

Hot Science Cool Talks

UT Environmental Science Institute

11

Ancestors of Us All: Recent Discoveries in Human Origins and Evolution

Dr. John W. Kappelman

March 2, 2001

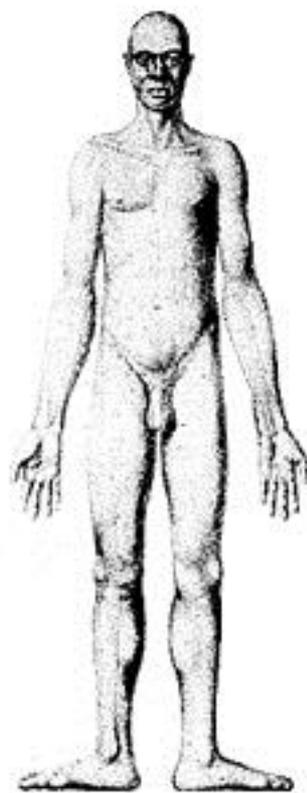
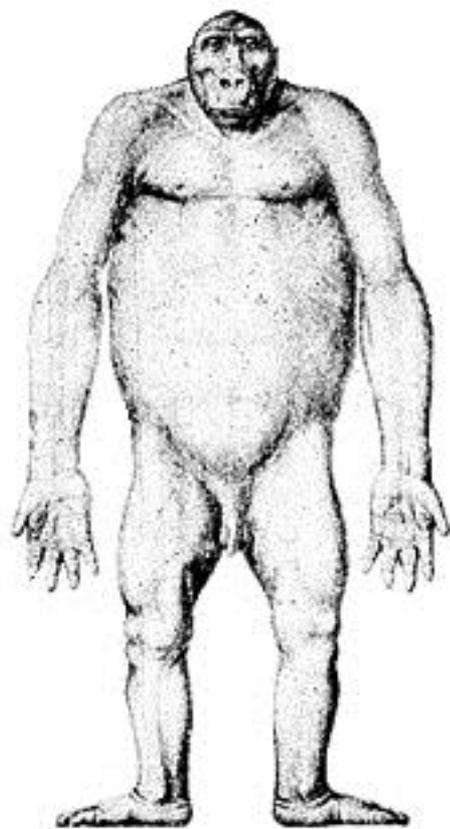
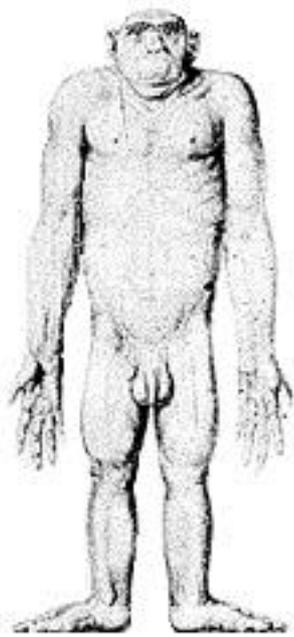
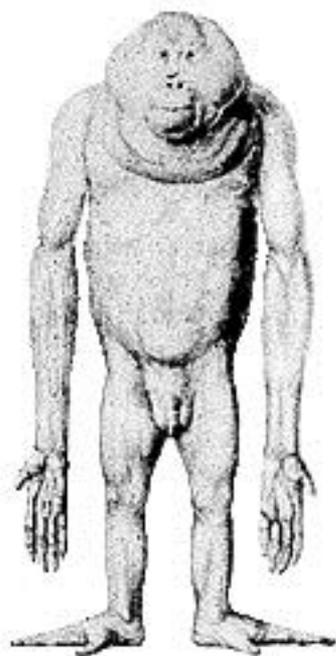
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Ancestors of Us All:



Recent Discoveries in Human Origins and Evolution

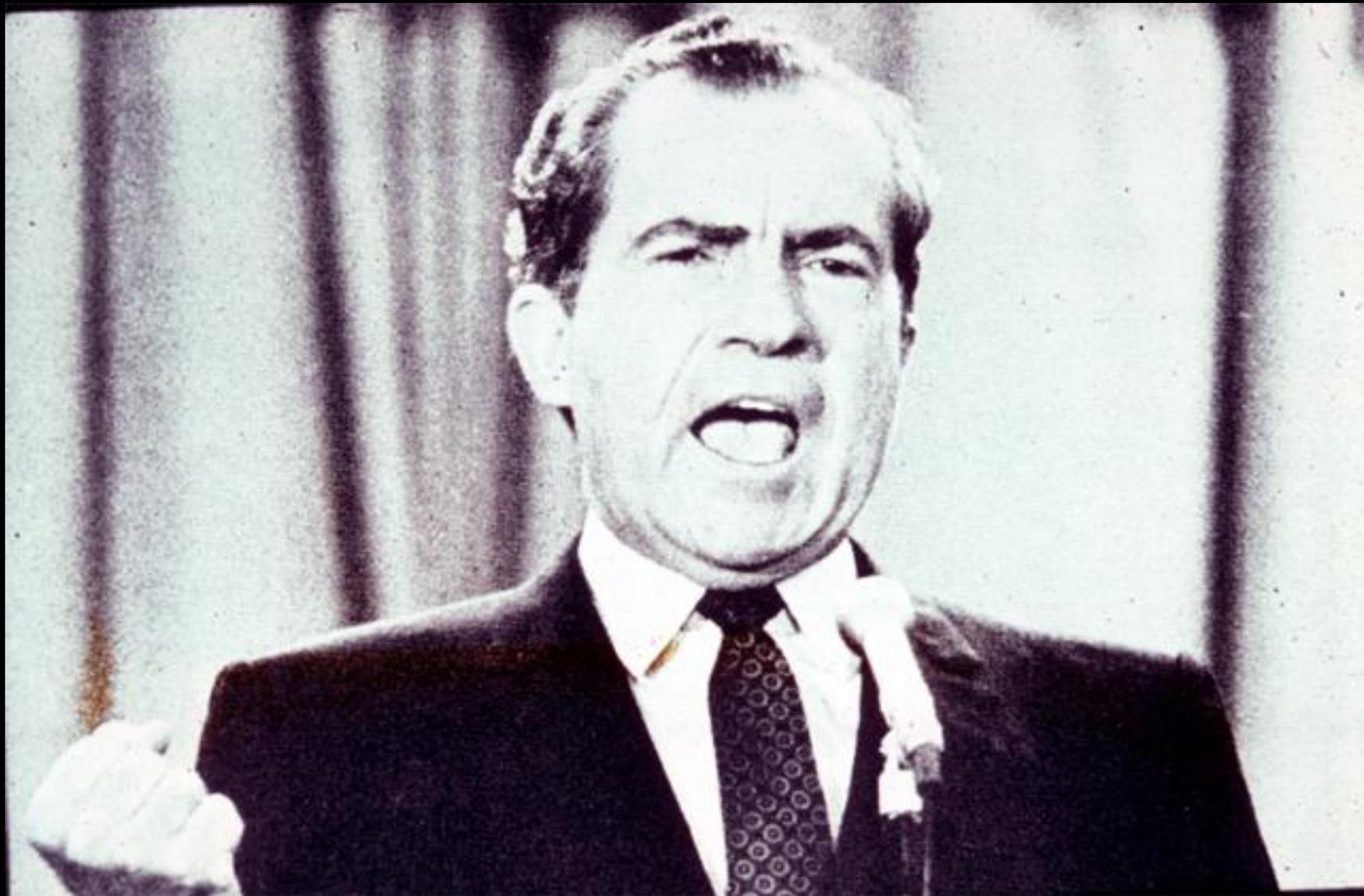
Dr. John Kappelman







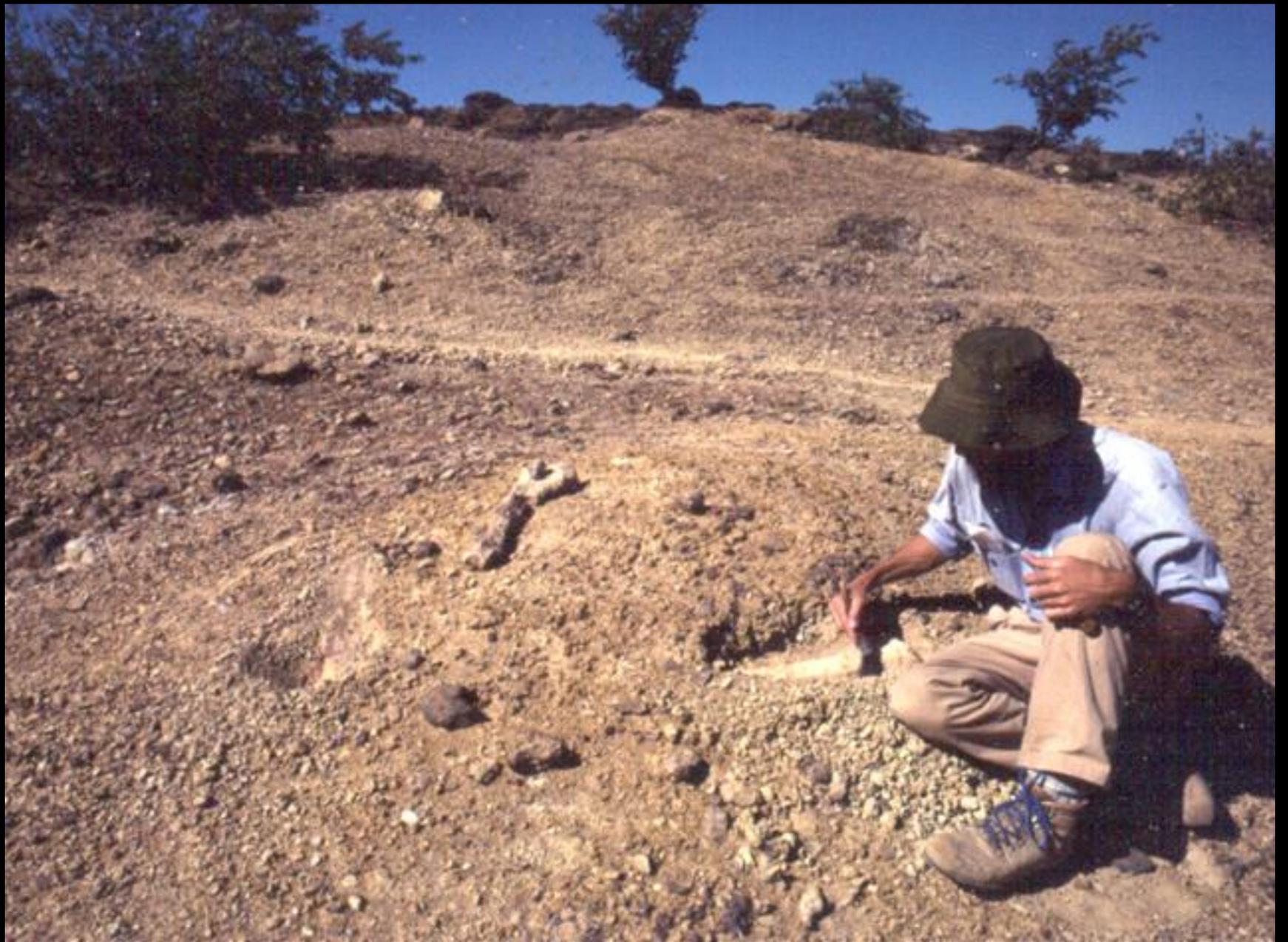










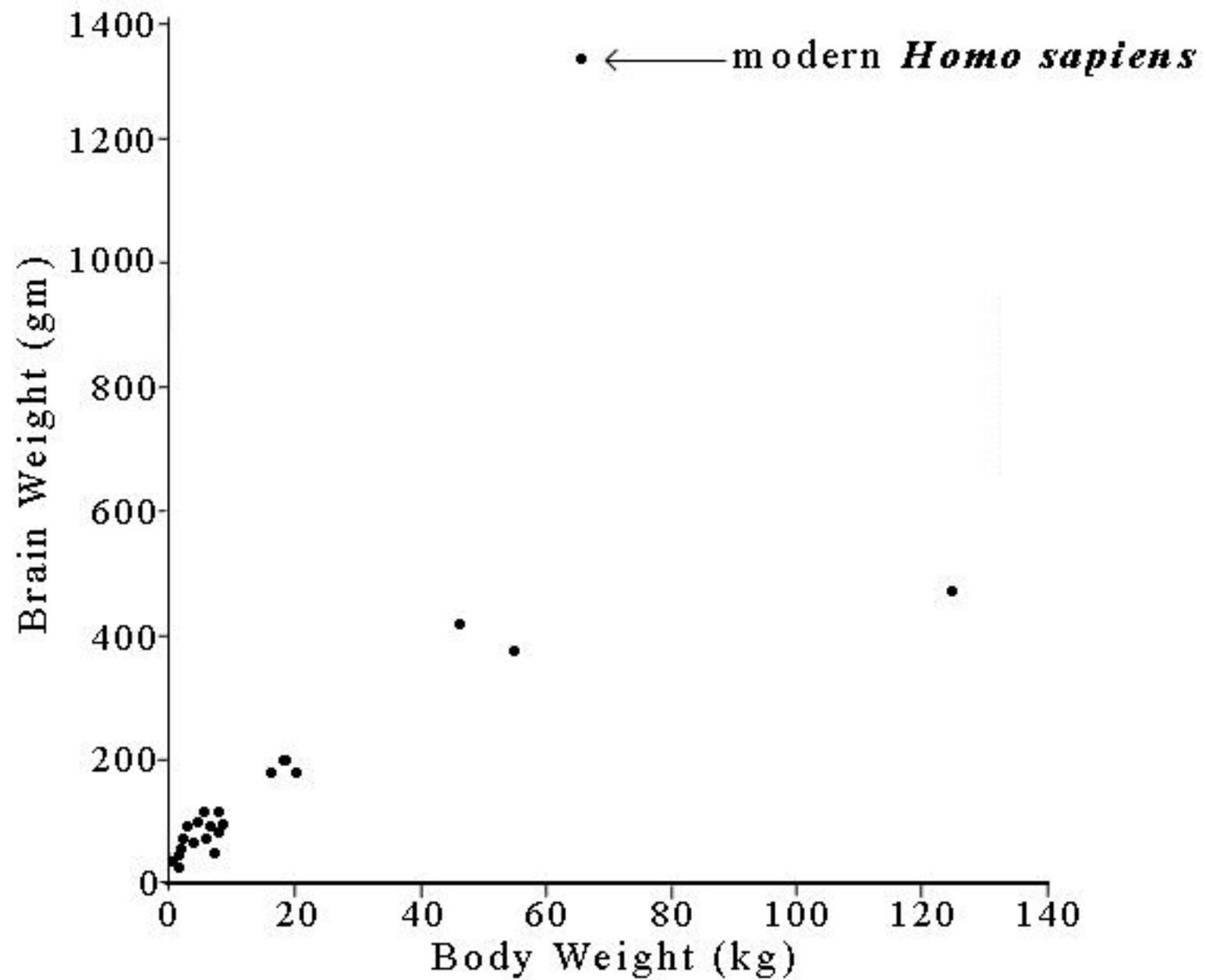


Human



Gorilla

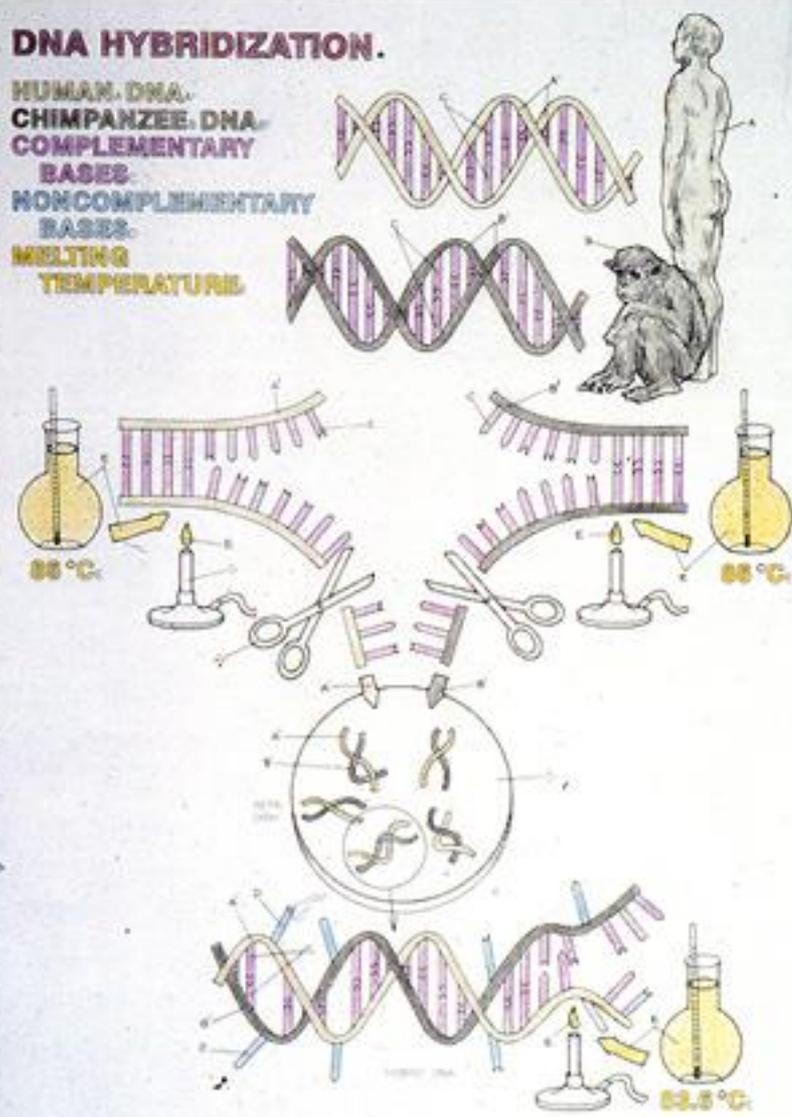


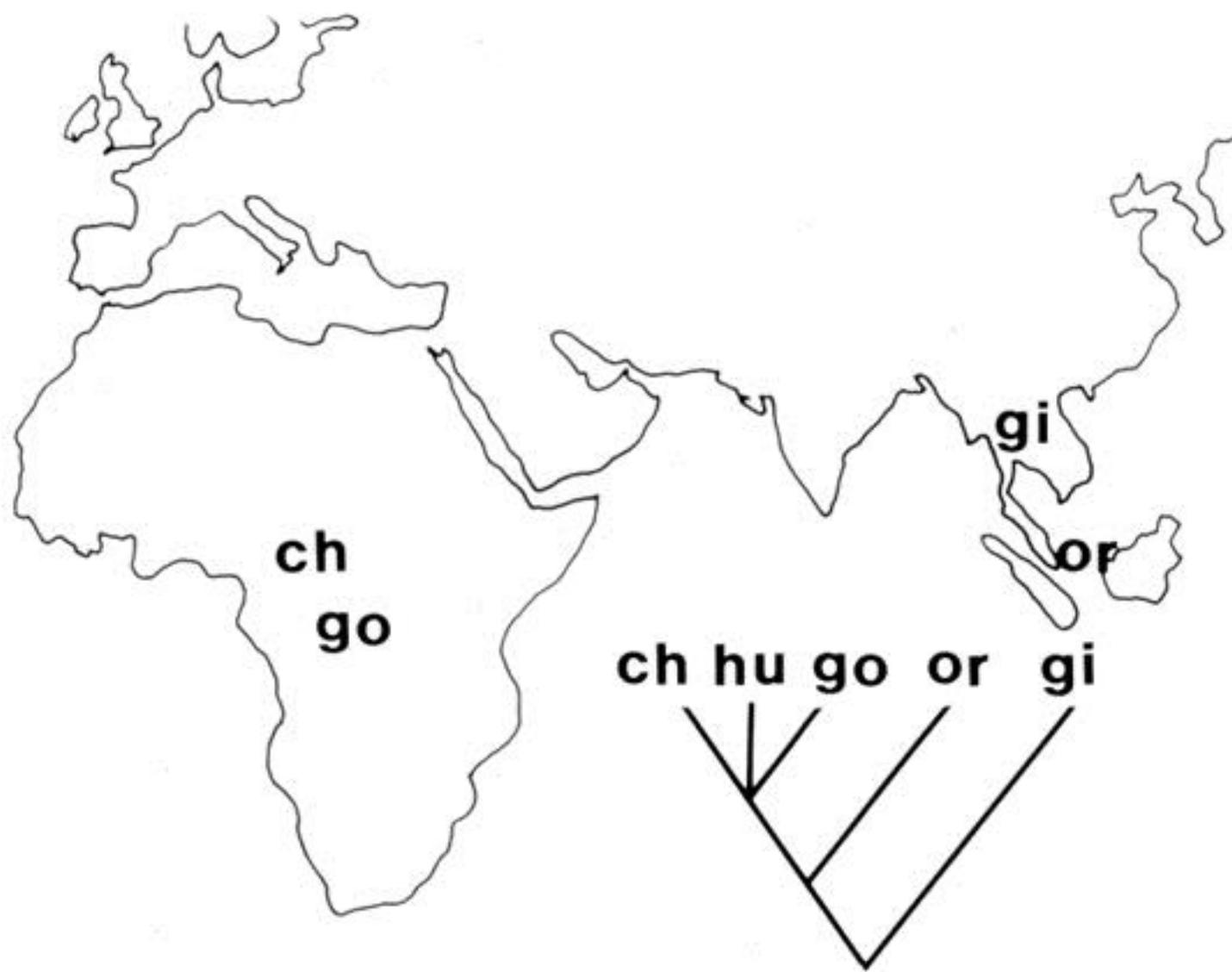




DNA HYBRIDIZATION.

HUMAN DNA.
CHIMPANZEE DNA.
COMPLEMENTARY
BASES.
NONCOMPLEMENTARY
BASES.
MELTING
TEMPERATURE.





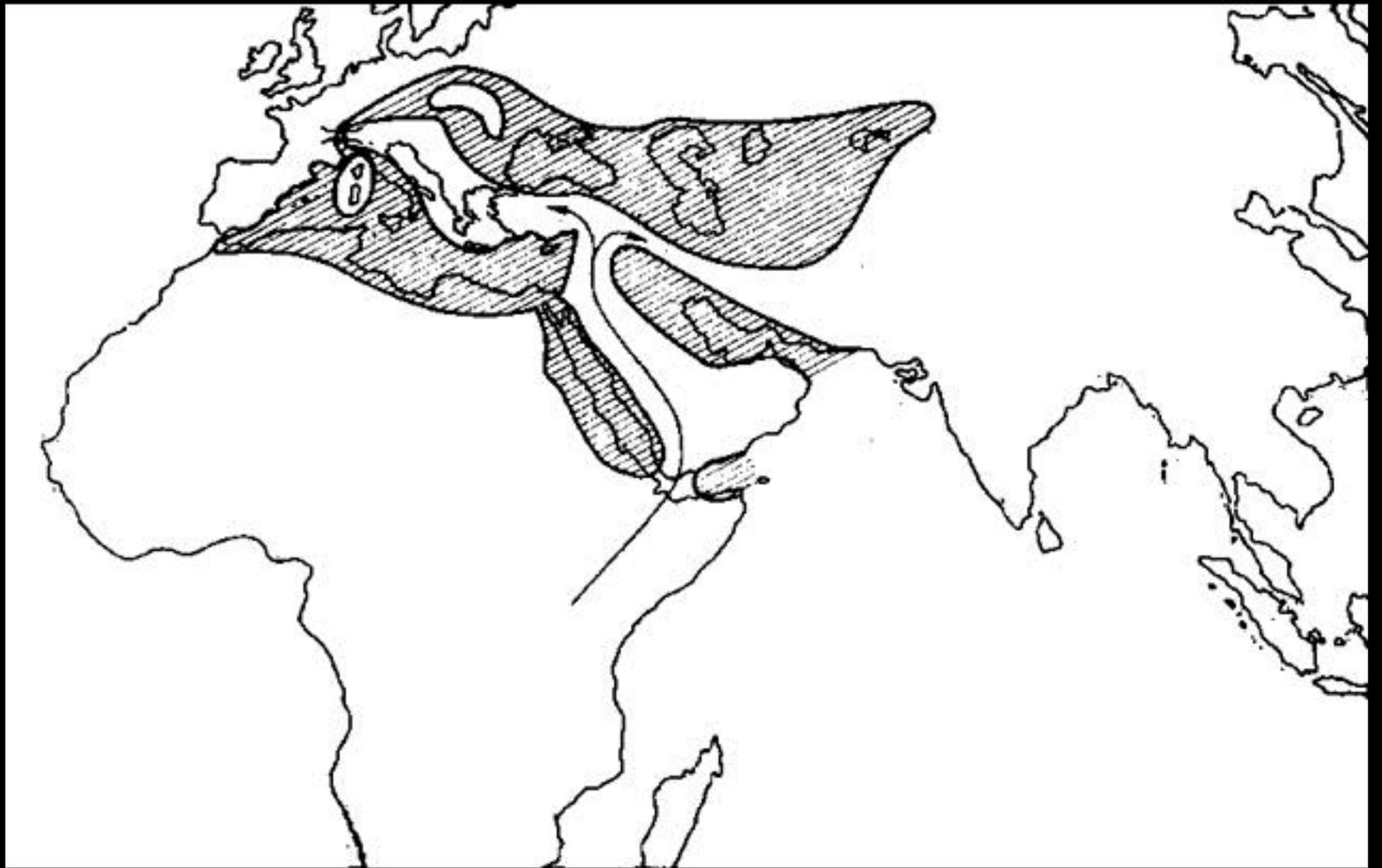
Ancestors of Us All

Hominid Origins

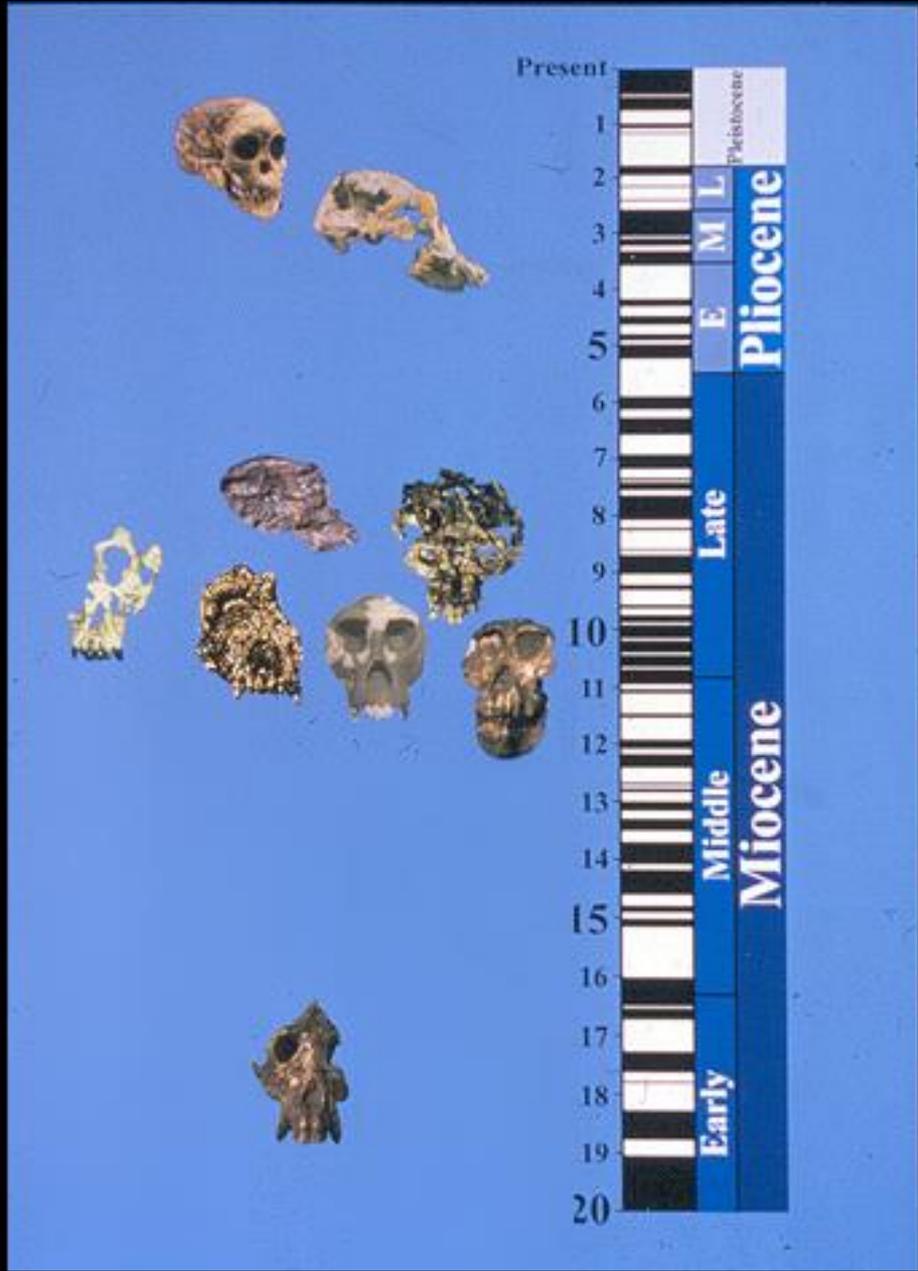
Evolution of Bipedalism

Bodies and Brains

Origin of Modern Humans







Present

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Pliocene

L

M

E

Pliocene

Late

Miocene

Middle

Early

Miocene

Early

Miocene

Middle

Late

Pliocene

L

M

E

Pliocene

Late

Miocene

Middle

Early

Miocene

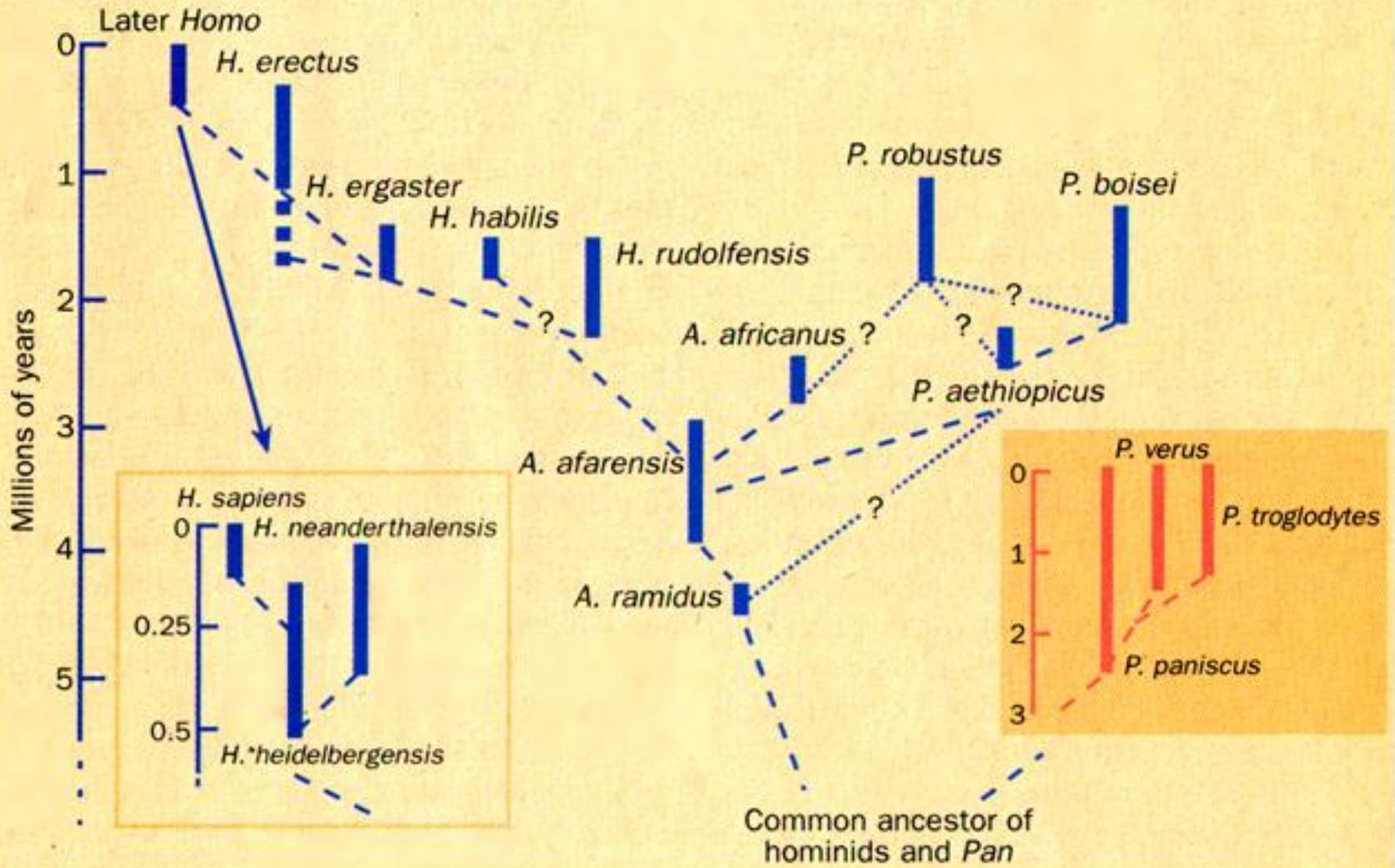
Early

Miocene









Ancestors of Us All

Hominid Origins

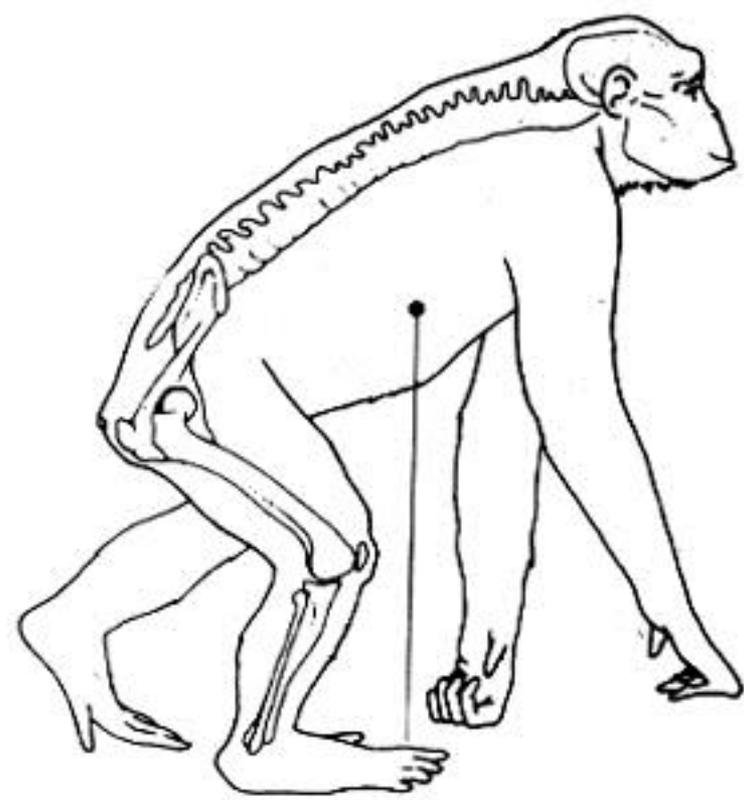
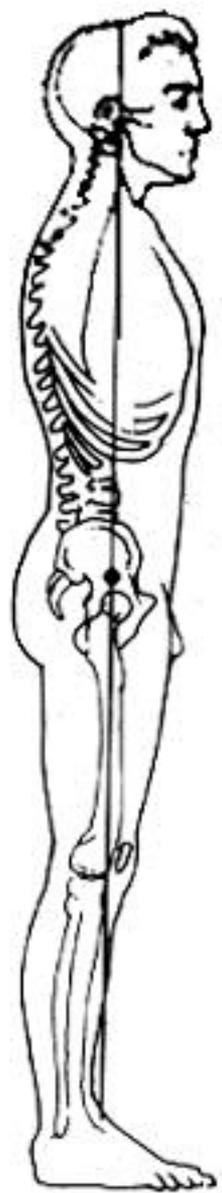
Evolution of Bipedalism

Bodies and Brains

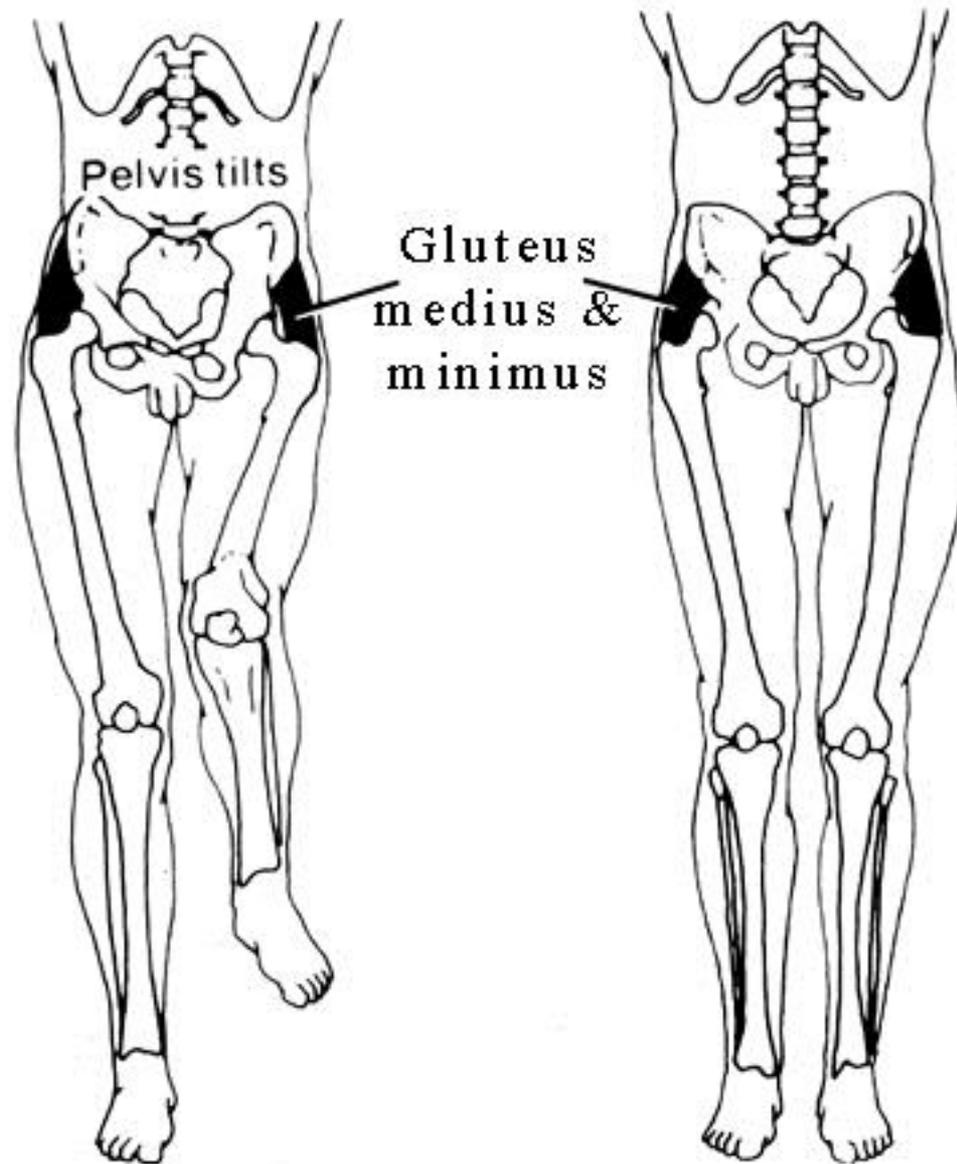
Origin of Modern Humans



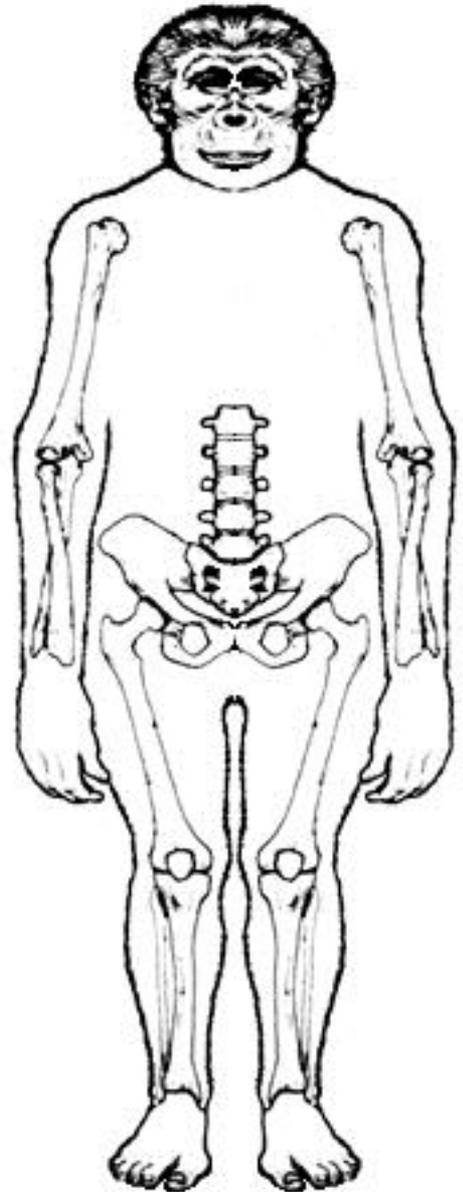
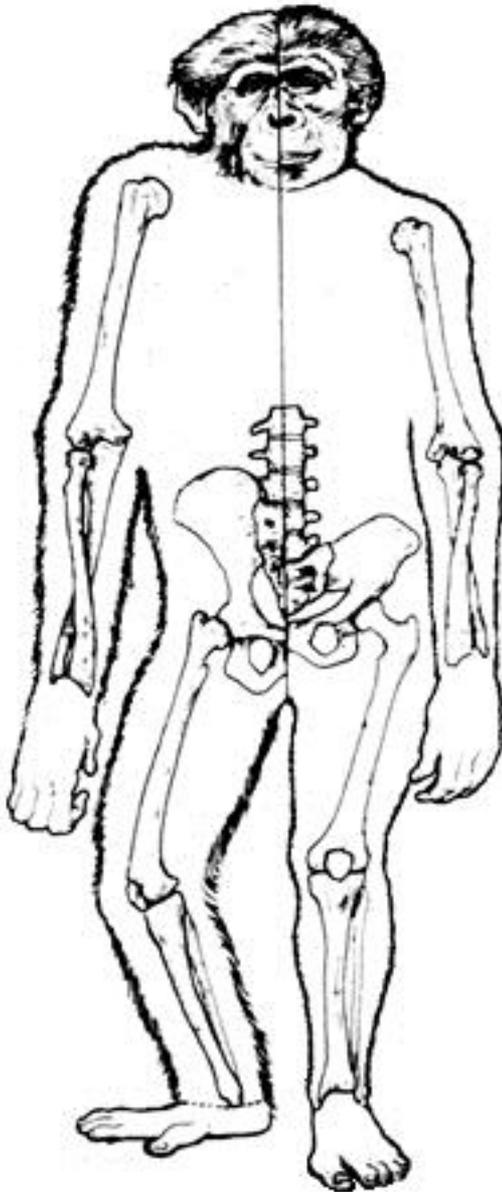
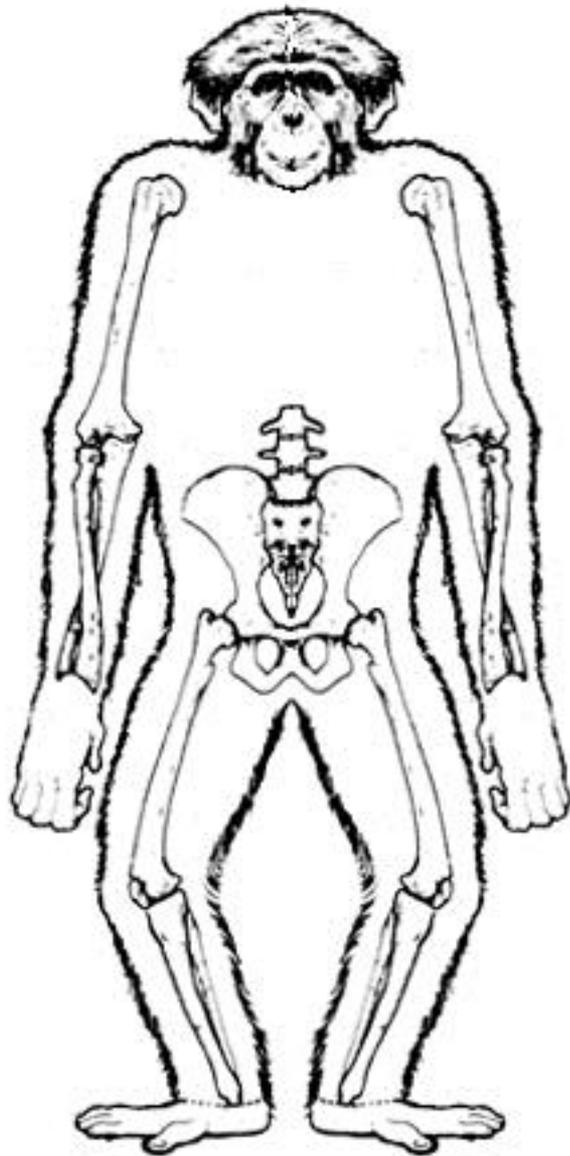
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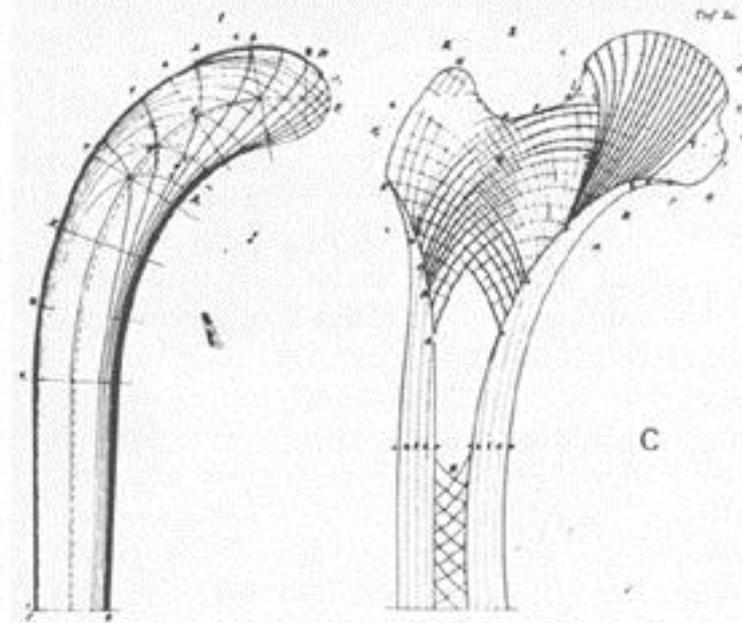
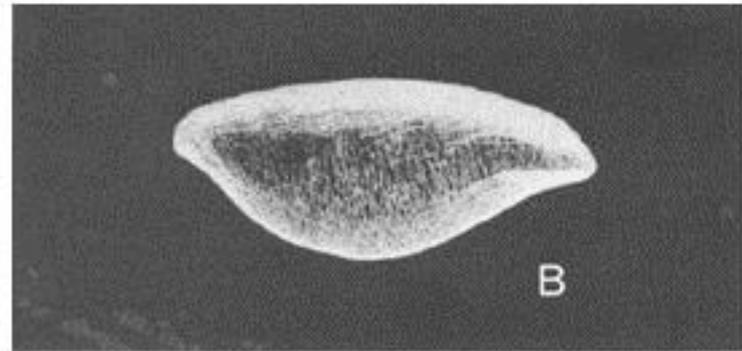
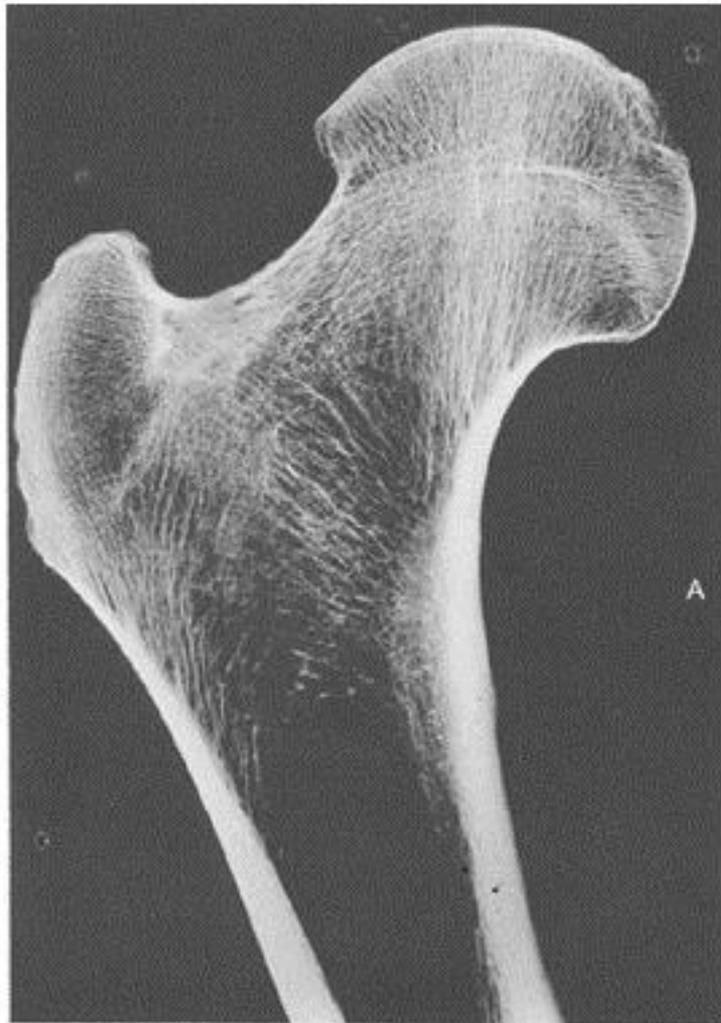
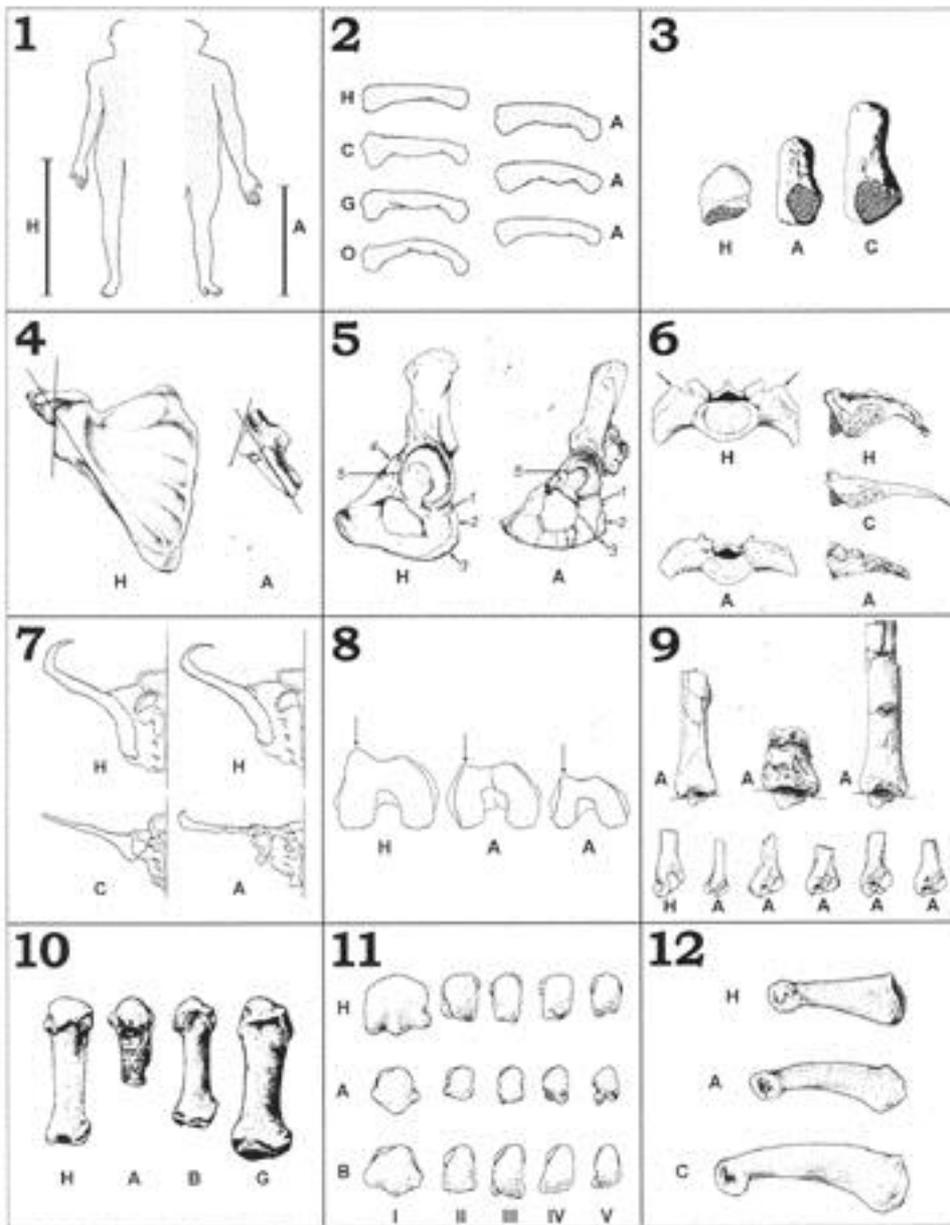


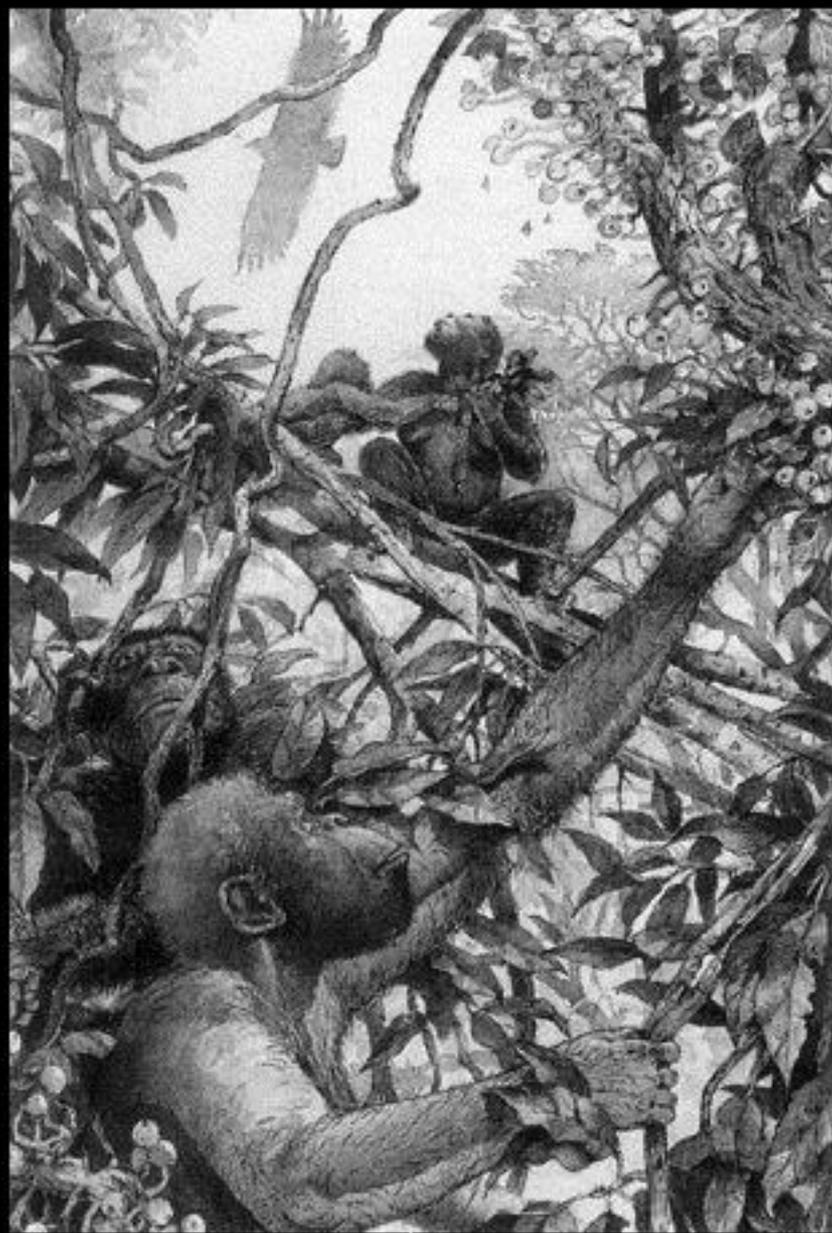
Figure 1-10 The lattice orientation of trabeculae. A: A radiograph of the proximal end of a human femur; B: a transverse microradiograph of a human patella. C: The distribution of loads and stresses in Culman's crane, which are similar in their course and distribution to the trabeculae in the human femur (reproduced from Wolff, 1870, with original symbols).

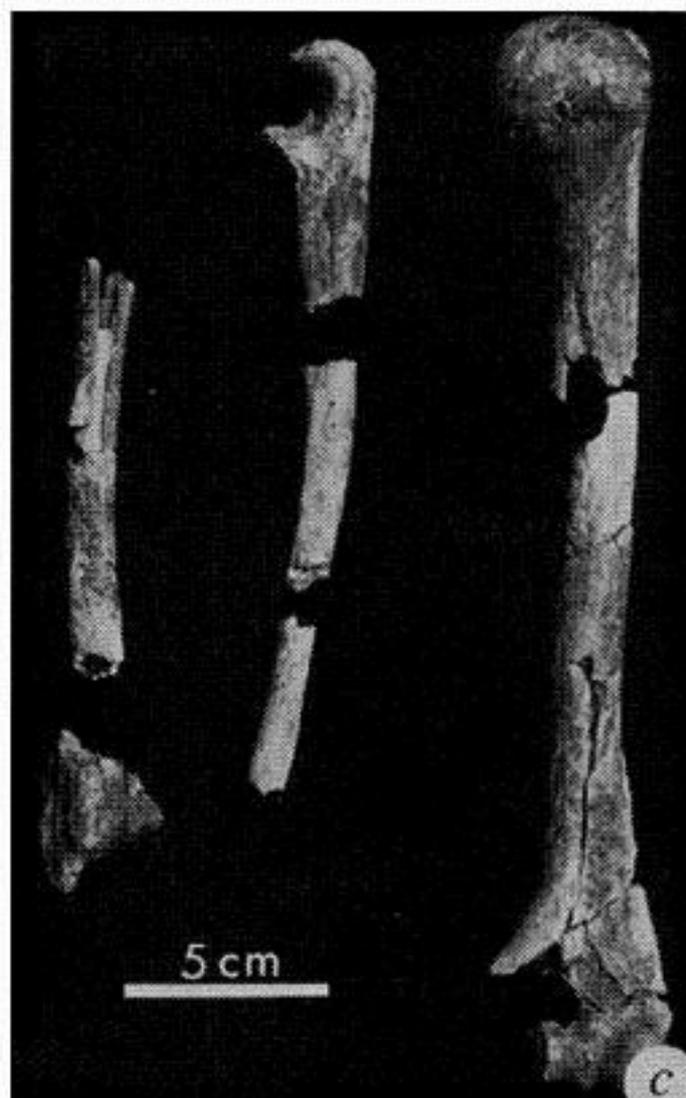
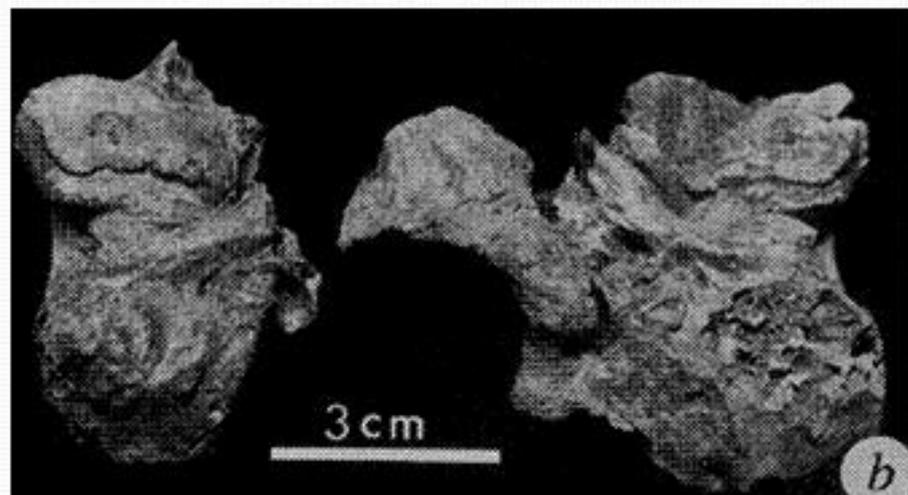
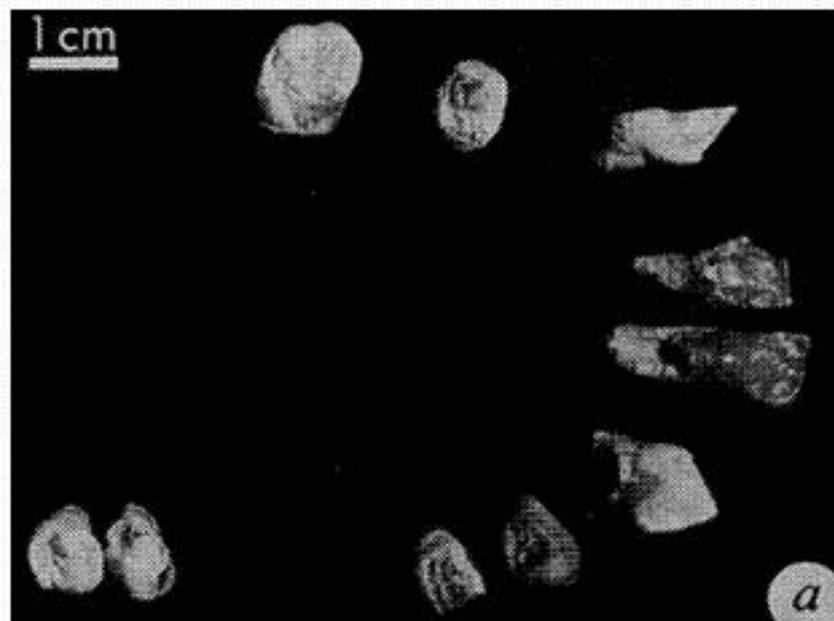












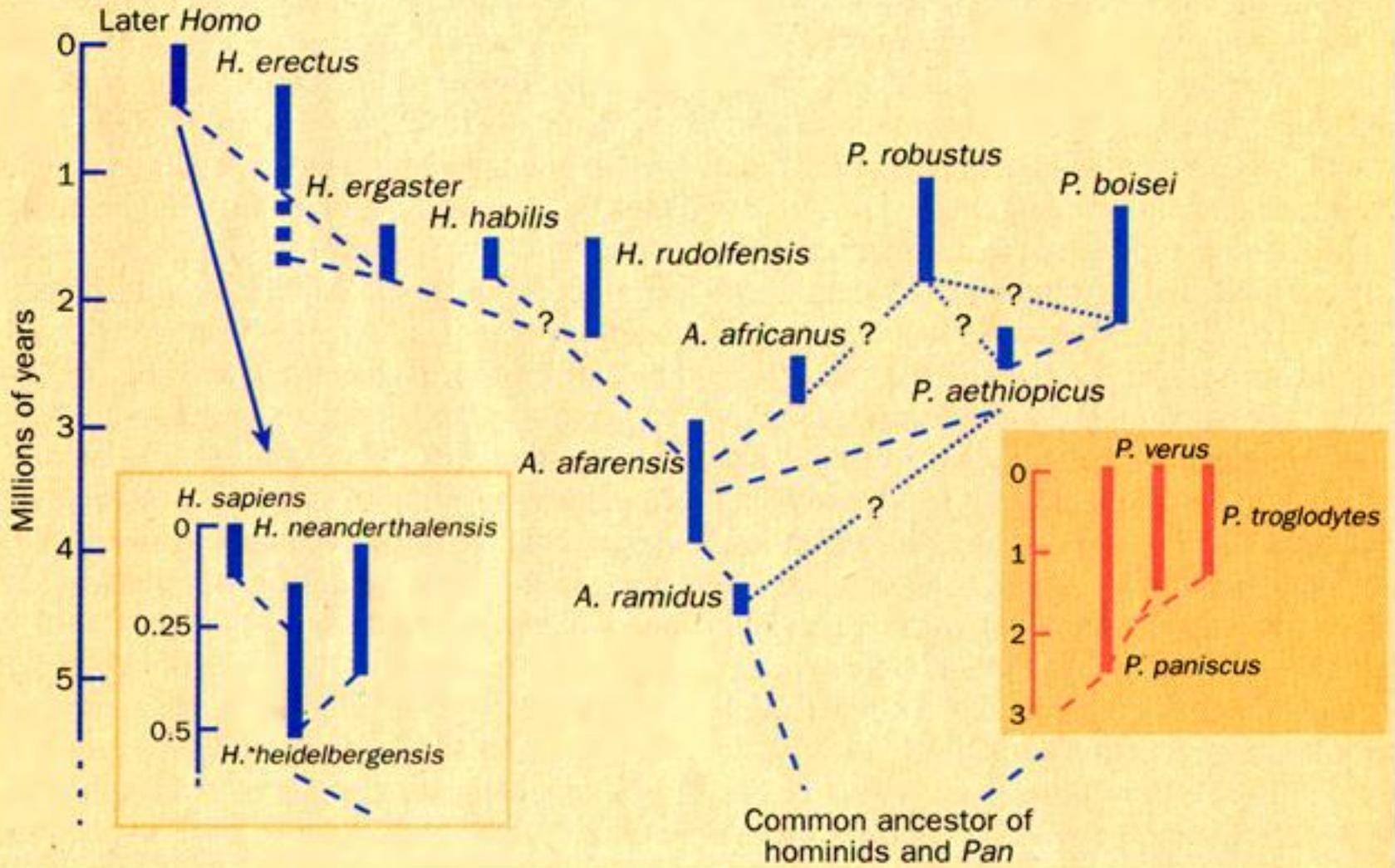
Ancestors of Us All

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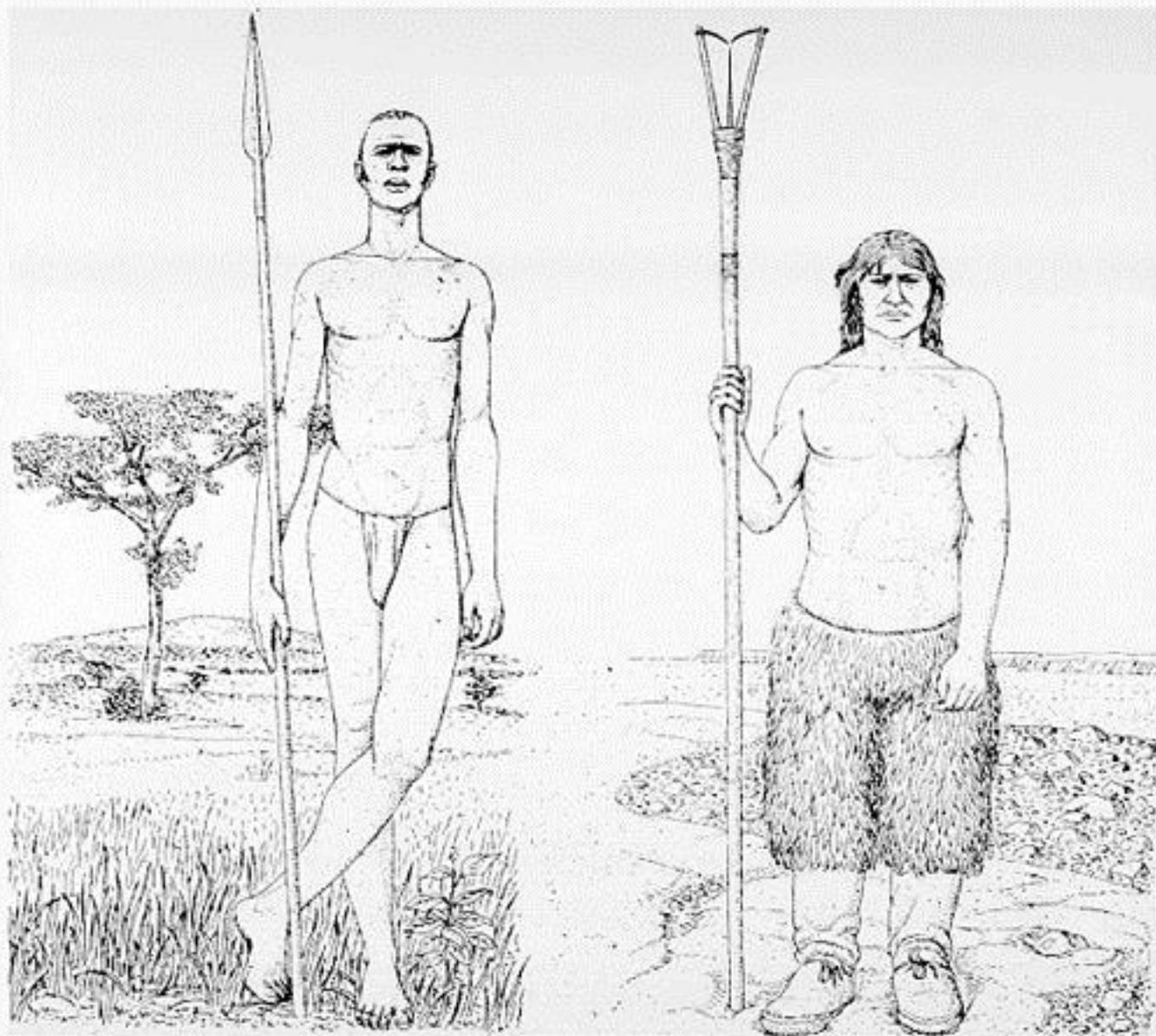


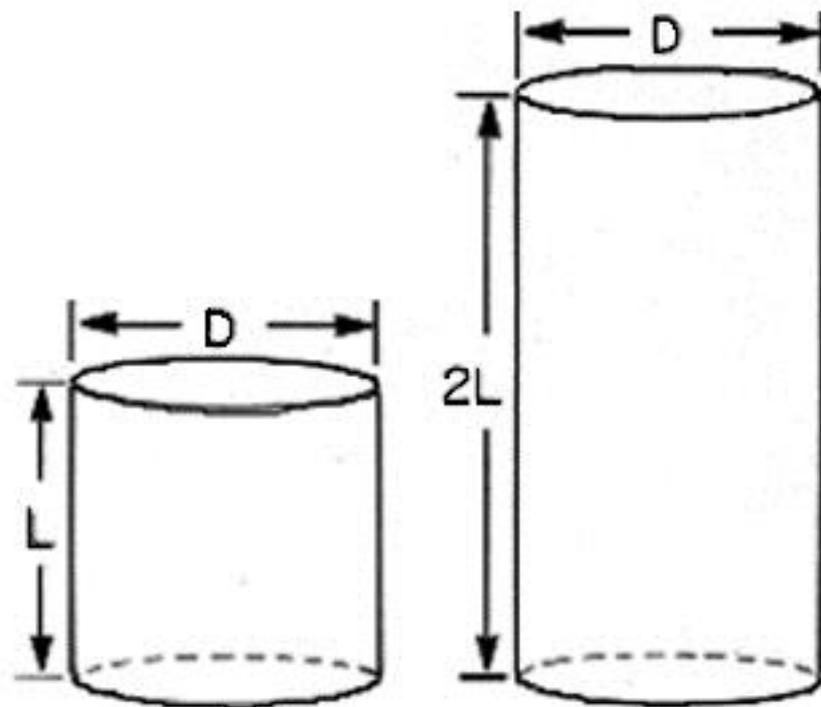
To view this movie, open the “Movies” folder on the CD-ROM and double click on “1470a1.mov”



To view this movie, open the “Movies” folder on the CD-ROM and double click on “oh5.mov”







Lateral surface area πDL

$\pi D2L$

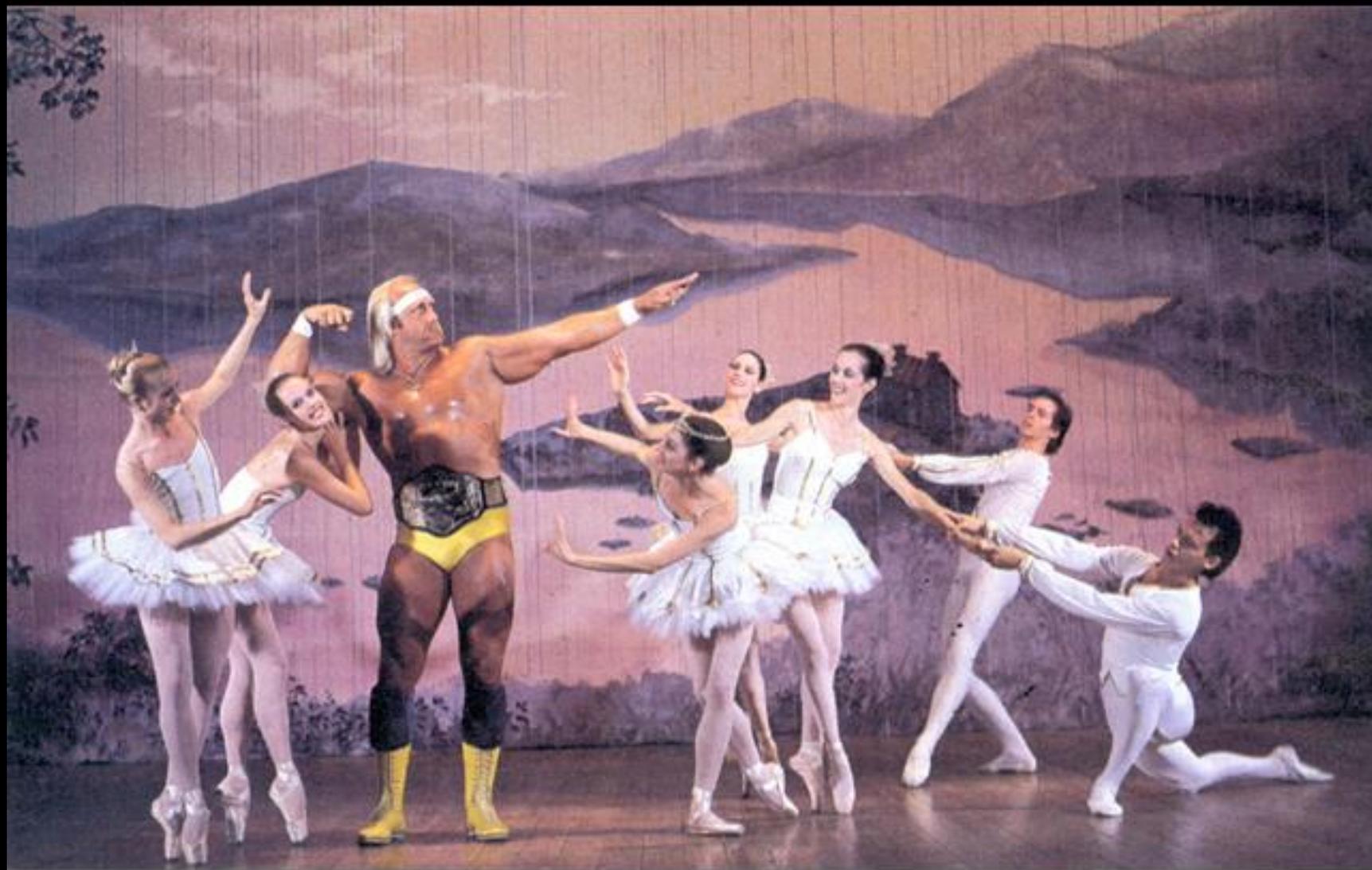
Volume (= mass) $\frac{\pi}{4} D^2 L$

$\frac{\pi}{4} D^2 2L$

$\frac{\text{Surface area}}{\text{mass}} \quad \frac{4}{D}$

$\frac{4}{D}$









1470all.mov

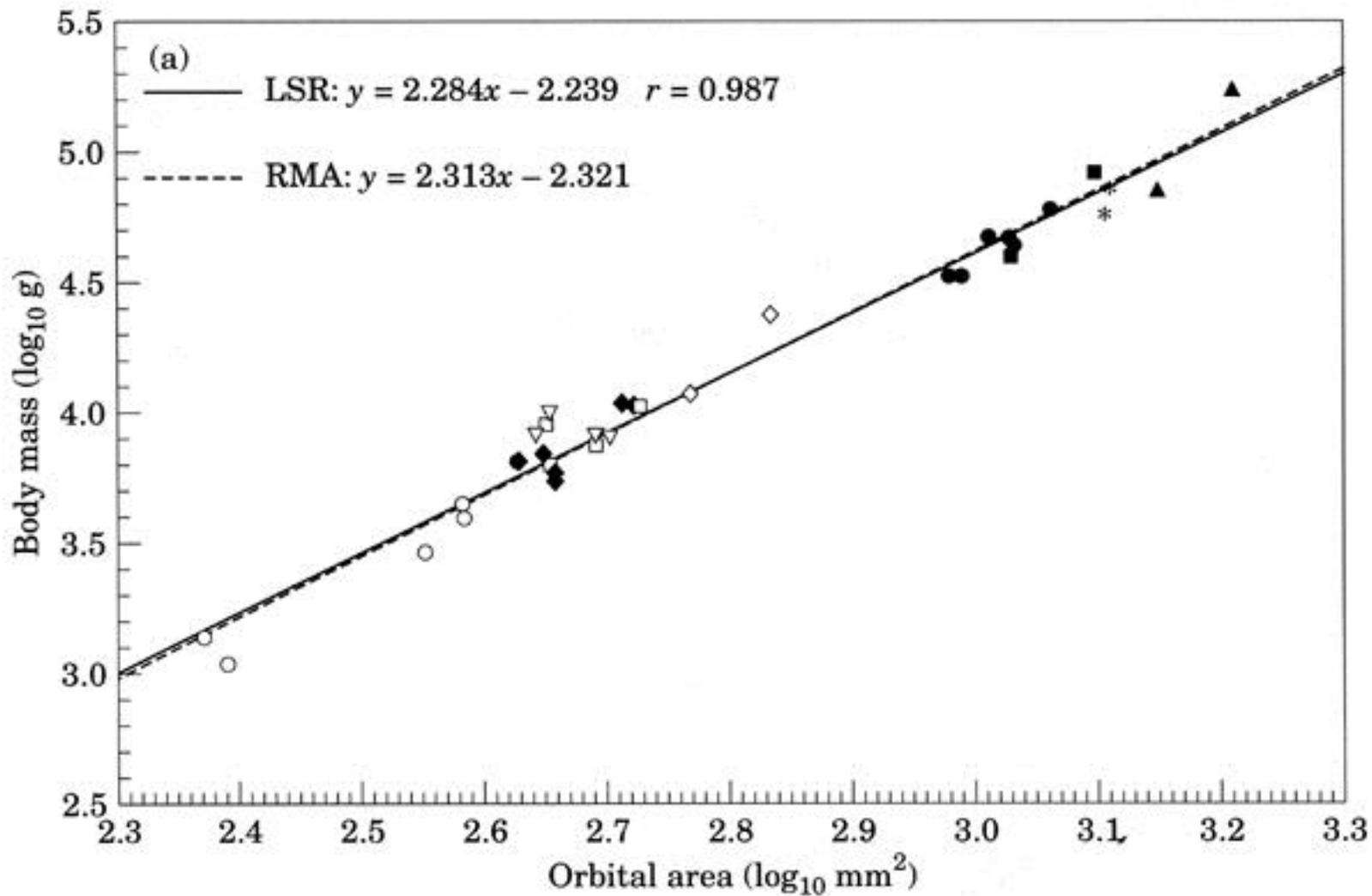
© 1998 J. Kappelman

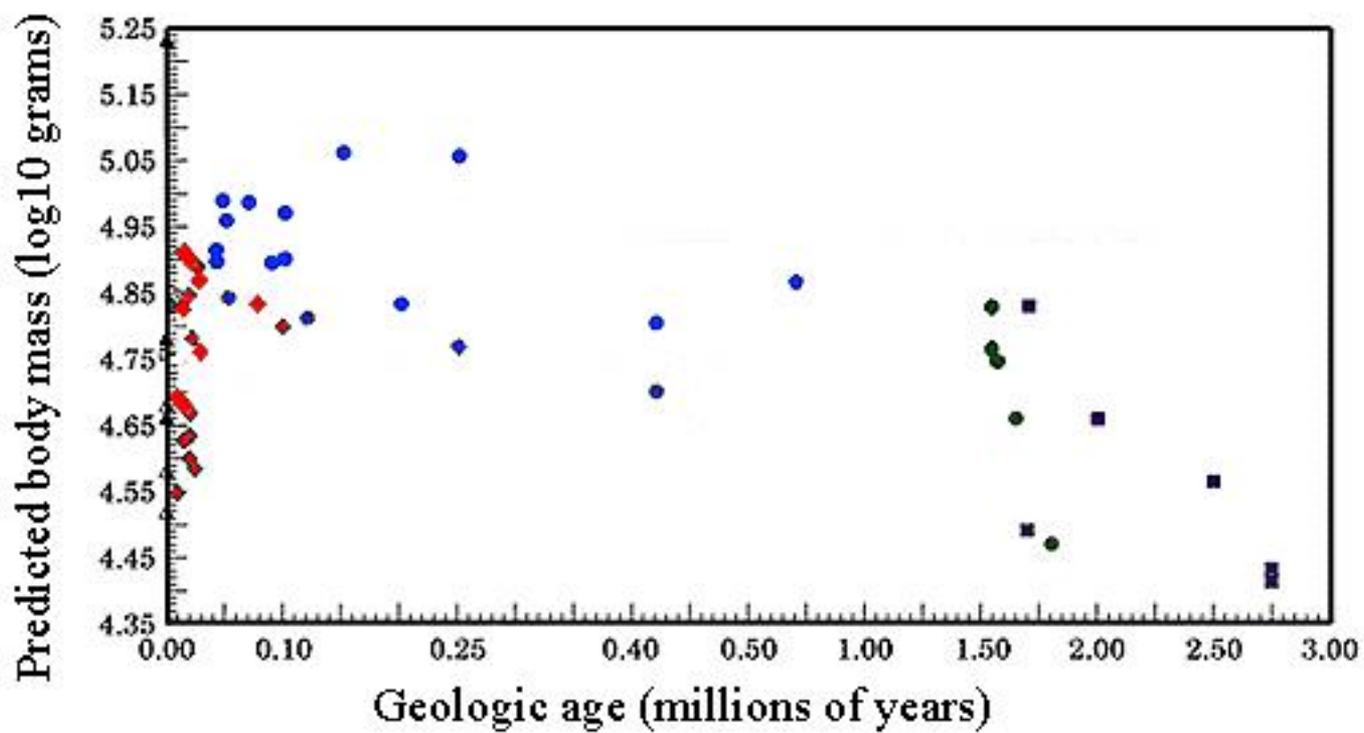
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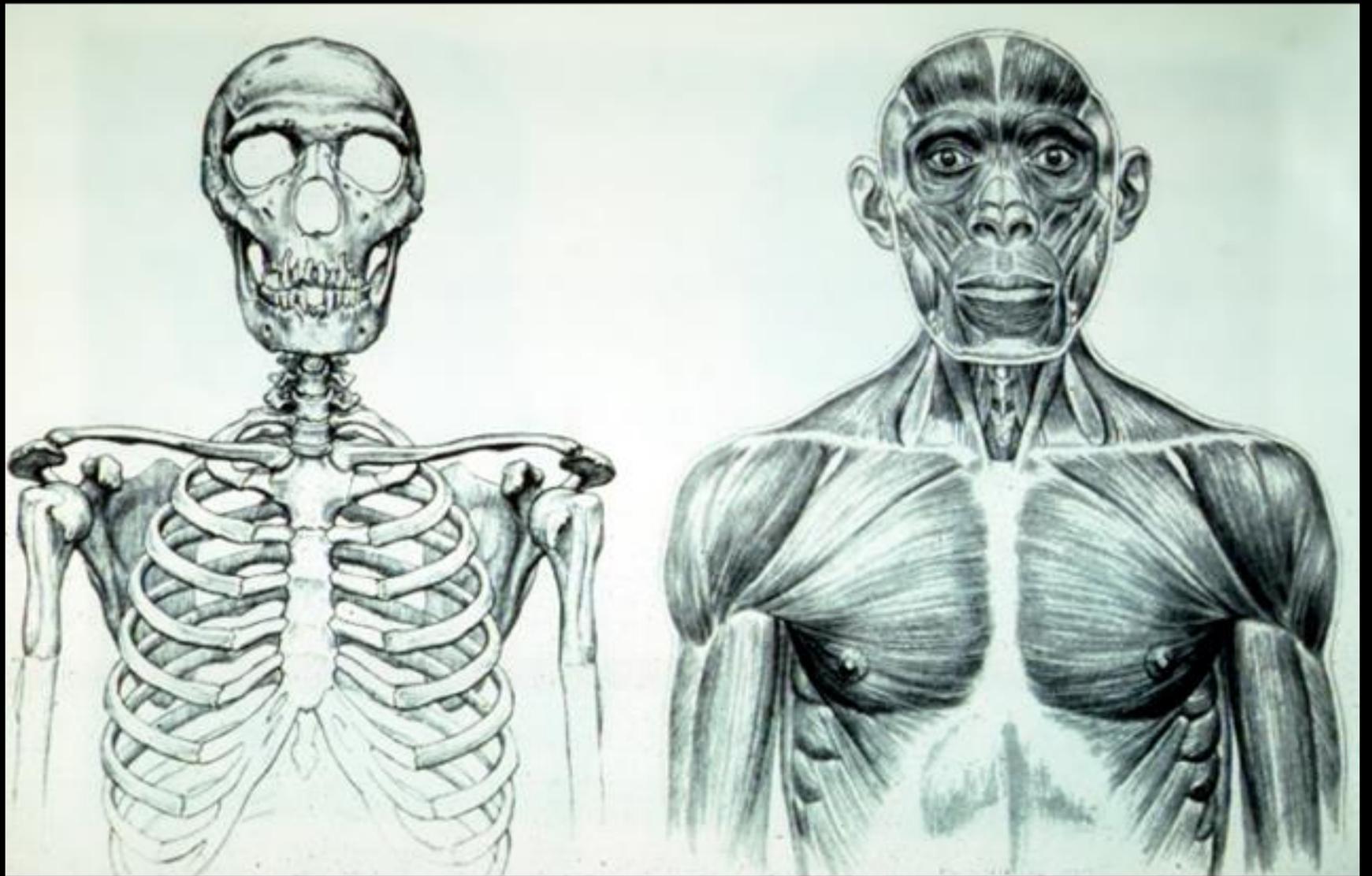
**Pygmy
chimp**

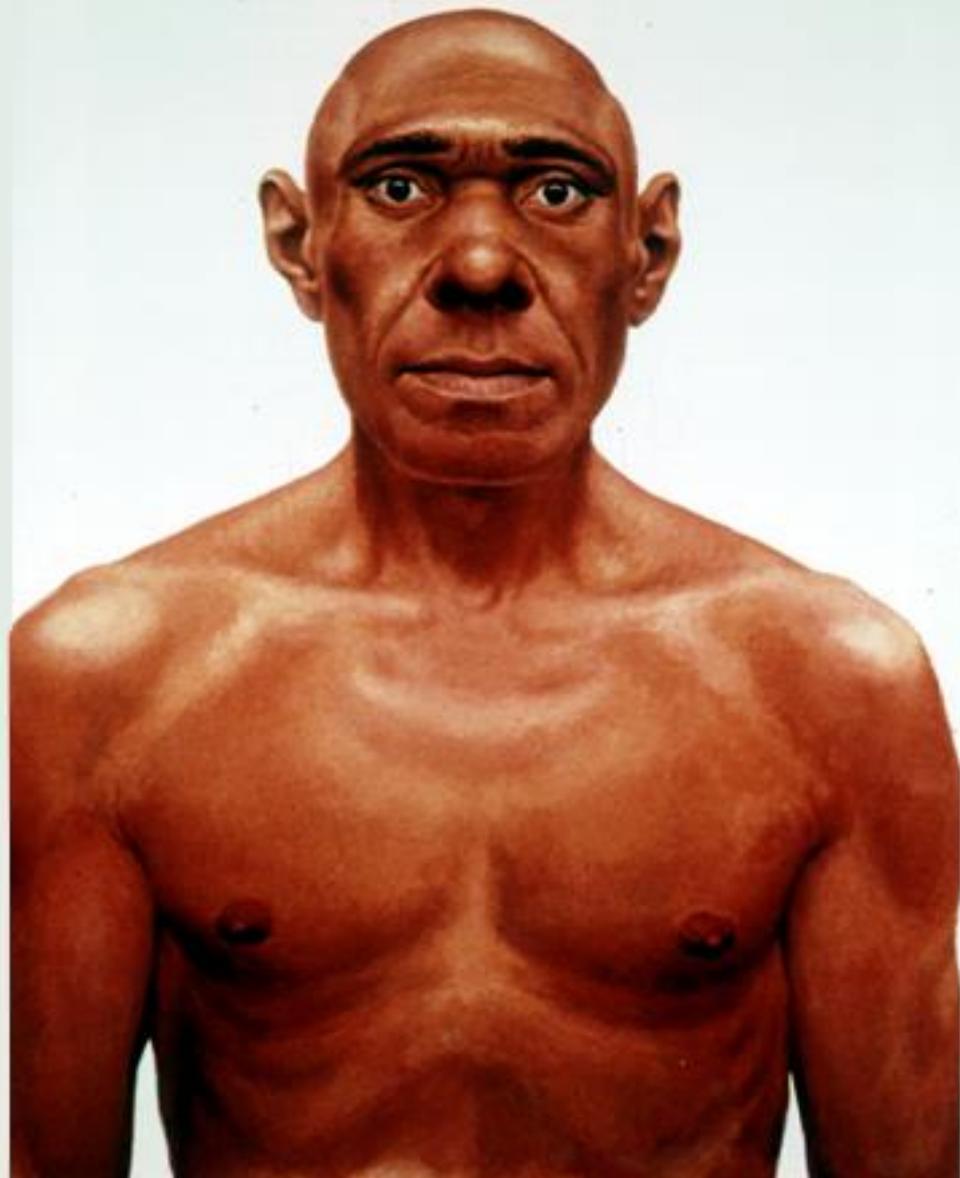
**KNM-ER
1813**





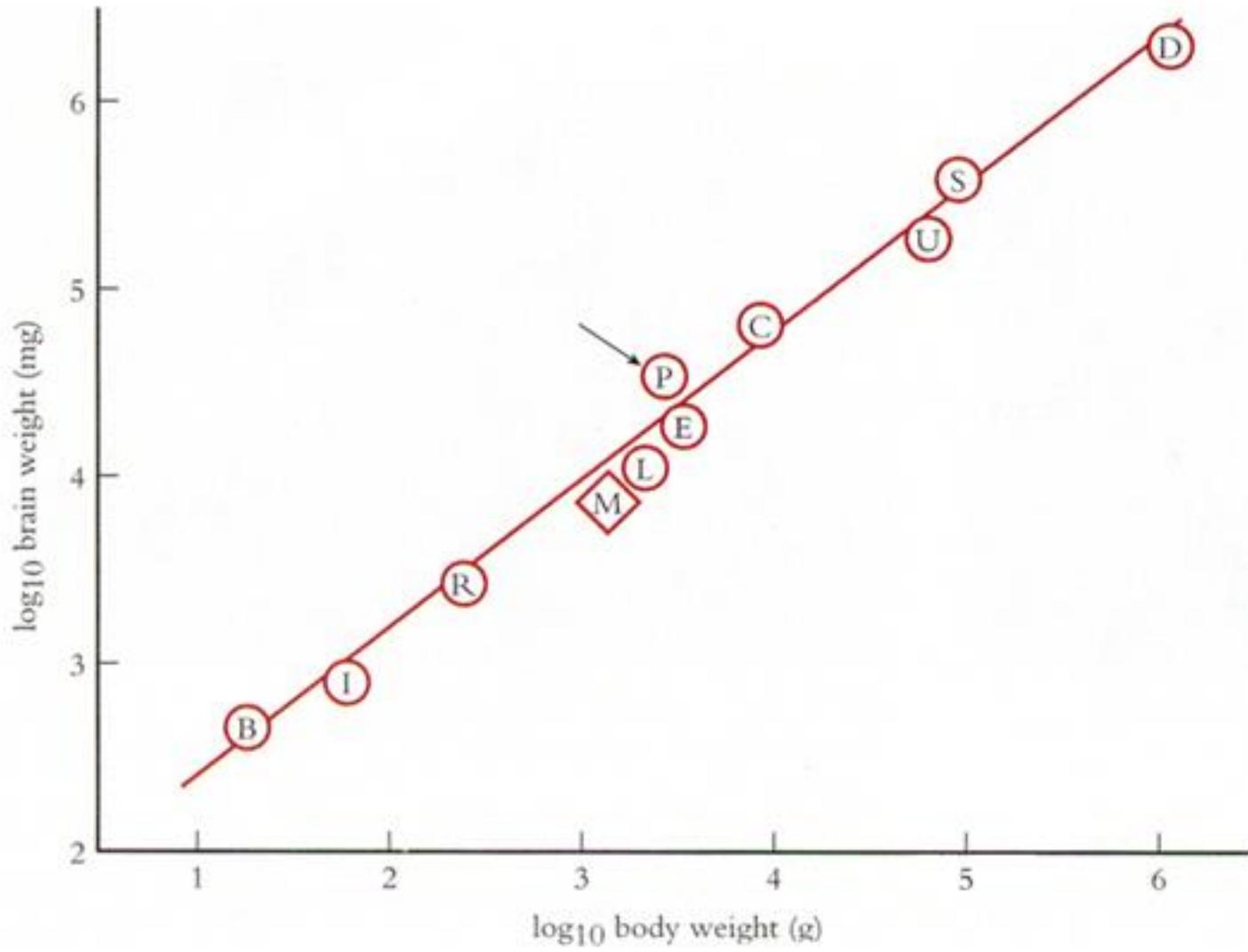


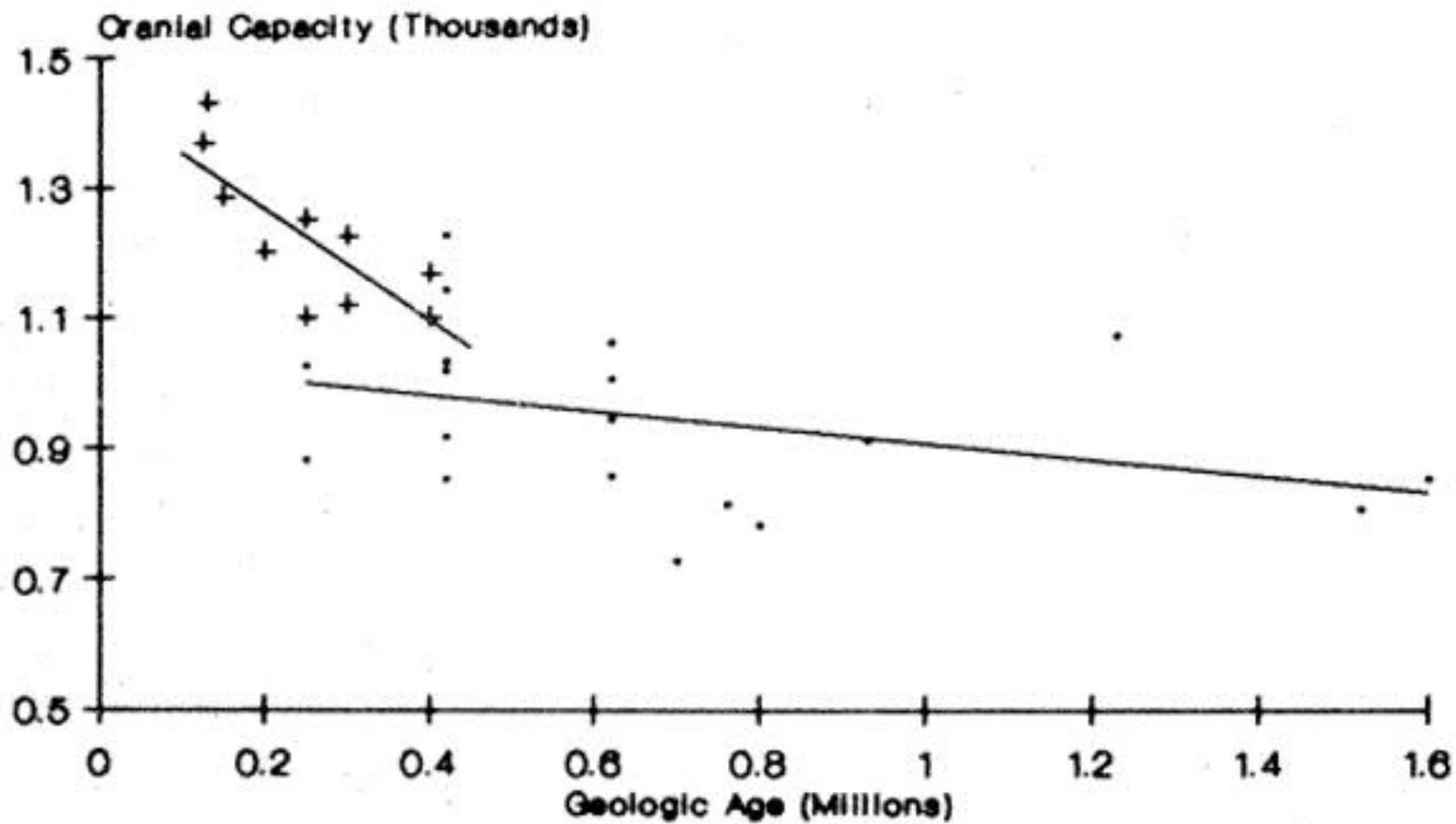




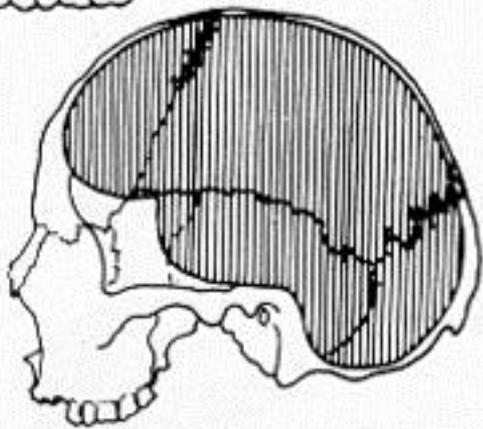
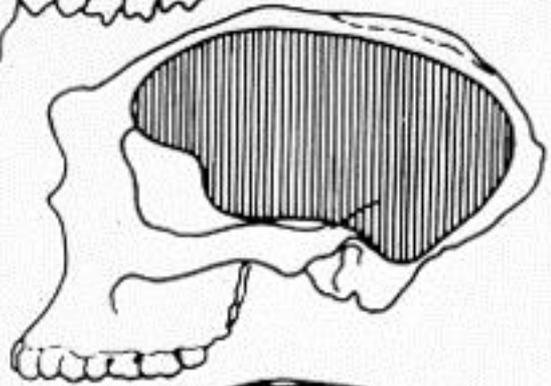
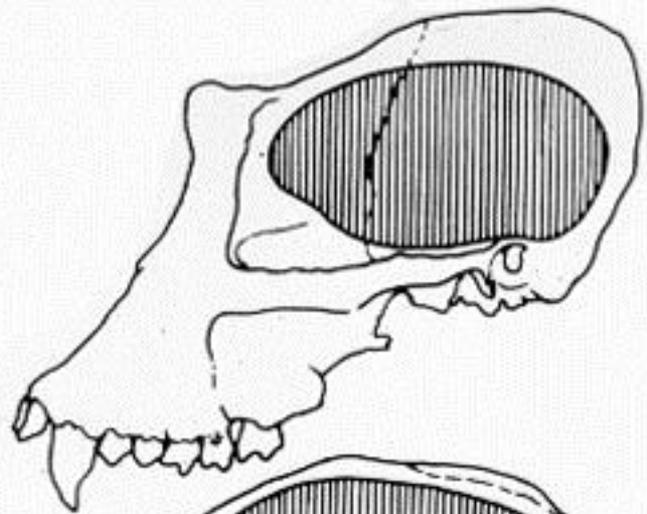


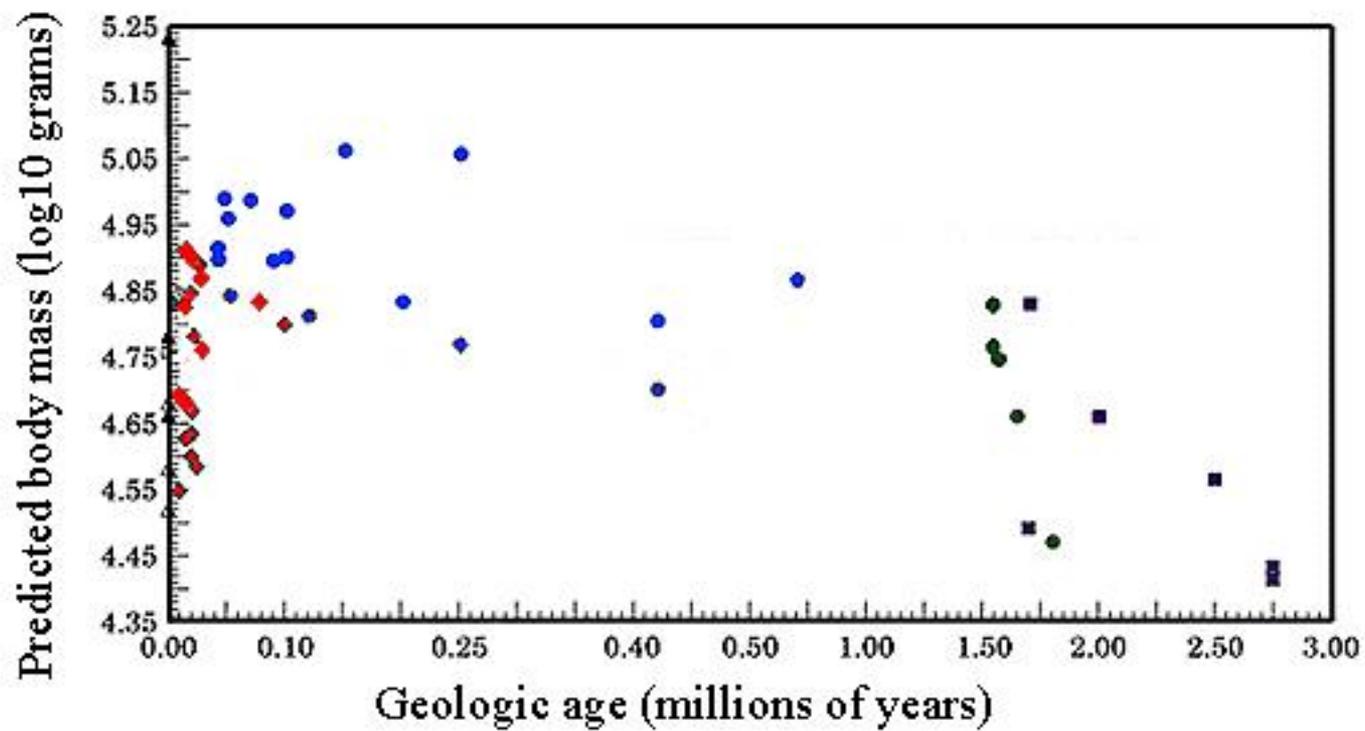
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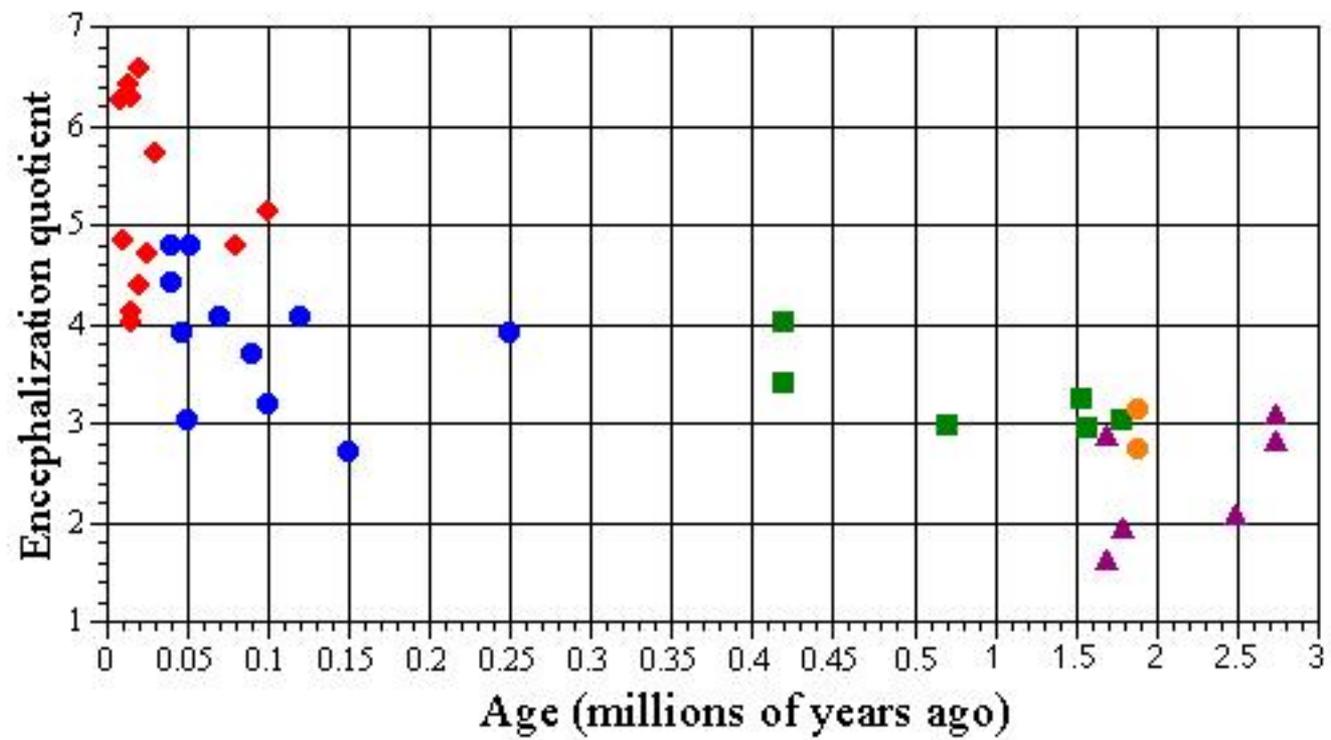


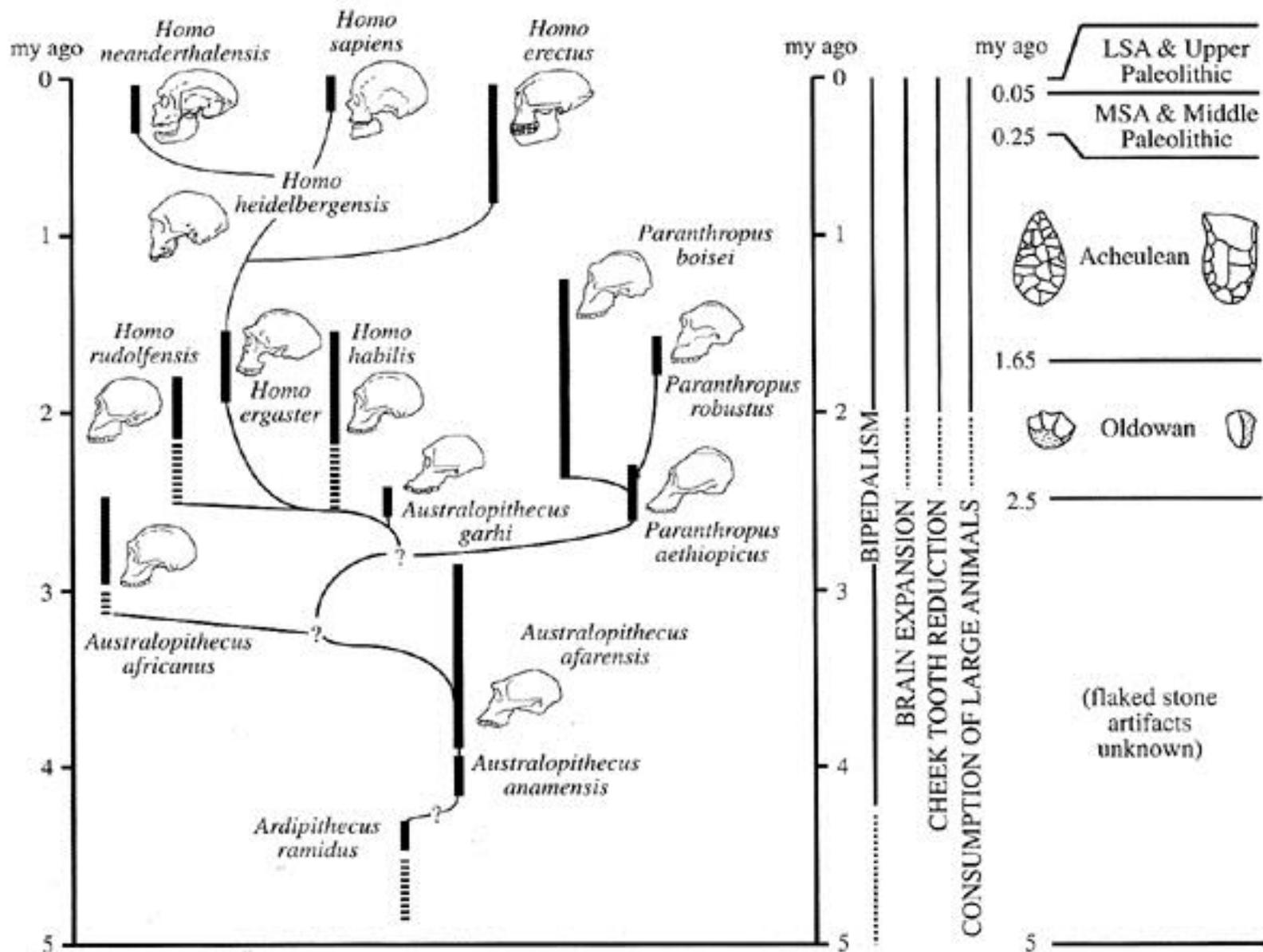


• *Homo erectus* + *Early Homo sapiens*



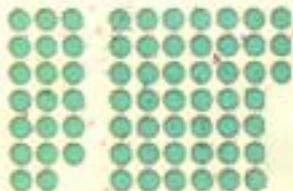




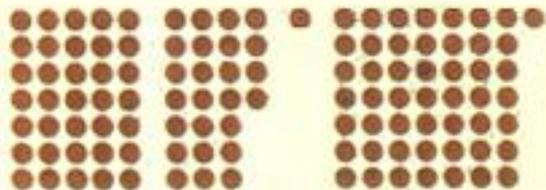




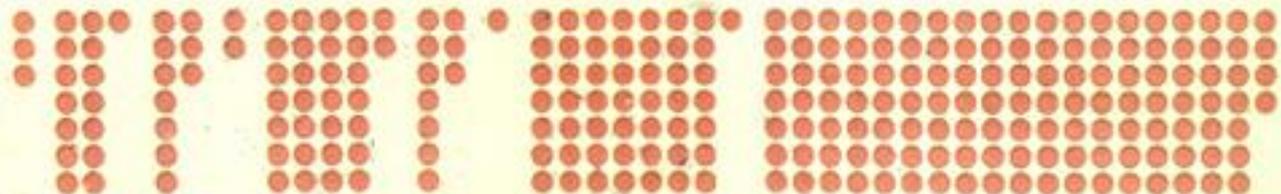
Homo erectus hand ax



Homo erectus hand ax



Neanderthal knife



Cro-Magnon knife



To view this movie, open the “Movies” folder on the CD-ROM and double click on “clovis.mov”

Ancestors of Us All

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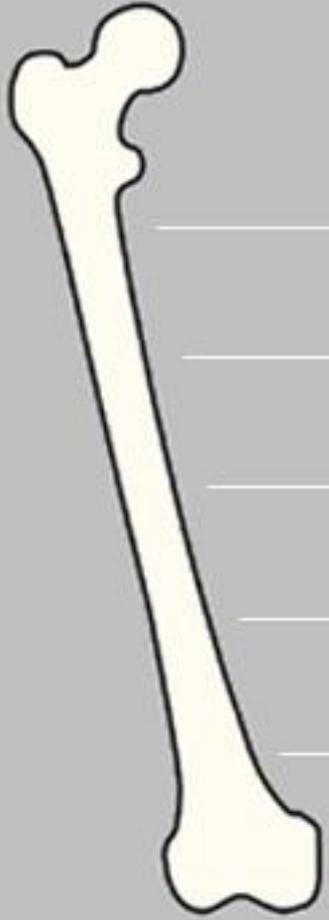
Bodies and Brains

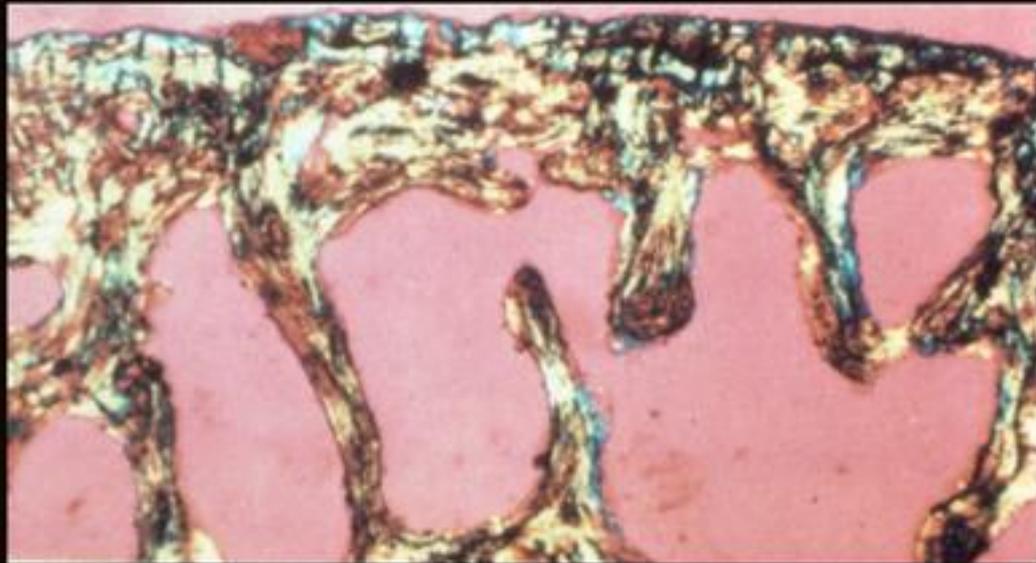
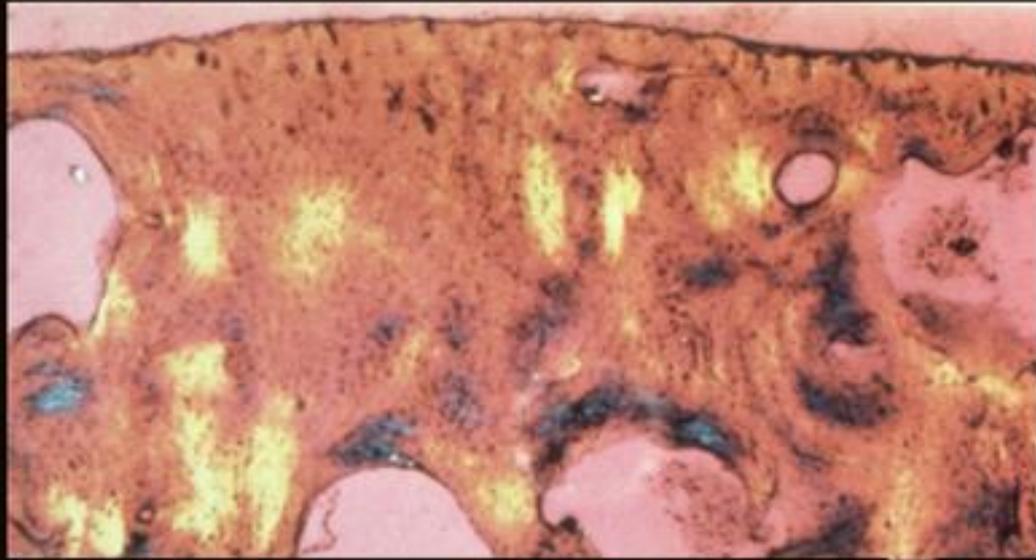
Origin of Modern Humans

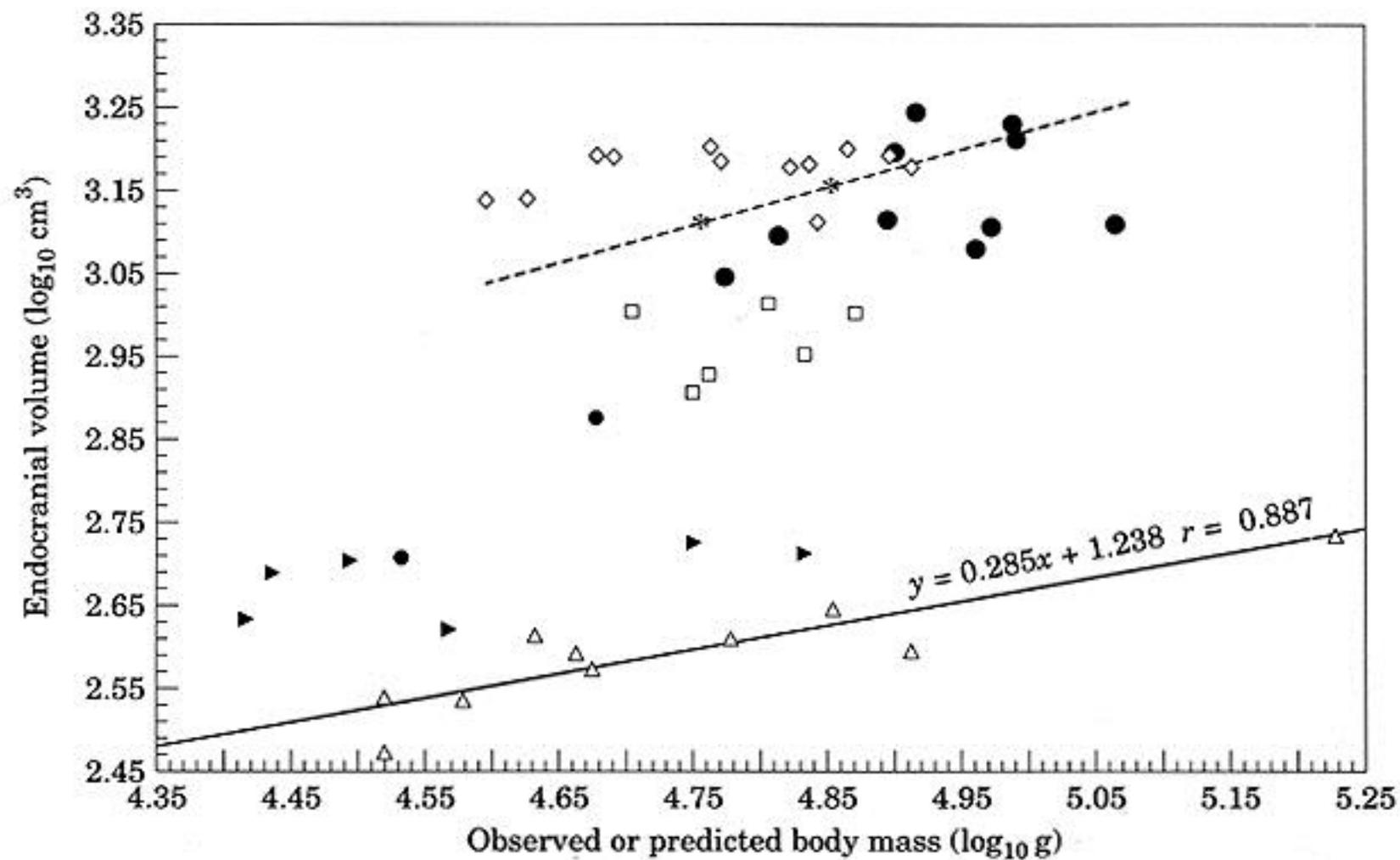




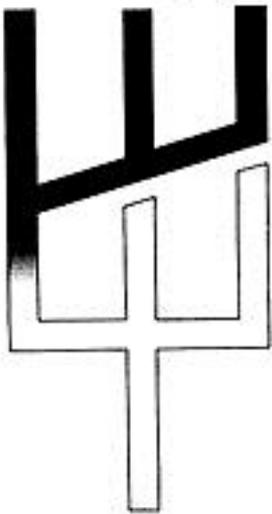
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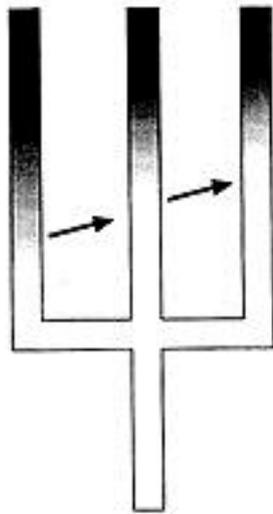


Africa Europe Asia



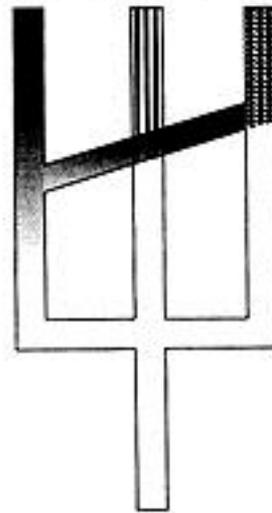
Out of Africa Model

Africa Europe Asia



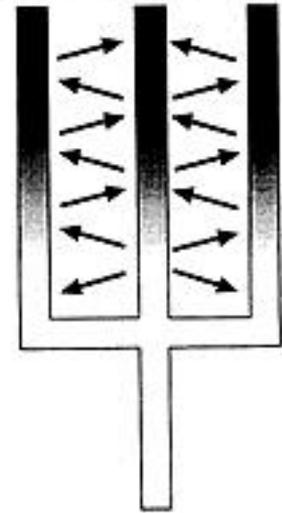
Smith's Model
(Assimilation)

Africa Europe Asia

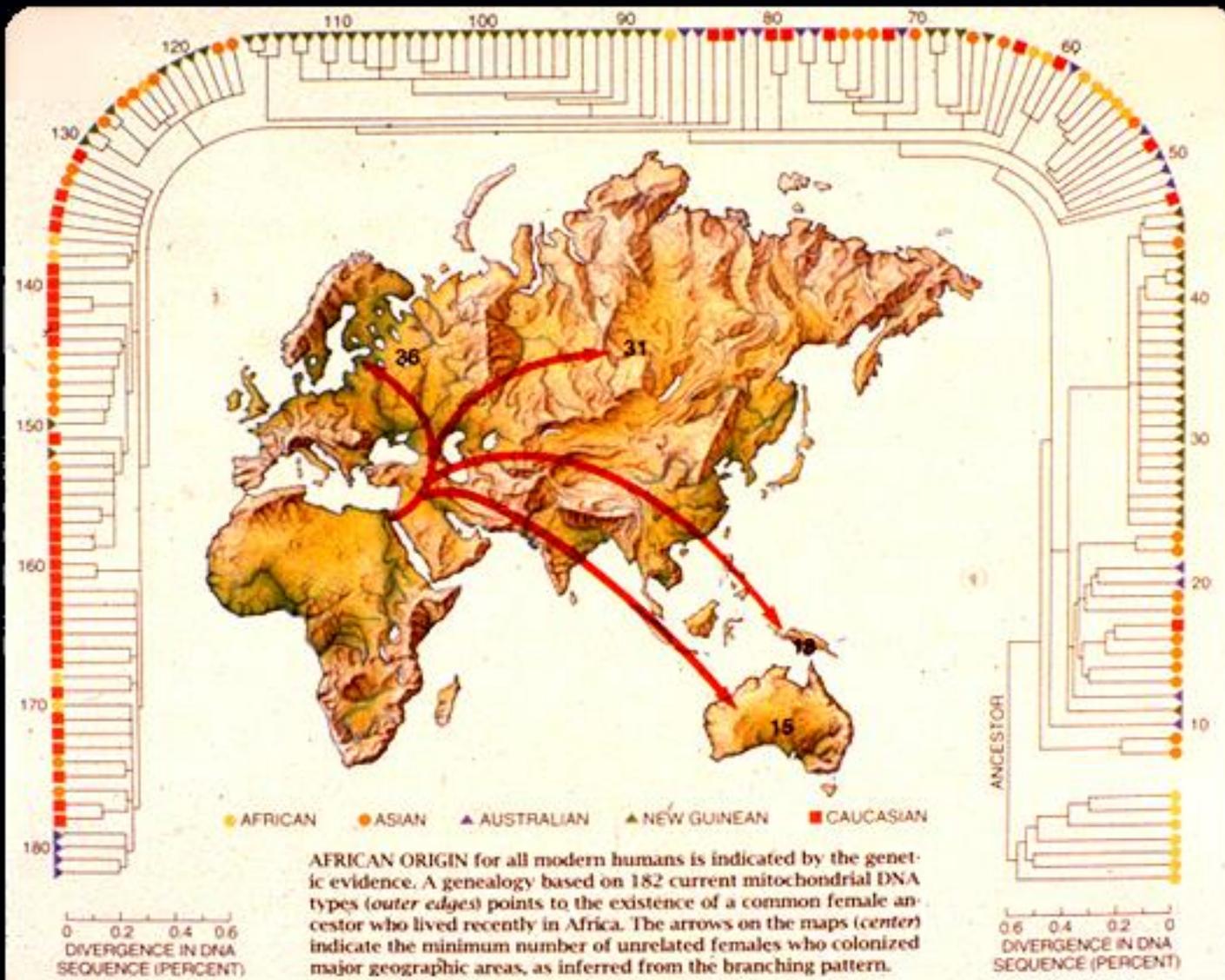


Brauer's Model
(Hybridization and Replacement)

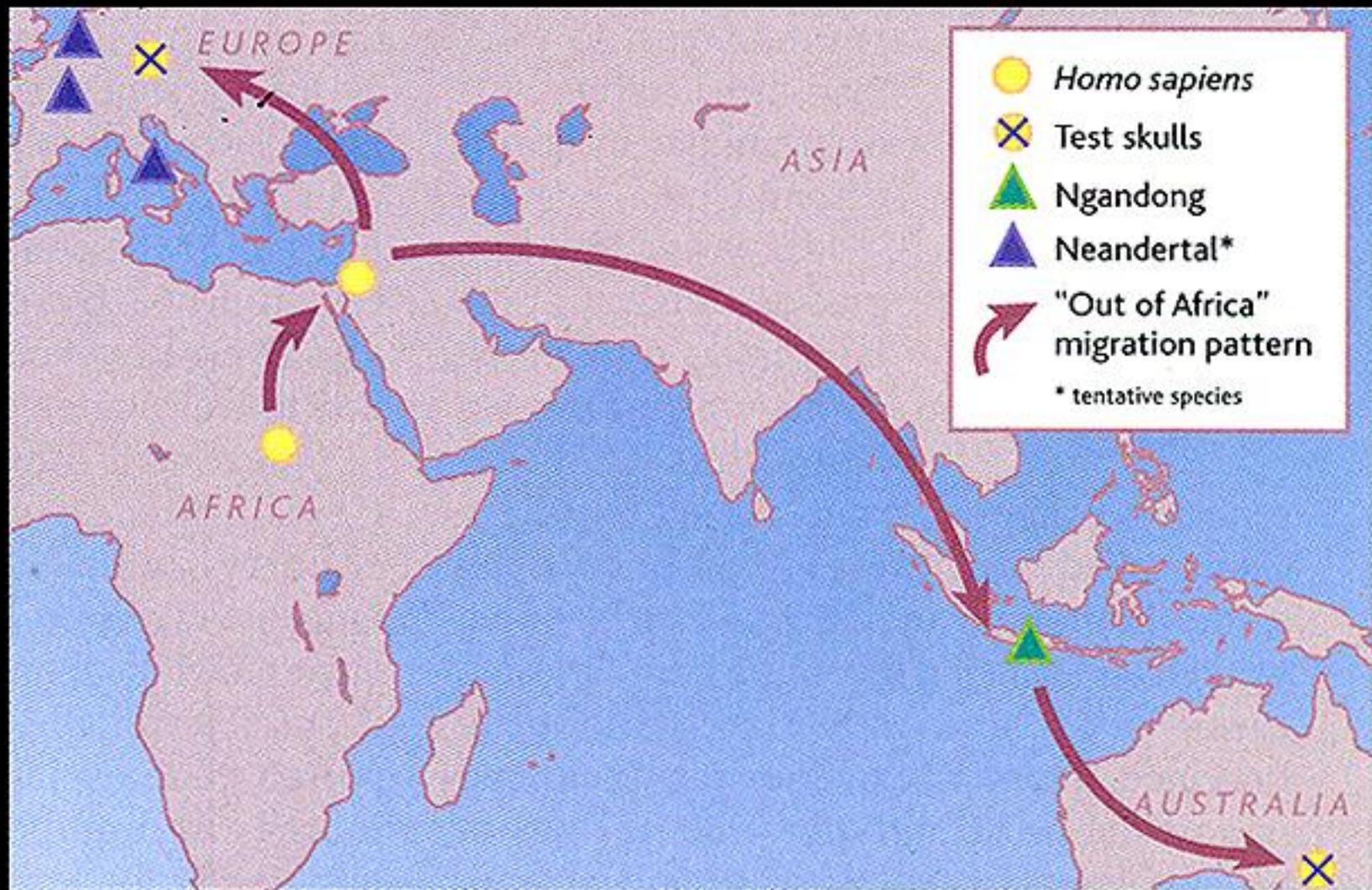
Africa Europe Asia



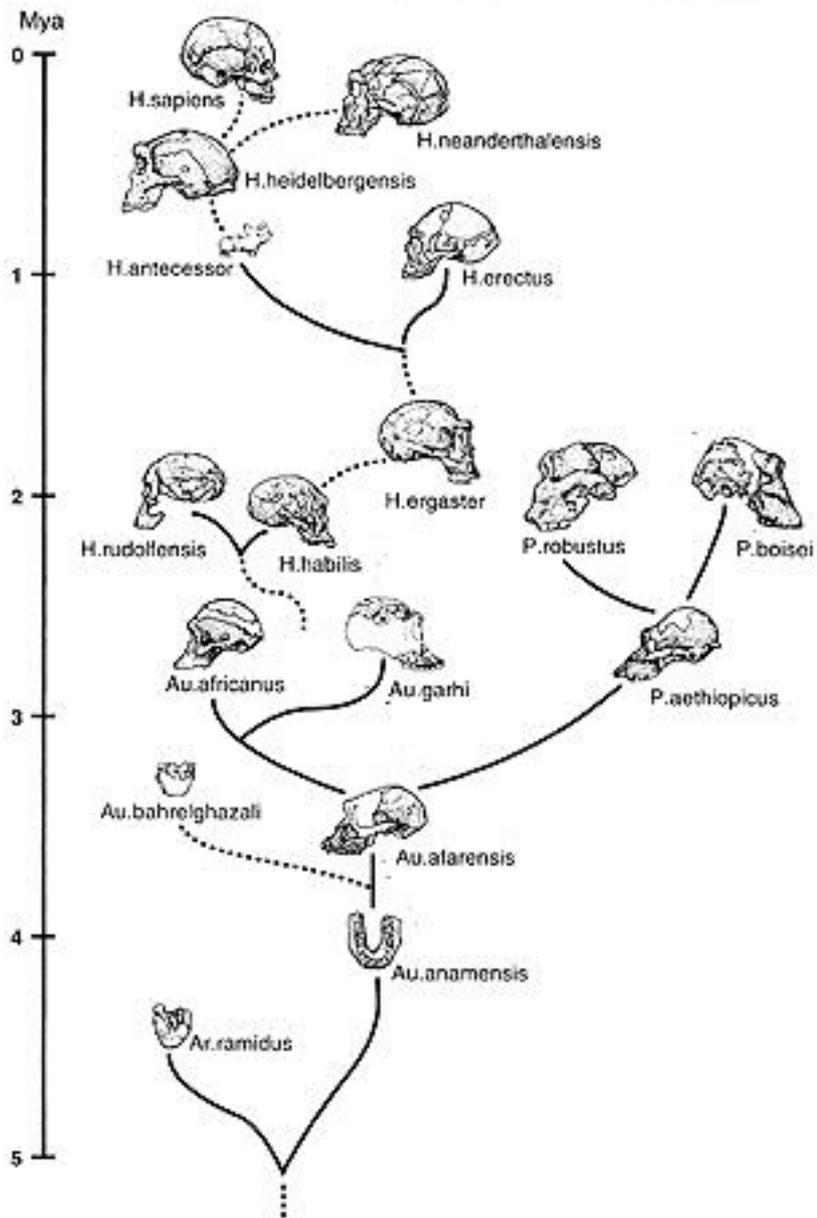
Multiregional Model



AFRICAN ORIGIN for all modern humans is indicated by the genetic evidence. A genealogy based on 182 current mitochondrial DNA types (*outer edges*) points to the existence of a common female ancestor who lived recently in Africa. The arrows on the maps (*center*) indicate the minimum number of unrelated females who colonized major geographic areas, as inferred from the branching pattern.









A. afarensis



A. africanus



A. robustus



A. boisei



H. habilis



H. erectus



H. sapiens

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Dr. John W. Kappelman



John Kappelman is a professor of Anthropology at the University of Texas. He grew up on a family farm in southwestern Idaho and has been at UT Austin since 1988. Dr. Kappelman holds a B.S. degree in Geology and Geophysics from Yale, and an A.M. in Anthropology and Ph.D. in Anthropology and Earth and Planetary Sciences, both from Harvard. Dr. Kappelman conducts research in hominoid evolution and human origins and evolution, and his work combines both field and laboratory research. He currently has field projects in Ethiopia and Turkey, and has also worked in China, Nepal, Pakistan, Egypt, Tanzania, and even Montana. Dr. Kappelman teaches the introductory course in physical anthropology as well as upper division undergraduate and graduate courses in primate and human evolution, and has developed several computer-based learning applications including Virtual Laboratories for Physical Anthropology on CD ROM (Wadsworth Publishing Co.), Vexams® (an interactive multimedia examination program), and eSkeletons®, an internet site (www.eskeletons.org) for the study of human and primate skeletons. Dr. Kappelman's research has received support from the National Science Foundation, the National Geographic Society, and the L.S.B. Leakey Foundation.