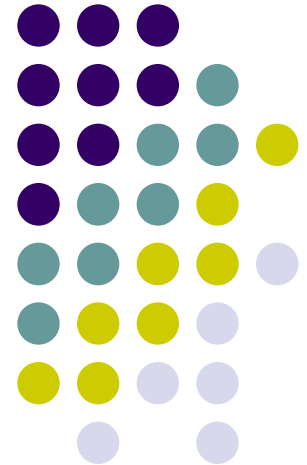


# Patterns of Hominid Dispersal

How did we get where we are today?



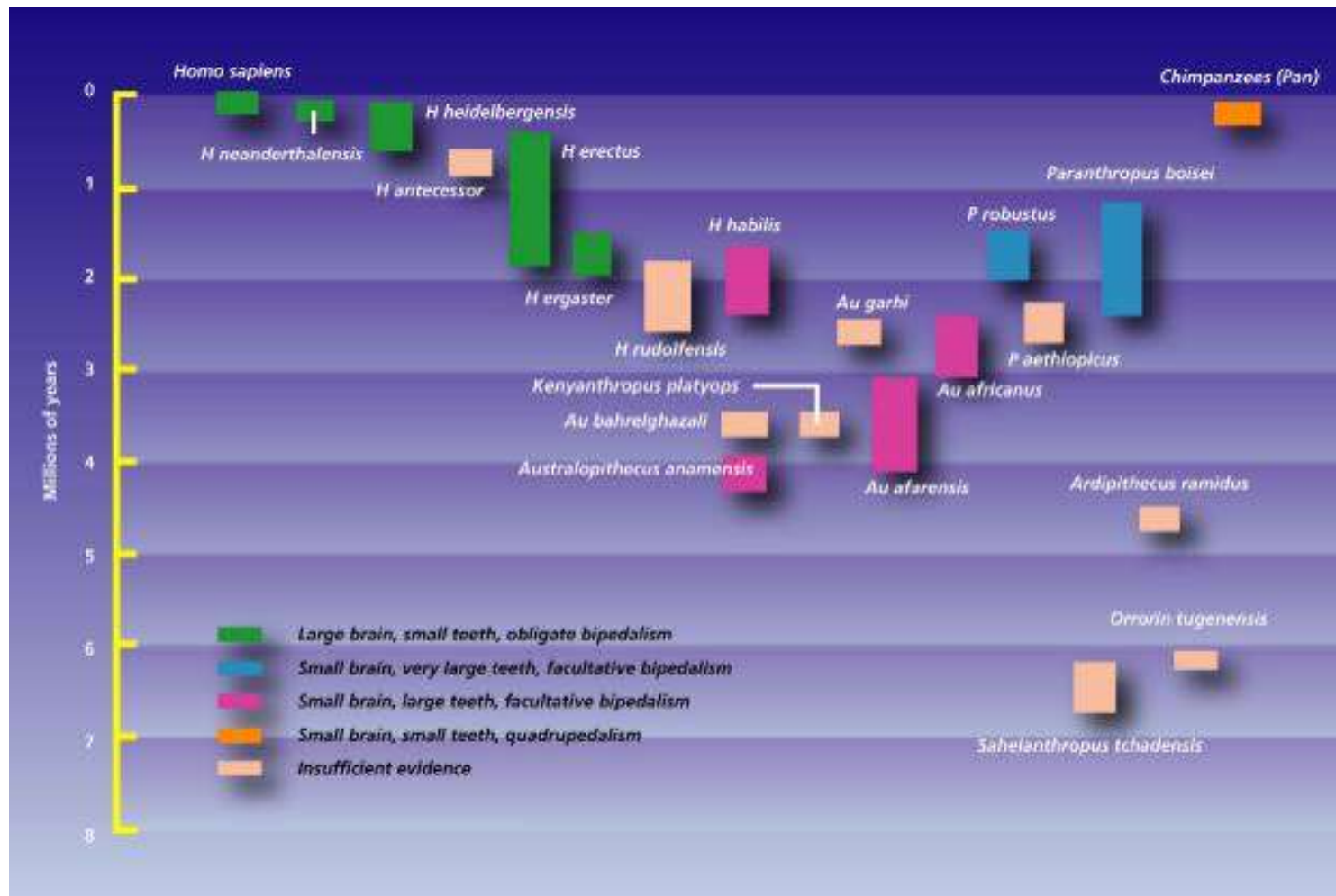
# There are two theories about the origin of modern humans:



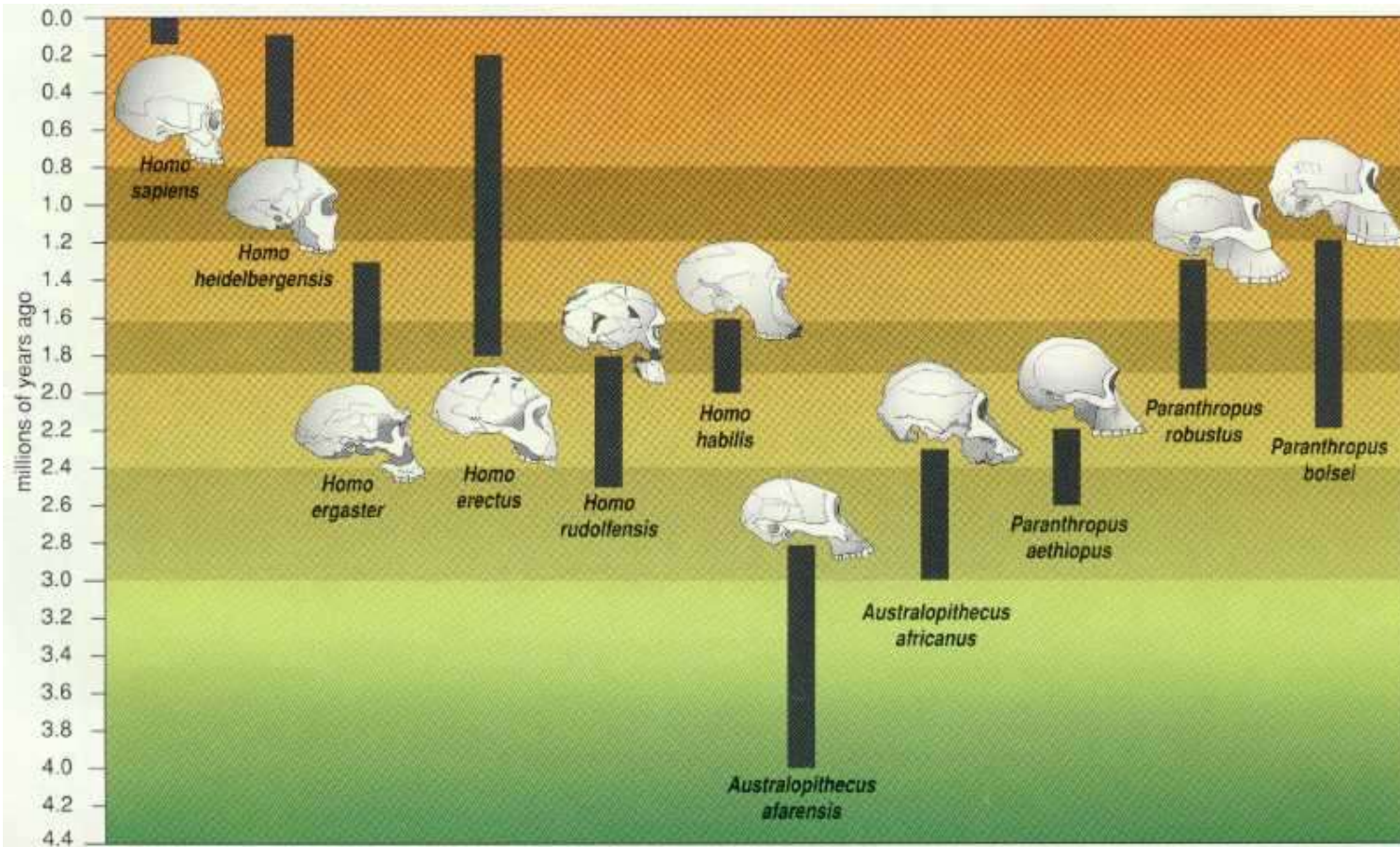
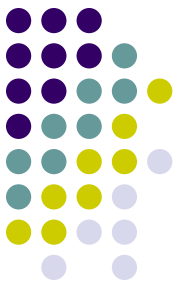
- One, they arose in one place — Africa.
- Two, pre-modern humans migrated out of Africa to become modern humans in other parts of the world.
- Most evidence seems to point to the first theory because:
  - fossils of modern-like humans are found in Africa
  - stone tools and other artifacts support African origin
  - DNA studies suggest a founding population in Africa



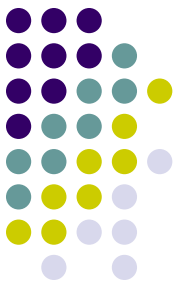
# The Hominid Continuum...



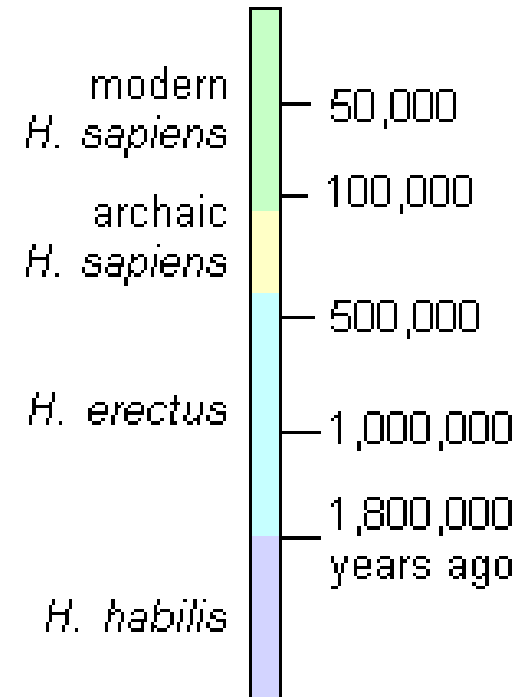
# ...and the Hominid Continuum



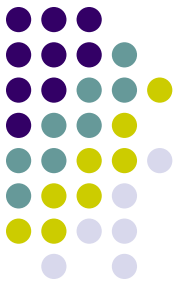
# Three Major Evolutionary Transitions



1. The transition from early *Homo* to *Homo erectus*.
2. The transition from *Homo erectus* to archaic *Homo sapiens*.
3. The transition from archaic *Homo sapiens* to anatomically modern *Homo sapiens*.



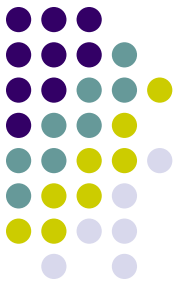
# Understanding the issue:



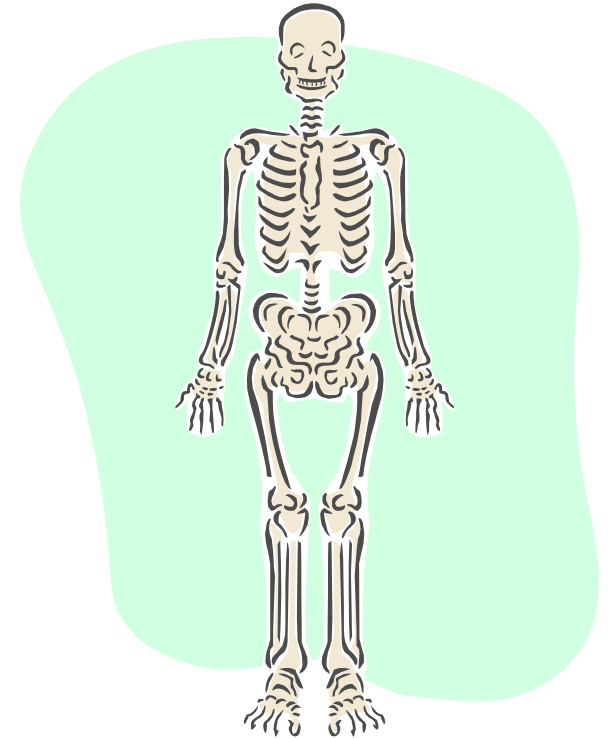
- One of the most hotly debated issues in the study of human origins focuses on the origins of modern humans, *Homo sapiens*.
- Roughly 100,000 years ago, the Old World was occupied by a morphologically diverse group of hominids.
- In Africa and the Middle East there was *Homo sapiens*; in Asia, *Homo erectus*; and in Europe, *Homo neanderthalensis*.



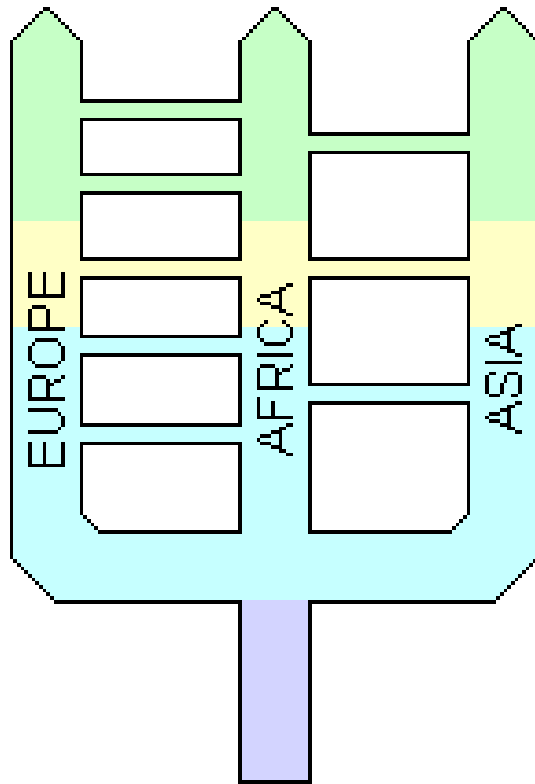
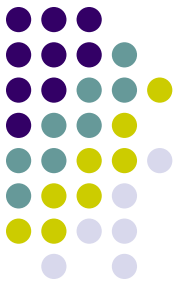
# Modern Homo sapiens sapiens



- By 30,000 years ago this taxonomic diversity had vanished and humans everywhere had evolved into the anatomically and behaviorally modern form.
- The nature of this transformation is the focus of great deliberation between two schools of thought: one that stresses multiregional continuity and the other that suggests a single origin for modern humans.



# The Multiregional Continuity Model

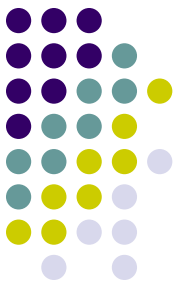


Regional Continuity Model

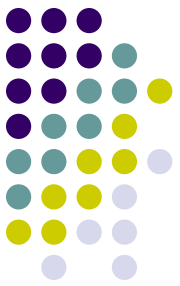
This contends that after *Homo erectus* left Africa and dispersed into other portions of the Old World, regional populations slowly evolved into modern humans.



# The Multiregional Continuity model contains the following components:

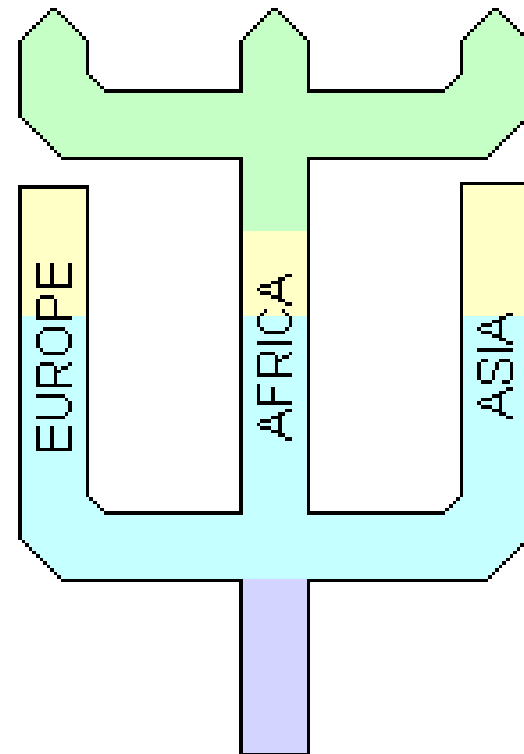


- some level of gene flow between geographically separated populations prevented speciation, after the dispersal.
- all living humans derive from the species *Homo erectus* that left Africa nearly two million-years-ago.
- natural selection in regional populations (ever since their original dispersal), is responsible for the regional variants (sometimes called races) we see today.
- the emergence of *Homo sapiens* was not restricted to any one area, but occurred throughout the entire geographic range where humans lived.



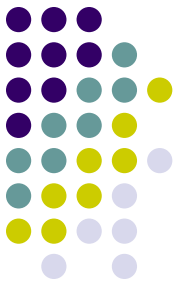
# The Out of Africa Model

In contrast, this model asserts that modern humans evolved relatively recently in Africa, migrated into Eurasia and replaced all populations which had descended from *Homo erectus*.



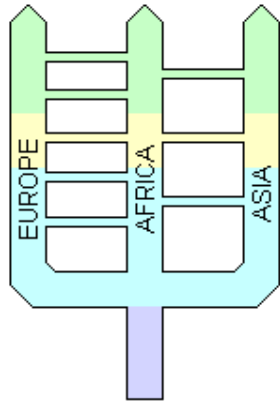
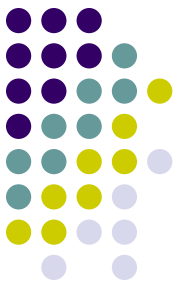
Replacement Model

# Critical to the Out of Africa model are the following tenets:

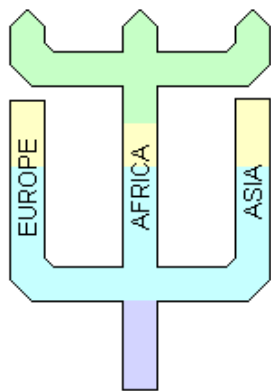


- after *Homo erectus* migrated out of Africa the different populations became reproductively isolated, evolving independently, and (in cases like the Neanderthals), into separate species.
- *Homo sapiens* arose in one place, probably Africa (geographically this includes the Middle East).
- *Homo sapiens* ultimately migrated out of Africa and replaced all other human populations, without interbreeding.
- modern human variation is a relatively recent phenomenon.

# To understand the controversy, the anatomical, archaeological, and genetic evidence needs to be evaluated.

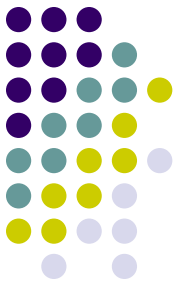


Regional Continuity Model



Replacement Model

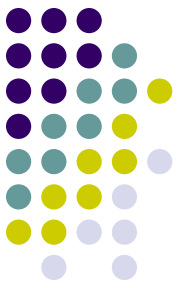
- The multiregional view posits that genes from all human populations of the Old World flowed between different regions and by mixing together, contributed to what we see today as fully modern humans.
- The replacement hypothesis suggests that the genes in fully modern humans all came out of Africa, and as these peoples migrated they replaced all other human populations with little or no interbreeding.



# Anatomical evidence:

- Sometime prior to 1 million years ago, early hominids (sometimes referred to as *Homo ergaster*), exited Africa and dispersed into other parts of the Old World.
- Living in disparate geographical areas their morphology became diversified through the processes of genetic drift and natural selection.
- In Asia these hominids evolved into Peking Man and Java Man, collectively referred to as *Homo erectus*.
- In Europe and western Asia they evolved into the Neanderthals.

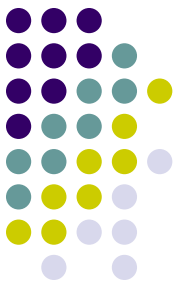




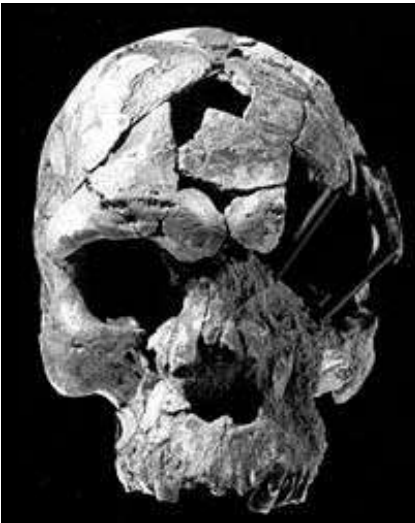
## Anatomical evidence...continued

- Neanderthals lived in quasi isolation in Europe and are distinguished by a unique set of anatomical features.
- By 130,000 years ago, following a prolonged period of independent evolution in Europe, Neanderthals were so anatomically distinct that they are best classified as a separate species — *Homo neanderthalensis*.
- This is a classic example of geographic isolation leading to a speciation event.





# Anatomical evidence...continued



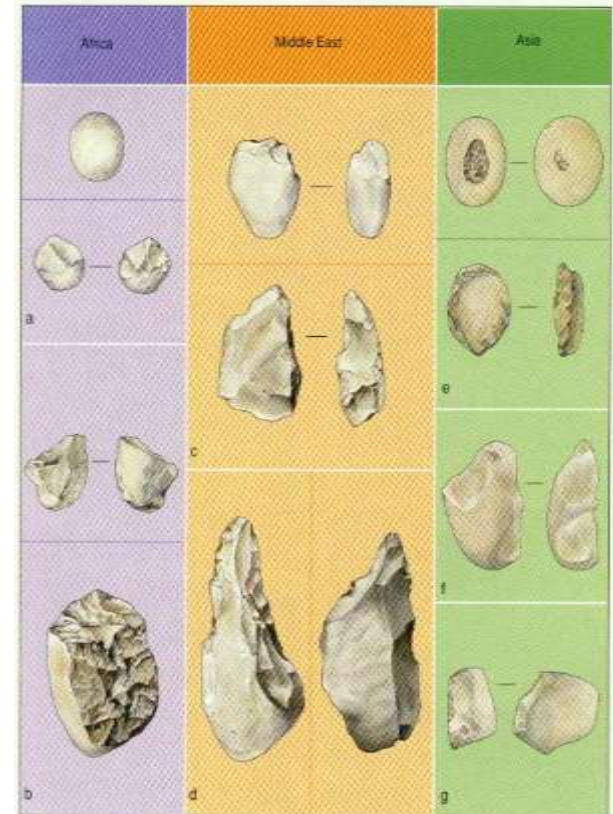
- At roughly the same time, in Africa, a body plan essentially like our own had appeared.
- While these early *Homo sapiens* were anatomically modern they were not behaviorally modern - it is significant that modern anatomy evolved prior to modern behavior.
- Hence, the anatomical and paleogeographic evidence suggests that Neanderthals and early modern humans had been isolated from one another and were evolving separately into two distinct species.





# Archaeological evidence:

- Very interestingly, while Neanderthals and early *Homo sapiens* were distinguished from one another by a suite of obvious anatomical features, archaeologically they were very similar.
- Hominids of the Middle Stone Age of Africa (*H. sapiens*) and their contemporary Middle Paleolithic Neanderthals of Europe had artifact assemblages characterized by little variation in stone tool types.





## Archaeological evidence...continued



- The archaeological picture changed dramatically around 40-50,000 years ago with the appearance of behaviorally modern humans.
- This was an abrupt and dramatic change in subsistence patterns, tools and symbolic expression - literally a “creative explosion” which made us who we are today.
- The appearance of fully modern behavior apparently occurred in Africa earlier than anywhere else in the Old World, but spread very quickly, due to population movements into other geographical regions.



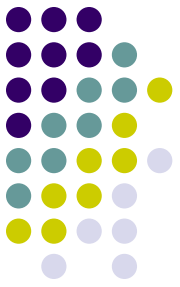
# Archaeological evidence...continued

- Some archaeologists suggest changes in social relations (such as development of the nuclear family), played a key role in bringing about the transformation.
- Others proffer the notion that biological change (brought about by mutations), played the key role in the emergence of behaviorally modern humans.



*The Venus of Wilendorf, dated at 24,000BP.*

# Archaeological evidence...continued

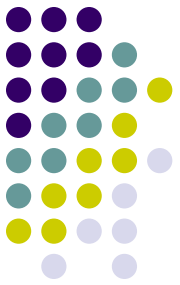
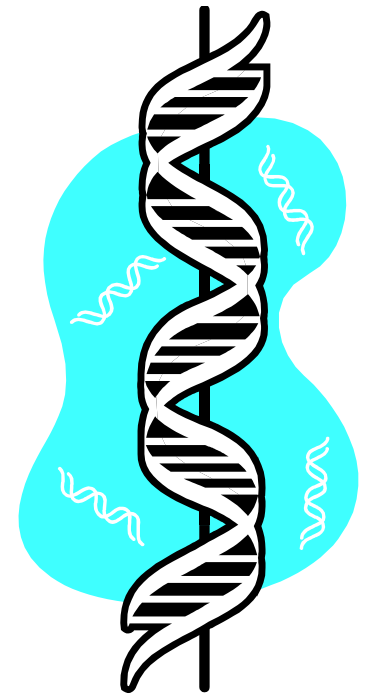


*A possible flute made from the femur of a cave bear, found in Slovenia. Dated to 45,000BP.*

- Shortly after fully modern humans entered Europe, roughly 40,000 years ago, the Neanderthals began a fairly rapid decline, culminating in their disappearance roughly 30,000 years ago.
- Neanderthals were apparently no match for the technologically advanced fully modern humans who invaded Europe and evidence for interbreeding of these two types of hominids is equivocal.

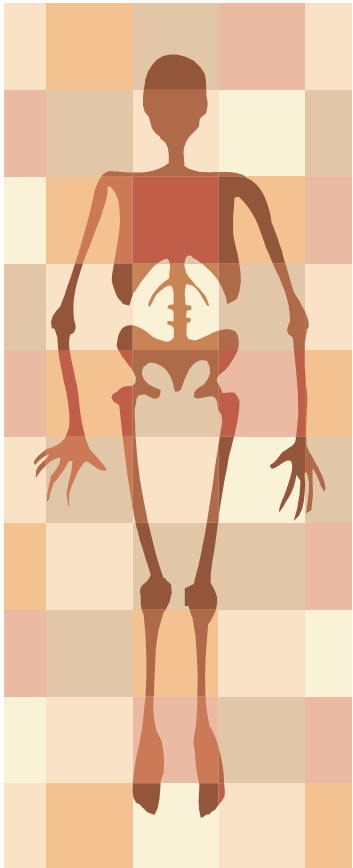
# Genetic evidence:

- Genetic variation in modern human populations supports the view that the origin of *Homo sapiens* is consistent with the Out of Africa Model.
- Studies of contemporary DNA, especially mitochondrial DNA (mtDNA), reveal that humans are astonishingly homogeneous, with relatively little genetic variation.
- There is significantly more genetic variation between two individual chimpanzees drawn from the same population than there is between two humans drawn randomly from a single population.





## Genetic evidence...continued



- The highest level of genetic variation occurs in African populations and implies that *Homo sapiens* arose first in Africa and has had a longer period of time to accumulate genetic diversity.
- The genetic distance between African populations and others suggests *Homo sapiens* arose between 100,000 and 400,000 years ago in Africa.
- The low amount of genetic variation in modern human populations suggests that our origins may reflect a relatively small founding population for *Homo sapiens*.



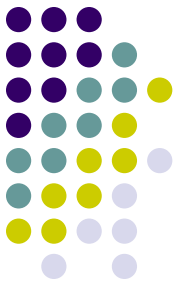
## Genetic evidence...continued



- Scientists recently succeeded in extracting DNA from several Neanderthal skeletons and after careful analysis, it is apparent that Neanderthal DNA is very distinct from our own.
- The degree of difference between DNA in Neanderthals and modern humans, suggest the two lineages have been separated for more than 400,000 years.
- Such genetic studies support the view that Neanderthals did not interbreed with *Homo sapiens* who migrated into Europe and it is unlikely that modern humans carry Neanderthal genes in their DNA.



# Additional considerations:



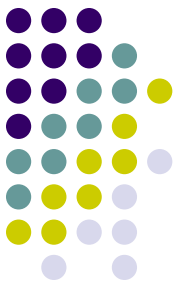
- The chronology in the Middle East does not support the Multiregional Model where Neanderthals and anatomically modern humans overlapped for a long period of time.



- Cave sites in Israel, most notably Qafzeh and Skhul date to nearly 100,000 years and contain skeletons of anatomically modern humans.



- Neanderthal remains are known from sites such as the 110,000-year-old Tabun cave, which predates the earliest *Homo sapiens* by about 10,000 years in the region.

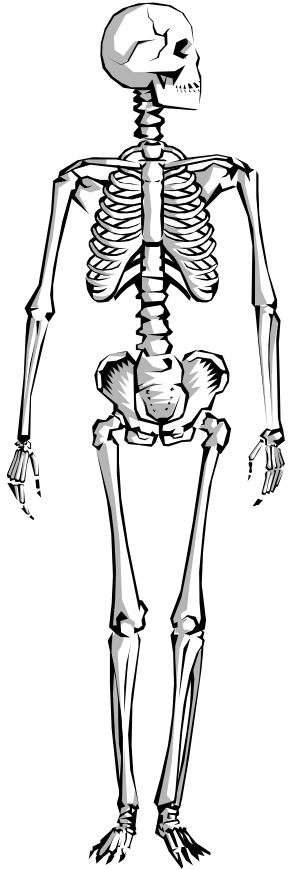
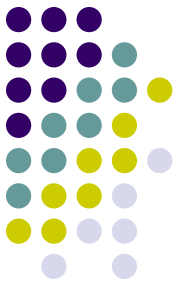


## Additional considerations...continued

- There are locations and remains that seem to support one dispersal model or another, but all have problems with interpretation.
- China may contain the best evidence for supporting the Multiregional Model with the discovery of a couple of skulls dated to roughly 100,000 years ago that seem to possess a mixture of classic *Homo erectus* and *Homo sapiens* traits.
- Better geological dating and more complete specimens are needed to more fully assess this possibility.



# Conclusion:



- For the moment, the majority of anatomical, archaeological and genetic evidence gives credence to the view that fully modern humans are a relatively recent evolutionary phenomenon.
- The major neurological and cultural innovations that characterize the appearance of fully modern humans has proven to be remarkably successful, culminating in our dominance of the planet at the expense of all earlier hominid populations.