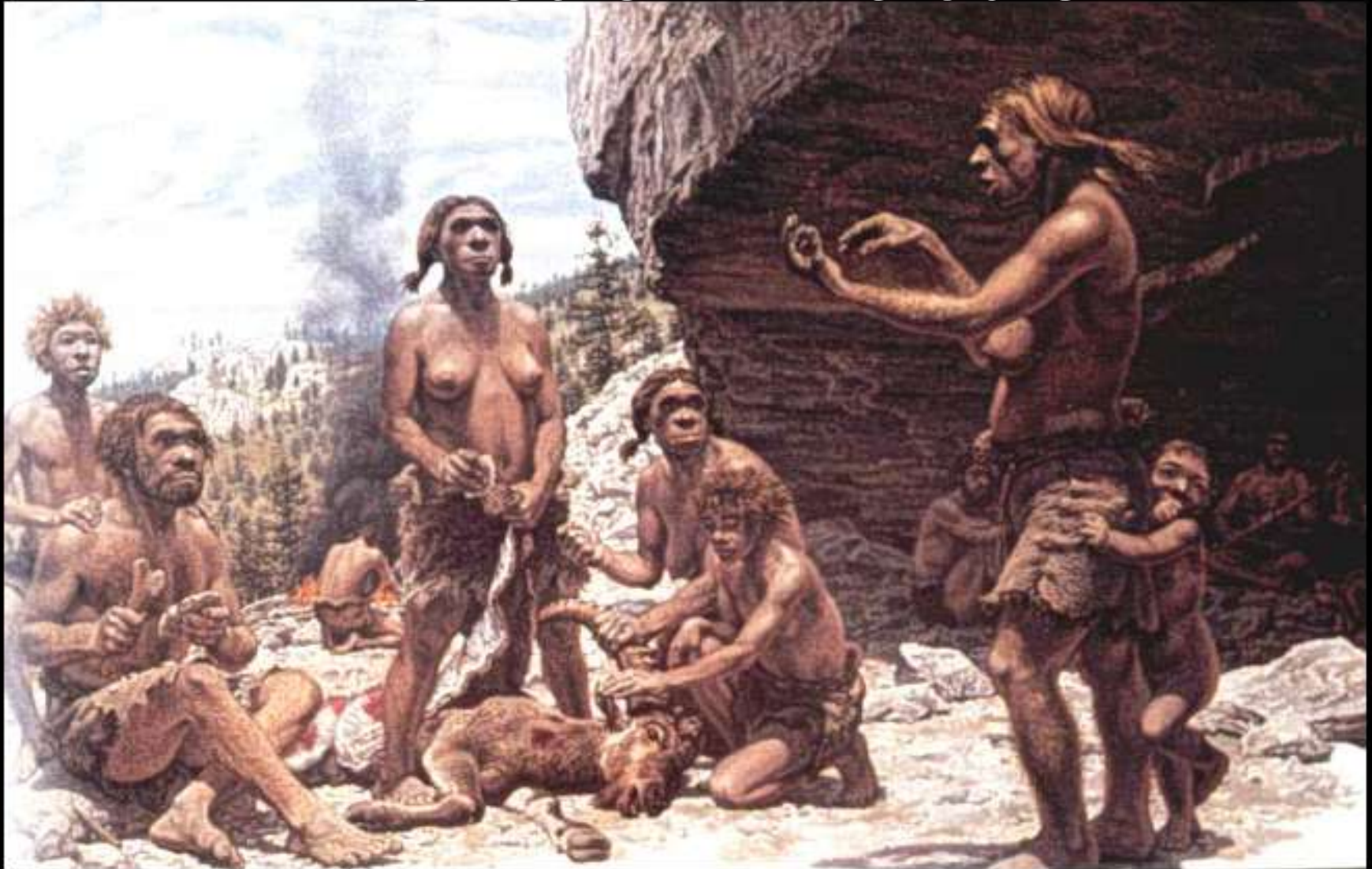
Neandertals were big-game hunters.



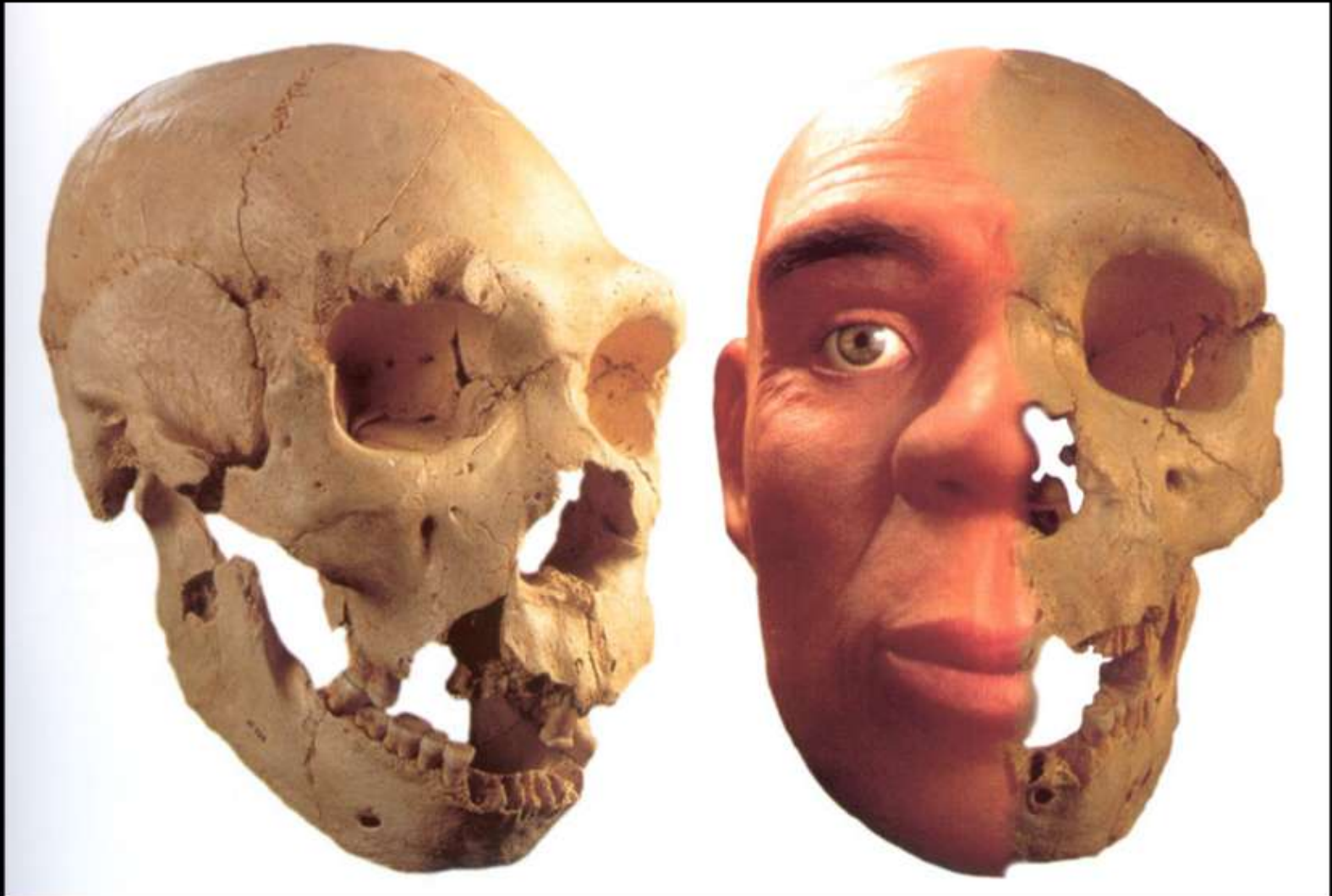
Neandertal night life around the fire.



A more modern view of Neandertals with naked skin like ours?



Fleshing out a Neanderthal skull



Reconstruction of Neanderthal child from Gibraltar, Spain, 30,000 years B.P.

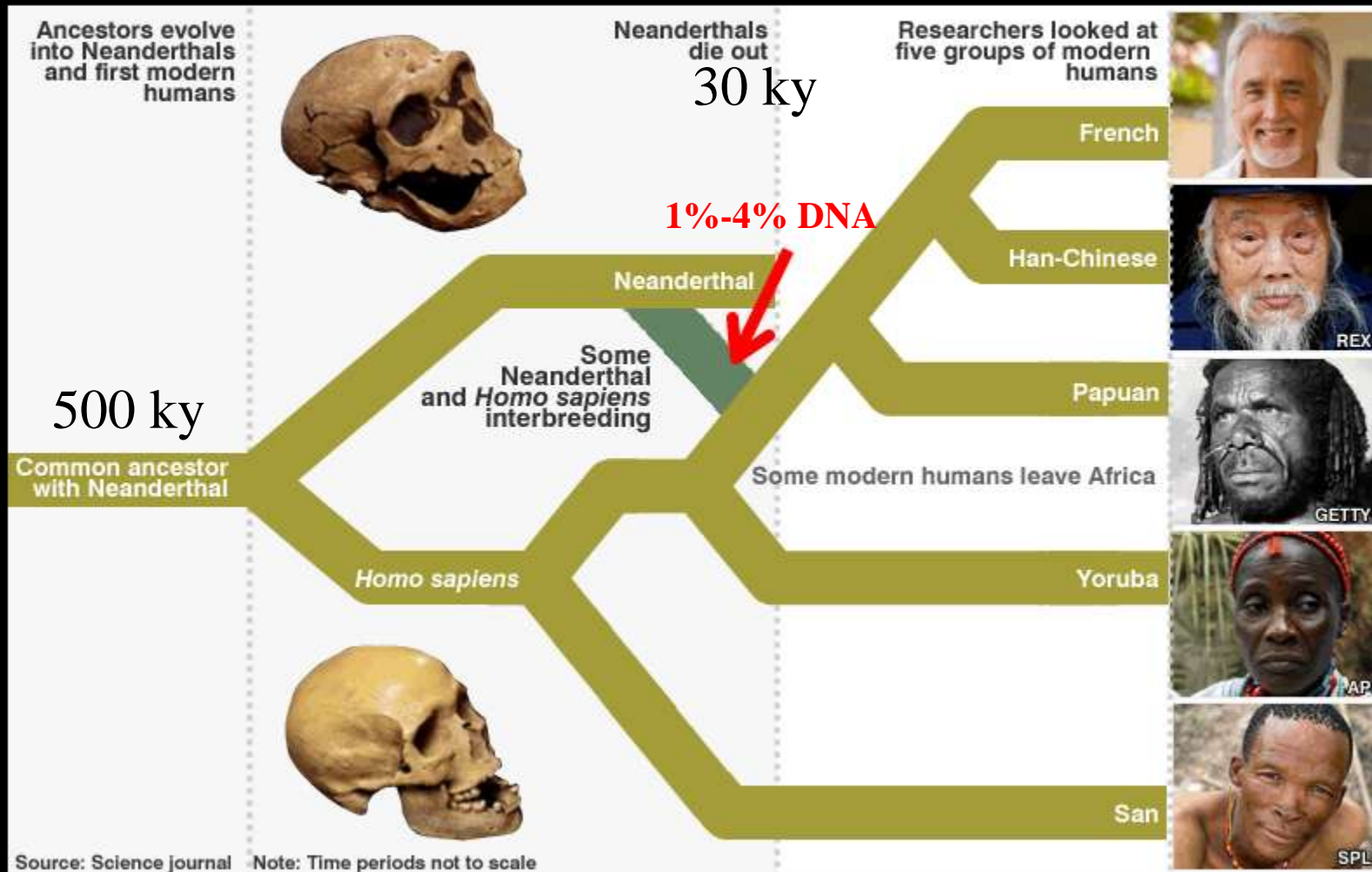


How scientists recreated Neanderthal man



<http://www.bbc.co.uk/news/science-environment-19960748>

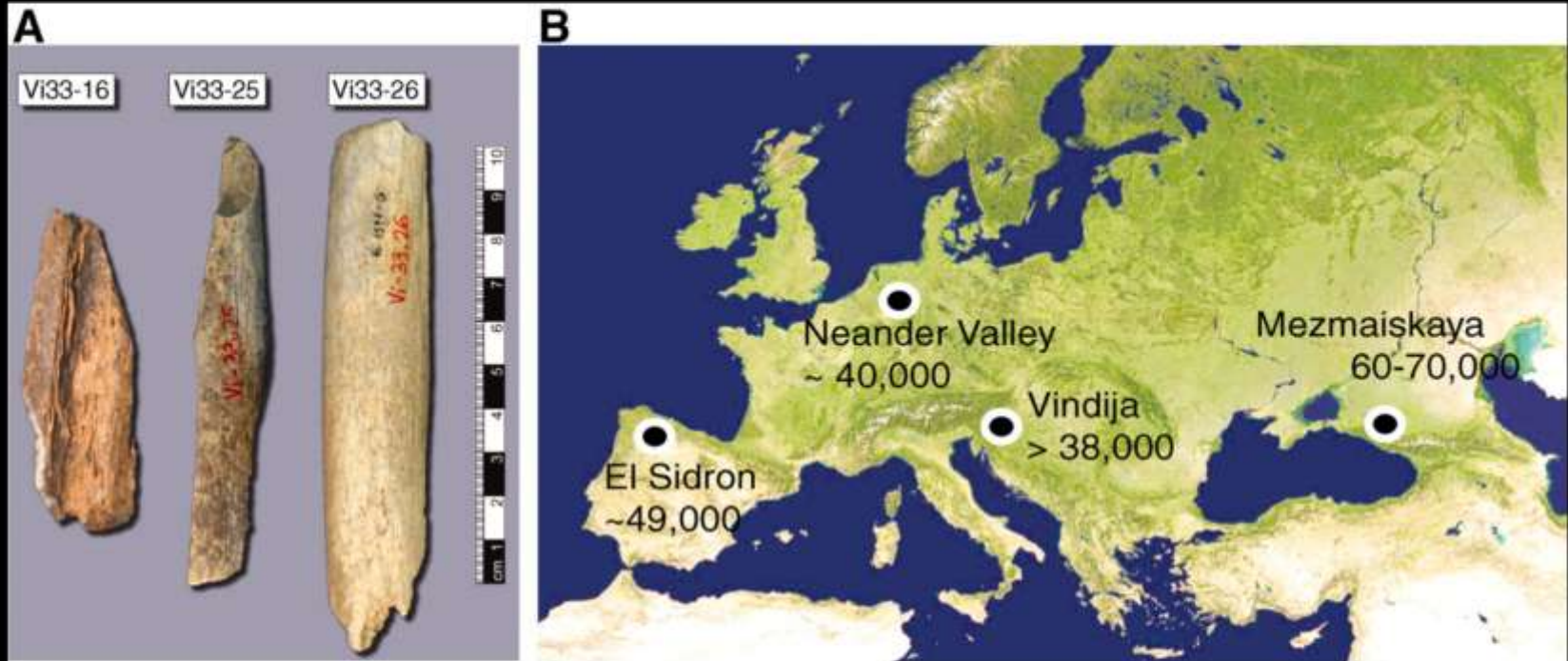
2010: Genetic studies of Neanderthal bones indicates that between 1-4% of modern human DNA is from Neandertals. Suggests interbreeding around 60,000 years ago.



<http://news.bbc.co.uk/2/hi/science/nature/8660940.stm>

2010: Genetic studies of Neanderthal bones indicates that between 1-4% of modern human DNA is from Neandertals. Suggests interbreeding around 60,000 years ago.

Fig. 1 Samples and sites from which DNA was retrieved.



R E Green et al. Science 2010;328:710-722

Homo sapiens
(Cro-Magnon
people) drew
the cave art in
France and
Spain about
17,000 years
ago.



Homo sapiens, Cro-Magnon people



Lascaux, France, cave art: 17,000 yrs BP



Life in the late Stone Age, which ended at different times on different continents.



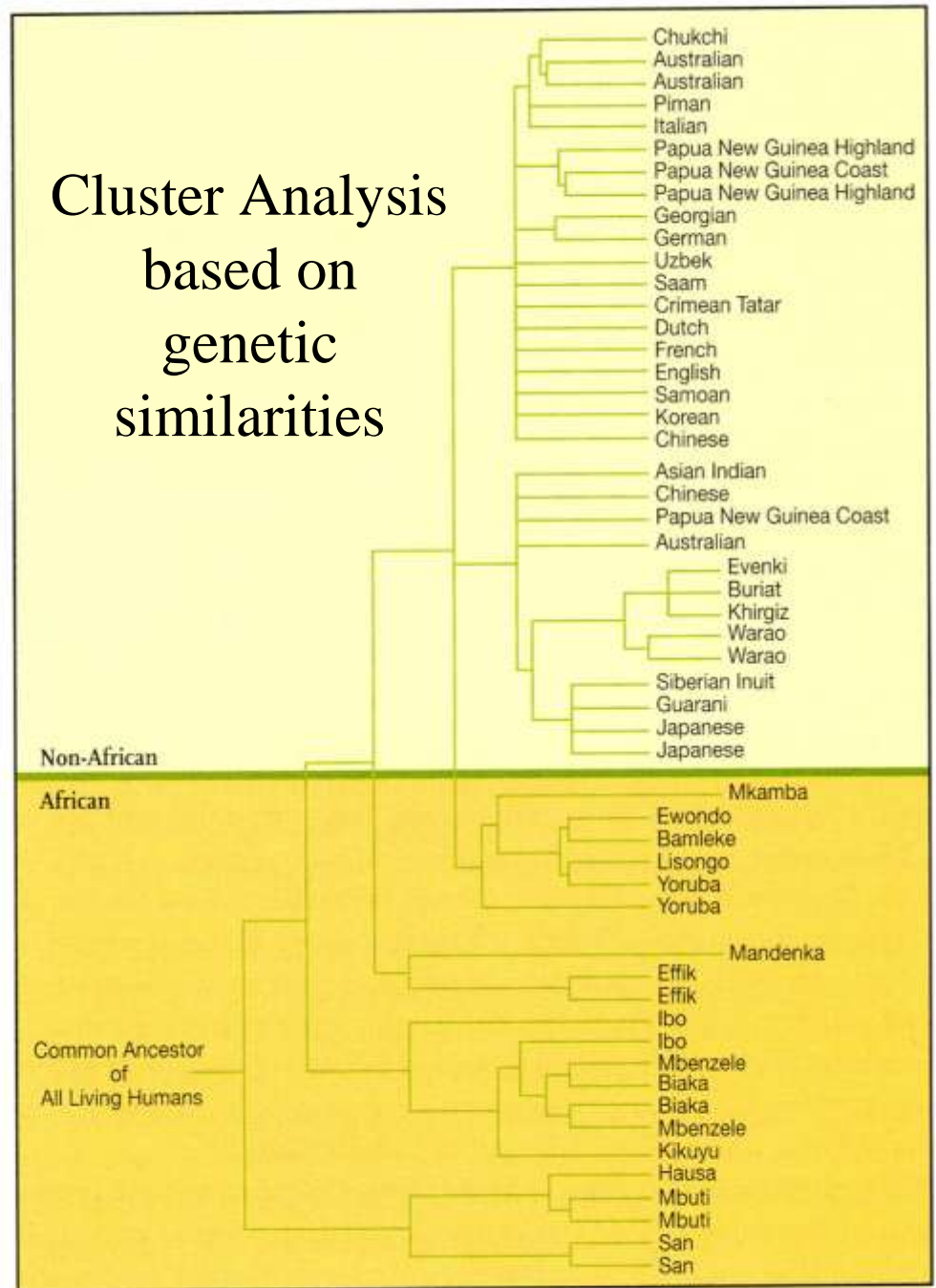
The invention of farming, plus domestication of animals, started civilization.



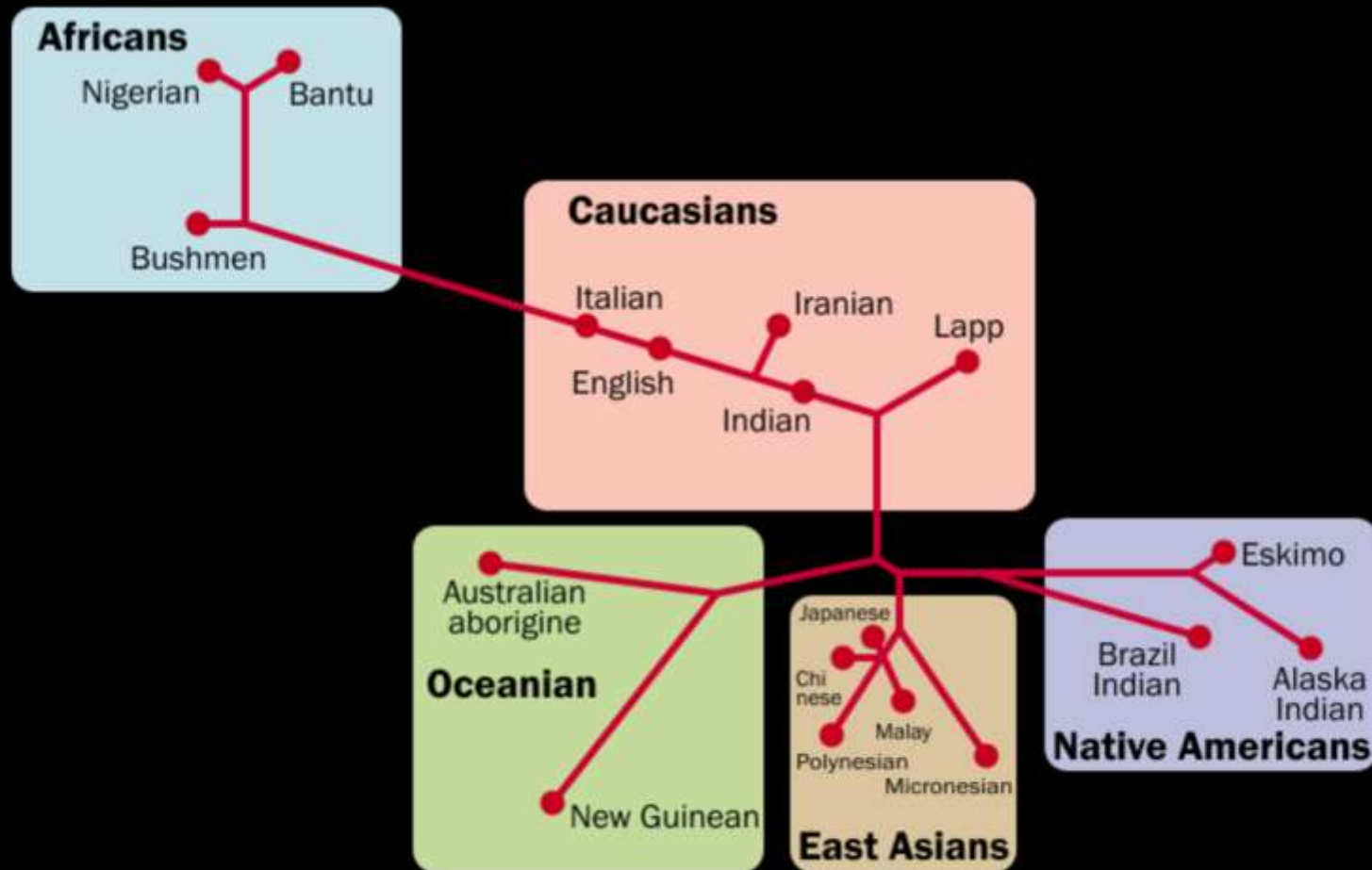
How far back
in time did
the modern
races diverge
from a
common
ancestor?



DNA studies
show the
common
ancestor of all
humans lived
in Africa about
170,000 years
ago

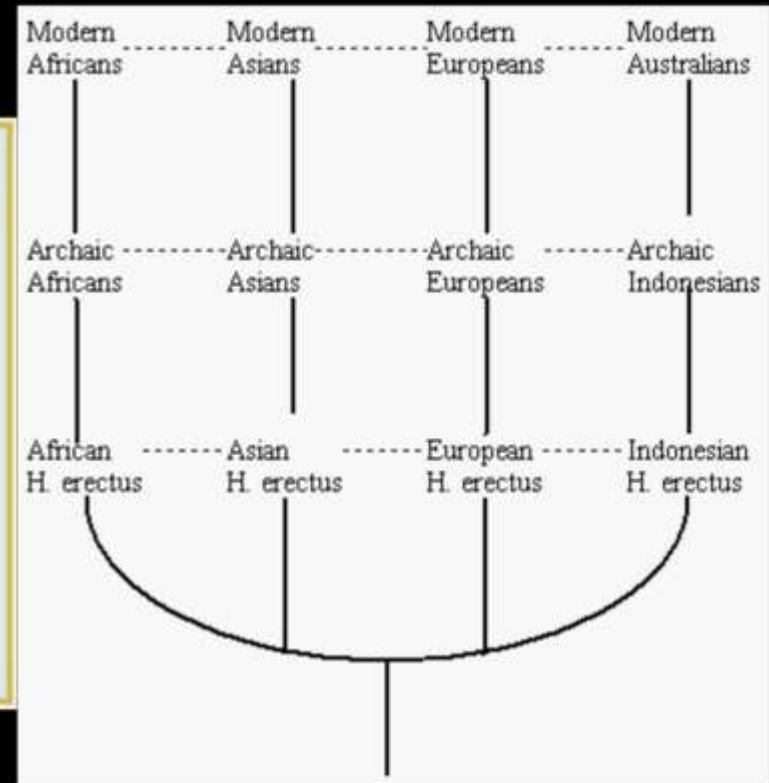
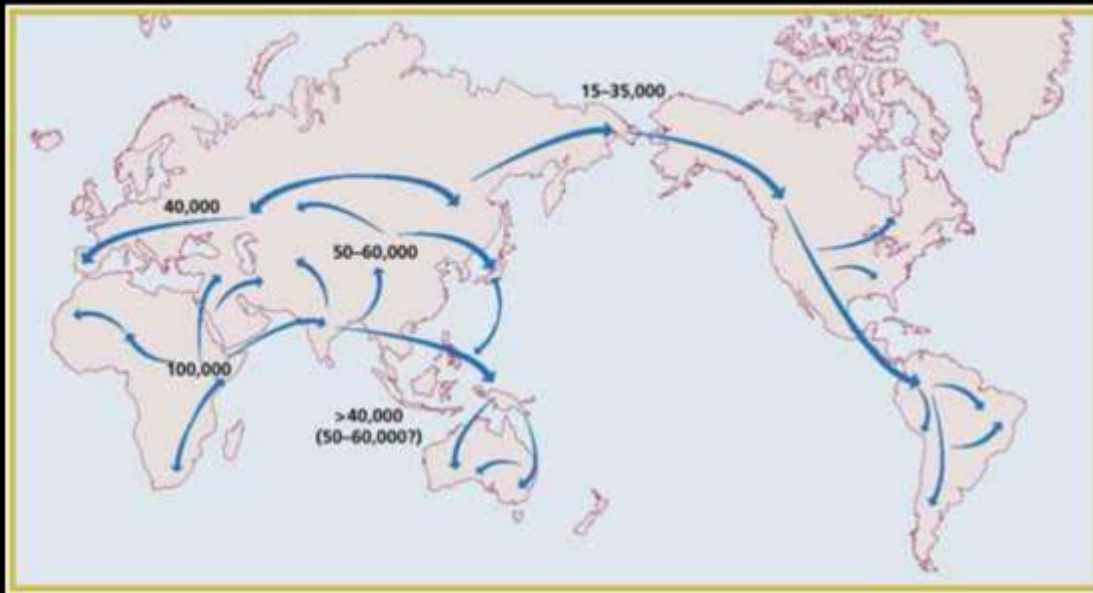


Another tree diagram of genetic similarity; nearest neighbor method

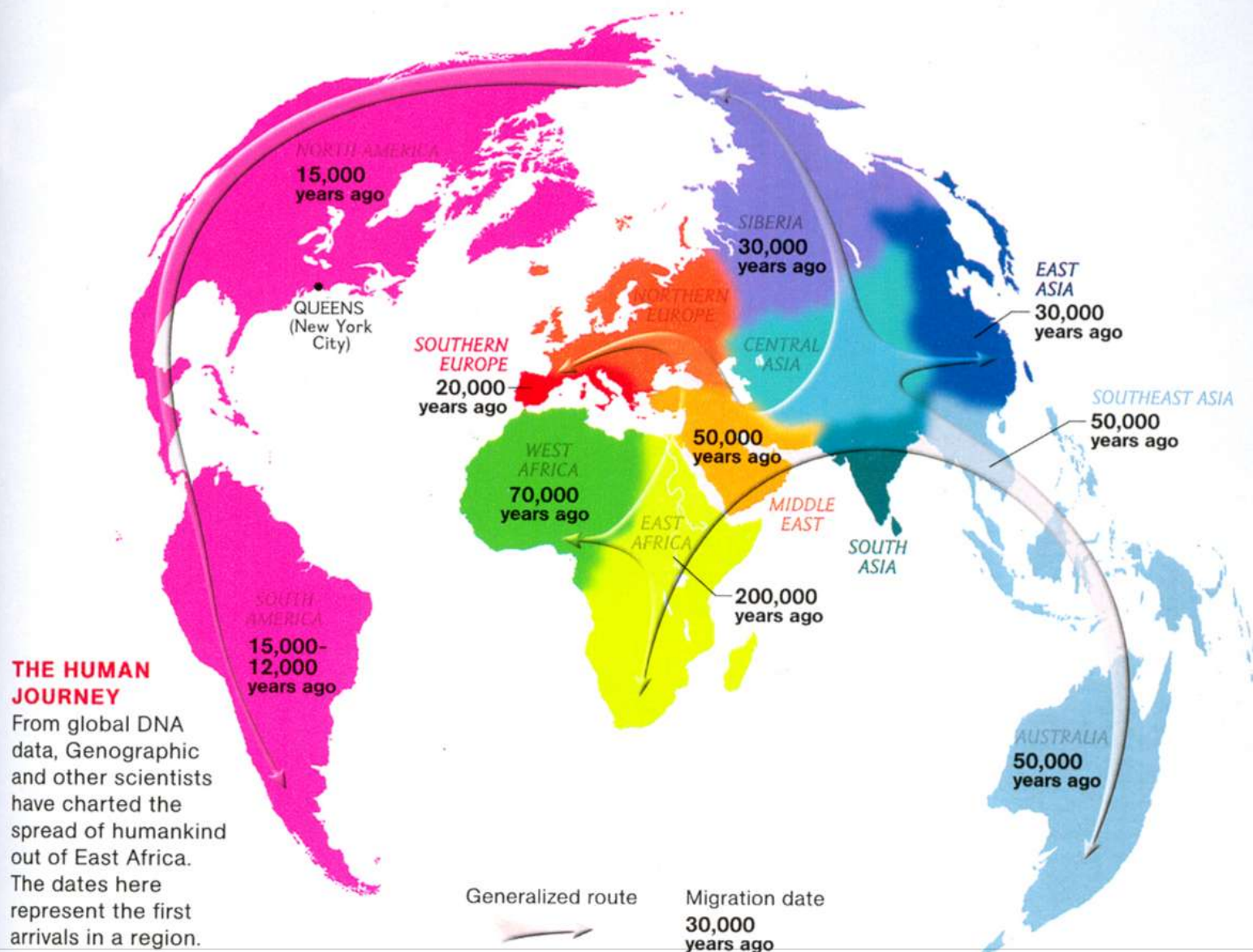


vs Multiregional Hypothesis

Out of Africa Hypothesis



THE BIG IDEA | GENOGRAPHY



Pieces of a skeleton of *Homo naledi*, a newly discovered human species from South Africa. Found in a cave, no way to date the age. Published: September 2015



THANK YOU